



# Innovation in the Allied Health Professions: Evaluation of supplementary prescribing by dietitians and independent prescribing by therapeutic radiographers

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## Abbreviations

ACP	Advanced Clinical Practice/practitioner
ADP	Advanced Dietetic Practice/practitioner
Afc	Agenda for Change
AHP	Allied Health Profession/professional
AP	Advanced Practice/practitioner
APTR	Advanced Practice Therapeutic Radiographer
AUD	Australian Dollars
BDA	British Dietitian Association
CMP	Clinical Management Plan
ATRP	Advanced Therapeutic Radiography Practice/practitioner
CAMRT	Canadian Association of Medical Radiation Technologists
CMP	Clinical management plan
CP	Consultant Practice/practitioner
CPD	Continuing Professional Development
D	Dietitian
DMP	Designated Medical Practitioner
DNA	Did not attend
D-SP	Dietitian supplementary prescribing/er
DOB	Date of Birth
DTR/ D-TR	Dietitian and Therapeutic Radiographer
EQ5-D	EuroQol 5-D
EN	Enteral Nutrition
GP	General Practitioner
HCPC	Health and Care Professions Council
HEI	Higher Education Institute
HR-QoL	Health related quality of life
ICER	Incremental cost-effectiveness ratio
IP	Independent Prescribing/Independent Prescriber
MDT	Multi-disciplinary team
MMA	Medicines Management Activities
NHS	The United Kingdom's National Health Service
NICE	National Institute for Health and Care Excellence
NISPs	Nurse Independent Supplementary Prescribers
NMB	Net monetary benefit
NMC	Nursing and Midwifery Council
NIHR	National Institute of Health Research
NMP	Non-medical Prescribing
NP	Non-prescriber

NP-DTR	Non-prescribing Dietitian and Therapeutic Radiographer
ONS	Oral nutritional supplements
OOP	Out of pocket expenses
OTC	Over the counter
PAG	Project Advisory Group
PERT	Pancreatic enzyme replacement therapy
PGD	Patient Group Direction
PIS	Participant Information Sheet
PN	Parenteral Nutrition
POM	Prescription only medicine
PSD	Patient Specific Direction
PPI	Patient Public Involvement
PPV	Patient Public Voice
QALYs	Quality adjusted life years
RD	Registered Dietitians
RT/RTT	Radiation Therapist
SCoR	Society of Radiographers
SP	Supplementary Prescribing/Supplementary Prescriber
TRaDiP	Evaluation of Therapeutic Radiographer Independent Prescribing & Dietitian Supplementary Prescribing
TPN	Total Parenteral Nutrition
TR	Therapeutic Radiographer
TR-IP	Therapeutic Radiographer independent prescribing/er
UK	United Kingdom
US	United States
WTP	Willingness to pay

## Glossary of Terms

Advanced Clinical Practice (ACP)	In the UK ACP is defined as a level of practice characterised by a high degree of autonomy and complex decision-making, underpinned by master's level education or equivalent that encompasses the four pillars of clinical practice (clinical practice, leadership and management, education, and research), whilst demonstrating core capabilities and area-specific clinical competence (Health Education England, 2017).
Advanced Practice	A term applied differently in different professional and national contexts and at different times, usually denoting higher levels of autonomy, training and experience coupled with specialist expertise in specific areas of practice.
Allied Health Professional	In the UK, a member of one of 14 degree-level professions not including medicine, dentistry, pharmacy and nursing who provide care within and across a broad range of health and social care settings (NHS England).
Clinical Management Plan	A clinical management plan is an agreed defined plan of treatment for a named patient which sets the legal boundaries of the medication and the parameters of prescribing responsibility for the supplementary prescriber. The plan must be agreed as the result of a voluntary partnership between the independent doctor or dentist prescriber and the supplementary prescriber, and with the knowledge of the patient and/or carer <sup>1</sup> .
Extended Practice	Practitioners working at a high level of expertise who have extended their practice and skills.
HEE ACP framework	Multi-professional framework for advanced clinical practice in England which sets out a new and bold vision in developing this critical workforce role in a consistent way to ensure safety, quality, and effectiveness. Developed for use across all settings including primary care, community care, acute, mental health and learning disabilities
Independent Prescribing	Prescribing by an appropriate practitioner responsible and accountable for the assessment of patients with undiagnosed or diagnosed conditions and for decisions about the associated clinical management.
Medicines Management Activities	Systems of processes and behaviours that determine how medicines are used by patients and by the NHS. For the purposes of this review, Medicines Management Activities refers to prescribing and/or the process of giving advice about medicines and the supply or administration of medicines. <sup>2</sup>
Non-medical Prescribing	Prescribing by specially trained nurses or allied health professionals working within their clinical competence as either independent or supplementary prescribers.
Order-writing privileges	Ability to write or modify orders or recommend medication changes by specially trained nurses or allied health professionals with or without requiring a clinician signature.
Over the counter medicines	Over the counter medicines are sold directly to a consumer without a prescription from a healthcare professional <sup>5</sup>
Patient Group Directions	Written instructions allowing the supply or administration of a specified medicine or treatment by named, authorised health professionals to a pre-defined group of patients for a condition described in the Patient Group Direction without the need for a prescription from a prescriber.
Prescription-only medicine	Requiring a prescription issued by a general practitioner or other suitably qualified healthcare professional. The prescription is then dispensed by a pharmacy or dispensing surgery.
Prescribing	To authorise in writing the supply and administration of a medicine or other healthcare treatment for a named patient.

Supplementary Prescribing	A voluntary partnership between an independent prescriber and a supplementary prescriber to implement an agreed patient-specific Clinical Management Plan with the patient's agreement.
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### Key Words

Dietitian; therapeutic radiographer; independent prescribing; supplementary prescribing; evaluation, mixed methods; case studies; health economics



## Lay Summary

Recent changes to the law allow dietitians and therapeutic radiographers, working at advanced level, to prescribe medicine for their patients. Dietitians, who manage diet and feeding, can prescribe from a treatment plan agreed with a doctor. This is known as 'supplementary prescribing'. Using independent prescribing therapeutic radiographers, who deliver radiotherapy and manage its side effects, can assess patients and prescribe medicines without a doctor. To understand the effect of this change in care a study was commissioned.

To understand how dietitians and therapeutic radiographers use prescribing in practice we looked at previous studies that had been published. We used surveys to explore how, what and where these professions prescribe. From the survey, and our contacts we chose 8 hospitals and a community-based clinic around England and put dietitian and therapeutic radiographer consultations, and prescriptions under the microscope.

We compared services provided by dietitians and therapeutic radiographers who are qualified prescribers to those provided by dietitians and therapeutic radiographers who are not prescribers. We asked these professionals, their colleagues, and patients about their experiences and views of this practice and what difference it made. We assessed any differences in the quality of care or cost of services.

Dietitian and therapeutic radiographer prescribers were found to make more medicines management decisions and provide more information. Prescribing was acceptable to most people, with many benefits including satisfaction with information provided and improved service access. There were challenges, particularly using supplementary prescribing. There was some evidence that care is more efficient and less costly over time than prescribing by a doctor. Overall, training for the role was satisfactory but there was competition to fund this. The vast majority of medicines decisions were safe and appropriate. A toolkit, co-produced with patients, was developed to support healthcare workers get the most out of the prescribing qualification.

## 1. Executive Summary

### 1.1 Background

Evidence suggests NMP, initially performed by nurses and pharmacists, offers improved service efficiency, access to medicines, cost savings, quality of care and better use of knowledge and skills. Recent changes to the law allow dietitians and therapeutic radiographers, working at an advanced level, to prescribe medicine for their patients. Using supplementary prescribing, dietitians, who manage diet and nutrition for many health problems, can prescribe medicines from a treatment plan agreed with a doctor. Therapeutic radiographers, who deliver radiotherapy and manage the side effects of this for people with cancer, can however use independent prescribing to assess patients and prescribe medicine without the need of a doctor. This study was commissioned in the wake of this policy change to provide an evaluation of dietitian supplementary prescribing (D-SP) and therapeutic radiographer independent prescribing (TR-IP) in England.

### 1.2 Study Aim and objectives:

The aim was to identify effective prescribing practice and innovative service models through evaluation of D-SP and TR-IP implementation in England. The objectives were to:

1. Undertake rapid review of literature.
2. Describe and classify services and identify innovative service models.
3. Examine prescribing activity and trends and factors that inhibit/facilitate uptake and implementation.
4. Explore patient/carer views and experiences.
5. Identify impact on patient choice, experience, access to medicines and outcomes.
6. Assess quality, safety and, clinical appropriateness.
7. Explore cost-consequences.
8. Evaluate quality, effectiveness and cost of prescribing educational programmes.
9. Develop a prescribing implementation toolkit.

### 1.3 Methods

A four-phase mixed method study undertaken March 2019- April 2024. **Phase 1:** literature review to determine medicines management activity, evidence of effectiveness and barriers and facilitators in practice. **Phase 2:** surveys of NHS trusts across England to assess D-SP-TR-IPs to explore prescribing activity and trends over 18 months and identify innovative service models. **Phase 3:** comparative case study with economic analysis across 8 sites (8 D-SP-TR-IP and 8 non-prescriber) in 7 geographical locations. Methods comprised: self-report audit, interviews, documentary evidence, observations, patient questionnaires, and case record review. Economic analysis examined cost consequences through comparison of care delivery at D-SP-TR-IP and non- prescribing sites and consideration of costs of benefits of prescribing training. **Phase 4:** development of an online prescribing toolkit.

## 1.4 Results

### 1.4.1 Phase 1

The 20 identified articles revealed a dearth of literature evaluating advanced practice or prescribing in either profession, and the extent of UK medicines management essentially unknown. A lack of clarity regarding advanced practice roles often led to ambiguity and hindered implementation.

### 1.4.2 Phase 2

*NHS Trust Manager Survey:* 56 service managers (D=33, TR=23), with follow-up interviews (n=6 per group) 18-22 months later. Prescribing uptake was higher for TRs (15/23) than dietitians(12/30). Personal motivation, backed by managerial support were key facilitators for early adoption, whereas demonstrating clinical need facilitated later adoption. Implementation issues were similar for both professions across time including clinical need; funding competition; organisational support; course preparation; and planning for advanced practice roles. SP limitations hampered uptake and use by dietitians.

*D-SP and TR-IP questionnaires:* A total of 92 (D=38, TR=54) respondents completed survey 1 and 34 (D=16, TR=18) survey 2 around 18 months later. More TR-IPs (87%, 94%) than D-SPs (60.5%, 68.8%) were prescribing in practice in both surveys. TR-IPs prescribed 11.6, and D-SP 3.1 items per week. There were no major changes between surveys. TR-IP frequently prescribed gastrointestinal medicines, skin treatments and drugs for urinary tract disorders. D-SPs prescribed nutrition and blood products, gastrointestinal medicines and endocrine system drugs most often. Those with higher degrees tended to prescribe from a broader range of therapy areas.

### 1.4.3 Phase 3

*Self-report audit:* Of 513 self-report audits (169 dietitians and 344 therapeutic radiographer) medicines management activities occurred in over 70% of all consultations, with D-SP used in 16% and TR-IP 35% of consultations. Predominant dietetic activities were medicines related to nutrition and blood, parenteral nutrition, and vitamins. Therapeutic radiographers were frequently involved with analgesia, ear nose and oropharynx, and gastrointestinal medicines.

*Interviews:* A total of 33 interviews were conducted with DTRs (n= 15) and team members (n=18) across case sites. Reported service benefits included improved efficiency and access to medicines, care quality, accountability and safety, with improved professional reputation and job satisfaction. A lack of organisational preparation, leadership, and high workload and challenges using the model of supplementary prescribing and CMP affected implementation. Interviews (n=27) were also undertaken with patients who had consulted with either a dietitian (n=6) or therapeutic radiographer (n=16) within sites. While awareness of prescribing was low prior to the study, acceptance was high with patients citing a range of benefits that they either experienced or could anticipate, so long as it was safely governed.

*Patient questionnaires:* 180 patients completed a questionnaire (dietitian=49 and TR=131). Most (93.9%) agreed that D-TRs should be able to prescribe. Patients were equally satisfied with the care (consultation satisfaction (80.4%) and general medical interview satisfaction (83%)) they received

from D-TR prescribers and non-prescribers. A significantly higher proportion of patients who saw a prescriber reported they had received medicines advice or information during the consultation ( $p=0.0022$ ). Highest levels of satisfaction across both groups related to information on 'what the medicine was for', 'name of the medicine' and 'how it works'. Least positive responses related to information 'on how long to take the medicine for' and 'if it would affect sex life'.

*Case record review:* 32 case records (D=10 and TR=22) were assessed. Records were found to be of high quality, with a high level of agreement between assessors. One medication error (D-SP) related to a wrong dose was identified.

*Economic analysis:* Differences in health-related quality of life were not statistically significant among patients managed by prescribers and non-prescribers for either profession. Analysis suggests that D-SP and TR-IP is likely to save money with minimal or no effect on patients' well-being in the long term.

#### 1.4.4 Phase 4

Priorities for the NMP implementation tool kit were identified and agreed with a consultative group and a subsequent plan of action. The NHS Learning Hub was identified as a suitable hosting platform with content developed in 3 key areas i) Patient Leaflet; 'who's who to prescribing'; ii) demonstrating need; online preparing to prescribe toolkit and innovative practice leaflets iii) transitioning; how to stay prescribing ready with examples from practice.

### 1.5 Key findings

This is the first research to investigate the effectiveness and efficiency of dietitian supplementary prescribing and therapeutic radiographer independent prescribing. The project was undertaken between March 2019 and April 2024.

- There is a lack of empirical evidence related to prescribing and a need for robust evaluation of dietitian and therapeutic radiographer involvement in medicines management activity, including prescribing.
- Key areas where DSP worked were renal, intestinal/nutrition and diabetes. Key therapy areas were nutrition and blood products, oral and IV nutrition, gastro-intestinal and endocrine system.
- TR-IPs provide on- treatment review services for a range of tumour groups. Key therapy areas were gastro-intestinal; skin and drugs for urinary tract disorders.
- D-SPs and TR-IPs were more active than non prescribers in most aspects of medicines management activity, most notably over the counter medicines, amending prescribed medicines and medication reviews, and fewer recommendations to doctors etc.
- Patients and healthcare professionals were generally positive about D-SP and TR-IP. The majority of patients agreed that dietitians and therapeutic radiographers should be able to prescribe medicine, as long as it was safely governed.
- Perceived benefits included: service efficiency, greater flexibility and resilience to cope with demands.

- Implementation issues were similar for both professions across time including demonstrating clinical need; funding competition; organisational support; course preparation; and planning for advanced practice roles. SP limitations hampered uptake and use by dietitians.
- D-SP and TR-IP is likely to save money with minimal or no effect on patients' well-being in the long term.

## 1.6 Conclusions

This is the first research to investigate effectiveness and efficiency of DSP and TR-IP and provides valuable information for key stakeholders. D-SP and TR-IP is acceptable to the majority of patients with reported high levels of satisfaction with information and access to services. The study confirms D-SP and TR-IP is developing in line with original policy intentions to improve care across a range of services, by advanced practitioners who regularly engage in medicines management. Evidence at this stage of implementation and from case sites suggest that D-SP and TR-IP is likely to save money with minimal or no effect on patients' well-being. However, the process of SP hampered uptake, use and innovation for dietitians. Evaluation of the educational programme was satisfactory. The vast majority of medicines decision were found to be safe and appropriate. A toolkit, co-produced with patients, was developed to support healthcare workers get the most out of the prescribing qualification.

## 1.7 Dissemination plans

Multiple routes including social media, voluntary organisations, distribution of the executive summary and Lay summary and a national online dissemination event. The recently developed prescribing implementation toolkit, a free and available resource is live on <https://learninghub.nhs.uk/Catalogue/prescribingtoolkit>

## 1.8 Impact

The prescribing role can help optimise AHP skills, improving care quality, sustainability, and cost savings. This will help inform plans for extension to other healthcare professionals.

## 2. Introduction

This evaluation is the first research project to investigate independent prescribing by therapeutic radiographers and supplementary prescribing by dietitians.

### 2.1 Study aim and objectives

#### 2.1.1 Study aim

The aim of the study was to identify effective prescribing practice and innovative service models through evaluation of dietitian supplementary prescribing (D-SP) and therapeutic radiographer independent prescribing (TR-IP) implementation.

#### 2.1.2 Study objectives

Informed by the principles of case-study design <sup>3</sup> this four-phase study addressed the following objectives:

1. Undertake a rapid review to inform dietitian and therapeutic radiographer prescribing.
2. Describe and classify dietitian supplementary prescribing and therapeutic radiographer independent prescribing services and identify innovative service models across England.
3. Examine dietitian supplementary prescribing and therapeutic radiographer independent prescribing activity and trends and factors that support or inhibit uptake or implementation.
4. Explore patient/carer views and experiences of dietitian supplementary prescribing and therapeutic radiographer independent prescribing.
5. Identify impact of dietitian supplementary prescribing and therapeutic radiographer independent prescribing on patient choice, experience, access to medicines and outcomes.
6. Assess quality, safety and clinical appropriateness of dietitian supplementary prescribing and therapeutic radiographer independent prescribing practice.
7. Explore cost-consequences of dietitian supplementary prescribing and therapeutic radiographer independent prescribing service models.
8. Evaluate quality, effectiveness and cost of dietitians and therapeutic radiographers prescribing educational programmes.
9. Develop a non-medical prescribing implementation toolkit for dietitians and therapeutic radiographers.

### 2.2 Background to the study

At a time of increasing demand and financial uncertainty in the NHS, the need to provide sustainable models of service delivery that ensure timely access to high quality healthcare is more important than ever <sup>4, 5</sup>. Allied Health Professionals (AHPs), who make up a third of the NHS workforce <sup>6</sup>, have been the focus of a policy drive to improve services by making better use of existing skills and extending medicines responsibilities<sup>5-9</sup>. With supportive educational and governance frameworks, non-medical prescribing (NMP) can facilitate development of roles that require specialist skills in assessment, diagnosis and medicines management. NMP can enable advanced role development, e.g. dietitian-led parenteral nutrition services <sup>10</sup> and community based therapeutic radiographer (TR) services <sup>11</sup>, creating new opportunities for services to be built around population needs<sup>4</sup>, and thereby contributing to the health policy agenda of improving equality and reducing health inequality<sup>12, 13</sup>. Non-medical prescribing was introduced as a means to improve service efficiency, access to medicines and to support service innovation <sup>8, 9, 14</sup>.

Independent Prescribing (IP) and Supplementary Prescribing (SP) are two different forms of prescribing within the UK. Training to become a non-medical prescriber (NMP) is interdisciplinary, typically involving 26 classroom days and 12 days in practice under medical supervision<sup>15, 16</sup>; a dual qualification in IP and SP being awarded<sup>17</sup>.

Independent prescribing rights were extended in 2001 to include all registered nurses<sup>18</sup>. Nurse independent supplementary prescribers (NISPs) are able to independently prescribe from the full range of licensed and unlicensed medicines, with the exception of some controlled drugs for addiction treatment<sup>16, 19, 20</sup> and can also prescribe any medicine as a supplementary prescriber<sup>16</sup>. Supplementary Prescribing, in contrast, is a form of dependent prescribing where initial diagnosis is made by a doctor and a clinical management plan, detailing medicines that can be prescribed, must be agreed between the SP, doctor and patient<sup>21</sup>. Pharmacists were given supplementary prescribing rights in 2003 and later legislative changes also enabled this group the same independent prescribing rights as nurses<sup>22</sup>. SP rights were extended to optometrists and allied health professions (AHP) (i.e. physiotherapists, radiographers, and podiatrists) in 2005<sup>21</sup>, with optometrists later granted independent prescribing rights<sup>23</sup>.

Following public consultation in 2015<sup>24, 25</sup>, medicines legislation was amended in 2016 to enable independent prescribing (IP) by therapeutic radiographers and supplementary prescribing (SP) by dietitians working at advanced levels in the UK. This was one of number of changes made following a scoping project to ascertain where prescribing by Allied Health Professionals (AHPs) could enhance service provision and quality of patient care<sup>26</sup>. Dietitians were considered for SP due to their advanced roles in nutrition support for acute and long-term conditions requiring medicines management. Parenteral nutrition (PN), for example, is considered likely to benefit from D-SP<sup>10, 27</sup> as it requires advanced practice to calculate requirements and errors can cause significant patient harm<sup>28</sup>. Joint pharmacist and dietitian decision-making for PN has been successfully piloted with no harmful effects<sup>29</sup>, and dietitian involvement reduced instances of prescription errors<sup>30</sup>. Benefits are also proposed for other chronic conditions such as renal failure<sup>27, 31</sup>, diabetes<sup>27</sup>, and cystic fibrosis<sup>27</sup>.

There has been little evaluation of SP by radiographers since its introduction in 2005. A review of TR practice identified an extending scope, scanning pre-post-treatment, with 30% undertaking SP training<sup>32</sup>, and a survey identified positive stakeholder feedback on TR-SP<sup>33</sup>. TR-IP is primarily for side-effect relief in acute settings<sup>11</sup>. TRs are highly specialist by cancer site and administration of some treatment pathways are TR-led<sup>34-36</sup>, demonstrating a high level of advanced practice. Development of community-based TR services also motivates the need for TR-IPs availability<sup>11</sup>, where patient group directives would not suffice<sup>37</sup>. As patient perspectives on radiotherapist competence can be affected by prompt recognition and management of side effects<sup>38</sup>, TR-IP has been identified to have significant potential benefits in this area<sup>11</sup>.

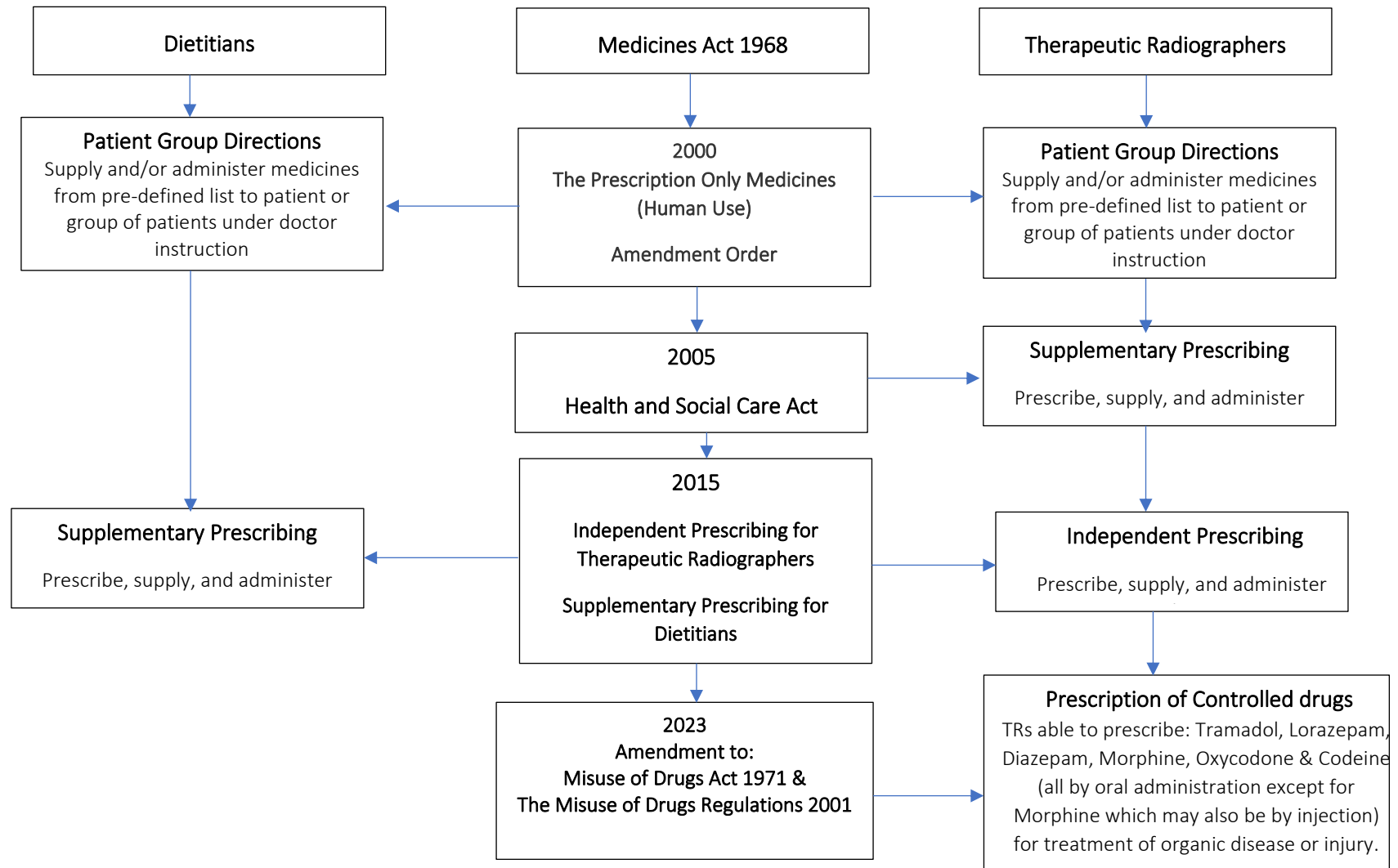
When used by nurses and pharmacists, SP and IP are reported as acceptable and beneficial to patient care with no significant safety concerns identified<sup>39-41</sup>. However, applicability of SP is dependent upon doctor availability<sup>26, 40, 42</sup>. A systematic review of non-medical prescribing (NMP) indicated enhanced clinical outcomes resulting from nurse and pharmacist prescribing compared to those achieved by doctors<sup>43</sup>. A review of NMP systematic reviews demonstrates no adverse impact upon patient outcomes, patient satisfaction or resource utilisation<sup>44</sup>. Comparable benefits have been reported for physiotherapists and podiatrists IP<sup>45</sup>. However, evaluating clinical and cost effectiveness in this area is hampered by heterogeneity of clinical setting, patient groups and confounding by multi-professional work arrangements, leading to inconclusive findings<sup>44-46</sup>.

As most evidence relates to nurses and pharmacists, it is important to evaluate impact and safety of prescribing by AHPs in order to inform commissioning and implementation of NMP services where they are beneficial. A comprehensive evaluation D-SP and TR-IP was therefore warranted.

This study was commissioned in the wake of the 2015 policy changes<sup>24, 25</sup> to provide an evaluation of supplementary prescribing by dietitians and independent prescribing by therapeutic radiographers in England, including conversion for those TRs who were already SPs introduced in 2005. This evaluation is the first to identify effective prescribing practice and innovative service models through evaluation of dietitian supplementary prescribing (D-SP) and therapeutic radiographer independent prescribing (TR-IP) implementation. The research was undertaken between February 2019 and November 2023.



**Figure 1: Models of medicines supply, administration and prescribing for UK Dietitians and Therapeutic Radiographers**



## 3. Methods

### 3.1 Overview of the study design and research plan

Informed by the principles of case-study design<sup>3</sup> the research enabled key stakeholders to have a voice in the evaluative process. In order to understand the pace of uptake, implementation, and impact of dietitian supplementary prescribing and therapeutic radiographer independent prescribing, context was captured at three levels of analysis.

- 1) Macro level: rapid review (**Phase 1**)
- 2) Meso level: surveys of: a) NHS trusts and b) D-SP and TR-IP (**Phase 2**)
- 3) Micro level: In depth analysis of D-TR practice settings pre-post implementation of the prescribing role over 27 months (**Phase 3**)

Case-study methodology, encourages use of multiple data collection methods and recognises significance of context<sup>47</sup>. This approach used previously<sup>41, 48-50</sup>, enabled study of D-TR services in real life context across a total of 8 sites. Due to the challenges and uncertainty in practice caused by the COVID-19 pandemic, a hybrid approach was adopted allowing comparison of D-TRs using: i) the original longitudinal approach (before and after NMP training) over 27 months (n=1) and ii) comparison of D-SP and TR-IP with a non-prescriber team member within the same profession and same organisation/ NHS Trust (n=7), and multiple data-collection methods (including audit, interviews, documentary evidence, observations, patient questionnaires, and case record review)<sup>51</sup>.

**Phase 4** adopted a participatory co-design method to synthesise **phase 1-3** findings and develop a D-TR NMP model of implementation<sup>52, 53</sup> and an online tool kit<sup>54</sup>.

**Phase 1** addressed objectives 1), **phase 2** objectives 2-3), **phase 3**, objectives 3-8) and **phase 4** objective 9).

### 3.2 Phase 1 (Macro level): Rapid Review

#### 3.2.1. Aim

Adopting a rapid review, registered with Figshare<sup>55</sup> a narrative synthesis was conducted on the medicines management roles of advanced dietitians and TR, evidence of effectiveness and the topic of barriers and facilitators experienced by D-SPs and TR-IPs.

The rapid review addressed the following questions:

1. What roles do Advanced Therapeutic Radiographers and Dietitians play in relation to medicines management?
2. What is the evidence of effectiveness of advanced practice Dietitian supplementary prescribers and/or and Therapeutic Radiographer independent prescribers in relation to patients and organisations?

### 3.2.2. Objectives

The objectives in this study phase were to

1. Describe and classify medicines management roles provided by advanced Dietitians and Therapeutic Radiographers and impact on patient outcomes
2. Identify factors that inhibit/ facilitate uptake and implementation of Dietitian supplementary prescribing and Therapeutic Radiographer independent prescribing
3. Describe the evidence of effectiveness of Dietitian supplementary prescribers (D-SP) and Therapeutic Radiographer Independent Prescribers (TR-IP)

### 3.2.3 Search strategy

Initial searches conducted during October and November 2019 were updated in March 2021. Searches included articles from January 1968 to-March 2021. Electronic health databases were searched, including Medline, CINAHL and economic databases. These sources were supplemented by manual searches and investigation of the reference lists of articles already identified. During the study period, the research team continued to update on new literature through scanning journals and networking. A final systematic literature search was carried out in November 2023, covering the period March 2021 to November 2023. This resulted in an additional 7 dietitian and 15 therapeutic radiographer articles and a final sample of 41 articles which went forward to the data extraction stage.

The search strings were primarily designed for use in the EBSCO Medline database and then adapted in minor ways to better fit the unique features of other databases. Both unique index terms and Boolean (AND/OR) key word searches were applied to the titles, abstracts, and keywords of articles. Search strings included key words such as 'ADV PRAC\*', 'PRESCRIB\*', 'MEDICINES\*'. Search terms and example search strings are available in **Appendix 2**. Retrieved citations were downloaded to EndNote V.X8 software.

### 3.2.4 Screening and eligibility

Electronic searches initially yielded 100 articles. A supplementary search of the reference lists and citations of these articles revealed an additional 66 potentially relevant articles. After removal of 3 duplicates 163 articles were initially screened in relation to the eligibility criteria. The remaining articles (n=85) were then rigorously assessed for relevance by three members of the project team. Discrepancies were resolved by a majority vote based on relevance of the content, and or they did not meet the inclusion criteria.

#### *Inclusion criteria:*

- Original full text research articles
- Any country
- Research theses
- Published in English
- Qualitative and Quantitative study design

#### *Exclusion criteria:*

- Grey literature
- Articles that did not report empirical research i.e., opinion pieces, conference abstracts, discussion papers, editorials

#### *Data extraction*

Data extraction was conducted by three team members using a bespoke data extraction form to capture details about population, data collection methods, sample, aims, results, and limitations.

#### *Data Quality*

Quality was evaluated using the Mixed Methods Appraisal Tool (MMAT) <sup>56,57</sup> and used to assess three methodological domains: mixed methods, qualitative and quantitative, each of which is scored out of four. Two team members appraised each study with disagreement resolved during research team meeting discussions. For the purposes of this review, a score of less than two was considered low quality and excluded. Those scoring 3, were considered medium quality and 4 high.

An overview of the selection process and search results are available in **Appendix 2**.

### 3.3 Phase 2 (Meso level): Prescriber Surveys and Service Manager Surveys

#### 3.3.1 Introduction

**Phase 2** was designed to explore TR-IP and D-SP at the organisational and delivery level. The longitudinal approach enabled ongoing developments in practice to be explored in order to gain a more generalised description of service development. It also provided a sampling framework for **Phase 3**.

##### 3.3.1.1 Aim

The aim of **Phase 2** was to answer the following research questions:

- 1) How and where is D-SP-TR-IP being implemented across healthcare organisations?
- 2) What are key drivers or barriers for implementation of D-SP-TR-IP?

##### 3.3.1.2 Objectives

The objectives in this study phase were to:

1. Describe and classify dietitian supplementary prescribing and therapeutic radiographer independent prescribing services and identify innovative service models across England.
2. Examine dietitian supplementary prescribing and therapeutic radiographer independent prescribing activity and trends and factors that support or inhibit uptake or implementation.

This was achieved via surveys of a) NHS service managers across England to assess current situation of D-TR practice and identify innovative models and b) D-SP-TR-IPs to explore prescribing activity and trends.

#### 3.3.2. Development of NHS Trust manager survey tools

A survey tool designed to collect information via telephone/MS Teams on-line interviews on: NMP strategy; service provision, team structure and care organisation; current use and uptake, number of

advanced practitioners, planned progression for NMP, barriers and facilitators to implementation and organisational preparedness was created (Appendix 3).

The survey tool was developed between February -September 2019 with input from members of the research team, and project advisory group (PAG). Early drafts in word format were revised during a PAG meeting in May 2019. Revisions to content, structure and layout were made at subsequent team meetings over the following three months. Formal piloting was completed in October 2019 which highlighted the need to audio-record the telephone interview to support data capture.

**Survey 1:** contained 5 sections comprising 20 questions informed by Roger's 'Diffusion of Innovation' theory<sup>58</sup> and previous evaluation of NMP (see Appendix 3.1). Questions were open ended to allow for discussion where appropriate. **Section 1** comprised a checklist for the researcher to confirm participants had read the participant information sheet, had any questions answered; agreed to take part in the study and their job title/role. **Section 2** (Q1-5) collected information about how services were organised, role in the organisation, number of D-TR specialities in the Trust; department structure; geographical area and patient groups served by the department. **Section 3** (Q6-9) asked questions on the number of D-TR prescribers and future plans; number of D-TRs in the trust; proportion eligible to become a prescriber, current number of prescribers; plans for future NMP training. **Section 4** (Q10-18) focused on the support for and use of NMP in the trust. Information on number of D-SP-TR-IPs currently using the qualification, service area of NMPs; areas which would benefit from NMP; status on NMP governance i.e. NMP policy; and service plans was collected. Views and experience on barriers and facilitators to prescribing were sought along with organisational preparedness, and thoughts on what would help NMP growth. **Section 5** (Q19-20) asked if the participant would be willing to pass an invitation to complete an online survey to D-SP-TR-IPs in the trust, and willingness to participate in a follow-up interview in 18 months.

**Survey 2:** contained 5 sections comprising 18 questions (See Appendix 3.1). Similarly to survey 1 questions were open ended to allow for discussion and exchange of information. **Section 1** comprised a checklist for the researcher to confirm participants had read the information sheet, had any questions answered, agreed to take part in the study and their job title/role. **Section 2** (Q1-5) collected information about any changes in how services were organised in the last 18 months, and any related details. Participants were asked to describe the kind of service provided; their role in the organisation, the number of D-TR specialities in the Trust; department structure; geographical area and patient groups served by the department. **Section 3** (Q6-9) asked questions on any changes that had occurred in the last 18 months and/or plans for extending the number of D-TR prescribers; number of D-TRs in the trust; proportion eligible to prescriber, current number of prescribers; plans for future NMP training. **Section 4** (Q10-18) focused on any changes to the support for and use of NMP in the trust in the last 18 months. Information on number of D-SP-TR-IPs currently using the qualification, service area of NMPs; areas which would benefit from NMP; status on NMP governance i.e. NMP policy; and service plans was collected. Participants were asked to identify the top 3 three things in the last 18 months that had helped to increase uptake or use and or had delayed or prevented increase or sustainability of NMP by D-TRs in their services. Additionally, they were asked to identify the top three things that had helped their organisation prepare for D-SP-TR-IP; how their organisation might be better prepared for introduction/ growth of NMP and the extent to which their service had been able to provide care when there is no doctor (or other prescribing professional) available. The final question asked them to comment on how the presence/ absence of NMPs in the service impacted on ability to meet Covid-19 related challenges.

### 3.3.3 Pilot

Formal piloting of the NHS Trust survey tool was undertaken during September-October 2019. Three service managers (dietitian n=1, and TR n=2) nominated by the PAG members completed the online telephone surveys.

Participant Information Sheets were provided, and participants asked to contact the researcher to agree a mutually convenient time to undertake the telephone/online survey. Following the telephone/online survey they were requested to fill in an evaluation pro-forma addressing comprehension, and completion time. Respondents found the questions easy to understand, comprehensive and of acceptable duration (13-18 minutes). Pilot data were recorded in a Microsoft Excel © spreadsheet.

Following completion of the pilot surveys and interim review of the data, the study team raised concerns over the robustness and completeness of the data due to lack of audio recording. Following an amendment, telephone surveys were subsequently audio-recorded to support quality of data collected.

The interview schedule for the first set of interviews was piloted on 1 dietitian manager and 2 therapeutic radiographer managers. The pilot interview with one of the TR managers was included in the analysis. Two were not included due to lack of data (no audio recordings were available for these as the decision to record the interviews to capture the data was made after the first two pilot interviews had already been conducted).

Survey 2 content was reviewed in January- March 2021 and a number of items revised (Section 2 -3 questions, 3- 1 question and 4-7 questions) and subject to further approval by the University of Surrey Ethics Committee. This ensured questions captured change over the last 18 months, including impact of Covid-19 pandemic and also allowed the use of audio-data being transcribed and analysed to support interpretation of the information that was shared.

### 3.3.4 Participant recruitment

In our original proposal, and based on our previous work<sup>33, 59, 60</sup> we estimated that 70% of the 187 organisations (135 non acute hospital trusts, 17 acute specialist trusts and 35 community providers) identified through the 2017 NHS Confederation Information Website in England<sup>61</sup> would respond providing a potential population of 131 NHS managers.

Additional information gathered prior to initial data collection confirmed that the total number of NHS dietetic and TR services in England is unknown. The most recent available evidence at the point of data collection confirmed that as of November 2020 there were 52 NHS radiography services<sup>62</sup> of which the contact details were available and invitations sent to 48 services, and an estimated 227 dietetic services based on the number of NHS trusts in England. Invitations (n=172) were sent to Trusts for whom dietetic service contact details were available.

#### **Survey 1:**

A purposive sample of NHS Trust managers was recruited to the survey. NHS Trust dietetic and TR service managers were identified through publicly available information on Trust websites, professional bodies (Society of Radiographers (SCoR); TR special interest prescribing group British

Dietitian Association (BDA) magazine, the BDA manager network and other BDA specialist groups), and study team contacts. Invitations to participate were sent by email along with participant information sheet (PIS) and consent from 24th October 2019 to March 20<sup>th</sup> 2020 and November 2020-March 2021. Data collection was interrupted due to the Covid-19 pandemic and the study being paused March- November 2020.

Recruitment was supplemented by study promotion at NMP conferences<sup>63</sup>, professional newsletters, University of Surrey study web pages and social media accounts (twitter), and through direct contact to the team from TR and Dietitian managers; these individuals were emailed the participant information sheet and invitation complete with project researcher contact information.

## Survey 2

For the second set of surveys participants were selected based on the type of organisation they represented within Rogers' Diffusion of Innovation framework, i.e., early adopter/innovator, early/late majority, laggard. Data collection was undertaken October 2021-May 2022.

### 3.3.5 Data collection and analysis

To facilitate understanding regarding the extent to which Dietitians are practicing as SPs and Therapeutic Radiographers as IPs in different areas and the models of use and service provisions governing their work interviews with NHS managers were carried out via the telephone or via MS Teams at a mutually convenient time. A bespoke Microsoft Excel @file was used to record data collected during the telephone/ MS Team call. Audio recordings of interviews were analysed thematically<sup>64</sup> to identify the extent of uptake of prescribing and the key factors (i.e., barriers and facilitators) that influenced adoption and implementation of NMP by D-TRs. The analysis of the uptake was informed by the Diffusion of Innovation theory<sup>65</sup>. Within the thematic analysis consideration was also given to different phases of implementation by noting where issues particularly affected a specific stage, i.e., during preparation, training, transition, and sustainment.

Following an update to the protocol in March 2021, and further approval from the University of Surrey ethics committee, audio recordings of interviews undertaken for **survey 2** were also transcribed to support interpretation and analysis.

## 3.4 Development of Dietitian Supplementary Prescriber and Therapeutic Radiographer Independent Prescriber questionnaires

A longitudinal online-survey explored qualified D-SPs and TR-IPs prescribing activity and trends, factors that facilitate or inhibit its uptake and provided an initial sampling frame for Phase 3. Two questionnaires informed by previous NMP surveys<sup>41, 48, 66, 67</sup>, the British National Formulary<sup>68</sup> and the PAG were created for completion by D-SPs (Q1-DSP) (Appendix 3) and TR-IPs (Q1-TR-IP) (Appendix 3.2) at each data collection point (baseline and at 18 month follow-up) (Q2-D-SP & Q 2 TR-

IP)(Appendix 3.2) using Online Surveys©- an online software tool. Questionnaires were developed between March- August 2019 with input from members of the research team, project advisory group (PAG) and patient and public involvement (Patient and Public Voice - PPV groups), in addition to professional colleague contacts. Formal piloting, via the on-line platform was completed in October 2019 following which final versions of Q1 for each profession were agreed.

**Questionnaire 1** contained a total of 43 questions. Questions were mainly fixed response options with room for open-ended comments. Question 1 asked participants to confirm that they had read the participant information sheet, had any questions answered and to confirm that they agreed to take part in the study. **Section A** (questions 2-12) collected general demographic information including job title, pay scale, age, hours worked, and educational/academic qualifications. **Section B** (questions 13-17) asked questions on services provided by participants including geographical region, type of organisation and service provided setting and type, and geographical coverage. **Section C** (questions 18-23) focused on prescribing practice. Participants were requested to indicate the number of items prescribed in a typical week; and reasons for not prescribing. Subsequent questions asked participants to indicate which methods and frequency with which they used SP/ IP, patient group directions (PGD), and patient specific directions to supply, administer or prescribe medicines to patients, and frequency of other activities including making recommendations to prescriber (i.e. by letter, fax, telephone or email); make recommendations for patient to buy over the counter medicines, amend prescribed medicine (i.e. stop, alter or correct dose); medication review; remote prescribing by telephone, email or fax; therapy areas they prescribed from; top 10 medicines prescribed; if they prescribed controlled drugs, and if so to list which ones. **Section D** (questions 24-28) related to preparation for the prescribing role and asked respondents to indicate which of 11 factors influenced or informed their decision to become a prescriber: with a further 6 factors examining initial and ongoing support within the organisation. Subsequent questions asked respondents to describe any additional difficulties experienced during preparation for the role, and details of their supervised learning in practice. **Section E** (questions 29-33) explored how participants used their prescribing qualification in practice and asked participants to indicate from a list of 11 statements which clinical governance arrangements were in place.

Participants were then asked to indicate whether any of the 20 identified potential benefits had resulted from their ability to prescribe medications for patients; to identify the top three areas where prescribing had been of most benefit; top three things that delayed or prevented prescribing and had supported their prescribing practice. **Section F** (questions 34-41) related to costs associated with undertaking the prescribing programme including course fees, funding arrangement; mode of study, number of days of supervised learning in practice, hours spent with practice assessor/supervisor; additional payments from employer and out of pocket study time and expenses (e.g. travel/accommodation/ study books and materials/ and out of pocket expenses). **The final section** (questions 42-43) sought consent for further participation in the study (questionnaire 2 and/or phase 3), and asked participants to provide details of their name; and contact details, email address; initials and date of birth, to anonymously link responses to the next questionnaire, along with their contact details to receive a summary of survey results, if requested and any additional comments on the questionnaire.



**Questionnaire 2** contained a total of 36 questions. Questions 1-2 asked participants to reconfirm their consent to participate provide details of their initials and Date of Birth (DOB) to link the previous questionnaire. **Section A** (questions 3-7) asked general demographic information, including profession, job title, pay scale, age, hours worked, and educational/academic qualifications. **Section B** (questions 8-14) asked about service provision and organisation of care and any changes in the last 18 months including employer or geographical area covered, type of service provided and if so to provide details of the change; geographical region, type of organisation and service provided setting and type, and geographical coverage. **Section C** (questions 15-21) focused on the prescribing practice of participants. Participants were requested to indicate the number of items prescribed in a typical week; and if not currently prescribing to explain why not. Subsequent questions asked participants to indicate which methods and frequency with which they used SP/ IP, patient group directions (PGD), and patient specific directions to supply, administer or prescribe medicines to patients, and frequency of other activities including making recommendations to prescriber (i.e. by letter, fax, telephone or email); make recommendations for patient to buy over the counter medicines, amend prescribed medicine (i.e. stop, alter or correct dose); medication review; remote prescribing by telephone, email or fax; therapy areas they prescribed from; top 10 medicines prescribed; if they prescribed controlled drugs, and if so to list which ones and any changes to their prescribing practice during the last 18 months. **Section D** (questions 22-35) related use of the prescribing qualification in practice and asked participants to indicate from a list of 11 statements which clinical governance arrangements were in place; which is any of the 20 identified potential benefits had resulted from their ability to prescribe medications for patients in the last 18 months; to identify the top three areas where prescribing had been of most benefit; top three things that delayed or prevented prescribing and had supported their prescribing practice in the last 18 months; changes to case load complexity, and ability for team to provide care when doctors and other professionals not available; details on the number of prescribers in the team, and future plans along with thoughts on how prescribing had impacted or influenced the individual and team to meet Covid-19 related challenges. **The final section** (questions 36-37) sought consent for further participation in future research, along with contact details to receive a summary of survey results, if requested and any additional comments on the questionnaire.

### 3.4.1 Pilot

Formal piloting was performed in September 2019. Seven participants took part. Seven people including 2 PAG members, two patient representatives, and 3 experienced practitioners completed the questionnaires. These individuals were sent the Participant Information Sheet, with an embedded link to the on-line survey, and requested to fill in an evaluation pro-forma addressing comprehension, length and completion time following questionnaire completion. Respondents found questionnaires easy to complete, comprehensive and of acceptable duration (15-18 minutes). Pilot data were downloaded, exported into a Microsoft Excel © spreadsheet and reviewed by a statistician, who confirmed its suitability for analysis and excluded from the final analysis. Questionnaire 1 subsequently went live on 24<sup>th</sup> October 2019.

Questionnaire 2 content was reviewed in January- March 2021 to ensure questions captured change over the last 18 months, and impact of Covid-19 pandemic, several items revised (Section B -2 questions, C- 1 question and D-11 questions) and subject to further approval by the University of Surrey Ethics Committee.

### 3.4.2 Participant recruitment

In our original proposal, and based on our previous work<sup>33, 59, 60</sup> we estimated a potential cohort of 137 D-SP-TR-IPs, and a 50% (n=69) response rate.

#### Questionnaire 1

Initial recruitment was via service managers participating in phase 2 who cascaded invitations to prescribers in their team. Due to slow uptake recruitment was supplemented by study promotion at NMP conferences<sup>63</sup>, via professional newsletters, University of Surrey study web pages and social media accounts (twitter), and through direct contact with the team from D-SP-TR-IPS; these individuals were then sent a direct link to the online survey containing the participant information sheet.

Data collection was undertaken 24th October 2019 to March 20th 2020 and November 2020-2<sup>nd</sup> April 2021. Data collection was interrupted due to the Covid-19 pandemic and the study being paused March- November 2020.

#### Questionnaire 2

Contact details of respondents who indicated that they would be willing to take part in the next phase of the research, case site involvement (Phase 3) were consecutively downloaded into Microsoft Excel©.<sup>69676666</sup>

Approximately 18 months after initial survey completion an email invitation with an embedded link to Questionnaire 2 was sent by a University of Surrey researcher, with reminder emails at 3 and 6 weeks. Data collection was undertaken 1<sup>st</sup> June 2021-30<sup>th</sup> June 2022.

### 3.4.3 Data collection and analysis

Data was downloaded from Online Surveys© as a Microsoft Excel© file. Data from the open-ended questions (e.g., job title, medications prescribed, barriers and facilitators) was coded by the research team prior to statistical analysis. Frequencies and cross tabulations were used to summarise categorical outcomes including mean, standard deviation, median and inter-quartile range.

Comparisons of means for normally distributed outcomes between professions was carried out using unpaired t-tests, and Mann- Whitney U test for non-normally distributed outcomes. Paired t-tests were used to compare Survey 1 and Survey 2 data.

When comparing 2 subgroups (notably dietitians, therapeutic radiographers) for a categorical outcome, the Chi-Squared test was used, reverting to a Fisher's Exact test in 2x2 cross tabulations if 1 or more expected cell count was found to be < 5.

Some question responses with three or more response options were dichotomised and compared using t-test or Chi-Squared test as above; for example, "Preparation and support for the prescribing role" had five possible responses: Strongly Disagree, Disagree, No Opinion, Agree, Strongly Agree.

Those who answered Agree or Strongly Agree were compared with those who responded Strongly Disagree, Disagree, or No Opinion.

## 3.5 Phase 3 (Micro level): Case studies

### 3.5.1 Introduction

An embedded case-study<sup>3, 70</sup> comparing costs and outcomes of D-SP-TR-IP in its real life context was adopted for **phase 3**. This supported exploration of D-TR at micro-level through in-depth analysis practice settings.

Comparative data on working processes, relationships within the wider clinical team, patient experiences and a holistic investigation of the training programme were synthesised using a mixed methods approach in to a cost-consequences framework<sup>71</sup>. This pragmatic comparison study was designed to provide information for stakeholders on a wide range of measures i.e., quality, satisfaction, and impact, and there was no specific primary outcome measure.

#### 3.5.1.1 Aim

The aim of this study phase was to answer the following research questions:

1. How do process and outcome indicators (e.g. service satisfaction, access, waiting times, medicines adherence, medicines information satisfaction, treatment specific outcomes) differ between patients with and without D-TR prescribing implementation?
2. How does level and extent of D-TRs involvement in medicines management activities (MMA) differ with and without prescribing implementation?
3. What are benefits and drawbacks of D-SP and TR-IP as perceived by D-SPs and TR-IPs, team members and patients?
4. What are the costs and consequences of D-SP and TR-IP for stakeholders and organisations?
5. Are D-TRs prescribing safely and appropriately?

#### 3.5.1.2 Objectives

The objectives in this study phase were to:

1. Examine dietitian supplementary prescribing and therapeutic radiographer independent prescribing activity and trends and factors that support or inhibit uptake or implementation.
2. Explore patient/carer views and experiences of dietitian supplementary prescribing and therapeutic radiographer independent prescribing.
3. Identify impact of dietitian supplementary prescribing and therapeutic radiographer independent prescribing on patient choice, experience, access to medicines and outcomes.
4. Assess quality, safety and clinical appropriateness of dietitian supplementary prescribing and therapeutic radiographer independent prescribing practice.
5. Explore cost-consequences of dietitian supplementary prescribing and therapeutic radiographer independent prescribing service models.
6. Evaluate quality, effectiveness and cost of dietitians and therapeutic radiographers prescribing educational programmes.

In our original proposal we planned to undertake a three-stage case-study design, using mixed methods to compare individual and team level data pre and post prescribing implementation.

Due to the challenges and uncertainty in practice caused by the Covid-19 pandemic in 2020 and in consultation with our project advisory group a revised approach to phase 3 was required. Discussions

with both D-SPs and TR-IPs during August/ September 2020 highlighted that the original proposed longitudinal approach of following D-TRs pre and post implementation over 27 months could be problematic due to reduced uptake of NMP training, and if there was another Covid-19 surge, an increased likelihood of those undertaking NMP training being recalled back to practice.

In order to mitigate the risk associated with adopting a single approach to Phase 3, a hybrid approach, allowing comparison of D-TRs using: i) the original longitudinal approach (before and after NMP training) over 27 months and ii) concurrent comparison of D-SP and TR-IP with a non-prescriber team member within the same profession and same organisation/ NHS Trust was agreed.

### 3.5.2 Recruitment of case study sites

#### 3.5.2.1 Case sites

Case sites were identified through established phase 2 and professional contacts, PAG members, and recruitment posts on social media platforms such as Twitter and LinkedIn, and or through National Institute of Health Research (NIHR) portfolio enquiry from individual trust Research and Development departments. Recruitment of case sites was challenging as organisations were still in Covid-19 recovery during this time. This restricted site access, practitioner availability and the speed with which organisations made decisions around capacity and capability to participate.

Clinical speciality/service areas in which D-SP and TR-IP training was planned (i.e. longitudinal approach over 18 months) who expressed an interest were asked to confirm date of NMP training commencement to ensure this was completed, and D-SP-TR-IP implemented in time to practice during the period of data collection. D-TR service areas where D-SP-TR-IP was already implemented (i.e. concurrent comparison sites) were asked to confirm a non-prescriber team member within the same profession and same organisation/ Trust.

To represent diversity with respect to care setting, geographical location and patient demographics, 8 sites, one TR longitudinal site, and 7 comparison sites (n=3 dietitians and n=4 therapeutic radiography) were selected. An additional site with TR approval subsequently withdrew prior to commencement of data collection. Numerous other sites expressed an interest in participating but the above restrictions limited the number of sites who eventually participated in the study.

Those interested were emailed participant information sheets and supplementary information on involvement. On confirmation of intent to participate, site contacts were requested to ensure organisational managerial authorisation and Research and Innovation department support. An initial meeting was then arranged with the project team to discuss their potential involvement and project fit. Written informed consent was taken from D-TRs at the start of data collection, and on-going consent assured throughout.

Participants were given the option to consent to complete an online self-report audit, medical record and prescription review, audio-recorded interview, completion of health economic questionnaire. They could choose partial or full involvement.

### 3.5.1.2 Patients

At each case site a consecutive sample of patients who had scheduled appointments with either the trainee TR-IP, D-SP- TR-IP and non-prescribing dietitians and therapeutic radiographers (NP-DTRs) were recruited in NHS sites by trained research nurses, or a D/TR between 1<sup>st</sup> December 2021 and 30<sup>th</sup> June 2023. Following changes to NHS site access related to Covid-19 in Autumn 2022, and further study amendment, in January 2023 the study team were permitted to make site visits. This allowed a study researcher to subsequently be involved in the recruitment process.

Potential participants (n =412) were identified on arrival and approached by the local research nurse, D/TR or study researcher, who explained the study and what involvement would entail. The consent process was carried out by a trained researcher or NHS staff member, face to face with the patient in the clinical setting. Alternatively, if this was not possible, the NHS staff member followed a two-step consent process where they discussed the study with the patient and ask if they would be interested in taking part. A permission to contact form was then completed with patients contacted later c by the study researcher using their preferred contact method where the study was discussed in more detail and if willing to take part consent taken.

A participant information sheet was provided (Appendix 4), and patients advised that they may participate in any of the three study components (questionnaire, interview, and or patient record review), and that declining individual components would not impact other study involvement. Following amendment to the study protocol in February 2023 patients recruited March- 30<sup>th</sup> June 2023 were additionally invited to consent to non-participant observation of their consultation.

A screening log of all patients approached for participation in the study (n=412) was recorded; both those recruited to the study (n=286) and those declining participation (n=126), including hospital/unit medical record numbers, gender and the date of consent, by the local research nurse/ study researcher. Those who agreed to participate were given a consecutive study identification number, relating to the site of recruitment.

### 3.5.1.3 Team members

At each case site, members of the healthcare team who worked alongside the trainee TR-IP, and D-SP-TR-IPs were invited to participate in face-to-face interviews with a University of Surrey researcher (n=18). Team members were nominated by the trainee TR-IP, and D-SP-TR-IPs and approached for participation by the researcher.

## 3.5.2 Self-report audit

### 3.5.2.1 Aim

The aim of the self-report audit was to explore the nature and duration of activity, patient types, presenting complaint and team structure, with a particular focus on medicines related activity and patient access to medicines and determine if and/or how the level of involvement differed before and after NMP training, and between D-SP- TR-IPs and NP-DTRs.

### 3.5.2.1 Development of self-report audit tool

The original intention was for a researcher to collect the audit data during visits to each site. Covid-19 site restrictions meant a different approach was required. An electronic pro-forma informed by previous work in NMP<sup>41, 66, 72, 73</sup>, was developed March- November 2021, and used to record real time service delivery by the trainee TR-IP, D-SP- TR-IPs and NP-DTRs via Qualtrics® online survey platform (Appendix 4.1).

The instrument comprised 33 questions: Qs1-7 asked for general demographic information, about the patient, age, gender, ethnicity, service location, consultation encounter and type; Qs 8-13 focused on the outcome of the episode of care, assessment of medication regimen, and any actions taken. More specific questions then followed where details were requested regarding medicines optimisation activities undertaken (i.e. new medication, alter existing medication, stop existing medication, repeat prescription and medication review), and identification of issues (e.g. sub-therapeutic dose of drug, inappropriate regimen, excess dose of drug. Inappropriate repeat prescription, other medication errors). Q 14 asked participants to indicate which of 10 modes of medicine management activity they used (i.e. IP, SP, patient group directions (PGD), and patient specific direction (PSD), exemptions, recommend over the counter (OTC) product, recommend: doctor or other prescriber that prescription is required; via hospital note; adjust dose/drug according to pre-agreed protocols, issue or write prescription.

Qs15-16 asked if medication adherence had been assessed, issues identified and assessment of current medication taking behaviour. Q17 recorded what if any medicines information had been shared during the consultation (17 categories). Qs 18-22 focused on working with colleagues, discussions with others, and any referrals that were made Q24-30 recorded the number of medicines prescribed, administered or recommended (up to 5) and specifics of each one name, dose, duration, and formulation: reason for decision. Q31-32 asked about who the decision had been communicated to and by which method of communication. Q33- was a free text area for comments and suggestions.

### 3.5.2.2 Pilot

Formal piloting was performed September-October 2021. In addition to the project team an additional seven participants (3 TRs and 4 Dietitians) completed 33 dummy entries using the online audit tool.

Respondents found questionnaires easy to complete, and comprehensive but some reported it took more than 30 minutes to complete (average 5-8 minutes). Comments suggested there were challenges with embedded logic embedded within the survey platform. Following further review and revisions bespoke audit tools were subsequently developed for each profession and for the trainee TR- IP at each site. Each was subsequently tested with dummy data to check logic flow within each point of data entry.

Pilot data were downloaded, exported into a Microsoft Excel © spreadsheet and reviewed by the project team and statistician, who confirmed its suitability for analysis. Further challenges in logic and sequencing were however identified and subsequently addressed through minor revisions to the tool on the Qualtrics® online survey platform.

### 3.5.2.3 Sampling

Discussions with dietitians and therapeutic radiographers in the PAG, indicated that a full-time D-TR would have up to 40-60 patient encounters/ week, generating data on approximately 480-720 episodes of patient care.

However, the number of patients accessing radiotherapy services reduced during the Covid-19 pandemic. Hence a pragmatic approach, extending the period of real-time service delivery was adopted, until the target number of patient encounters with each D-TR was obtained.

D-TRs were asked to conduct self-reported audit over the equivalent of one working week (maximum 5 days, 37 hours in total), around 80 patient encounters per site. This pragmatic approach was adopted to reflect real time service delivery across a range of healthcare settings working patterns and shifts.

### 3.5.2.3 Data collection and analysis

D-TRs were asked to conduct self-reported audit over the equivalent of one working week (maximum 5 days, 37 hours in total), a total of 640 data points across all 8 case-sites. This pragmatic approach was adopted to reflect real time service delivery across a range of healthcare settings working patterns and shifts.

Data were downloaded from Qualtrics and exported into a Microsoft Excel © spreadsheet prior to analysis. Categorical outcomes were summarised as frequency and percentage for continuous outcomes, the mean, standard deviation, median and interquartile range. When comparing sub-groups based on prescribing status categorical Chi-Squared test, or Fisher's Exact test were used if one or more expected cell counts were < 5.

## 3.5.3 Semi-structured interviews

### 3.5.3.1 D-TRs/Team members

#### 3.5.3.1.1 Aim

The aim of semi-structured interviews with D-SP-TR-IPs, trainee TR-IP, and NP-DTRs was to explore team structure, case-load, demographics (i.e. age, experience, role, grade); prescribing views and impact, benefits and disadvantages; service development; governance arrangements; educational preparation; and job satisfaction. Interview schedules for team members were designed to explore prescribing views, benefits, disadvantages, and innovation plans.

#### 3.5.3.1.2 Interview schedule development

Informed by previous work in NMP<sup>74-76</sup> interview schedules contained questions about the extent of use of IP/SP by D-SP-TR-IPs since qualification, services provided, case load, ease of access, perceived benefits in relation to patients/services/other health professionals/themselves, difficulties experienced or issues preventing IP/SP, effect of IP/SP on service development, adequacy of governance systems and communication arrangements, preparedness and impact on wider professional development.



Interview guides for the trainee and NP-DTRs contained questions on views on IP/SP, involvement if any, in medicines management activities and communication on patient care between different service providers.

#### **3.5.3.1.3 Pilot**

All interview schedules (Appendix 4.2) were reviewed by the research team and PAG group members. A second interviewer, experienced in non-medical prescribing research, buddied the main interviewer for the first two interviews in order to provide guidance and clarify and address any issues with the interview schedule. Following this pilot, minor revisions were made to improve the flow of questions.

#### **3.5.3.1.4 Sampling**

D-SP-TR-IPs, trainee TR-IP, and NP-DTRs (n=14) provided verbal consent for interviews, audio-recording and full transcribing prior to onset of audio-recording; consent was taken prior to the interview. The project researcher made initial contact with team members nominated by D-SP-TR-IPs, and trainee TR-IP. Those who were interested in participating were provided with a participant information sheet and consent form, prior to undertaking the interview.

#### **3.5.3.1.5 Data Collection and analysis**

To facilitate understanding of case site service delivery, interviews with D-SP-TR-IPs, and the trainee TR-IP were carried out via MS Teams at mutually convenient times prior to the main data collection at each site(n=15). Interviews lasted between 22.2 and 82.4minutes. Team members (n=18) provided written consent prior to completing an interview via MS Teams which lasted between 13.3 and 60.5 minutes.

### **3.5.3.2 Patients**

#### **3.5.3.2.1 Aim**

The aim of the semi-structured interviews with patients/ carers was to explore views and preferences about prescribing, experience of receiving medicines or medicines advice, waiting times, number and type of staff involved.

#### **3.5.3.2.2 Interview schedule development**

Informed by previous work in NMP <sup>49, 76</sup> the interview schedule contained questions about the patient/carer relations to the D/TR service, awareness of prescribing by D-TRs, benefits, disadvantages, medicine taking behaviour, consultation experience, confidence, and views about any differences in care experienced compared to what might have been expected from a medical doctor. The second part of the interview explored the patient journey, and asked patients to reflect on how long it takes and how many people (healthcare professionals) were involved in getting their medicines to them. Focusing on the most recent appointment they had with the D/TR, patients were asked to talk the researcher through each step of the process starting from arranging the appointment, through to when they received the medication.

### 3.5.3.2.3 Pilot

The interview schedule (Appendix 4.2) was reviewed by research team and PAG group members. Following the pilot interview, the schedule was amended to reduce time and improve clarity, and amount of detail on the patient journey was reduced.

### 3.5.3.2.4 Sampling

In our original proposal we estimated 10 patient interviews would be undertaken per site (total n=80) using a subsample of consenting patients where a medicines management decision was made during the consultation. Due to low numbers of patients recruited who had medicines management decisions in their consultation, the focus shifted to exploring views on NMP by D-TRs, benefits and disadvantages. Those who were interested in participating were then invited to participate in an interview at a mutually convenient time. Challenges to patient recruitment, due to restricted in person access to sites in line with NHS Covid-19 organisational policies, meant uptake was lower with a total 27 patient interviews being conducted.

### 3.5.3.2.5 Data collection and analysis

Interviews were conducted at mutually convenient times using the telephone and audio-recorded. Interviews lasted between 12.4-45.2 minutes.

Interviews were transcribed (by an independent company) and checked for accuracy against the original recording by experienced researchers (JE and KS). Using a framework approach<sup>77</sup> a coding matrix was developed based on emerging themes and initial research questions. Two researchers [KS, JE] independently coded a sample of transcripts from D (n=2) and TR (n=2) patient datasets and met to discuss minor differences. Analysis was conducted separately on D and TR patient datasets (KS) considering similarities and differences across sites to assist explanation building and develop a comprehensive picture. Initial coding and categorising of data were managed by Nvivo© qualitative data analysis software. Key findings across D and TR patient datasets were then summarised.

## 3.5.4 Patient Questionnaire

### 3.5.4.1 Aim

The aim of the patient questionnaire was to evaluate the contribution of D-SP-TR-IP to patient experience and its impact on choice, access, and self-reported health outcomes. Data were collected with the intent of exploring patient experience of D-SP-TR-IP/ trainee TR-IP and NP-DTR consultations.

### 3.5.4.2 Questionnaire development

A patient questionnaire was developed by the team for data collection at the point of the D-SP-TR-IP, trainee TR-IP, NP- DTR consultation that formed the basis of the self-report audit (Appendix 4.3). Early versions of the questionnaire developed in January-March 2020 were revised November 2020- March 2021 following study recommencement, with input from research team members, PAG and PPV advisors, in addition to professional colleague contacts. Later drafts were reviewed by the University of Surrey, School of Health Sciences service user group and patient support group of an NHS Trust in

February 2021. Feedback from the various groups mainly related to question wording, clarity and questionnaire length, following which the questionnaire was revised and finalised prior to piloting.

The patient questionnaire was designed to capture information on methods of obtaining medicines, waiting times, satisfaction with consultation, satisfaction with advice and information about medicines, attitudes towards D-SP-TR-IP, quality of life and demographic information and data for economic evaluation. To enable comparison of patients seen by prescribing and non-prescribing dietitians and therapeutic radiographers, generic questions were required that were relevant across a range of conditions, care settings and for patients attending initial or follow up appointments. For these reasons two generic questionnaires, in line with previous work in NMP<sup>67, 78</sup> were selected to be adapted for this study.

The questionnaire included the following sub-scales from validated tools:

- Consultation Satisfaction Questionnaire (CSQ) subscales on 'professional care', 'perceived time' and 'overall satisfaction' <sup>79-81</sup>
- the 'compliance intent' subscale of the Medical Interview Satisfaction Survey (MISS) <sup>82, 83</sup>
- The satisfaction with Information about Medicines Scale <sup>84</sup>
- The Generic medical interview satisfaction scale: the G-MISS questionnaire<sup>85</sup>

Amendments were made to make the wording appropriate to consultations with dietitians and, therapeutic radiographers, additional questions were included on quality of life and satisfaction with services. The questionnaire used a mixture of rating scales, fixed option and open-ended questions set out in seven sections.

After confirming if they were completing the questionnaire for themselves, a spouse/partner or another person, **section 1** asked questions about the service and consultation experience, locations, waiting time for this encounter, and how respondents usually received their prescription for the consulted condition; prescriber information, length of time taken for prescription to be written; and who if anyone writes prescription for the consulted condition. **Section 2** comprised 17 items that patients related to satisfaction, and their views and experience of the consultation with the dietitian or therapeutic radiographer: 10 statements from the Consultation Satisfaction Questionnaire (CSQ) and 7 statements from the quality of hospital consultations<sup>86</sup> used in previous NMP research<sup>78</sup>. **Section 3** comprised 16 items related to consultation experience<sup>85</sup>. Medicines advice and information were explored in **Section 4** which asked for confirmation that medicines advice and or information had been provided during the consultation. Those confirming 'yes' were then asked 17 items related to information they had received about their medicines, and likelihood of taking medicines as prescribed<sup>84</sup>. Those indicating 'no' were redirected automatically to Section 5. **Section 5** explored views on prescribing by dietitians and therapeutic radiographers and contained 4 statements measuring patients attitudes towards D-SP-TR-IP, and confidence in decision making<sup>48</sup>.

**Section 6** employed the validated EQ-5D-5L quality of life questionnaire developed by the EuroQoL group <sup>87</sup>. The EQ-5D composes 5 dimensions with 5 weighted levels affording a single index value score. The standardized extended EQ-5D incorporates a vertical 20 cm visual analogue scale (VAS) rating scale. In response to PPV group members who consistently reported difficulty indicating numerical values for how they felt at any one time point, and it was decided to exclude this from the questionnaire. **Section 7** related to general demographic information in which 6 questions collected

information on age, living arrangements, employment, and ethnic group in order to describe respondent characteristics.

### 3.5.4.3 Pilot

Formal piloting of the patient questionnaire was undertaken January- June 2022-in two pilot case sites one for dietitians (n=1) and one therapeutic radiography (n=5). Six completed questionnaires were returned with verbal feedback to the study researcher indicating that content, layout and design was comprehensive and completion time was of acceptable length. Pilot data were download into a Microsoft Excel© and reviewed by a statistician, who confirmed its suitability for analysis.

### 3.5.4.4 Sampling

A lack of prior work in D-SP-TR-IP meant a meaningful sample size calculation was not possible. Based on previous work in NMP<sup>33, 48</sup> a 60-70% response rate was anticipated, i.e. 48-56 completed questionnaires per site (total n=384-448).

For details of patient participant recruitment for the questionnaire, as well as the patient interview, case record review and observation, please see Section 3.5.1.2.

### 3.5.4.5 Data collection and analysis

Patients had a choice of several ways to complete the questionnaire: via the telephone, online or hard copy. Large print versions of the questionnaire and or coloured paper print-outs were also provided if required.

Those completing by the telephone were contacted by a researcher (n=9), and a mutually convenient time and date for questionnaire completion agreed. Each question was read verbatim over the telephone and answers recorded directly on the online survey platform Qualtrics©. For unanswered calls a message was left on voice mail if available, with explanation of contact and a return University of Surrey mobile phone number. On average 3 telephone contact attempts were made over a one-month period. Participants choosing email contact (n=30) were sent a standardised invitation with attached questionnaire to complete, with reminders at 4 and 6 weeks post initial email, as required. Completed hard copies of the questionnaire returned by post were logged at time of receipt into a Microsoft Excel© file and entered on to the online survey platform Qualtrics©.

Data were downloaded into Microsoft Excel © for coding prior to data analysis.

#### *Data analysis*

All questionnaire data was anonymised and entered on a database and analysed. Frequencies and cross tabulations were used to summarise the data i.e. mean, standard deviation, median and inter-quartile range. When comparing 2 subgroups (notably dietitians and therapeutic radiographers, prescribing and non-prescribing) for a categorical outcome, the Chi-Squared test was used, reverting to a Fisher's Exact test in 2x2 cross tabulations if 1 or more expected cell count was found to be < 5.

Comparisons of means between professions for normally distributed outcomes was carried out using unpaired t-test; and Mann-Whitney U test for non-normally distributed outcomes.

Domain scores for Consultation Satisfaction, Consultation Experience and Satisfaction with Information about Medicines are summarised as mean (SD) and median (IQR). Individual item responses were dichotomised into Agree (Strongly Agree or Agree) vs Not Agree (No opinion, Disagree or Strongly Disagree) and compared using Chi-Squared test or Fisher's Exact test.

For some items, a 'not applicable' response was available. Where this was checked, the participant is not included in the summary or analysis of that item. Analysis for domains or scales that include multiple items will exclude data from any respondent who has checked 'not applicable' for any of the contingent items.

Regression analysis was carried out to explore factors that may be associated with consultation satisfaction scores. For each domain, univariable linear regression models were fitted to each of the following factors to test for associations: prescriber (yes, no); type of consultation (hospital ward, hospital outpatient, community clinic or GP, and telephone/video); gender (male, female, prefer not to say); age; employment status (paid or voluntary employment, unemployed/student, retired/sick); health rating (good/very good/excellent, fair/poor); waiting time (same day, 1-6 days, 7 or more days, booked in advance, not known); seen before by TR/D (yes, no); medications information received (yes, no). This was done separately for each profession. Age was included as a continuous variable. Factors with a p-value of <0.1 were included in multivariable models and non-significant predictors dropped. Coefficients and 95% confidence intervals are presented.

### 3.5.5 Observations

#### 3.5.5.1 Aim

Non-participant observation of D-SP-TR-IP/ NP-DTRs service delivery aimed to observe patient consultations and TR-IPs/D-SP and TRs/Ds roles in real-life context. It also aimed to explore TR-IPs/D-SP and TRs/Ds work patterns, duties and responsibilities, practice/service set up, staff numbers, patient appointment/referral systems, patient pathways and medicines management practices.

#### 3.5.5.2 Field notes

Field notes were used to document descriptions of patient consultations, and TR-IPs/D-SP and TRs/Ds roles in real-life context. Additional notes were also made on TR-IPs/D-SP and TRs/Ds work patterns, duties and responsibilities, practice/service set up, staff numbers, patient appointment/referral systems, patient pathways and medicines management practices.

#### 3.5.5.3 Sampling

For details of patient participant recruitment for observations, please see Section 3.5.1.

Once this additional component of data collection was approved in February 2023 updated participant information was provided, and consent obtained from D-SP-TR-IPs/ NP DTRs, who were advised that practice observation would involve collection of data on general work patterns and medicines management activities.

#### 3.5.5.4 Data collection and analysis

Following approval for this aspect of data collection in February 2023, the study researcher negotiated access to case sites with local service managers, during which the study researcher engaged in non-participant observation periods of up to 1-2 hours, to a maximum of 6 hours per case site (3 hours/clinician), a total of 96 hours across 6 case sites.

Notices and posters placed in clinic area were used inform patients that consultation observations will take place, and information sheets were given as appropriate and consent obtained from the participating patients and staff.

Field notes made during the period of observation supplement data collected from documentary evidence, interviews, patient questionnaires and self-report audits permitting the triangulation of evidence and a method of enhancing rigour of data.

#### 3.5.6 Documentary analysis

##### 3.5.6.1 Aim

The aim of the documentary analysis was to review internal documents (e.g. service audit, patient throughput, DNA rates, adverse events) documentation detailing NMP pathway redesign in practice.

##### 3.5.6.2 Recruitment

At each case site D-SP-TR-IPs and NP-DTRs were asked if they or their organisation could provide any documentation detailing service redesign or workforce planning as result of D-SP-TR-IP.

##### 3.5.6.3 Data collection and analysis

Of the 14 DTRs who participated in a case-site none were able to provide any documentation detailing workforce planning or service redesign related to D-SP-TR-IP. Two sites (one dietitian, and one therapeutic radiography) were able to share training manuals that had been introduced to support implementation of the prescribing role. A lack of appropriate documentation meant it was not possible to undertake any further analysis.

#### 3.5.7 Case-record review

##### 3.5.7.1 Aim

The aim of the case-record review was to assess the quality, appropriateness and safety of medicines management decisions made during the consultation.

##### 3.5.7.2 Development of case-record assessment tool

D-SP-TR-IPs and NP-DTRs anonymised case records, including prescriptions, CMPs, and relevant treatment or clinical guidelines were assessed using a structured assessment tool (Appendix 4.4) composed of 6 sections and was drafted based on the study teams' previous work<sup>49, 76</sup>. The tool was adapted for use to be relevant to all DTRs. Minor amendments to the wording of statements were made to the tool to align with current electronic record systems and the tool was reviewed for face validity by members of the project team.

Data included:

Section A – Type and quality of source documents available (7 items)

Section B – Patient background, medical history, medicines prescribed (4 items)

Section C – Appropriateness of prescribing/ medicines management decision (s) (2 items)  
Section D – Medication errors: assessment of source documents (2 items)  
Section E – Error details: errors identified (9 errors at either prescribing stage or medicines management decision stage)  
Section F – Free text box for any other comments

Section A included an assessment of the availability of source documents (such as information on present/current condition, past medical history, current medication, allergies, rationale for prescribing decision or medicines management decision, prescription record for episode of care, and other relevant information) and a subjective evaluation of the overall quality of the patient record was scored on a scale of 1 (poor) to 10 (excellent).

Assessors were asked to indicate whether or not each item was present in the available information (yes, no or not applicable to patient/condition or type of consultation). Section C & D had the additional options to record 'unsure'.

### 3.5.7.3 Pilot

The case record assessment tool was piloted on a set of electronic medical records chosen randomly from the TR pilot site by four study team members. Minor changes were made to the wording to improve the clarity of the instructions for rating items.

### 3.5.7.4 Sampling

A random sample of patients who had consented to medical records being reviewed was generated using Microsoft Excel® random number generator. A maximum of 10 patients at each site were selected. For full details of participant recruitment, please see **Section 3.5.1**

### 3.5.7.5 Data collection and analysis

Case-records from up to 5 patient consultation with each dietitian or therapeutic radiographer were requested from each site (total anticipated n=80). A total of 43 case records were available, however 11 of these were rejected as they were incomplete or not readable. Each set of records was independently assessed by two assessors with appropriate professional expertise. Assessors were 4 dietitian supplementary prescribers, and 6 therapeutic radiographer independent prescribers. Online-training was provided on the use of the assessment tool and a pilot set of medical records prior to commencement, queries were discussed via email, and or online meetings with 2 members of the research team to enhance inter-rater reliability.

Files were shared with assessors via share point on the University of Surrey server, with copies of the assessment tool for completion and electronic return to the study team. Initial analysis showed only low levels of disagreement between assessors. Where discrepancies of > 2points were noted (n= 5), they were reviewed and resolved through discussion between two members of the study team. Microsoft Excel® and SPSS® Version X was used for data entry and analysis with descriptive statistics.

## 3.6 Economic Evaluation

### 3.6.1 Aim

The aim of the economic evaluation was to:

1. Explore cost-consequences of D-SP and TR-IP service models
2. Evaluate quality, effectiveness and cost of D-TR prescribing educational programmes

The economic evaluation included a model-based cost-effectiveness analysis of supplementary prescribing by dietitians and independent prescribing by therapeutic radiographers compared to non-prescribing DTRs. The economic model was informed by a comparative mixed-methods study, which included self-report audit, case record reviews, D-TR, and team member interviews, D-SP-TR-IP surveys, patient interviews, and patient questionnaire, and a health economic questionnaire for D-TRs (see Appendix 3 & 4).

A within-study analysis was conducted to populate the model with costs, probabilities, effectiveness outcomes and estimates of uncertainty. The within-study data were supplemented with data from other relevant sources. The data on prescribing courses and fees was obtained from the University websites [e.g. <sup>88-91</sup>]. Unit costs were taken from the NHS national reference costs and the Personal Social Services Research Unit (PSSRU) Unit costs for the Health and Social Care report <sup>92, 93</sup>. Staff salaries were estimated using the NHS pay scales<sup>94</sup>. The economic evaluation was carried out from the NHS perspective and adhered to the National Institute for Health and Clinical Excellence (NICE) reference case framework<sup>95</sup>. The model was developed using the recommended methods <sup>96-98</sup> and reported according to Consolidated Health Economic Evaluation Reporting Standards (CHEERS) <sup>99</sup>.

We conducted a scoping review to identify evidence on costs and consequences and the value for money of NMP to inform the model-based economic evaluation<sup>100</sup>. The protocol for the scoping review was registered with the Open Science Framework Registry on 31 July 2021 (registered DOI: 10.17605/OSF.IO/PSR3N, accessible from [https:// osf.io/psr3n](https://osf.io/psr3n)).

### 3.6.2 Model description

The cost-effectiveness model is based on a decision tree see Figure 2. The model was built in Microsoft Excel©. The model considers two options - to train or not to train healthcare professionals in non-medical prescribing.

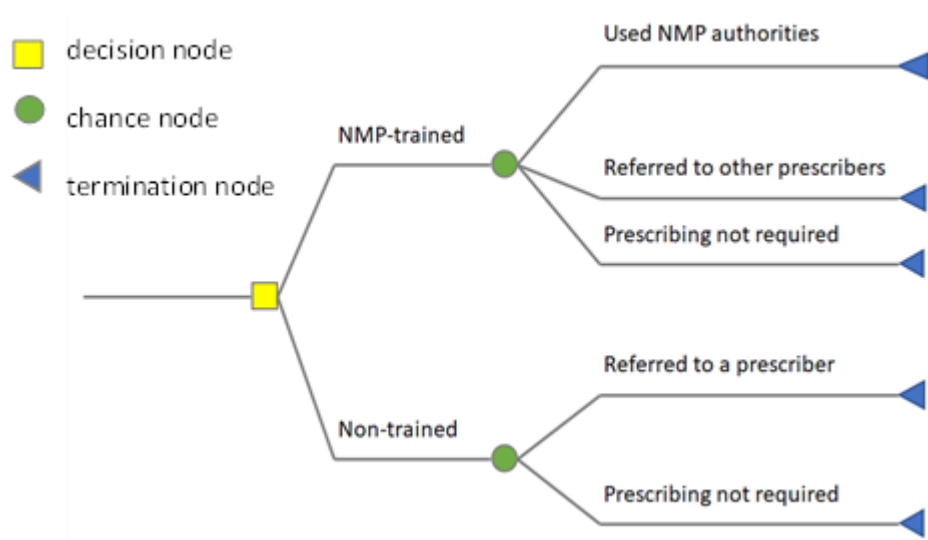


Figure 2. Decision tree illustrating the model. The same model applied to both professions.



Trained professionals may or may not use their prescribing rights and refer patients to other prescribers for prescribing purposes (e.g. general practitioners). Professionals who are not trained in NMP refer patients to a prescriber whenever prescription management is required. The model compared two decisions (to train professionals in NMP or not to train) in terms of costs and patient-reported outcomes (time to obtain a prescription, patients' satisfaction and patients' health-related quality of life (HR-QoL)). The costing perspective was that of NHS with a price year of 2021-2022. The list of model assumptions used in the model and correspondent references are shown in Table 1. The analysis considers one- and five-year post-training time horizons (many NMP training courses take from 6 to 10 months to complete). To estimate costs for the five-year time horizon scenario, the costs associated with the training programme were only considered in the first year, with the cost of referral, consultation and prescribing-related activities included for all five years. In line with the National Institute for Health and Care Excellence (NICE) recommendations, the costs associated with referral, consultation and prescribing-related activities that occurred in years two to five were adjusted at a rate of 3.5%<sup>101, 102</sup>.

**Table 1 Study assumptions (and inclusion/exclusion criteria)**

Item	Assumption
Cost of the patient referral to other prescribers (including doctors)	Patients' referrals to other prescribers were costed in line with the NICE recommendations as these usually mean unplanned consultations, which cannot be used for other patients. We assumed that 50% of referrals would be managed face-to-face and 50% via telephone or online consultation.
The training course fee	An average course fee was estimated based on data collected from study participants (i.e. trained dietitians and therapeutic radiographers) and other data gathered from the Health and Care Professions Council website and course programme webpages (see Table 2) for both professions.
Out-of-pocket (OOP) expenses	The OOP expenses related to the training programme (i.e. travelling, transport, study material, etc) paid by professionals (i.e. trained dietitians and therapeutic radiographers) was calculated based on data collected using the health economics questionnaires. Two cost scenarios were assumed one including the OOP expenses (as the employers might pay a refund for this) and one excluding these expenses.
Cost of time off work to complete the course	The costs associated with time off work were calculated using data (e.g. course duration, paid study time and work hours per week) and the average salary (i.e. pay band) received by each profession based on data collected from the study sample.
Cost of personal study time	The data collected during the study shows the trained professionals were reimbursed partly for their personal study time during the training course, which was included in the non-medical prescribing training related costs. Where the professionals were not reimbursed for their personal study time, it was considered as part of the OOP expenses incurred by the professionals.
Patient contact	The average number of patient contacts per year was estimated using data collected from the study sample. We assumed a year of 48 working weeks for both professions to calculate the number of patient contacts annually ( <a href="https://www.healthcareers.nhs.uk/explore-roles/allied-health-professionals/roles-allied-health-professions/">https://www.healthcareers.nhs.uk/explore-roles/allied-health-professionals/roles-allied-health-professions/</a> )

### 3.6.3 Cost of training prescribers and training cost per patient

As discussed in the previous sections, since 2016, dietitians have been authorised to be trained as supplementary prescribers and therapeutic radiographers as independent prescribers. The healthcare

professionals from the two professions who have completed an approved NMP course are legalised to prescribe and manage medication within their scope of practice area<sup>103, 104</sup>.

The Health and Care Professional Council website was used to gather information about NMP training programmes for dietitians and therapeutic radiographers in England in 2021 delivered by different universities<sup>91</sup> (see Table 2), supplemented by information from course websites related to course duration, fees and methods of delivery (Appendix 7 XIII).

**Table 2: A summary of the characteristics of 20 NMP training programmes in the UK in 2021**

Item	Minimum	Average	Maximum
Duration (week)	3	6	13
1Number of training sessions (day)	10	30	48
Class/study time (hour)	7	7.5	8
Fee (£)	1,200	1,800	3,240
Course credit	20	40	60
Annual intake	2	2	4
Average number of attendees per intake	40	60	80
Average number of attendees in each cohort	6	6	6

Note: All data were collected using online websites of sample courses approved by the Health and Care Professions Council for dietitians and therapeutic radiographers. A few course organisers were contacted to obtain information on annual intake, average number of attendees per intake and average number of attendees in each cohort.

Training costs included course fees, employer-paid additional study time and out-of-pocket expenses associated with attending the course (e.g. travel, accommodation, study materials and personal study time). Out-of-pocket expenses were included in the costing since these potentially can be reimbursed by the employer. The data on employer-paid additional study time, staff pay grades and out-of-pocket expenses were collected using the health economics questionnaires (Appendix 7.1). Additional study time was costed using the NHS pay scales 2021-2022<sup>94</sup>. Not all patients required a prescription or to manage their medication. Therefore, two scenarios were considered when calculating the training costs: the average cost per patient seen and the average cost per patient required to manage their medication.

### 3.6.4 Cost of consultations and prescribing-related activities

Spending time on prescribing activities (e.g. reviewing medication) means that the prescriber group might need to spend more time and cannot use this time for other patients (compared to the non-prescriber group). Therefore, time should be accounted for in the cost-effectiveness analysis. Data on prescribing activities (number of patients seen/required to manage their medication, consultation time with the patient, preparation time for prescribing, time spent writing the prescription, etc.) were collected using the health economics questionnaires (Appendix 7.1). The unit costs were obtained from the NHS reference cost 2021-22 to estimate the costs associated with consultations and prescribing-related activities<sup>92</sup>.

### 3.6.5 Cost of healthcare use by patients

Our original intention was to analyse the data on the use of secondary care (hospitalisations, consultations, A&E attendance, etc.) by patients managed by prescribers and non-prescribers. We planned to download these data from the NHS Secondary Uses database (<https://digital.nhs.uk/services/secondary-uses-service-sus>). This was however not possible as NHS Digital (data custodian for the NHS) subsequently requested a significant unexpected payment for downloading the data since we were considered non-NHS data users (though the project included

three NHS partners: University College London Hospitals NHS Foundation Trust, University Hospitals Bristol NHS Foundation Trust and NHS Trafford CCG). We partially mitigated the impact of the unavailability of the NHS data by including the question about “referrals to other specialists” in the service providers' questionnaires and incorporated the cost of referrals in our model.

### 3.6.6 Cost of referrals

Non-trained and trained healthcare professionals may refer patients to other prescribers for prescribing purposes. A referral for a prescription may require a consultation with another healthcare professional (e.g., GP, hospital consultant, etc) face-to-face, via telephone, or online. This means that this consultation cannot be used for other patients and should be included in the cost. The data on the proportion of referred patients was collected using data from health economics questionnaires (Appendix 7.1) and audits.

We elicited the relevant groups of professions the patients were referred to by dietitians and therapeutic radiographers for prescribing purposes according to audits data and specialties of the case sites in our study. A subsequent list of services was gathered from the NHS National Reference Cost Dataset representing different specialities e.g. GPs or consultants or other relevant healthcare professionals led by consultants providing face-to-face and non-face-to-face consultations to patients referred by dietitians and therapeutic radiographers. We used medical and clinical oncology services for a range of cancers covered by the case sites in our study for the two professions. Referrals to other prescribers were costed using the NHS reference costs<sup>92</sup>. The National Reference Unit Costs are aggregated costs which represent the value of specific interactions of patients (e.g. consultations) or the specific episodes of care (e.g. surgical procedures). These are based on the average cost of services submitted by NHS organisations in the annual National Cost Collection. The National Schedule of Reference Costs is published annually at <https://www.england.nhs.uk/costing-in-the-nhs/national-cost-collection/>.

### 3.6.7 Cost of deprescribing medicines

Deprescribing is part of the prescribing process, and it is defined as discontinuing or reducing the dose of medications or changing or stopping medicines<sup>105</sup>. Deprescribing can potentially contribute to reducing the costs of prescribing, however, we did not have sufficient data to make accurate estimates of the extent or the costs of deprescribing medicines for both professions.

### 3.6.8 Effectiveness outcomes

Effectiveness outcomes considered in the cost-effectiveness analysis included the time to obtain a prescription, patients' satisfaction and patients' health-related quality of life (the latter was used to calculate quality-adjusted life years, QALYs). The time to obtain a prescription from prescribing specialists was collected using patient questionnaires (Appendix 7) with the following categories: “less than 5 minutes”, “5 to 10 minutes”, “10 to 20 minutes”, “20 to 30 minutes”, “more than 30 minutes”, “the next day”, “several days or more”, and “don't know”. In the case of referrals to other specialists, the time categories were: “on the same day”, “1 - 3 days”, “4 - 6 days”, “1 - 2 weeks”, “up to a month”, “more than a month”.

Patients' overall satisfaction with consultation and patient's overall experience of the consultation were collected using the patient questionnaire (Appendix 4.1) with the following categories: “strongly disagree”, “disagree”, “no opinion”, “agree”, and “strongly agree” Patients' health-related quality of life was measured using the EQ-5D-5L questionnaire asking patients about their mobility, self-care, pain/discomfort, anxiety/depression and usual activities (e.g. work, study, housework,

family or leisure activities). It includes five possible response categories: “no problem”, “slight problem”, “moderate problem”, “severe problem” and “extreme problem”<sup>106</sup>. Quality-adjusted life years (QALYs) were then calculated using utility values for England<sup>107</sup>.

### 3.6.9 Cost-effectiveness analysis

We conducted a cost-effectiveness analysis to evaluate incremental changes in costs and effectiveness outcomes for supplementary prescribing by dietitians (i.e. prescribers) versus non-trained dietitians (i.e. non-prescribers) and independent prescribing by therapeutic radiographers compared to non-trained therapeutic radiographers. The incremental cost-effectiveness ratio (ICER) was calculated as the difference in costs between services provided by prescribers and non-prescribers (incremental cost,  $\Delta C$ ) divided by the difference in effectiveness outcomes (incremental effect,  $\Delta E$ ).

$$\text{ICER} = \frac{\Delta C}{\Delta E}$$

Costs included in the analysis consisted of the cost of training, the cost of prescribing-related activities and the cost of referrals to other prescribers. Effectiveness outcomes included the time to obtain prescriptions, patients’ satisfaction and QALY. In the analysis of waiting time, the denominator was multiplied by -1 to reflect the fact that a lower waiting time represents a better outcome.

To account for the heterogeneity of the sample, the effectiveness outcomes were adjusted for covariates using a mixed-effects linear regression model with ‘study site’ as a random effect. Covariates included in the model as fixed effects were age, gender and general health status.

Deterministic sensitivity analysis was conducted to address the uncertainty of model parameters, including probabilities, costs and effectiveness outcomes. A probabilistic sensitivity analysis was undertaken to assess the joint uncertainty in model parameters. To deal with uncertainty, probability distributions were assigned to probabilities, effectiveness outcomes and costs. 5,000 Monte-Carlo simulations were conducted to generate samples of health and patient outcomes and costs, and distributions of ICERs, which are shown as a scatterplot (i.e. the cost-effectiveness plane). In the cost-effectiveness analysis using QALY (also referred to as cost-utility analysis), the probability of non-medical prescribing being cost-effective was estimated using the net monetary benefit (NMB) approach. NMB represents the monetary value of extra gains in QALY associated with the intervention (in this study, non-medical prescribing) for a given willingness to pay WTP ( $\lambda$ ).

$$\text{NMB} = \lambda \times \Delta E - \Delta C$$

Non-medical prescribing is seen as cost-effective if the ICER is less than some maximum amount ( $\lambda$ ) that the payer (i.e. NHS England) is willing to pay.

$$\Delta C / \Delta E < \lambda$$

It follows that for the intervention to be cost-effective, the following decision rule should apply:

$$\lambda \times \Delta E - \Delta C > 0$$

We explored the probability that non-medical prescribing is cost-effective at £30,000 per quality-adjusted life year considered by NICE for the UK context<sup>101</sup>. A deterministic sensitivity analysis was conducted to evaluate the sensitivity of the findings from our model-based analysis to variations in the model parameters.

### 3.7 Triangulation

This was a comparative case study design<sup>108 47</sup>(comprising 8 sites) and multiple data collection methods. Data collected by each of the separate methods (literature review, surveys, audit, interviews, documentary evidence, observations, patient questionnaires, and case record review) was initially analysed and reported in individual units. Comparisons between the two professions and between prescribing and non-prescribing groups, where applicable, were made within in each unit of analysis and reported as such in the results (Section 6). Detailed notes on individual case sites were summarised and presented in the findings. This was followed by a process of triangulation, whereby consideration was given to convergent evidence across sites and findings as a whole in order to inform the discussion<sup>108</sup>. Triangulation of methods and data sources was used to confirm the accuracy of the data-set and to inform answers to the original study questions and objectives<sup>109</sup>. This process of convergent validation enhances trustworthiness, transferability and rigour, as well as enabling a holistic portrayal of the impact of prescribing and its complexity in real life context<sup>108 47</sup>.

### 3.8 Research Ethics

Ethical approval for Phase 2 was obtained from University of Surrey ethics committee in August 2019, UEC 2019-076. NHS Research ethics approval for Phase 3 was obtained from London-Camberwell St Giles Research Ethics Committee in April 2021, REC Ref No 21/LO/0316. Recommended procedures for recruiting participants and obtaining informed consent were followed. Participants were made aware of right to withdraw and told study participation, or withdrawal, would not affect NHS service provision or employment. Where possible, study information was sent 1-2 weeks in advance to all potential patient participants. Each site also advertised the study prior to and during data collection.

## 3.9 Phase 4: Development of D-TR model of implementation and online tool kit

### 3.9.1 Introduction

Phase 4 of the study aimed to synthesize findings from Phase 1-3 to provide evidence of the emerging NMP model of implementation informed by diffusions of innovation<sup>58</sup>, normalisation process theory<sup>110, 111</sup> and the consolidated framework of implementation research<sup>52</sup>.

Using principles of participatory co-design<sup>112</sup>, emerging findings were brought to a wider consultative group of people who had participated in the study, including research participants, PAG and PPV members during three workshops (April 2021, January 2023 & May 2023). Participants were involved in both interpreting findings and identifying key messages that influence service commissioning, implementation within clinical settings and priority areas for tool kit content.

### 3.9.2 Objectives

The objective for this study phase was to develop a non-medical prescribing implementation toolkit for dietitians and therapeutic radiographers.

### 3.9.3 Recruitment

Building on team expertise in non-medical prescribing and toolkit development<sup>54</sup>, utilising nationwide contacts and case site participants, a group of volunteers were invited to participate in the development of the toolkit to support adoption and integration of NMP within practice.

Of the 24 people who responded 10 attended meeting one, 8 the second, 9 the third and 5 the final meeting, along with the core study team and PPV members (n=2). Volunteers comprised a mix of TR-IPs, D-SP, D-TR service managers, NMP leads and NMP course leads.

### 3.9.3 Tool kit development

Priorities for the NMP implementation tool kit identified during the first workshop were prioritised using a consensus event at meeting 2, with a subsequent plan of action (see section 7).

### 3.10 Patient and Public Involvement

A range of approaches to patient and public involvement were utilised during the project. Our co-production approach was primarily supported by our PPI co-investigator, and two patient public voice (PPV) volunteers who were recruited to the Project Advisory Group in October 2019.

Due to the diverse nature of services provided by dietitians and therapeutic radiographers it was not possible to establish a PPI group of service users across D-TR specialities. The recommendation from NHS England Involve in 2019 was to recruit 2-3 core PPI members to support the project throughout and adopt a flexible approach to obtaining additional PPI input.

In order to ensure optimal PPI participation additional input was obtained as and when required throughout the project including a patient support group of an NHS Trust, the University of Surrey, School of Health Sciences service user group, and an NHS England patient group.

Our PPI co-investigator was invited to and participated in monthly team meetings, the PAG, and NMP toolkit development meetings. They were also involved in the recruitment of the two PPVs and helped facilitate a patient group meeting regarding the content of a patient information leaflet. PPV volunteers also participated in the PAG and NMP toolkit development meetings. The NHS England patient group were specifically involved in the development of a patient facing leaflet.

The core PPI team were invited to comment on study recruitment, content, presentation and format of numerous study documents including phase 2 surveys of D-TRs and D-TR managers, phase 3 case studies; patient information sheet and patient questionnaires, and phase 4- NMP toolkit development and content. Interim PPI newsletters (June 2021, December 2022 and January 2024) were shared and provided ongoing updates on study progress with an invitation to provide feedback and comments to the research team. PAG meetings and NMP toolkit development meetings also allowed the core team of PPI members to discuss study progress and emerging findings.

Throughout the project the various co-production activities helped ensure that PPI members contributed to a range of different activities and had opportunity to voice their opinions, share lived experiences and put forward suggestions to inform the project.

Following an initial in person PAG meeting, the remaining activity was conducted remotely, reducing travel and cost, allowing contributions from a wider range of people from diverse groups of the population across England. This approach worked well throughout particularly during the height of the Covid-19 pandemic. During meetings discussions naturally flowed and active meeting participation was facilitated by a member of the research team, comments were captured and fed into the various aspects of work as outlined in Section 3. & 7.

Having a PPI co-investigator and core team of PPI members helped ensure we had regular and ongoing feedback adding value to the project. Our PPI co-investigator reported that they felt listened to, that their advice was followed and a valued team member. Challenges were experienced regarding managing expectations of some PPI members and balancing this against the agreed scope of work and budget constraints. Changes made to patient facing information proved problematic during the subsequent analysis of case-study data as the questionnaire items then deviated from original published scales.

### 3.11 Equality and Diversity

From its inception the project adopted an inclusive approach to establishing research team member, project plans, and project advisory group reflecting the diverse nature of commissioning brief along with dietitian and therapeutic radiography services. The research team including the PPI co-investigator, project advisory group, PPV members, PPI contributors, working group for NMP toolkit, healthcare professionals, managers and patients were drawn and recruited from across England reflecting diversity in ethnicity, gender, disability, age and sexual orientation.

Phase 1, literature review comprised of evidence drawn from international published articles; phase 2, participants from national level surveys (D-TR survey and manager survey) provided a national demographic profile of dietitian supplementary prescriber (D-SP) and therapeutic radiographer independent prescriber (TR-IP) service provision and the healthcare professionals who undertake non-medical prescribing training, and provide information on age. Results show that representation from each region in England was achieved (see section 6).

Geographic diversity was achieved through purposive sampling of case-study sites for phase 3. Social, ethnic and economic demographics of local populations were considered prior to approaching sites regarding interest in study participation. Obtaining feedback from patients was an integral part of the case study design and achieved through patient questionnaires and interviews. Our patient questionnaire collected data on ethnicity, gender, age, socioeconomic status. Development of the implementation toolkit, phase 4 also included input from representatives across the United Kingdom to ensure national relevance and applicability.

A flexible approach to PPI activities meant that most of this was largely undertaken remotely reducing travel burden for those with long-term conditions, and further supporting contributions from a wider range of people from diverse groups of the population across England. This approach worked well particularly during the height of the Covid-19 pandemic.

Demographic information from the prescriber surveys indicated implementation was dispersed across England. Despite this, findings highlighted inequitable access and inter-professional competition for funding against more established NMP professions, such as nurses. The different legal standing across NMP professions regarding IP responsibilities and ability to prescribe controlled drugs caused, in some cases, marginalisation and unequal access to funding for NMP training and job positions. As some organisations were slow to develop a coherent AHP NMP strategy, there is potential for unwarranted regional variation in DTR workforce upskilling, which may widen regional inequalities in access to healthcare.



## 4 Results from Phase 1: Literature review

### 4.1 Overview

Of the 41 full text articles assessed for eligibility, 16 met the inclusion criteria of which 11 related to dietitians<sup>113-123</sup> and 5 therapeutic radiography<sup>124-128</sup> (see Appendix 2). Updated searches in November 2023 yielded an additional three articles related to dietitians (revised n=14) and one related to therapeutic radiographers (revised n=6) a total of 20 papers.

*Dietitians:* Seven articles focused on advanced practice (AP)<sup>113, 114, 120-123, 129</sup>, 2 reported core components of the role<sup>113, 114</sup> and 6 the main activities and benefits associated with AP<sup>120-123, 129, 130</sup>. Seven explored general medicines management activities<sup>115-119, 121, 130, 131</sup>, including 3 which reported on patient outcomes<sup>115, 118, 131</sup>. Each article, bar one<sup>131</sup>, identified factors that can inhibit or facilitate the uptake and implementation of AP and medicines management activities<sup>113-123, 129, 130</sup>. Literature originated from 5 countries: United Kingdom, USA, Sweden, Canada, and Australia.

Of the 14 included articles; 8 were quantitative studies<sup>114-116, 118-121</sup>, 3 Delphi studies<sup>113, 117, 123</sup>, 1 mixed methods<sup>129</sup>, 2 qualitative studies<sup>122, 130</sup>. Quantitative studies included 6 questionnaire surveys<sup>114, 116, 119-121, 131</sup>, and 2 case record reviews<sup>115, 118</sup>. The mixed methods study comprised a questionnaire survey and interviews<sup>129</sup>. The 3 studies adopting a Delphi/modified Delphi technique comprised literature reviews, consensus events, and 2-3 survey rounds.

*Therapeutic Radiographers:* Four papers reported on the scope of advanced practice for therapeutic radiographers<sup>125-127, 132</sup>(APTR), and 2 medicines management activities<sup>124, 128</sup>, along with patient satisfaction. Factors that can inhibit or facilitate the uptake and implementation of AP and medicines management activities were identified in each article<sup>124-128, 132</sup>. Articles were from the UK, Canada, Portugal and Singapore.

The six papers comprised 4 quantitative studies, adopting questionnaire surveys<sup>124, 126, 127, 132</sup>, 1 Delphi study<sup>125</sup> and 1 mixed methods study<sup>128</sup>. The Delphi study<sup>125</sup> used a consensus event, and an online survey while Shi<sup>128</sup> used 2 rounds of clinical observations and a survey in their mixed methods study.

### 4.2 Dietitian Literature

#### 4.2.1 Scope of dietitian advanced practice

There was a lack of consensus regarding the definition of what constitutes advanced dietetic practice (ADP) between countries, which was generally poorly defined or dependent on individual interpretation<sup>113, 114, 120-123</sup>. In the UK, an agreed framework for Advanced Clinical Practice (ACP) has specific criteria for educational level, autonomy and experience, along with stipulated performance to an advanced level but does not specify a need to be a prescriber<sup>2</sup>. Whereas in other countries such as the US and Australia, AP is associated with greater professional status<sup>114</sup>, increased job satisfaction<sup>122, 123</sup>, depth and breadth of scope of practice<sup>114, 123</sup>, specialist expertise and/or increased autonomy<sup>113, 123</sup>. There was however a lack of agreement about role preparation<sup>122</sup> and a lack of recognition regarding the importance of ADP by employers<sup>122</sup>. For example, Skipper and Lewis's survey<sup>122</sup> identified that 76% of 391 US based dietitians considered themselves to be working at an advanced

level of practice but only 38% had a degree level qualification or met the entry level criteria. Although 90% of 440 survey respondents also reported AP was important to the dietetic profession, only 49% of 61 employers recognised the need for the advanced dietitians in practice. More recently Delaney<sup>129</sup> reported 61.7% of 81 survey respondents were considered to be working within an 'advanced scope of practice', and 29.6% an 'extended scope of practice'. While 75% of all respondents had >6 years dietitian experience, details regarding qualifications and role preparation were not reported.

Taking on tasks that others have previously carried out, such as prescribing and order-writing were seen as key examples of AP<sup>113, 114, 116, 119, 121-123, 129</sup>. However, prescribing and order-writing activities were not always considered to be essential components of advanced practice in Canada<sup>123</sup> or the US<sup>114</sup>. Cochran's<sup>114</sup> survey of 33 US nutrition support dietitians for example, found only 72% participants who described themselves as 'advanced' held order-writing privileges, with 28% making treatment recommendations only. Similar results were reported by Wildish and Evers<sup>123</sup> in a Canadian based survey of RDs, and stakeholders where only 73% of 365 respondents considered order-writing privileges to be a key aspect of the increased autonomy associated with ADP.

#### 4.2.2 Medicines management activities

Literature on medicines management activities is predominantly descriptive and based outside the UK<sup>116-119, 121</sup>. The available evidence suggests that medicine management activities focus on 2 key areas: i) initiating parenteral nutrition<sup>115-118, 121</sup> (PN), or nutrition prescriptions<sup>116 130</sup>, and ii) adapting or changing treatments/ titration of doses<sup>115, 116, 118, 121, 129</sup>.

Evidence on dietitian involvement with medicines management in the UK is scarce with only 1 study reporting on the extent to which a specially trained dietitian and a pharmacist can safely and effectively prescribe perioperative PN<sup>115</sup>. After being deemed competent by a medical consultant, assessment of 370 nutrition support decisions made by dietitians identified 35% were recommendations to commence, adjust or stop parenteral feeding, and a third related to the volume or formulation of PN, on initiation of treatment or in respect of changes that were felt to be subsequently required.

Early work undertaken in the US and Puerto Rico by Olree & Skipper<sup>117</sup> aimed to obtain consensus regarding the frequency with which nutrition support dietitians performed 15 previously validated advanced level nutrition support tasks including physical examination, prescribing enteral formulae, medical rounds, and research. Tasks reported to be undertaken often or always by chief clinical dietitians (n=124) and nutrition support dietitians (n=120) included 'determining macronutrient content for parental nutrition' (56%), 'transitional feeding' (50%), 'prescribing enteral feeding' (49%), 'medications and nutrition' (49%) and 'completing parental nutrition orders' (16%).

Focussing on activities related to US based advanced Registered Dietitians (RDs) dietetic practice in diabetes, Green et al.<sup>116</sup> examined 16 functions of with the aim of identifying the activities associated with different levels of practice. Secondary analysis of survey data (n=1,282) found 320 advanced practitioner RDs reported frequent activities included 'provision of treatment and prevention recommendations for hypoglycaemia' (93.1%); 'developing nutrition prescriptions' and 'instructing patients in glucose pattern management' (92.5%); 'recommending medication changes to physicians' (86.9%); and 'initiating medication adjustments' (81.3%).

Similarly, the ability to independently order, modify and monitor nutrition therapy were the most frequently cited examples of autonomous RD practice by participants in Skipper & Lewis's (2006) qualitative study<sup>121</sup>. Several RDs highlighted how they had obtained additional clinical privileges that enabled them to order PN and enteral nutrition (EN), or modify medications such as insulin, phosphate binders, and calcium and iron supplements.

Those engaged in 'advanced practice' in Delaney's survey<sup>129</sup> reported they were mainly involved in providing recommendations to the medical team for initiation or dose adjustment of pancreatic enzyme replacement therapy (PERT), and education on PERT and associated risk. Those (29.6%) deemed to be engaging in an 'extended scope of practice' were however, frequently involved in the adjustment of medications or discussing recommendations with patients without medical team input.

Following 2014 & 2017 legislative changes, Peterson et al. (2020)<sup>119</sup> recently reported the uptake and use of nutrition related ordering privileges by 558 hospital or long-term care -based registered dietitian nutritionists. Amongst the participant's 52% (n=306) were found to have PN ordering privileges and 81% (n=407) EN, the majority writing 10 or fewer orders of either type in a typical week. However, restrictions on practice were also reported with 28% of PN and 44% of EN orders requiring a provider co-signature.

Qualitative findings from Swedish dietitian's<sup>130</sup> identified that shared tailoring of ONS prescriptions with the patient, and being flexible regarding products and amounts prescribed was a core component of dietitian prescribing for ONS use. Adopting different approaches to communication and organisation of practical issues (e.g., ONS delivery and support) was also key to supporting and facilitating patients' ONS usage.

#### 4.2.3 Care outcomes and costs

Five studies reported beneficial effects of ADP on patient outcomes<sup>115, 118, 120, 129, 131</sup>. Positive outcomes identified by Farrer et al.<sup>115</sup> and Peterson et al.<sup>118</sup> included improving patient safety by reducing inappropriate tube feeding, preventing infections, avoiding mistakes on written orders or preventing decisions deemed not to be clinically beneficial, with Mohammed-Elfadil<sup>131</sup> reporting improved consumption of ONS in hospitalized patients with, or at risk of malnutrition. For example, there was agreement that 50% of decisions undertaken by a specially trained dietitian and a pharmacist had improved patient care in the study by Farrer et al.<sup>115</sup>, with 2-8% classed as significant interventions, averting adverse events and no adverse effects on patient safety reported. Additional results reported by Delaney et al.<sup>129</sup> identified 97% survey respondents believed that formalised extended scope of practice pathways would enhance high quality person-centred care, with interview findings highlighting additional potential benefits related to increased convenience for patients, and time saving if dietitians could write prescriptions for PERT.

Peterson et al.'s<sup>118</sup> secondary analysis of retrospective cohort data from 1,965 patients in a single tertiary care centre found that tube feeding decreased by 18% from 1,080 to 885 patients when care was provided by advanced dietitians: this was largely achieved via identification and elimination of inappropriate tube feeding, which decreased from 482 (45%) to 240 (27%) patients. No significant

changes were detected in infections rates, length of hospital stay or the number of admissions to intensive care.

An Australian based longitudinal survey by Simmance et al. (2019)<sup>120</sup> is the only paper to report on service changes following the introduction of AP dietitian roles. Of the 5 sites reporting development and implementation of gastronomy-based AP roles and ten credentialled dietitians, after 12 months > 120 independent g-tubes had been removed generating >200 service events. This included diverted service events from medical inpatient consultations or specialist outpatient clinics, resulting in an avoidance of 15 emergency department admissions to the short stay unit and 100 endoscopy unit and radiology appointments, with no adverse reactions reported. A reduction in waiting times to access g-tube procedures from up to 6 months at baseline to 0–2 days for urgent cases and 1–2 weeks for routine care was reported across all sites: two sites reported restricted access during weekends and out of standard working hours due to the low number of credentialled dietitians.

Three articles offered some assessment of economic impacts<sup>118, 120, 131</sup>. Financial savings caused by a 20% reduction PN costs associated with preventing unnecessary tube feeding and avoiding wastage from PN bags was estimated to save USD\$300K during the 2-year period studied by Peterson et al.<sup>118</sup>.

Similarly, Simmance et al.<sup>120</sup> estimated savings related to the costs of hospital admission, medical procedures and hourly rates of pay for dietetic and medical staff as part of their mixed-method survey, with overall health service savings conservatively estimated at AUD\$185K over a 12-month period. These savings were broken down into AUD\$44.7K from averted emergency department admissions, AUD\$103.6K from avoided endoscopy visits, AUD\$5.7K from avoided radiology visits and a further AUD\$30.9K from 206 other instances in which dietitians were able to provide care that would otherwise require intervention from a medical specialist.

A more recent survey undertaken in the US by Mohamed-Elfadil et al.<sup>131</sup> observed that compared to physicians and nurses, ONS prescribed by a dietitian were associated with significantly less wastage in hospitalized patients with, or at risk of malnutrition ( $p < 0.0001$ ). Cost savings associated with the reduced wastage were however not reported.

#### 4.2.4 Facilitators and barriers

Several factors were identified that can inhibit or facilitate the uptake and implementation of ADP (see Appendix 2).

Aspects highlighted as important to supporting ADP included: practitioner readiness ( $n=6$ ) and having access to support, supervision, and funding ( $n=6$ ). It was recognised that having advanced knowledge, expertise and a post-registration qualification was key to supporting specialist clinical skills<sup>113, 115-117, 119, 121</sup>. Completion of education or training in medical nutrition therapy, counselling, and an ability to communicate with multiple groups were key areas reported in several studies<sup>113, 115, 118, 119, 121, 122</sup>. Equally having support from the organisation and senior colleagues were also deemed to be key to successful implementation<sup>115, 118, 120, 129</sup>.

Advanced dietetic roles were associated with increased career and professional opportunities along with increased job satisfaction and retention in the workforce<sup>114, 120, 122, 123, 129</sup>. Improved team working,

knowledge and skills along with communication with patients and key stakeholders were also found to help AP role development<sup>119, 121, 123, 130</sup>. The benefits hinged on enabling factors like strong executive and stakeholder support and the availability of funding for training and backfill, and appropriate governance frameworks<sup>115, 120, 122</sup>.

Although there was some evidence of the benefits of ADP including improved patient outcomes and satisfaction<sup>120, 122, 129</sup>, along with service improvements such as increased efficiency and reduced waiting times<sup>114</sup>, a number of issues regarding the development and implementation AP roles were noted.

A lack of clarity regarding the AP role often led to a lack of support and the required governance, and infrastructure needed for successful role implementation<sup>119, 120, 122, 123, 129</sup>. Barriers to effective implementation included state level regulation and restrictions, a lack of available training and accreditation<sup>115, 119, 123</sup>, resistance from other professional groups<sup>119, 120, 122, 123, 129</sup> and a lack of manpower and resources<sup>120, 122, 123</sup>. Concerns about legal liability, and insufficient education or experience, and in some instances a lack of RD interest<sup>120</sup> and expanded waiting lists<sup>130</sup> were also felt to hamper implementation of advanced dietitian roles.

## 4.3 Therapeutic Radiographer Literature

### 4.3.1 Scope of therapeutic radiographer advanced practice

AP for therapeutic radiographers remains ill defined, with 3 studies being undertaken between 2014-2019 in Canada<sup>125-127</sup>, and a 2023 European survey<sup>132</sup>.

AP was associated with increased autonomy<sup>125-127</sup>, and extended scope of practice<sup>125-127</sup>, specialist knowledge<sup>125-127</sup>, increased job satisfaction<sup>127</sup> and knowledge<sup>127</sup>. The ability to prescribe and or dispense medicines along with provision of medicines information was a key characteristic of the AP-TR role reported in the earlier studies.

Initial work by Kinamore<sup>126</sup> with 183 radiation therapists in British Columbia found a high level of agreement with the Canadian Association of Medical Radiation Technologists (CAMRT) definition of AP that it requires post degree level educational preparation (43%), an extended scope of practice (54%), expert competency and leadership (49%) and 5 year minimum level of RT experience (40%). Although only 28% agreed or strongly agreed that they were currently practising at an AP level, results showed prescribing routine medicines was the task most frequently associated with AP by 83% of 119 respondents who agreed with the task being AP.

Aiming to improve clarity in Western Canada, Martens<sup>127</sup> used Kinamore's existing survey 1 year later to explore perceptions of advanced RT in Alberta. A similarly high level of agreement with the CAMRT proposed definition of AP was found including the requirement to have undertaken post-degree level educational preparation (95%), extended scope of practice (83%), expert competency and leadership (88%) and a 5-year minimum level of RT experience (75%). Forty-two (75%) of the 56 survey respondents agreed that the AP role should include prescribing routine medicines.

In their mixed method study, Harnett et al.<sup>125</sup> used a consensus method to develop a definition for AP radiation therapists in Ontario identifying 7 traits including increased autonomy, having additional knowledge and skills, extended scope of practice and leadership and 4 levels of practice, including early, expert, specialised and advanced-level practitioner. The ability to prescribe and dispense drugs for pain relief from an approved formulary appeared amongst the clinical competencies needed for AP roles designed to meet the pressures of a growing demand for cancer care on an already overstretched workforce.

A recent European Survey assessing AP roles amongst TR/ RTTs by Oliveira<sup>132</sup> found a lack of professional recognition for advanced practice was still evident across 21 European countries. Advance practice activity was associated with direct care including patient information (pre/ during and post treatment); patient assessment and management and site specific roles. Pharmacological intervention was noted but the actual number not reported in the paper. A master's degree was seen to be crucial to advance practice work. Despite this only 53% (n=100/189) reported advance practice postgraduate education, with prescribing reported by only one person. Pharmacology and radiopharmacology were reported as an education need by 15% (n=29) respondents.

#### 4.3.2 Medicines management roles by advanced therapeutic radiographers

Literature reporting medicines management activities performed by advanced TR was extremely limited with only 2 studies, both situated in the context of a treatment review clinic where medication is typically prescribed to treat side-effects of radiotherapy<sup>124, 128</sup>. Despite potential opportunities for role enhanced and diversity through increased access to medicines granted via supplementary prescribing rights in 2006, only one small scale evaluation of SP was identified<sup>124</sup>.

In order to determine the scope of radiation therapists (RTT) practice, Shi et al.<sup>128</sup> compiled a list of tasks performed in treatment review clinics from observations of 160 consultations in Singapore which were subsequently used to assess 22 radiation oncologists and 52 radiation therapists views and opinions on the ability of radiation therapists to undertake the identified tasks. More than a third of reviews were found to need some form of medical intervention, i.e. wound dressing, referrals or the prescription or modification of drug regimen. Overall, both professions agreed that radiation therapists were capable of leading treatment reviews, giving patients advice on side-effects and answering questions related to treatment if they were given the appropriate education, multidisciplinary support, and development of appropriate medico-legal governance frameworks. Interestingly, neither group felt that TRs were capable of recommending medicines to treat standard side effects or answering medical questions.

The second limited service evaluation of 5 SPs in one UK hospital<sup>124</sup> found although qualified >2 years prescribing rates were low, with only one issuing more than one prescription per week. Three reported they were prescribing less than once a month. A lack of detail exploring the actual medicines prescribed prevents more detailed insight into the scope of either MMAs or SP practice in the UK.

#### 4.3.3 Care outcomes and costs

Three studies reported beneficial effects of advanced therapeutic radiographers on patient outcomes including patient satisfaction and quality of care<sup>124, 125, 127</sup>. For example, 92.5% of 67 patients surveyed

by Griffiths reported they were completely satisfied with the care provided including: amount and type of medicines information, consultation duration, and extent to which TR listened to their concerns, with 94% reporting a reduction in waiting times. Improved access to medicines was similarly reported in survey responses by all 5 TR-SPs, and 87% of the 53 stakeholders who participated in additional aspects of this service evaluation. The majority (81%) of stakeholders agreed that TR-SP was not associated with increased risk of medication error, with all TR-SPs in agreement that they prescribed safely and effectively. Service efficiencies including saving time for doctors and a reduction in the number of healthcare professionals seen were reported by 92% and 53% of stakeholder respondents respectively.

More recently, Martens et al.<sup>127</sup> and Harnett et al.<sup>125</sup> identified patient benefits including improved care experience, and continuity of care when RTs adopted AP roles. Harnett et al.'s study which comprised pilot testing of 7 APs in 4 Canadian based cancer centres demonstrated RTs had the ability to deliver specialised services, and perform delegated tasks which led to program efficiencies and development of new services, improving access to care to a previously underserved population. There is an absence of studies reporting on effectiveness, including costs.

#### 4.3.4 Facilitators and barriers

Motivation to undertake AP roles was firmly associated with anticipated service improvements which were considered to improve efficiency, reduce waiting times<sup>124, 125, 127, 128</sup> and have a positive effect on patient satisfaction and care outcomes<sup>124, 126-128</sup>. Such improvements were underpinned by strong team working<sup>124-126</sup> which in turn enhanced communication with patients, family, and stakeholders<sup>124, 127, 128</sup>. Undertaking AP roles was reported to increase job satisfaction along with career and professional opportunities supporting long term retention of TRs in the profession<sup>125-127</sup>. Aspects highlighted as important at the level of individual TRs included having specialist knowledge and skills<sup>126, 127</sup>, along with advanced knowledge, expertise and having a post-reg qualification<sup>126, 132</sup>. Having access to support, supervision and funding were also key aspects associated with successful implementation of advance TR roles in practice<sup>126</sup>.

A lack of role understanding hindered uptake of AP roles, together with a lack of organisational support, local governance, manpower and resources<sup>124-128, 132</sup>. Griffiths<sup>124</sup> for example, described how effective implementation of non-medical prescribing requires colleagues and managers to be aware of exactly what SPs can and cannot do and to understand the prescribers' role within their organisation so as to be better able to support and benefit from their work. Additional barriers specific to implementation of SP<sup>124</sup> included a lack of time and opportunity to participate in treatment reviews along with the challenges of using clinical management plans.

Organisational concerns regarding medico-legal responsibility<sup>126, 127</sup> and resistance from other professional groups appear to arise through a lack of clarity regarding AP roles<sup>124, 126, 127, 132</sup>, and inconsistent state level regulation. The resultant effect of this meant there was a lack of accreditation, and access to training<sup>126, 128, 132</sup>, education<sup>126, 127, 132</sup> or even interest from TRs to extend their role<sup>126, 127</sup>. Fear of the increased responsibility associated with the AP role was cited as a barrier to role implementation by 19% of 183 RT who participated in Kinamore et al.'s survey<sup>126</sup>.

#### 4.4 Summary

The review revealed a dearth of literature evaluating AP roles or NMP. This was the case for both professions but was more marked in TR therapeutic radiography where only a small number of empirical papers were found. It can be concluded that AP, and NMP as an emerging topic has to date received modest attention. Subsequently, it is impossible to determine with any certainty how and where AP or NMP uptake has occurred in dietetics and therapeutic radiography, and what its effect (if any) has been on patient care. This is despite over a decade of TR-SP in the UK.

For many years prior to the introduction of SP in the UK, dietitians in various countries have contributed to nutrition support decision-making as members of multidisciplinary teams. The review found a lack of evidence on D-SP and a relative paucity of empirical work carried out on ADP, with a tendency towards questionnaire surveys and a lack of evaluation. Despite the varying regulatory frameworks, and a lack of consensus regarding the definition of ADP, evidence suggests that having a higher educational qualification, specialist expertise, and experience are key to supporting the increased level of autonomy required to function beyond the boundaries of dietitian's traditional roles.

Prescribing and order-writing, are key examples of AP, and to supporting medicines management activities related to initiation, adapting, or changing nutrition prescriptions most commonly related to PN. Evidence of effectiveness is limited, but there is some indication that dietitian involvement in medicines management decisions can reduce inappropriate parenteral and enteral feeding, minimise prescription writing errors, decrease incidences of infections and potentially save on costs by reduction of unnecessary tube feeding, avoiding wastage via unused PN bags and preventing admissions and referrals to other units.

There is, however, a lack of clarity and detail regarding the roles ADP play in multidisciplinary nutrition support teams and/ or the nature of what they are prescribing or recommending. As a result, there is a lack of understanding about the current scope of D-SP and limited knowledge and understanding about the scope of ADP, its service delivery, and challenges for implementation. A lack of role understanding, support and associated infrastructure were evident, and it was apparent that the inconsistent approach to regulation and accreditation were likely causative factors, and that these issues remain prevalent in practice.

In therapeutic radiography, where it could be argued that involvement in medicines management is more intrinsic to managing side-effects from radiotherapy, literature was sparse, descriptive, and focussed on understanding core components of AP in Canada and Singapore, with one small scale service evaluation of supplementary prescribing in the UK. No literature was identified outside of these countries. The extent of MMAs and NMP in TR in the UK is essentially unknown.

Available definitions of advanced TR appear to incorporate some aspects of ACP as defined in the UK, for example, the autonomy, advanced clinical skills, higher-order cognitive skills (e.g., critical thinking, problem-solving, decision-making skills, etc.), broader understanding of the healthcare discipline and its place in the multidisciplinary healthcare environment needed to function on the boundaries of traditional TR roles.



Medicines management activities were a consistent facet in the available definitions of advanced TR practice. The literature portrayed medicines management by TRs in the context of assessing and managing side-effects of radiotherapy via treatment review clinics. Levels of involvement ranged from assessing and managing side effects to supplementary prescribing using a clinical management plan. Few details were provided of what these activities comprised, and no details were provided regarding the actual medicines prescribed.

As with dietitians a lack clarity regarding the AP role often led to ambiguity. Despite the recognition of the multiple potential service improvements that AP and SP could offer TR service, progress was hampered by a lack of support resulting in adequate organisational infrastructure and governance frameworks that are required to help drive change in practice.

## 5. Results from Phase 2: National surveys of prescribers and service managers

### 5.1 NHS Trust manager survey

#### 5.1.1 Response rate

A total of 56 managers took part in the survey (D=33, TR=23). Each of the seven NHS regions were represented for dietetics and all but the Northwest was represented for TRs. The response rate for Dietitian managers was 17.4% (n=30 + pilot interview n=1). An additional 13.9% (n=24) indicated interest but did not participate. The TR manager response rate was 45.8% (n=22, + pilot interviews n=2). An additional 20.8% (n=10) indicated interest but did not participate.

Due to loss of recorded data, 53 interviews were included in the analysis: 30 dietitian and 23 therapeutic radiographer service managers.

#### 5.1.2 Dietitians

##### i) Adoption and use of Dietitian Supplementary Prescribing

*Uptake:* Of the thirty participating organisations<sup>1</sup>, eighteen (60.0%) (Table 3) did not have any qualified D-SPs. The remaining twelve organisations employed one or more qualified D-SPs, in total there were 21 qualified D-SPs, the majority of whom were prescribing regularly (86.0%). Of the 18 organisations with no D-SPs, 4 had one trainee D-SP (D3; D10; D11; D26), two (D13 & D18) intended to implement D-SP and 12 had no plans to implement D-SP (D1; D5; D6; D7; D9; D14; D15; D16; D20; D22; D25; D30).

**Table 3 Number of Dietitian Supplementary Prescribers within each organisation**

Zero D-SPs	One D-SP	Two D-SPs	Three D-SPs	Four D-SPs
Eighteen organisations	Seven organisations	Two organisations	Two organisations	One organisation
D1; D3; D5; D6; D7; D9; D10; D11; D13; D14; D15; D16; D18; D20; D22; D25; D26; D30	D4; D12; D17; D23; D27; D28; D29	D8; D21	D19; D24	D2

*Patterns of uptake:* There were no clear patterns of uptake by geographical location or catchment area (Appendix 5 I). There was, however, some indication that uptake was lower for organisations with under 20 full time equivalent (FTE) staff. Eight organisations had a large catchment area, i.e., serviced a large and dispersed population (e.g., with hubs around the county). In addition, five organisations offered specialist services and had patients coming in nationally, from across the UK. The remaining 17 had smaller geographical catchment areas (e.g., covering one city or part of a county).

*Use of D-SP:* The majority of D-SPs were reported to be prescribing regularly (n=18, 86.0%). Three D-SPs were not actively using their NMP qualification: one had moved to a manager post and had no need to prescribe (D19), the other two D-SPs were delayed in using their prescribing qualification due to issues with their paperwork (D8). Qualified D-SPs worked predominantly in secondary care, across a wide range of disease types, including gastroenterology, renal, diabetes, bariatrics, intestinal failure, and oncology (D2; D4; D8; D17; D19; D21; D24; D27; D28; D29). They treated both adults and children and mostly prescribed (total) parenteral nutrition (D2; D8; D12; D17; D29). They also advised patients on diet and exercise (D2; D4).

## 2. Key drivers and barriers for implementation of D-SP

The key issues that influenced the implementation of D-SP are reported here as themes that acted as either a barrier or facilitator, depending on the local context (See Appendix 5 II).

### a) Demonstrating need for SP

*Facilitators:* A range of benefits of D-SP were reported as influential to implementation including: more timely and appropriate care, reduced time spent on finding a person to prescribe and improved efficiency.

*"Often there weren't doctors around and we would spend a lot of time trying to find a doctor to prescribe something. So that would be phone calls, kind of tracing them down elsewhere in the hospital to sort of find a signature, just that practical stuff that is not a good use of anybody's time, really." (D19)*

Prescribing helped improve autonomy, making better use of D-SP skills and improved the accountability and safety of prescribing decisions:

*"I was increasingly frustrated by the whole TPN prescribing because ... we were essentially doing all the legwork for the TPN and then literally handing the prescription chart to an F1 who didn't know what he was prescribing and he was just kind of signing it and then we were waiting for them to come back from lunch to sign the form, and it was just dragging out a process that we were quite expert in doing already. And I just felt it would be better for the trust, better use of my time plus the doctor's time and also better for the patient." (D12)*

Other benefits reported were that D-SP facilitated service innovation and improvement, for example by D-SPs undertaking triage to help manage long waiting lists.

*Barriers:* Despite the cited benefits, some managers with D-SP in place felt the benefits were marginal and lack of demonstrable clinical need was a major barrier cited by dietetics managers to adopting and integrating D-SP into their service. This was mainly due to the availability of other prescribers (mostly doctors), and the time involved in setting up Clinical Management Plans (CMP).

*"I think because most of these patients are seen as part of an MDT, so there will be a doctor there, and I suppose from a practical point of view the doctor can just prescribe. The process is a lot more difficult for us at the moment what with it being supplementary prescribing." (D19)*

Managers of organisations without D-SP considered it reasonable that doctors wrote prescriptions based on the recommendations made by dietitians without assessing the patient. Setting up and agreeing CMPs was described as laborious and involving a lot of paperwork. Use of CMPs was a deterrent to prescribing in situations where dietitians worked across multiple general practices in community settings. For sustainment, it was argued that having independent prescribing responsibilities would strengthen the business case for NMP by dietitians.

*"My understanding is that you can sort of prescribe but you actually have to get a doctor to back you up on it and that just wouldn't work in the community because you're out and about all the time, each patients got a different GP, it just wouldn't work. So, I think supplementary prescribing in our role isn't really beneficial." (D15)*

It was also difficult to justify financially, where a limited range of medications were to be prescribed for a relatively small number of patients in acute settings well-supported by clinicians. This was the case for both organisations with and without D-SPs.

*"I don't think it's terribly relevant for us because... it's quite a lot of training and commitment for relatively little gain for an acute team.... there's usually doctors in the clinic, it's not that hard to sort out if you do need something there and then." (D9)*

Furthermore, it was not clear to some managers how D-SP was an improvement on use of existing mechanisms for supplying medication to patients, such as Patient Group Directives (PGDs).

*"What we do have in our dietetics team are patient group directives. So, we order food supplementary to medicines, you know FSMPs, all of those we prescribe, but it's not on a prescription.... Any supplements on the wards or enteral feeds, we write those on the drug chart, so it's just accepted that we're the experts and that's what we prescribe.... our trust has always been very supportive of patient group directives and given us the autonomy, if you like, to do it." (D11)*

In summary, being able to demonstrate need for D-SP was facilitated by the benefits D-SP could provide, which included improvements to efficiency, team flexibility, time saving, patient safety and quality, as well as continuity of care. Overall, the limitations of D-SP in terms of set up costs and difficulty of CMP use, outweighed the benefits for those who had not implemented it. Being able to demonstrate clinical need for D-SP was an ongoing issue across phases, from early implementation through to the integration of D-SP as part of wider workforce planning and dealing with long waiting lists.

#### **b) Leadership, MDT support and organisational culture**

*Facilitators:* A key facilitator to adoption of D-SP was support from colleagues and the organisation. This often took the form of a pervading culture which embraced the expansion and development of AHP roles and actively encouraged non-medical prescribing:

*"I think we're quite lucky, it's a forward-thinking department and area and trust so you know we were really keen to get people on the course and get support, we didn't have any problems getting support." (D23)*

Strong leadership helped drive AHP role expansion and was key to NMP development, including D-SP implementation. Acceptance of dietitians as experts in their field with the potential to make broader contributions to patient care was reported in trusts with D-SP. Often this respect was presented as the result of good collaborative relationships built up over years of working with other professions, for example in multidisciplinary nutrition support teams. Support from clinicians was facilitated where there was recognition of the direct benefit of D-SP on the clinicians own workload:

*"The consultant involved in IS conditions is loving it because that means that she's not asked to prescribe everything all the time, so she's loving it... it takes the pressure off." (D17)*

Within supportive organisations, there was an established trust within teams, dietitians found themselves supported by supportive colleagues as well other NMPs, who often were trailblazers for other AHP prescribing. Also, within supportive organisations, there was evidence of networking between senior management and MDTs, and there was an onus on building relationships with external partners, for example GPs, which in turn helped with setting up CMPs.

*Barriers:* Support varied across organisations and was compounded by low understanding of D-SP roles. At organisational and national level, dietitian prescribing roles were not well-established or understood. Some managers thought more could be done at a national level, e.g. by the British Dietetics Association, to promote understanding of the range of roles in dietetic practice, including advanced roles and the benefits of these. In some organisations there was little drive to seek to address negative attitudes and resistance towards D-SP from senior clinicians, managers, and MDT. Staff were reported to be less familiar with the process of supplementary prescribing and a lack of clarity over responsibilities and scope of practice was a deterrent.

*"Because nobody else in the trust really used supplementary prescribing erm.... I just felt that no one really understood what it was because nobody else used it. So, they just think you're a prescriber and they think you're an independent prescriber even though you're not." (D19)*

There were concerns that D-SP would result in deskilling of doctors, particularly the skills of prescribing TPN. Within some Trusts, dietitians were at a disadvantage, being in competition for funding against nurse prescribers and other AHPs.

*"There is always a battle against the nurses". (D13)*

Overall, organisational culture was an important driver for D-SP implementation across the different phases as it influenced the organisations stance on demonstrating clinical need, access to funding for the training, to dealing with red tape. If the organisational culture was against D-SP it would make each of these issues more challenging. However, an organisational culture that was in favour of D-SP would help facilitate its implementation. Developing role understanding was particularly relevant during early implementation to get the backing not just of senior management but also of clinicians and nurses within the organisation. In addition, during the transition phase it was important to make sure that the scope of practice of D-SPs was clear, particularly regarding the responsibility of writing prescriptions, as SP was less common than IP.

### **c) Organisational preparation**

*Facilitators:* Organisations with a supportive culture was often found to have a clear NMP strategy with robust governance and specific support for dietitian career progression as part of a NMP

organisational policy. Obtaining funding for NMP training and gaining clinical supervision were both presented as much easier to achieve in these sorts of supportive environments:

*"We've been able to pick up on opportunities where perhaps other departments haven't been able to use what they've put in for. Or we've been able to access - we've put in for ACP funding but actually said "what we'd actually prefer to do is just do HEE or what we really want until we've figured out how ACP is necessarily going to work for dietetics, we just want the prescribing element of it" and that's how we got a few more of the places funded." (D2)*

Having access to flexible funding opportunities for NMP training was viewed as important by most managers and some Trusts were very supportive of staff development requests, including continued professional development (CPD).

As SP was less common than IP, having a clear scope of practice for what dietitians will prescribe and taking time to explain roles in relation to SP to ensure expectations were realistic, were reported to help teams to navigate implementation. A smooth process of registering new prescribers was only reported in a couple of organisations where preparation for trust wide regulations and procedures had been foreseen.

*Barriers:* A lack of strategic vision, exhibited for example by an out-of-date NMP policy that did not include AHPs and dietitians, hampered uptake. Lack of support from Clinical Commissioning Groups (replaced in 2022 by Integrated Care Systems) was also a deterrent as managers reported that it was difficult to get new roles, such as dietitian first contact practitioners, on the CCG agenda. In some trusts, NMP was not considered by senior management to be relevant for dietitian career progression and no funding was made available.

Lack of organisational preparation was a particular issue for D-SPs who were the first to qualify as an NMP due to the lack of established procedures in place for them to follow. This resulted in IT systems not being set up to support D-SP and poor access to medical records, electronic prescribing, and prescription pads. Integrating NMP into a service where it hadn't existed before was seen as inherently challenging because it required both practical and cultural change within large and complex organisations:

*"There's nothing easy about it, at all, getting it. You're changing pathways. It's difficult." (D23)*

*"So, she went on the course.. passed it, all is lovely and then had to go through millions of hurdles locally in order to be able to prescribe here. So, she had to go through the medicines management committee, we had to meet with the director of pharmacy a number of times to get the paperwork done, and it was - we were in all support, it was just the length of time it took to get the paperwork signed... the red tape, the in-house red tape." (D17)*

NMP training was seen as prohibitively expensive to the detriment of other professional development opportunities and acquiring funding often proved difficult.

*"The price of the course wipes out all our other training, the prescribing course, so we've opted not to go down that route." (D13)*

Dietitians had to compete for funding with nurses and other AHPs, who would be able to gain IP for the same amount of money. Taking a valuable staff member away from their work for extended periods and obtaining backfill to cover their workload was a frequently cited obstacle, especially in smaller departments.

*"We're just at that very much disadvantage in that why would someone want to invest within dietetics to do those roles when - again diabetes is an example of that - when they could fund a diabetes specialist nurse who then has that ability to prescribe and doesn't have all that red tape preventing them from doing their job as efficiently as they could." (D22)*

When funding did become available it was often at short notice making it difficult to identify and prepare a potential trainee in time to join the course:

*"When we got funding to do the course, we had a quick turnaround in terms of getting someone who was able to do it, who wanted to do it, who had the clinical skillset to do it, the support from clinicians to do it, and all the other things you need in place to enable it to happen...." (D4)*

In addition, places on nearby courses were limited, increasing costs incurred on travel and extra subsistence and disruptions to training plans arose due to organisational changes and Covid-19.

Further preparational barriers included clarifying which budget D-SPs would prescribe from, and addressing concerns about increasing prescription costs due to D-SP.

Overall, managers framed the expenditure of time and money required by the NMP course as a significant deterrent, particularly in trusts where D-SP was not considered a priority. Access to funding for training was particularly relevant in the early implementation stage as without it, D-SPs were not able to apply for the NMP course and be able demonstrate the benefits of D-SP. Red tape was mainly an issue for newly qualified D-SPs at the beginning of their transition phase.

#### **d) Job satisfaction and career progression**

*Facilitators:* Personal motivation was a key driver for early adoption of D-SP and continued to be important for later adoption. There was an eagerness to raise the profile of the profession by expanding and diversifying the dietitian role and demonstrating the potential of dietitians through D-SP. Including SP as desirable within job descriptions and the development of new dietitian ACP roles was expected to help with career progression, status, morale and staff retention. Motivation was also driven by concern that low uptake of D-SP may signify to policy decision makers that there was low interest, which may delay any future move to independent prescribing for dietitians.

*Barriers:* Managers argued that there was a lack of recognition of dietitians' potential and that a clearer career progression pathway was needed, including dietetics-led services, bespoke advanced roles or extended scope practice/role, and a better integration of dietitians in MDTs. There was a lack of clarity and vision about the ACP role in dietetics and whether being in an advanced role is necessary for D-SP to be useful. In organisations where there appeared to be a lack of support in senior management for dietitians' career progression, no educational structures were in place that would help dietitians prepare for advanced roles. Motivation of individual dietitians to train as D-SP was reported to be low by some managers, mainly due to lack of incentives such as remuneration or

change in status. The added responsibility and liability were viewed as a further deterrent, in combination with a lack of confidence experienced by both dietitians themselves.

*"[There is a problem with] the enthusiasm level of the staff to take on that level of responsibility when at the minute there's potentially not a lot of gain for them, you know, no financial gain even though it potentially increases their workload." (D7)*

Reluctance to train as D-SP, undertaking the same course as other NMPs but without access to independent prescribing, was experienced as frustrating. The potential for dietitians to be able to use IP in the future was anticipated to make ACP roles more viable for dietitians and help with career progression.

*"It's a really exciting thing that's happened for the profession and everyone was really hyped up and it's really great, but in reality, when people really stand back and look at it, they're thinking "it's not that much different from a PGD.".... I think there's a feeling, you know, regionally, within the profession that it would be helpful to be at the next level and then it really has got its worth." (D5)*

Job satisfaction and career progression were key themes in D-SP implementation across the different phases. During early implementation they helped drive the diversification of dietitian roles. Additionally, advancement to IP was highly anticipated as it would make ACP roles more viable for dietitians, and thus help to further drive career progression.

#### **e) The prescribing programme and supervision support**

*Facilitators:* The majority had no issue finding able and willing clinical supervisors. There were advantages of getting consultants on board at an early stage, for example, one manager reported how the implementation of D-SP was incorporated into the course and the trainee D-SP worked alongside consultant to discuss how SP would work in practice once qualified.

*Barriers:* Managers found that dietitians were reluctant to undertake D-SP training if they worked part time, had young children, or lacked the education requirements needed despite having many years of experience working as a dietitian. The course had a reputation for being highly demanding, in terms of time commitment and difficulty, often required candidates to travel and use their annual leave.

*"I got time out to attend the college things but all the kind of writing up and things I ended up doing in my own time, really, because we're a small service so they can't kind of like support me."(D12)*

Some trainee D-SPs had trouble identifying consultants with the capacity and availability to supervise. It was reported that there was a lack of both professional and peer support during training, particularly finding a dietitian specific NMP support network was difficult. Some managers suggested that the BDA could do more regarding setting up a support network and providing advice to dietitians regarding NMP. Others suggested that more could be done within undergraduate professional programmes to prepare dietitians for a prescribing role (e.g. pharmacology).

Educational preparation was a key barrier to uptake and focused on the individual candidates' level of preparation for NMP training. Sustainment of D-SP was also hampered by poor succession planning, preparation for course pre-requisites and small numbers of dietitians in teams to provide support. Support for staff whilst on training was crucial during the training phase.



### 3. Models of adoption

Informed by the Diffusion of Innovation theory (Rogers, 2003), the 30 trusts were ordered by the timing of uptake of D-SP into categories of: innovator, early adopter, early majority, late majority, and last adopter (see Table 4) (Appendix 5 III & IV):

**Table 4 Models of D-SP implementation**

Category	Rogers' (2003) definition	TRaDiP definition	Number of organisations
Innovator	The innovator plays a gatekeeping role in the flow of new ideas into a system (p. 264)	None of the organisations could be considered as innovators	0
Early adopter	Early adopters help trigger the critical mass when they adopt an innovation (p. 264)	Have Ds who qualified as D-SPs in 2017	2
Early majority	The early majority adopt new ideas just before the average member of a system (p. 264)	Have D-SPs who qualified in 2018	4
Late majority	The late majority adopt ideas just after the average member of a system	Have D-SPs who qualified between 2019-2020 (and includes organisations who had at least one trainee D-SP at the time of the interview)	9
Last adopter	The last adopter is the last in a social system to adopt an innovation	No qualified D-SPs and no trainee D-SPs	15

The two early adopters (D19; D29) were supportive organisations (e.g., providing funding for D-SP training and supervision), and both saw the benefits of D-SP. Enthusiasm of the trainee D-SP drove the early implementation within one of the Trusts (D29). Similar to TR-IPs, early majority and late majority D-SP organisations could be categorised as either using a team approach (i.e., employing more than one D-SP to increase flexibility and capacity in teams based on clinical need) or a “test the water” approach (training one D-SP and establishing the benefits before deciding to expand). The remaining fifteen organisations were categorised as last adopters as they had no qualified D-SPs, nor did they have trainee D-SPs at the time of the interview. However, it should be noted that three of the last adopters did have plans for training D-SPs.

### 5.1.3 Therapeutic Radiographers

#### i) Adoption and use of Therapeutic Radiographer Independent Prescribing

*Uptake:* Adoption of TR-IP was high with 15 organisations reporting TR-IP in place. Of the 8 that did not, 2 had previously employed TR-IPs who had since left, 5 had TRs undertaking the prescribing qualification and 2 had plans to train TR-IPs. Only 1 of these organisations had no plans to implement TR-IP, preferring a nurse IP to prescribe during treatment review. Table 5 shows the number of TR-IPs employed per organisation. In total there were 30 qualified TR-IPs. Four had TRs who initially qualified as supplementary prescribers and then converted to IP, the remainder trained as TR-IPs.

**Table 5 Number of qualified TR-IPs per organisation**

Number of qualified TR-IPs	Number of organisations	Code number of organisations
0	8	TR1; TR4; TR7; TR11; TR12; TR15; TR17; TR22
1	6	TR6; TR8; TR9; TR13; TR18; TR21
2	6	TR2; TR3; TR5; TR10; TR19; TR20
3	1	TR16
4	1	TR2
5	1	TR14

*Patterns of uptake:* There were no clear patterns in uptake by geographical region or catchment demographics (e.g., urban/rural; size of catchment area). There was, however, some indication that uptake increased where staff numbers were over 60 FTE (Appendix 5 III). Ten organisations had a large catchment area covering a wide geographical area (e.g., one or more counties), twelve organisations had relatively small catchment areas (i.e., covering their local area only).

*Use of TR-IP:* All qualified TR-IPs were reported to be prescribing regularly except for one who was not yet registered (TR21). The majority of qualified TR-IPs worked in treatment review clinics within hospitals. They mostly prescribed medications to patients dealing with side effects/symptoms of radiotherapy (TR1-TR8; TR10; TR13-20), such as managing digestive tract issues, oral soreness, swelling, as well as preparation for treatment (e.g., bowel preparation) (TR18; TR19). The remaining TR-IPs worked in a range of clinical roles, including treatment preparation, e.g., pain relief (TR9; TR12; TR16; TR18; TR19; TR21; TR22), managing patients' side effects during radiotherapy treatment (TR1; TR4), as well as palliative care planning (TR3; TR13; TR15; TR16). There was some overlap within organisations, for example some TR-IPs used their prescribing qualification both in treatment preparation and in treatment review. One manager (TR9) was planning to use IP by a therapeutic radiographer to help patients be stronger and fitter when they begin treatment (e.g., by prescribing smoking cessation aids).

## 2. Key drivers and barriers for implementation of TR-IP

The key issues that influenced the implementation of TR-IP are reported here as categories/themes that acted as either a barrier or facilitator, depending on the local context (Appendix 5. IV).

### a) Demonstrating need for IP

*Facilitators:* Being able to demonstrate direct benefits of TR-IP, especially in terms of preventing delay in patient access to medicines and reducing costs of clinical oncologist time, were strong facilitators for gaining approval for training.

*"The reason that they got the business case approved was that they go into the clinic with the consultant, and we've reduced the consultant appointment time down." (TR10)*

Clinical need was reported to vary according to the type of clinic or cancer/patient group treated. For example, patients with head and neck cancer more often experienced symptoms requiring prescriptions for treatment side effects than patients with breast cancer and therefore these clinics were stronger candidates for TR-IP. The availability of clinicians or NMPs to prescribe often hinged on pragmatic, organisational or geographic factors such as where radiotherapy departments were situated and how well they were integrated with other services. Access was poor when clinics took place during evenings, weekends, or holiday periods:

*"The clinicians are not on site. They're rarely in the department for us, so it depends on the kind of trust that you work in and where else your doctors have to go to. But we certainly don't see them day to day, so it's the availability of having someone to sign the prescription." (TR12)*

Lack of other accessible prescribers enabled managers to argue clinical need for TR-IP. It was reported that the role of medicines management, which traditionally had been performed by clinicians or advanced practice nurses, was gradually being taken on by TRs. This helped build the resilience and adaptability of multi-disciplinary teams by increasing the prescribing and related skills mix of TRs. Building team capacity by employing more than one TR-IP was considered the best way to future-proof service against potentially disruptive organisational changes:

*"There's this realisation now that we can't continue to work in these restricted roles with no overlap between the different disciplines, especially in radiotherapy. You know, that just doesn't work anymore there's not enough medical staff, there's not enough physical staff. So, where we can take over parts of people's roles in an area where we already exist – so you know the radiographers are already in the department, this is their base, they're already seeing the patients, they have the knowledge and the experience. So, I think partly the lack of resources has made people more adaptable or have to consider different options." (TR8)*

Further benefits included streamlining patient pathways, improving patient access to information about medicines and continuity of care.

*"Once the consultant's done their bit that they need to do the patients usually have a lot of questions, they need to talk a bit more and they want their consent completing, and our radiographers would then step in, take the patient to another room and then go through the consent with them and we've been finding that works extremely well because often the patients are more comfortable talking to the radiographers." (TR10)*

Demonstrating need was an ongoing issue across phases. There were examples where candidates were funded due to their motivation and drive when TR-IP was first introduced, however making a strong business case for need became more important over time and was necessary for ongoing

development and succession planning to avoid gaps in the skills mix of teams as staff retired or were absent.

*"With just one when she's not here there's no service and then with two there's some cross-cover, but really to have a proper service it needs to have that resilience." (TR8)*

*Barriers:* Lack of demonstrable need for TR-IP was a key barrier for uptake and expansion.

*"There isn't a clinical need, there isn't a deficit in the workforce that I can use to justify it, there's no vacancies I can create these posts from." (TR12)*

The adequacy of existing systems, such as the use of patient group directives (PGDs) and the availability of prescribers from other professions, were key arguments against the need for TR-IP amongst organisations without TR-IPs. For example, where nurse prescribers were already in place within multi-disciplinary teams (MDTs), there was not considered to be a need for TR-IP. However, on occasion managers appeared to contradict themselves by stating that there was no clinical need for TR-IPs whilst at the same time positing that having TR-IPs would make care more accountable, safe, or help to deal with staff shortages. Additionally, alternatives, such as use of PGDs could be inflexible and burdensome compared to TR-IP.

#### **b) Leadership, support and organisational culture**

*Facilitators:* Early adopter TR-IPs often succeeded in qualifying due to their motivation and drive rather than demonstrated need, but to do so required organisational support, facilitated by supportive managers and multi-disciplinary teams (consultants, pharmacists and colleagues). Forward-looking organisational cultures supported the development of NMP and AHP roles. In cases where such a culture existed managers often attributed this to the leadership of a specific general manager or NMP lead who was aware of the benefits of TR-IP not just for radiotherapy patients but for services and staff more broadly:

*"When the independent prescribing came in it coincided with the time when we had a new general manager who was a paramedic by background who'd also just done independent prescribing himself who's quite a strong character... so we sort of hit the sweet spot where they were feeling a bit more open to suggestions about moving forward." (TR10)*

Those managers who had a proactive attitude in problem-solving were crucial when overcoming barriers which prevented other organisations from moving ahead:

*"As a professional group we have a very can-do attitude. So, you are going to get less resistance to them seeing a patient and to review them and give them the right medication that they need." (TR2)*

Strategies to increase awareness of TR-IP and AP roles, such as hosting an AHP forum within the organisation, was considered to raise the profile of TRs. Increasing visibility and understanding of TR-IP potential was suggested to be beneficial.

*"Think that the ACP framework and the fact that we have consultant radiographers helps people to recognise that perhaps radiographers have a greater skill mix than they originally thought and have potential to expand their role in other areas." (TR9)*

*Barriers:* Managers often experienced resistance from and sometimes conflict with clinicians and other health professionals over TR-IP development. This was in part fuelled by a poor multidisciplinary comprehension of ACP roles in general and of the scope of practice of TRs in particular. There were negative views in some organisation about prescribing by professions other than nurses or doctors, including that the scope of prescribing by TR-IPs was limited compared to other AHPs. Developing role understanding was particularly relevant during early implementation to get the backing not just of senior management but also of clinicians and peers (e.g., other AHPs) within the organisation. Without their support subsequent issues, in particular access to funding for training, as well as support during and after training, would be even more challenging.

Organisational culture was an important driver for implementation across the different phases. If the organisational culture was unsupportive of TR-IP, barriers, such as gaining access to funding, were more challenging, whereas a favourable culture helped overcome barriers to implementation.

### **c) Organisational preparation**

#### NMP policy and procedures

*Facilitators:* Having a NMP policy in place as part of a wider strategic vision was perceived to be beneficial, backed by processes and governance procedures to support NMP. Trail-blazing by other AHP prescribers in the organisation helped to ensure that processes and wider support was in place to implement TR-IP:

*“I think because there were already some non-medical prescribers who were independent prescribers in place we weren’t sort of bashing down barriers if you like because it [TR-IP] had never happened. There was a process in places, there was a clear pathway for how to enable it through pharmacy etc and who were the links that we needed to get everything set up through and how we acknowledge with the trust that [IP] has passed his non-medical prescribing and that he’d got the right processes behind him to set it up and review it going forward.” (TR9)*

*Barriers:* Most managers were aware that NMP policy existed in their trust, but it was less clear how relevant NMP policy was for TR-IP. For example, some policy focused on nurse and pharmacist prescribing and it was unclear if the policy was up to date with current legislation for TR-IP. There was also a sense of lack of engagement with policy development from the TR managers who took part in this study. Related to this, there was a lack of targeted support for TRs from within their organisation and some did not feel integrated as part of the AHP community.

Regarding organisational readiness to enable use of TR-IP, delays were often met by the first TR-IP to qualify as procedures needed to be set up before they could prescribe. Following professional registration with the Health and Care Professions Council (HCPC), internal ratification was required from the employing organisation, with one manager reporting that the number of NMPs allowed was restricted in their Trust. Internal ratification included having an agreed formulary. In some cases, pharmacy required that clinical management plans (CMPs) were in place for each of the individual medications the TR-IP would be prescribing. This often led to delays between TR-IPs qualifying and being able to start prescribing, i.e. at the beginning of their transition phase.

### Access to funding for training and backfill

*Facilitators:* The majority of managers agreed that having access to reliable and consistent funding for NMP training was of particular importance as competition for funding from other AHPs and nurses was fierce. In some organisations, funding was usually forthcoming for some or all training requests if they made a solid case. Writing IP into job descriptions for new TR posts help justify the funding needed. Where funding arose at short notice, a proactive approach was taken by some managers by having a list of willing potential trainees already identified and ready to go should the opportunity arise:

*"it's actually quite a logistical nightmare to access the funding .... So yeah, we have people lined up and ready, aware that they may or may not get the funding." TR9).*

Having access to backfill to cover staff absence and forward planning to stagger access to training were strategies used to overcome barriers of releasing staff for TR-IP training.

*Barriers:* Difficulty accessing funding for the NMP course was reported by around half of the managers, though the severity of this difficulty varied from one trust to another. Several managers mentioned that training needs of their staff were side-lined as preference was given to nurses in departmental targets. Funding became available at very short notice, often only weeks before the course was due to begin in some organisations. This meant the manager had to identify a suitable candidate very quickly and make hasty arrangements for supervision and backfill. Difficulty predicting what funding would be available each year and how it would be distributed made planning future NMP training problematic:

*"I think every year we get our health education funding for the region, and we can tap into that, but it gets swallowed quite quickly and each year there's no guarantee that you're going to have – I mean, we do our learning needs analysis and say how many we need each year but there's no guarantee we'll get that by any stretch of the imagination. It just seems rather ad hoc as to how that pot is disseminated." TR9*

Managers reported difficulty in planning to release trainees and ensuring cover during their absence when putting one or more of their staff members through the NMP training. This was consistently reported to be problematic for smaller departments where there were often insufficient remaining staff to provide a comprehensive service. Although there were exceptions where small departments had managed to arrange cover. There was an indication that managers and trainees may not have realistic expectations as to the duration and requirements of the NMP course.

*"I think the one thing I wasn't anticipating as much was the number of clinical hours, they needed to complete the course in such a short time scale... it makes it more difficult in a smaller department." (TR1)*

Covid-19 was reported to have disrupted training plans in two organisations, with NMP courses being cancelled or postponed. This was a particular issue when funding for training was allocated to a specific financial year, which in turn meant that if training was postponed until the next financial year, it would not necessarily be funded. Covid-19 also meant that training needs changed, which in turn made it more difficult to get approval for NMP training from senior management.

Access to funding for training was particularly relevant in the early implementation stage as without it, TRs would not be able to apply for the NMP course and then be able demonstrate benefits.

#### **d) Job satisfaction and career progression**

*Facilitators:* Progressing and developing a career pathway for TRs was an important driver for adoption of TR-IP. It was argued that IP made the TR role more interesting, provided the opportunity to learn new skills and offered the option of having a portfolio career like other AHPs. Being able to prescribe increased the attractiveness of the TR role as it allowed TRs to work more autonomously and flexibly to meet the needs of a fast-changing and unpredictable healthcare environment. TR-IP was considered beneficial for job satisfaction, increased motivation, career development and staff retention:

*"We needed to look at not just the technical side of the service but the softer skill side and giving radiographers more opportunity because we know we're going to hit potentially a workforce crisis." (TR9)*

*"I think that's what people come into the profession for, that whole patient care and patient communication and if all you're allowed to do is treat the patient, if you end up having to refer patients to other professions, other radiographers or nurses or healthcare professionals for the aspects of the job that you enjoy then you're going to end up – you're going to end up with a profession nobody wants." (TR12)*

Given staff shortages, some manager preferred to develop the roles of existing TR staff via TR-IP, to help fill service gaps, however other managers believed that creating clear ACP roles for TRs was better than adding TR-IP to existing roles without considering benefits for the practitioner or taking their capacity into account. A reported benefit of the ACP route was that trainees were provided with protected time to undertake the ACP masters level programme as opposed to doing a standalone MSc module in NMP.

*Barriers:* Although advanced clinical practice (ACP) was considered beneficial for attracting TRs for recruitment, the development of IP and its alignment to ACP was in its infancy. The ACP framework was often perceived as driven by and focused on nursing practice with a lack of clarity or definition over what TR ACP roles entailed and how NMP aligned with these roles.

*"I don't think you necessarily need to be an ACP to be a prescriber. As a manager you need to make it very clear that just because you are doing this, you are not necessarily going to move on to be an ACP. It is an additional skill. Prescribing in itself doesn't make you an ACP but it is starting you in the manner that you need to be thinking if you want to go down that ACP route to be able to work autonomously and follow clear guidelines and ultimately be responsible." (TR19)*

Various barriers to the development of ACP TR roles were noted. A national shortage of TRs made it difficult to recruit, meaning some organisations were reluctant to create new TR posts. The cost of ACP roles was a barrier for some as upskilling pushed staff to higher pay bands that the organisation could not afford. In some trusts, advanced practice TR-IP roles were considered sufficient whereas the full capacity of an ACP role was not considered appropriate or necessary. Developing the specialist

skills set necessary for ACP roles occurs over a number of years and is often bespoke to an individual TR. A lack of recognition of the planning and time required to develop ACP -TR-IP roles and the implications of this for succession planning, was reported as a barrier. One further barrier to the development of TR-IP roles in areas such as pain relief and anaesthetics was the need for independent prescribing of controlled drugs (CDs). At the time of interview, CDs were prescribed either by a consultant or via SP, which hampered ease of use. It was anticipated that change in legislation would support TR-IP role sustainability and future proofing.

Job satisfaction and career progression were key themes in TR-IP implementation across the different phases. During early implementation they helped drive the development ACP roles for TRs, which in turn facilitated sustainability.

#### **e) The prescribing programme and supervision support**

*Facilitator:* Motivation of individual TRs to undertake TR-IP training was no problem in some trusts. Clinician willingness to provide clinical supervision for trainee TR-IPs was facilitated by anticipated decrease in their own workload once the TR-IP was qualified. Ongoing support for trainees was perceived as crucial as it enabled them to focus on their learning and enable them to successfully complete their NMP training.

*Barrier:* There were numerous barriers reported to the uptake of the TR-IP training programme and to course completion. The process of ensuring that candidates had completed training to meet course pre-requisites, such as physical assessment, was reported to take time and planning and therefore hindered rapid uptake of TR-IP. Difficulties were reported by some in finding a willing supervisor from the limited pool of clinicians, all of whom were very busy. In other cases, there was reluctance of candidates themselves, due to lack of perceived benefits or remuneration. Managers were concerned about the difficulty of the course being a deterrent to staff and that the academic skills set required would be a challenge.

*"I think from the feedback I've received from some individuals it can be quite challenging. So that would probably be one of my concerns... whilst probably being very good at their job the treatment review radiographer might not necessarily be able to cope with the demands of the training." (TR7)*

Additionally, one manager noted that TR reluctance may be due thinking that they would be responsible for prescribing radiotherapy treatment rather than for the side effects of treatment:

*"We still think of "prescription" as being radiotherapy prescription, which is always in the medical domain and carries great responsibility. So, it's maybe just getting people to share their experience of prescribing for side effects and things like that might just help break down any barriers people might have around the term "prescribing" ... because I think there is some hesitancy about accepting that responsibility." (TR8)*

Obtaining one of a limited number of places on a NMP course and potentially having to travel a long way for teaching days was also seen by some as a potential barrier, albeit one that was becoming less



relevant as more and more institutions began offering the course with online provision. Once in training, there was some anecdotal evidence of a lack of support during training from NMP course providers and a bias in course content towards nurse prescribing, with a lack of relevance in practice for TR.

### 3. Models of adoption

Informed by the Diffusion of Innovation theory (Rogers, 2003), trusts were ordered by the timing of uptake of TR-IP into categories of: innovator, early adopter, early majority, late majority, and last adopter (see Table 6). Data excludes pilot site TR2 as details were not retained for this site.

**Table 6 Models of Adoption**

Category	Rogers' (2003) definition	TRaDiP definition	Number of organisations
Innovator	The innovator plays a gatekeeping role in the flow of new ideas into a system (p. 264)	Pioneer in adoption of TR-SP	0
Early adopter	Early adopters help trigger the critical mass when they adopt an innovation (p. 264)	TR-IPs who did conversion course from SP to IP	6
Early majority	The early majority adopt new ideas just before the average member of a system (p. 264)	TR-IPs qualified between 2016-2018	5
Late majority	The late majority adopt ideas just after the average member of a system	TR-IPs qualified between 2019-2020	4
Last adopter	The last in a social system to adopt an innovation	No qualified TR-IPs	8

The main difference discerned by stage of adoption was that early adoption of TR-IP was largely driven by the motivation of individual TRs rather than by service-led demand. Early adopters had a positive, forward-looking culture towards TR-IP. Conversely, for late adopters and last adopters, more emphasis

was placed on being able to demonstrate a clinical need within the trust for TR-IP. Non-adoption was influenced by preference for nurse prescribers to undertake this role, combined with a lack of understanding of TR's scope of practice as well as TR's potential. Although the research team were aware of 'innovator' organisations where TRs trained initially as SPs, these organisations did not participate in the survey. Some of the early adopters demonstrated characteristics of innovation in that the first to train as TR-IPs were influential in gaining support for this new role within their organisation.

A stronger pattern in terms of models of adoption was the distinction between a **team approach** versus a **test the water** approach:

**Team approach:** mainly used by early adopters, this approach was to secure two or more qualified TR-IPs within the organisation to build capacity within the team. Organisations with at least two qualified TR-IPs found the team approach important for building a more resilient workforce able to provide continued care (e.g. providing cover during leave). Building 'prescribing capacity' within teams was also associated with workforce and succession planning. All nine organisations with more than one qualified TR-IP had plans to train more TR-IPs.

**Test the water:** mainly used by late majority and last adopters, whereby organisations put one TR through NMP training to assess any benefits to the organisation, before deciding to train further TR-IPs. Organisations using the 'test the water' model, included 7 of those with no qualified TR-IPs plus those with only one qualified TR-IP. Plans for further training of TR-IPs were largely dependent on a review of the impact of having one TR-IP in the team, as well as future needs regarding succession planning.

## 5.2 Questionnaire 1: Dietitian supplementary prescribers and therapeutic radiographer independent prescribers

### 5.2.1 Response rate

A total of 92 respondents completed questionnaire 1, of whom 54 (58.7%) were therapeutic radiographers and 38 (41.3%) were dietitians.

It is not possible to determine exactly how many TR-IPs and D-SPs received an invitation to participate in the first prescriber questionnaire. In order to estimate the total population for each profession during the period of data collection, November 2019 - March 2021, data on NMP was provided by the Health and Care Professions Council. This indicated that in November 2020, 132 therapeutic radiographers and 133 dietitians had registered with independent and/or supplementary prescribing rights in the United Kingdom, suggesting the survey sample represents around 34.7% of the target population.

### 5.2.2 Sample Demographics

Details of the sample characteristics are provided in Table 7. Participants were based in 13 geographical regions across England, with the largest representation from the Midlands (21.7%, n=20) and lowest from the South-East (6.5%, n=6). Two thirds (n=60, 65.3%) of the sample were aged 40 years or over, with 77.2% (n=71) reporting full time employment.

Aside from consultant radiographers (n=18), all of whom reported Agenda for Change (AfC) band 8 roles, there was heterogeneity found across both professions in role descriptors and their corresponding pay bandings. However, categorised job titles indicated that NMP was predominantly being undertaken by consultants, advanced practitioners and senior specialists (n=67, 72.8%) who were at the higher end of the salary scale, with 31.5% (n=29) at Agenda for Change band 8 (or equivalent) and 67.0% (n=52) at band 7. There were, however, fewer dietitians (18.4%, n=7) than therapeutic radiographers in band 8 roles (40.7%, n=22, p=0.016).

While over half (n=53, 57.6%) the total sample had less than 10 years' experience in their practice area prior to becoming a prescriber, just under two thirds (60.8%, n=63) held masters' or doctorate level degrees, with 62.0% (n=57) having undertaken post-graduate level training in their specialist area of practice (Table 8). Dietitians had significantly more years of experience in their specialist area of practice prior to becoming prescribers than therapeutic radiographers (mean 11.8, (SD 6.5) years Vs 8.0, (SD 7.8), p=0.001). However, more therapeutic radiographers had undertaken master's level modules specific to their specialist practice area (74.1% Vs 42.1%, p=0.004) and a higher proportion held Masters/PhD degrees (79.6%, Vs 50.0%, p=0.005).

The majority (72.8%, n=59) of respondents had studied NMP at masters' level (level 7) as opposed to degree level (level 6, 27.2%, n=25), with 17.4% (n=16) having undertaken IP conversion courses (therapeutic radiographers) and the remainder of the total sample (n=76, 82.6%) having undertaken combined IP/SP courses.

**Table 7 Sample demographics: D-SP and TR-IPs**

	Dietitians (n=38)		Therapeutic Radiographers (n=54)		Total (n=92)	
	n	%	n	%	n	%
<b>Job title</b>						
Specialist/ Senior Specialist Dietitian	19	50.0	-	-	19	20.7
Lead Dietitian/Team lead/Manager	8	20.5	-	-	8	8.7
Dietitian	7	17.9	-	-	7	7.6
ACP/trainee ACP	4	10.3	-	-	4	4.3
Consultant Radiographer	-	-	18	33.3	18	19.6
Advanced practitioner/senior Radiographer	-	-	13	24.1	13	14.1
Specialist radiographer	-	-	13	24.1	13	14.1
Review Radiographer	-	-	10	18.5	10	10.9
<b>Age (years)</b>						
<40	14	36.8	18	33.3	32	34.8
40-50	18	47.4	23	42.6	41	44.6
>50	6	15.8	13	24.1	19	20.7
<b>Geographical region</b>						
Midlands (East Midlands, West Midlands)	4	10.5	16	29.6	20	21.7
South-West (South-West, Wessex)	4	10.5	14	26.0	18	19.6
North-West (North-West)	9	23.7	8	14.8	17	18.5
Northeast & Yorkshire (Yorkshire & Humber, North-East)	13	34.2	4	7.4	17	18.5
London (North, Central & East, North-West, South)	5	13.2	2	3.8	7	7.6
East of England (East of England)	3	7.9	4	7.4	7	7.6
South-East (Kent, Surrey & Sussex, Thames Valley)	0	0.0	6	11.2	6	6.5
<b>Agenda for Change pay scale</b>						
8c (£61,777-73,935)	0	0.0	1	1.9	1	1.1
8b (£52,306-61,776)	0	0.0	7	13.0	7	7.6
8a (£44,606-52,305)	7	18.4	14	25.9	21	22.8
7 (£37,570-44,605)	26	68.4	31	57.4	57	62.0
6 (£30,401-37,569)	5	13.2	1	1.9	6	6.5
<b>Hours worked</b>						
Part-time (21-30 hours)	9	23.7	12	22.2	21	22.8
Full-time (>30 hours)	29	76.3	42	77.8	71	77.2
<b>Length of time qualified as NMP</b>						
Dietitian group: n=38, mean 2.50, SD 1.10, (range 0.0-4.0)						
Therapeutic radiographer group: n=54, mean 2.98, SD 2.36, (range 0.0-7.0)						
Total: n=92, mean 2.78, SD 1.28, (range 0.0-7.0)						
≤ 1 year	6	15.8	8	14.8	14	15.2
2-3 years	24	63.2	24	44.4	48	52.2
≥ 4 years	8	21.1	22	40.7	30	32.6

**Table 8 Dietitian and Therapeutic radiographer specialist experience and qualifications**

	Dietitians (n=38)		Therapeutic Radiographers (n=54)		Total (n=92)	
	n	%	n	%	n	%
<b>Specialist practice experience prior to becoming NMP (years)</b>						
Dietitian group: n=38, mean 11.81, SD 6.51, (range 1.0-25.0)						
Therapeutic radiographer group: n=54, mean 8.0, SD 7.84, (range 0.0-35.0)						
Total: n=92, mean 9.57, SD 7.52, (range 0.0-35.0)						
0-2	2	5.3	13	24.1	15	16.3
3-5	8	21.1	16	29.6	24	26.1
6-8	4	10.5	7	13.0	11	12.0
9-11	5	13.2	6	11.1	11	12.0
> 11	19	50.0	12	22.3	31	33.7
<b>Specialist training prior to NMP course</b>						
Non-accredited study	25	65.8	32	59.3	57	62.0
Master level modules	16	42.1	40	74.1	56	60.9
Accredited study days	17	44.7	26	48.1	43	46.7
Degree level modules	6	15.8	6	11.1	12	13.0
Other	4	10.5	7	7.4	8	8.7
Diploma level modules	3	7.9	3	5.6	6	6.5
None	2	5.3	4	7.4	6	6.5
Professional doctorate	1	2.6	0	0.0	1	1.1
<b>Highest academic qualification</b>						
Doctorate	3	7.9	1	1.9	4	4.3
Masters	16	42.4	42	77.8	59	63.0
Degree	19	50.0	10	18.5	29	31.5
Diploma	0	0.0	1	1.9	1	1.1
<b>Prescribing programme</b>						
IP conversion	-	-	16	29.6	16	17.4
Combined IP and SP	38	100.0	38	70.4	76	82.6
<b>Academic level of NMP course</b>						
Masters	23	60.5	44	81.5	67	72.8
Degree	15	39.5	10	18.5	25	27.2
<b>Currently prescribing in practice</b>						
Yes	23	60.5	47	87.0	70	76.1
No	15	39.5	7	13.0	22	23.9

## 5.2.3 Areas of service provision

### 5.2.3.1 Total Sample

Details of the types of services and care settings in which participants worked are provided in Tables 8-10. Around 90% (n=83) of therapeutic radiographers and dietitians worked for acute trusts or acute specialist trusts, with most dietitians (80%, n=30) providing NHS inpatient and outpatient services, and therapeutic radiography provision predominantly (98.1%, n=53) NHS outpatient based. Of those reporting data on patient age ranges (73.9%, n=68), the majority (73.5%, n=50) managed

adults, with 17.6% (n=12) providing services for all age ranges and 2.9% (n=2) exclusively managing children and/or adolescents.

**Table 9 Care and service settings**

	Dietitians (n=38)		Therapeutic Radiographers (n=54)		Total (n=92)	
	n	%	n	%	n	%
<b>Employing organisation</b>						
Acute/Acute Specialist Trust	34	89.5	50	92.6	84	91.3
Combined Acute & Community Trust	2	5.3	2	3.7	42	4.3
Community Trust	1	2.6	1	1.9	2	2.2
Mental Health/Learning Disabilities Trust	1	2.6	0	0.0	1	1.1
Independent sector	0	0.0	1	1.9	1	1.1
<b>Services provided (multiple responses possible)</b>						
NHS outpatient	31	81.6	53	98.1	84	91.3
NHS inpatient	30	78.9	11	20.4	41	44.6
NHS community clinic	5	13.2	0	0.0	5	5.4
Community Service	3	7.9	0	0.0	3	3.3
Other	2	5.3	1	1.9	3	3.3
General Practice	1	2.6	0	0.0	1	1.1
<b>Age range</b>						
Adult <sup>1</sup>	18	47.4	32	59.3	50	54.3
Adolescents <sup>2</sup> & Adults	4	10.5	0	0.0	4	4.3
Adolescents & Children <sup>3</sup>	2	5.3	0	0.0	2	2.2
All ages	4	10.5	8	14.8	12	13.0
Missing	10	26.3	14	25.9	24	26.1

<sup>1</sup>20years+, <sup>2</sup>10-19 years, <sup>3</sup>1-9 years.

### 5.2.3.2 Dietitians

Thirty-eight dietitians completed questionnaire 1, representing 41.3% of the total sample. Over half reported senior/specialist (50.0%, n=19) or lead/team lead positions (21.1%, n=8), with fewer in dietitian (18.4%, n=7) or ACP/trainee ACP (10.5%, n=4) roles. No link between specific job titles and AfC pay scales was evident (p=0.48), however, the larger majority reported band 7 (65.8%, n=25) positions with fewer at band 8 compared to therapeutic radiographers (18.4%, n=7 Vs 40.7%, n=22, p=0.009). Fewer dietitians also held postgraduate degrees (50.0% Vs 79.6%, p=0.005).

The majority (89.5%, n=34) worked in secondary care acute or specialist trusts with a small number (n=4, 10.5%) based in acute and/or community trusts (n=3, 7.9%) and mental health/learning disabilities trusts (n=1, 2.6%). The main areas of service provision were outpatient (n=31, 81.6%) and inpatient (n=30, 78.9%) with a quarter (n=9, 23.7%) providing community or GP services. Table 9 shows the range of clinical specialties managed by dietitians; 31.6% (n=12) managed renal conditions, 18.4% (n=7) managed intestinal/nutritional and diabetic patients respectively with a smaller number treating cystic fibrosis (7.9%, n=3) or a mixed caseload (13.2%, n=5) such as epilepsy, metabolic disorders, obesity surgery, mental health, pancreatic conditions, and oncology. Of those reporting patient age ranges (n=28, 73.7%), 78.6% (n=22) provided adolescent and/or adult services, 7.1% (n=2) managed children and adolescents and 14.3% (n=8) covered all age ranges.

**Table 10 Dietetic service provision**

<b>Dietitians (n=38)</b>		
<b>Dietetic service provision (can indicate &gt; 1)</b>	<b>n</b>	<b>%</b>
Renal ( <i>chronic kidney disease, dialysis</i> )	12	31.6
Intestinal/nutritional ( <i>Intestinal failure, parenteral and enteral nutrition</i> )	8	21.0
Diabetes ( <i>type 1/type 2, gestational diabetes, transitional, insulin pumps, education, continuous glucose monitoring</i> )	7	18.4
Other ( <i>epilepsy &amp; metabolic, bariatric surgery, mental health, oncology, pancreatic</i> )	5	13.2
Range ( <i>critical care, acute/community/mental health, infants</i> )	4	10.5
Cystic fibrosis	3	7.9

### 5.2.3.3 Therapeutic radiographers

Fifty-four therapeutic radiographers completed questionnaire 1, representing 58.7% of the total sample. Fifty-seven per cent (n=31) were consultants or advanced practitioners, with 24.1% (n=13) and 18.5% (n=10) in specialist and review roles respectively. All consultants (n=18, 33.3%) reported AfC band 8 pay scales, with the majority (86.1%, n=31) of advanced practitioners, specialists and review radiographers at pay band 7 (n=31). Fewer advanced practitioners (38.4%, n=5) held postgraduate degrees than those in other job roles (92.6%, n=38, p<0.001).

Therapeutic radiographers were predominantly employed by acute or specialist acute trusts (92.6%, n=50), with a small number employed by combined acute and/or community trusts or the independent sector (n=4, 7.4%). The main area of service provision was outpatient (n=53, 98.1%) with a fifth (n=11, 20.4%) providing inpatient services. Table 11 shows the range of cancer sites managed by therapeutic radiographers; 50% (n=27) provided generalist services, treating a wide range of different cancer diagnoses, 38.9% (n=21) specialised in a single cancer site and 9.3% (n=5) provided a combination of generalist and single site services. Of those reporting patient age ranges (n=40, 74.1%), 80.0% (n=32) provided adult services and 20.0% (n=8) managed adults and children.

**Table 11 Therapeutic radiographer service provision**

<b>Therapeutic Radiographers (n=54)</b>		
<b>Specialist Single site</b>	<b>n</b>	<b>%</b>
Head & neck	5	9.3
Urology (prostate, bladder)	4	7.4
Breast	2	3.7
Brain & spinal cord	1	1.9
Lower gastrointestinal (colorectal, anal)	1	1.9
Lung	1	1.9
Pelvic	1	1.9
<b>Generalist Multiple site</b>	<b>n</b>	<b>%</b>
All sites	24	44.4
Breast, prostate, lung, lower gastrointestinal, gynaecology	1	1.9
Head & neck, prostate	1	1.9
Head & neck, upper & lower gastrointestinal, urology, skin, sarcoma	1	1.9

Anal, rectal, vulval, head & neck	1	1.9
Head & neck, upper & lower gastrointestinal, skin, sarcoma, urology	1	1.9
All sites (except gynaecology & urology)	1	1.9

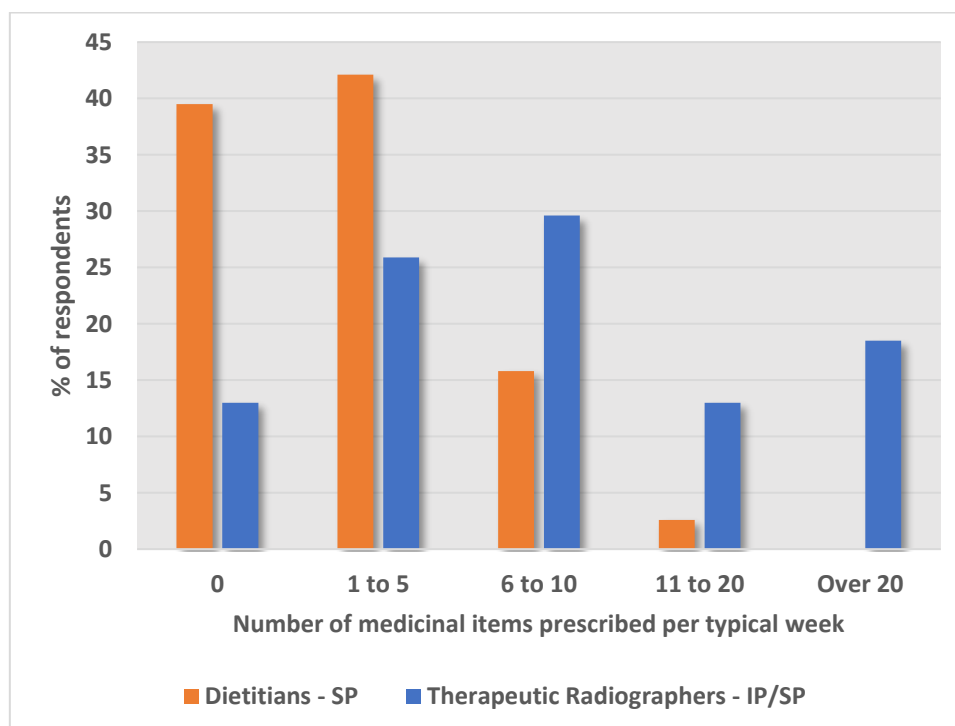
### 5.3. Medicines Management

#### 5.3.1 Total Sample

Participants were asked a series of questions about their prescribing and medicines management practices. Of the total sample, 70 (76.1%) reported that they were currently prescribing in practice; 23 (60.5%) dietitians and 47 (87.0%) therapeutic radiographers ( $p=0.003$ ). Consistent with current legislative rights dietitians exclusively used SP with therapeutic radiographers using IP (63.8%,  $n=30$ ), or IP and SP (36.2%,  $n=17$ ). The main reasons cited for failing to prescribe following NMP qualification were delays in HCPC registration or organisational approval of NMP status ( $n=9$ , 34.6%), logistical difficulties with implementing the Clinical Management Plan (CMP) in the case of SP ( $n=5$ , 19.2%) and Covid-19 related role changes or delays to setting up SP ( $n=4$ , 15.4%) (Appendix 5 V).

The total sample reported prescribing a median of 4.75 (range 0.0-75.0) medicinal items in a typical week (Appendix 5 VI) with 1 dietitian (2.6%) and 17 (31.5%) therapeutic radiographers prescribing more than 11 items per week (Figure 3).

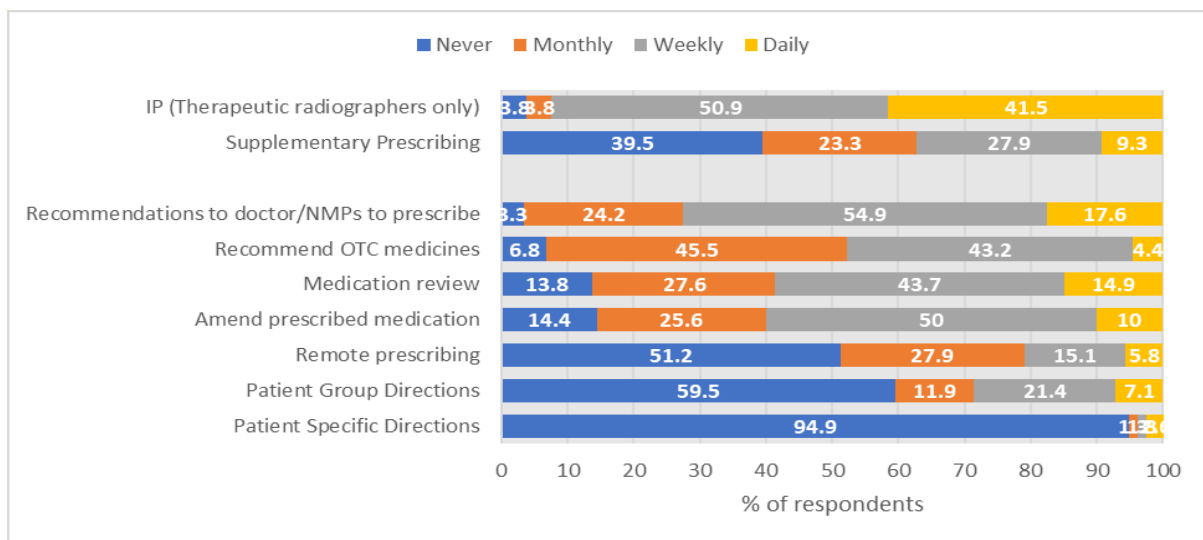
**Figure 3** Number of medical items prescribed by dietitians and therapeutic radiographers in a typical week





In addition to prescribing, dietitians (n=38) and therapeutic radiographers (n=54) also indicated engagement in a median of 5.0 (range 1.0-7.0, mean 4.4, SD 1.3) other methods for the administration, supply and/or optimisation of medicines as shown in Appendix 5 VII & VIII. Thirty four (40.4%) accessed medicines using Patient Group Directions, of whom 70.6% (n=24) did so on a weekly or daily basis. The use of Patient Specific Directions overall was minimal (n=4, 5.2%). Respondents also made recommendations to patients to buy OTC medicines (n=82, 93.2%) on a monthly, weekly or daily basis, in addition to amending prescribed medicines (n=77, 85.6%), performing medication reviews (n=75, 86.2%) and undertaking remote prescribing (n=42, 48.8%). Eighty eight (97%) of the total sample made recommendations to doctors or other NMPs for prescribed medicines; two thirds (72.5%, n=66) on a weekly or daily basis. (Figure 4)

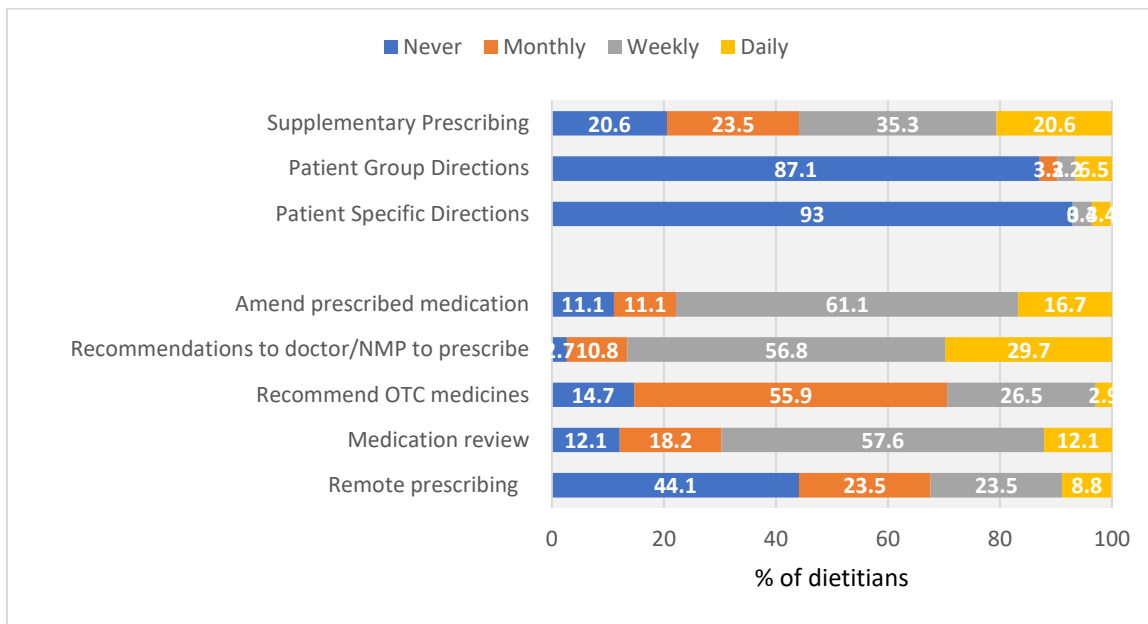
**Figure 4 Methods used by dietitians and therapeutic radiographers to supply, administer prescribe or optimise medicines**



### 5.3.2 Dietitians

Ninety-seven per cent (n=37) reported engaging in medicines management in some capacity on at least a monthly basis, overall using a median of 5.0 (range 1.0-8.0) different methods to optimise, supply and/or prescribe them (Figure 5). Fewer dietitians than therapeutic radiographers overall used PGD (12.9% Vs 56.6%, p<0.001) with only 3 (9.7%) doing so on a weekly/daily basis. However, more dietitians made recommendations to doctors/other NMPs for prescribed medicines on a weekly/daily basis (86.5% Vs 63.0%, p=0.019) as well as amended prescribed medicines (77.8% Vs 48.2%, p=0.023). Dietitians estimated that they prescribed a mean of 3.1 (SD 4.4, median 2.5, range 0.0-20.0) medicinal items per week using SP (See Appendix 5 VI & VII).

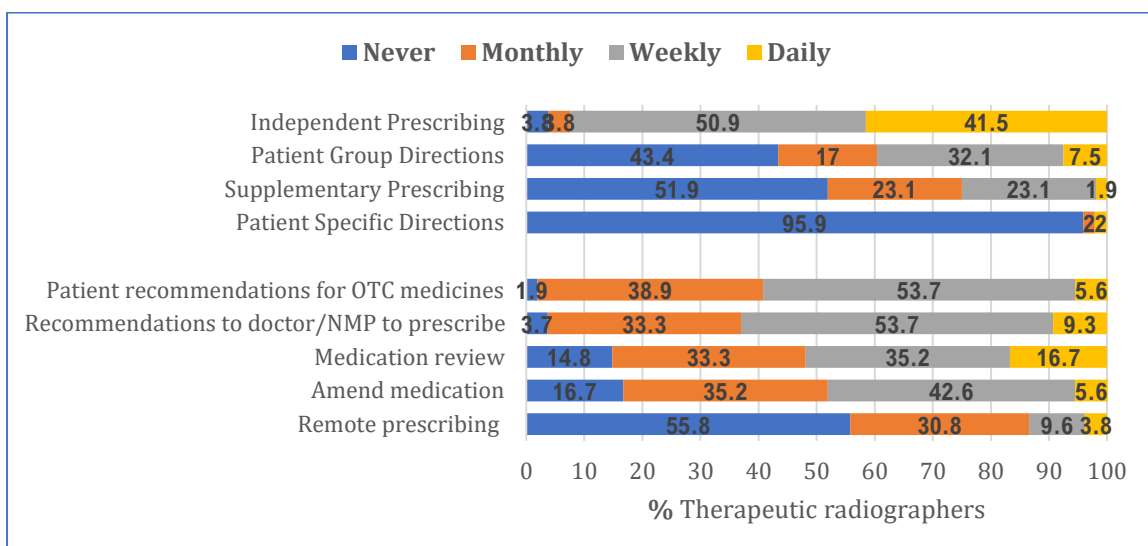
**Figure 5 Methods used by Dietitians to supply, administer or prescribe medicines**



### 5.3.3 Therapeutic radiographers

All TR survey respondents (n=54) indicated that they were involved in medicines management activities at least a monthly basis, using a median of 6.0 (range 2.0-9.0) methods. Just over half (56.6%, n=30) reported PGD use with 98.2% (n=53) advising patients to buy over the counter medicine(s), 85.2% (n=46) undertaking medication reviews and 83.4% (n=45) amending medications. In addition 63.0% (n=34) made recommendations to doctors/other NMPs for prescribed medicines on a weekly or daily basis. (Figure 6).

**Figure 6 Methods used by Therapeutic Radiographers to supply, administer or prescribe medicines**



Therapeutic radiographers used IP to prescribe a mean of 10.3 (SD 13.1, median 6.75, range 0.0-75.0) medicinal items within a typical week and SP to prescribe a mean of 1.3 (SD 3.5, median 0.0, range 0.0-20.0) items (See Appendix 5 VI & VIII).

## 5.4 Therapy areas where treatment is provided

### 5.4.1 Total Sample

Participants were asked to indicate the therapy areas where they prescribed (Table 12). The main therapy areas were gastro-intestinal medicines (antacids, laxatives, n=63, 68.5%), skin treatments (emollients, topical preparations, n=44, 47.8%), drugs for urinary tract disorders (urinary frequency, erectile dysfunction, n=39, 40.2%) and infections (antimicrobials, n=37, 40.2%). Participants with higher degrees prescribed from a broader range of therapy areas (median 4.0, range 1.0-12.0) than those with degrees/diplomas (median 2.0, range 1.0-9.0, p=0.010).

**Table 12 Therapy areas in which therapeutic radiographers and dietitians currently prescribe medication\***

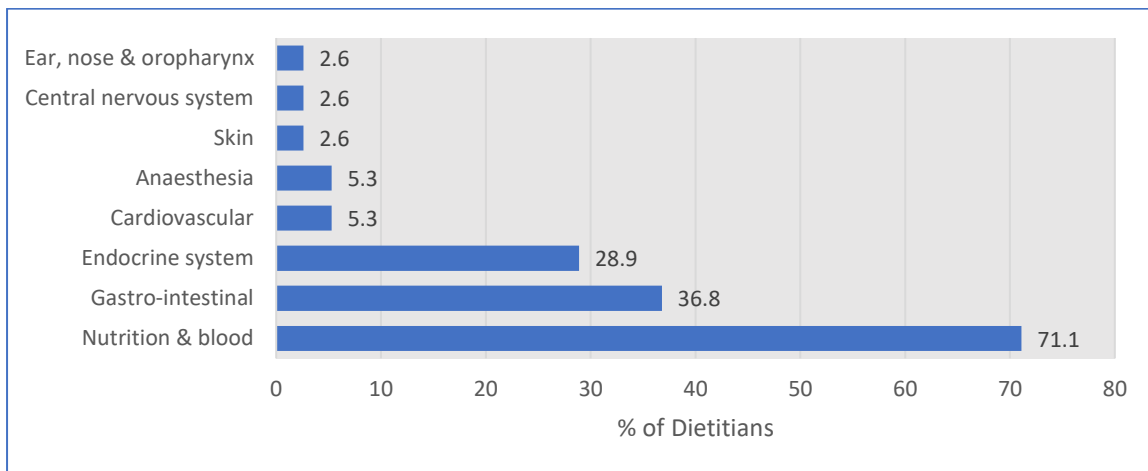
	Dietitians (n=38)		Therapeutic Radiographers (n=54)		Total (n=92)	
	n	%	n	%	n	%
Gastro-intestinal	14	36.8	49	90.7	63	68.5
Skin	1	2.6	43	79.6	44	47.8
Urinary tract	0	0.0	39	72.2	39	42.4
Infections	0	0.0	37	68.5	37	40.2
Nutrition & blood	27	71.1	7	13.0	34	37.0
Ear, nose & oropharynx	1	2.6	32	59.3	33	35.9
Endocrine system	11	28.9	15	27.8	26	28.3
Musculoskeletal	0	0.0	26	48.1	26	28.3
Central nervous system	1	2.6	21	38.9	22	23.9
Respiratory system	0	0.0	19	35.2	19	20.7
Anaesthesia	2	5.3	10	18.5	12	13.0
Malignant disease	0	0.0	6	11.1	6	6.5
Eye	0	0.0	6	11.1	6	6.5
Cardiovascular	2	5.3	4	7.4	6	6.5
Obstetrics & gynaecology	0	0.0	1	1.9	1	1.1
Immunological	0	0.0	0	0.0	0	0.0

\*Multiple responses possible

### 5.4.2 Dietitians

Dietitians prescribed from 8 treatment/therapy areas (Figure 7), with nutrition and blood (71.1%, n=27), gastro-intestinal (36.8%, n=14) and the endocrine system (diabetes drugs, thyroid, sex-hormones, 28.9%, n=11) the three main areas where the greatest number prescribed.

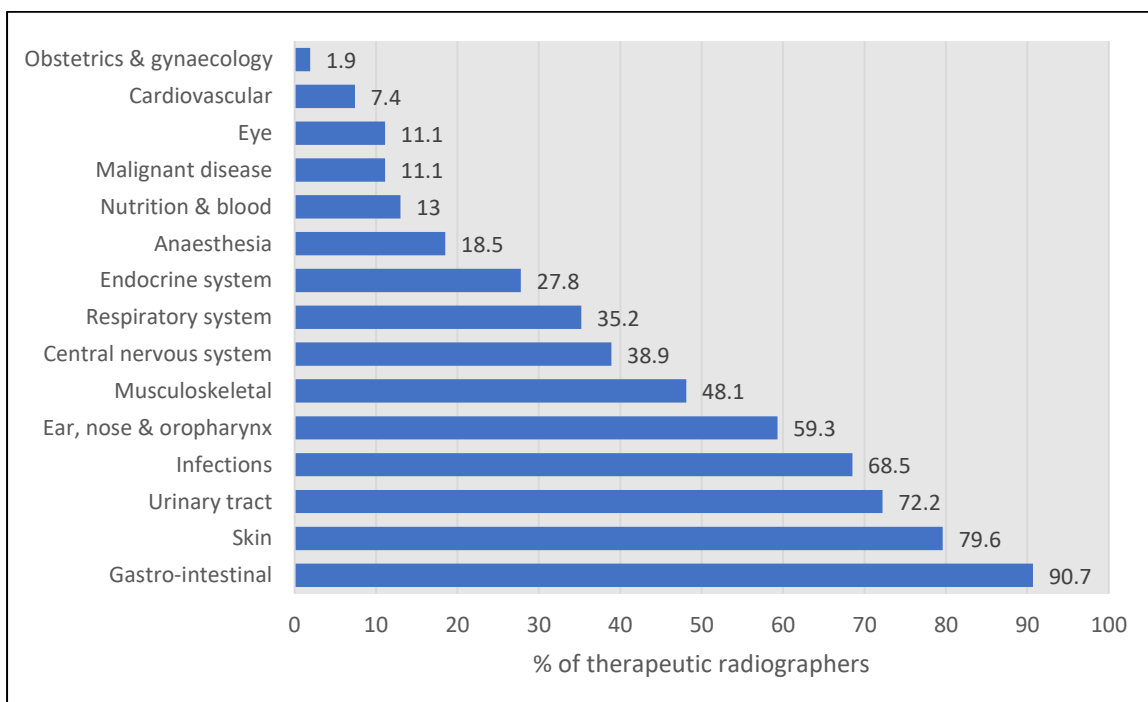
**Figure 7 Main therapy areas in which dietitians prescribe medication**



### 5.4.3 Therapeutic radiographers

Overall, TR-IP respondents (n=47) prescribed a broad range of medicines (median 6.0, range 2.0-12.0) (Figure 8). Forty-nine (90.7%) prescribed gastro-intestinal medicines; 79.6% (n=43) medicines for skin 72.2% (n=39) urinary tract, and 68.5% (n=37) for infections. Fifty nine per cent (n=32) prescribed ear, nose and oropharynx medicines, with 48.1% (n=26) and 38.9% (n=21) respectively prescribing musculoskeletal and central nervous system drugs (antidepressants and analgesics).

**Figure 8 Main therapy areas in which therapeutic radiographers prescribe medication**



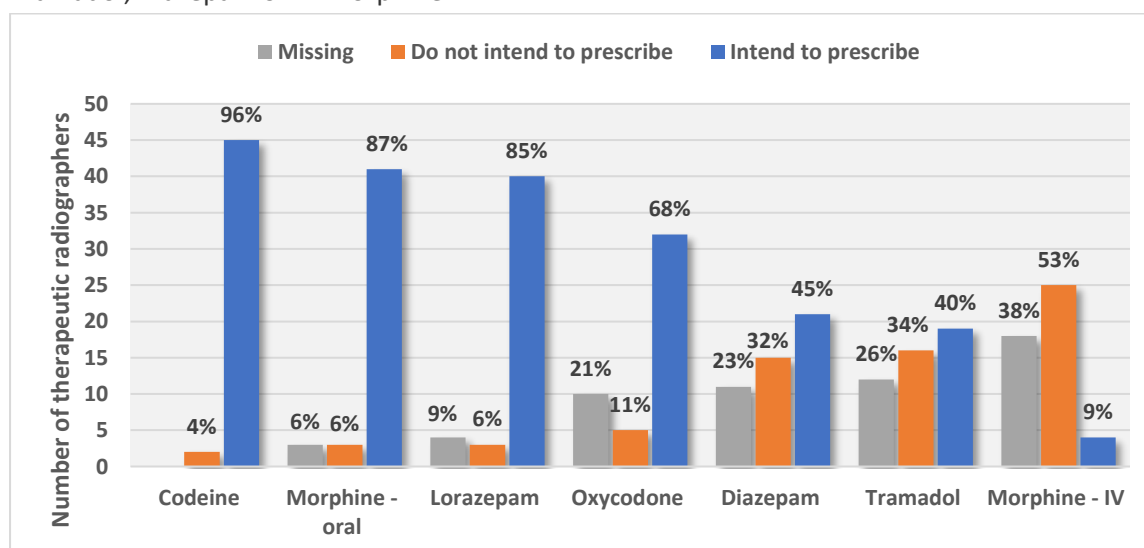
### 5.4.4 Controlled drugs

Sixteen (22.9%) respondents indicated they prescribed controlled drugs via supplementary prescribing using a clinical management plan; 14 (87.5%) TR-IPs and 2 (12.5%) D-SPs (p=0.048). The most frequently reported CDs are shown in Table 13.

**Table 13 Controlled drugs prescribed by D-SPs and TR-IPs (n=16)**

	Dietitians (n=2)		Therapeutic Radiographers (n=14)		Total (n=16)	
	n	%	n	%	n	%
Codeine	2	100.0	13	92.9	15	93.8
Morphine	0	0.0	14	100.0	14	87.5
Benzodiazepines	0	0.0	8	57.1	8	50.0
Fentanyl	0	0.0	3	21.4	3	18.8
Tramadol	0	0.0	2	14.3	2	12.5
Pregabalin/Gabapen	0	0.0	2	14.3	2	12.5
Buprenorphine	0	0.0	1	7.1	1	6.3

TR-IP respondents were additionally asked about their intentions should future legislation permit the independent prescribing of controlled drugs (Figure 9). Over 85% anticipated that they would prescribe Codeine, oral Morphine and Lorazepam, with fewer than 50% intending to prescribe Tramadol, Diazepam or IV Morphine.



**Figure 9 TR-IP intentions re future prescribing of controlled drugs**

## 5.5 Barriers and facilitators to NMP training

### 5.5.1 NMP training

The majority of respondents (n=73, 79%) reported completing NMP training programmes between 2017-2019 (Table 14), attending 19 different HEIs across England (dietitians, n=9 HEIs; therapeutic radiographers n=15 HEIs). Seventy-eight (84.8%) received funding for NMP fees from their employer, 6 (6.5%) NHSE/HEE or regional workforce monies and 4 (4.4%) cited

independent charity, HEI or PhD scholarship funding sources. Only three participants had either independently (n=1, 1.1%) or in conjunction with their employer (n=2, 2.2%) self-funded their training

All but one participant (98.9%, n=91) was supervised by a Designated Medical Practitioner (DMP), the vast majority of whom were consultants (95.6%, n=88).

**Table 14 Year NMP course completed**

	Dietitians (n=38)		Therapeutic Radiographers (n=54)		Total (n=92)	
	n	%	n	%	n	%
<b>Year NMP course completed</b>						
<2017	-	-	5	9.3	5	5.4
2017	8	21.1	17	31.5	25	27.2
2018	11	28.9	11	20.4	22	23.9
2019	13	34.2	13	24.1	26	28.3
>2020	6	15.8	8	14.9	14	15.3

### *5.5.2 Expectations and motivations*

Over 90% reported that improving patient quality of care (n=89, 96.7%), access to medicines (n=84, 92.3%) and making better use of individual (n=87, 94.6%) and team clinical skills (n= 85, 92.4%) were strong motivating factors (Table 15). Whilst at an organisational level, 69.2% (n=63) reported undertaking training to support development of a new service, fewer (n=33, 36.3%) expected that it would enhance patient choice (55.0%, n=50) or contribute to meeting organisational targets such as reducing waiting times, hospital admissions or use of emergency services. Increasing job satisfaction (n=80, 87.0%) was also a strong motivator, however fewer (68.5%, n=63) considered adopting the prescribing role would lead to a definitive increase in professional status or offer enhanced job prospects (30.8%, n=28). There was minimal motivation for undertaking NMP as a pathway to financial remuneration, with 74.4% (n=67) indicating this was not an influencing factor.

**Table 15 Reasons given by Dietitians and Therapeutic Radiographers for undertaking non-medical prescribing**

Which, if any, of the following influenced or, and/or, informed your decision to become a prescriber?	n (%)			p value
	Dietitians (n=38)	Therapeutic Radiographers (n=54)	Total (n=92)	
<i>a) Improve quality of care</i>	36 (94.7)	53 (98.1)	89 (96.7)	0.37
<i>b) Improve patient access to medicines</i>	32 (86.5)	52 (96.3)	84 (92.3)	0.08
<i>c) Increase patient choice</i>	19 (51.4)	31 (57.4)	50 (55.0)	0.51
<i>d) Meet other organisational targets (e.g. reducing waiting times, admissions or use of emergency services)</i>	14 (36.8)	19 (35.2)	33 (36.3)	0.44
<i>e) Support the development of a new type of service provision</i>	19 (51.4)	44 (81.5)	63 (69.2)	0.001
<i>f) Make better use of my skills</i>	36 (94.7)	51 (94.4)	87 (94.6)	0.95
<i>g) Make better use of the skills of the clinical team in which I practice</i>	36 (94.7)	49 (90.7)	85 (92.4)	0.48
<i>h) Improve my job satisfaction</i>	36 (94.7)	44 (81.5)	80 (87.0)	0.06
<i>i) Increase my professional status</i>	27 (71.1)	36 (66.7)	63 (68.5)	0.60
<i>j) Increase my income</i>	3 (8.3)	5 (9.3)	8 (8.7)	0.91
<i>k) Improve my job prospects</i>	12 (32.4)	16 (29.6)	28 (30.8)	0.52

### *Dietitians*

Fifty-one per cent (n=19) of dietitians indicated that supporting development of a new type of service was highly influential in their decision to undertaking NMP training. Overall dietitians expected prescribing capability would contribute to improved care quality (n=36, 94.7%) and patient access to medicines (n=32, 86.5%). However, fewer considered it would impact patient choice (n=19, 51.4%) or be used to meet organisational targets (n=14, 36.8%). Although 94.7% (n=36) of dietitians thought becoming a prescriber would make better use of their skills improve their job satisfaction, there was limited expectation prescribing would lead to improved jobs prospects (32.4%, n=12) or financial reward (8.3%, n=3).

### *Therapeutic Radiographers*

Therapeutic radiographer responses were very similar to dietitians. Eighty-one per cent (n=44) indicated that supporting development of a new type of service was highly influential in their decision to undertaking NMP training. Overall therapeutic radiographers expected IP capability would improve patient access to medicines (n=52, 96.3%) and contribute to improved care quality (n=53, 98.1%). However, fewer considered it would impact patient choice (n=31, 57.4%) or be used to meet organisational targets (n=19, 35.2%). Although 94.4% (n=51) of therapeutic radiographers thought becoming an IP would make better use of their skills and 81.5% (n=44) reported it would improve their job satisfaction, there was limited expectation that IP would lead to improved jobs prospects (29.6%, n=16) or financial reward (9.3%, n=5).

### 5.5.3 Programme specific skills

Despite presenting as a highly qualified group with (Table 8), educational preparation for prescribing was limited in the areas of assessment/diagnosis, numeracy and pharmacology (Table 16). Therapeutic radiographers appeared better prepared in assessment/diagnostic skills, with 46.3% of those responding (n=25) having undertaken accredited study compared to 13.2% (n=5) of dietitians, however, there was a heavy reliance on experiential training in this area for both professions (50.0%, n=27 Vs 55.3%, n=21). Additionally, around a third of dietitians and over half of therapeutic radiographers reported a lack of preparatory numeracy or pharmacology training for NMP, with 40% of dietitians also lacking any form of training for developing assessment/diagnostic skills.

**Table 16 Programme specific skills training undertaken by dietitian and therapeutic radiographers**

	Dietitians (n=38)		Therapeutic Radiographers (n=54)		Total (n=92)	
	n	%	n	%	n	%
<b>Assessment &amp; diagnostic skills</b>						
Accredited	5	13.2	25	46.3	30	32.6
Non-accredited	3	7.9	4	7.4	7	7.6
Experiential/on-the-job	21	55.3	27	50.0	48	52.2
None	15	39.5	7	13.0	22	23.9
<b>Pharmacology</b>						
Accredited	5	13.2	6	11.1	11	11.9
Non-accredited	4	10.5	5	9.3	9	9.8
Experiential/on-the-job	20	52.6	17	31.5	37	40.2
None	5	13.2	6	11.1	11	11.9
<b>Numeracy</b>						
Accredited	15	39.5	30	55.6	45	48.9
Non-accredited	4	10.5	8	14.8	12	13.0
Experiential/on-the-job	5	13.2	3	5.6	8	8.7
None	16	42.1	11	20.4	27	29.3

### 5.5.4 Preparation and support for the prescribing role

The majority (92.4%, n=85) felt that their employers had supported their NMP programme requirements, although 9 (9.7%) experienced difficulties securing a suitable DMP/Practice Assessor and 15 (16.3%) expressed dissatisfaction with the level of supervision that they received during training (Table 167). Despite few (n=10, 10.9%) indicating difficulties meeting course learning objectives, 23 (25.3%) did not consider their scope of prescribing practice had been sufficiently agreed with their employers and 15 (16.5%) did not feel prepared to prescribe following qualification.

Overall, more dietitians than therapeutic radiographers indicated difficulty with the course, with 10.5% (n=4) versus 1.9% (n=6, p=0.07) expressing difficulty meeting course learning objectives and 64.9% (n=24) versus 81.4% (n=44, p=0.07) indicating a lack of agreed scope of practice.



**Table 17 Preparations and support for the prescribing role**

To what extent do you agree/disagree with following statements about preparation for the prescribing role?	n (%) Adequate preparation/support (agree/strongly agree)			p value
	Dietitians	Therapeutic Radiographers	Total Sample	
a) My employer was supportive of the programme requirements (n=92)	33 (86.8%)	52 (96.3%)	85 (92.4%)	0.92
b) I experienced difficulty securing a suitable Designated Medical Practitioner/Practice Assessor (n=92)	3 (7.9%)	6 (11.2%)	9 (9.7%)	0.61
c) I am satisfied with the level of support and supervision that I received (n=92)	33 (86.8%)	44 (81.4%)	77 (83.7%)	0.49
d) After completing the prescribing programme I felt prepared to prescribe in my area of practice (n=91)	29 (78.4%)	47 (87.0%)	76 (83.5%)	0.18
e) I had difficulty meeting the learning outcomes of the prescribing programme (n=92)	4 (10.5%)	6 (1.9%)	10 (10.9%)	0.07
f) My scope of prescribing practice had been sufficiently agreed with my employer (n=91)	24 (64.9%)	44 (81.4%)	68 (74.7%)	0.07

### 5.5.5 Governance

Table 18 provides a summary of safety and clinical governance systems reported to be in place for NMP following qualification. A median of 8.0 (range 0.0 to 11.0) governance systems were reported to be in place.

Whilst 86% of the total sample had access to relevant drug alerts and safety notices, access to the BNF, an agreed scope of practice and contact details for an NMP-lead, less than 50% were involved in developing local prescribing formularies guidelines or had access to their own clinical or prescribing data. Overall provision was similar between the two professions (therapeutic radiographers median 8.0, range 1.0-11.0; dietitians median 8.0, range 0.0-11.0,  $p=0.907$ ), although fewer dietitians had provided specimen signatures to their employers/local pharmacists (60.5%,  $n=23$  Vs 83.3%,  $p=0.02$ ).

**Table 18 NMP clinical governance systems**

To what extent are the following aspects of non-medical prescribing clinical governance in place in your area of practice?	n (%) stating "yes" (vs. no/unsure)			p value
	Dietitians	Therapeutic Radiographers	Total Sample	
a) An up-to-date non-medical prescribing policy relevant to my profession and prescribing practice (n=92)	26 (68.4)	47 (87.0)	73 (79.3)	$p=0.302$
b) Specimen signature provided to employer/ local pharmacist (n=92)	23 (60.5)	45 (83.3)	68 (73.9)	$p=0.02$
c) Access to all relevant clinical information e.g. Patient Safety Notices, Drug Alerts and Hazard Warnings (n=91)	34 (91.9)	48 (90.6)	82 (90.1)	$p=0.24$
d) Access to each edition (electronic or print version) of the British National Formulary (BNF) (n=92)	35 (92.1)	52 (96.3)	87 (94.6)	$p=0.81$
e) An agreed scope of practice (n=92)	31 (81.6)	48 (88.9)	79 (85.9)	$p=0.85$

e) Non-medical prescribing lead contact details (n=92)	35 (92.1)	47 (87.0)	82 (89.1)	p=0.32
g) Access (via employer/trust/ independently) to continued professional development (CPD) to support me in prescribing role (n=92)	28 (73.7)	42 (77.8)	70 (76.1)	p=0.89
h) Involvement, now or in the future, with regular clinical audit and review of my clinical services (n=92)	25 (65.8)	32 (59.3)	57 (62.0)	p=0.65
l) Involvement, now or in the future, in the development of local formularies and guidelines (n=91)	21 (56.8)	23 (42.6)	44 (48.4)	p=0.22
j) Access to regular data to monitor my prescribing practice (n=92)	18 (47.4)	21 (38.9)	39 (42.4)	p=0.65
k) Access to my own prescribing data (via prescribing analysis and cost tabulation (PACT) or otherwise) (n=92)	12 (31.6)	12 (22.2)	24 (26.1)	p=0.69

### 5.5.6 Impact of NMP

To determine the perceived impact of adopting the prescribing role, a series of 20 statements were presented on the potential benefits of NMP, to which respondents were requested to stipulate agreement 'A Lot/A Little' or 'Not At All' (Table 19).

Over 80% of both professions agreed that adopting the prescribing role enabled more holistic care, enhanced communication with patients regarding medications and improved knowledge of prescribing and pharmacology. More than 75% also considered that NMP saved time arranging prescriptions from doctors or other prescribers, increased patient satisfaction, enhanced safety and the specificity and responsiveness of prescribing and improved team working and job satisfaction.

Dietitians were less inclined than therapeutic radiographers to think that their prescribing practice had an impact on reducing waiting times ( $p < 0.001$ ) or that it saved time in arranging prescriptions from other prescribers ( $p = 0.018$ ), increased patient satisfaction ( $p = 0.032$ ), or improved access to prescriptions/services ( $p = 0.029$ ). This probably reflects differences in the models of NMP used and/or the aims of service provision between the two professions.

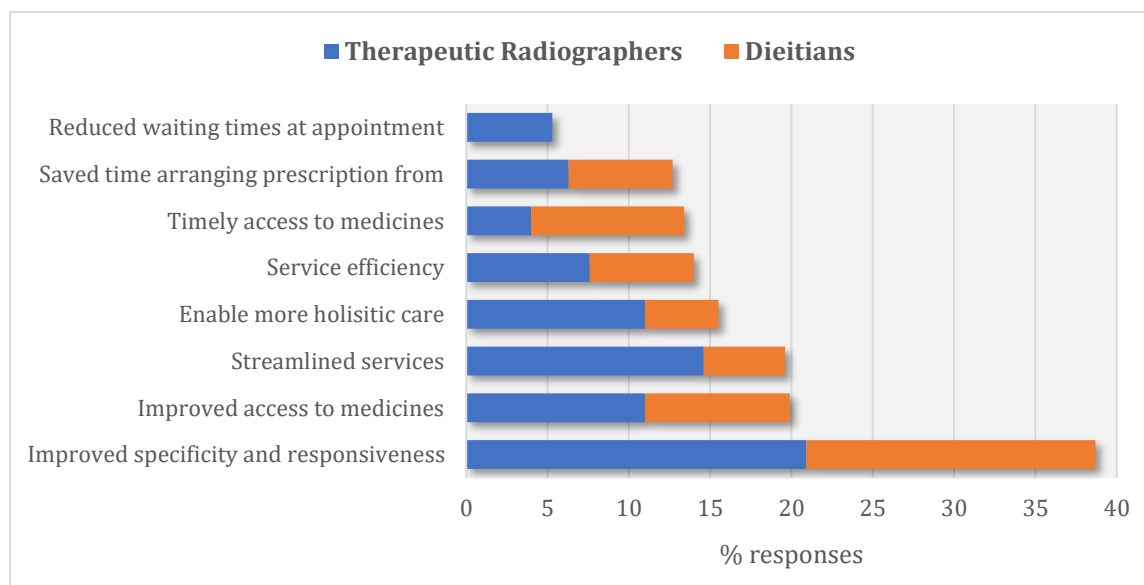
**Table 19 Benefits of NMP**

To what extent has your prescribing practice resulted in the following benefits?	n (%) stating "A Lot" (vs. A Little/Not At All)			p value
	Dietitians	Therapeutic Radiographers	Total Sample	
a) Reduced waiting times for patients once at the appointment? (n=90)	14 (38.9)	45 (83.3)	59 (65.6)	<0.001
b) Streamlined services, i.e. fewer patient appointments with fewer health care professionals? (n=90)	20 (55.6)	40 (74.1)	60 (66.7)	0.068
c) Increased patient choice with regards to healthcare professional accessed and convenience? (n=89)	20 (55.6)	34 (64.2)	54 (60.7)	0.415
d) Saved time arranging prescription from doctor or other prescriber? (n=90)	28 (77.8)	51 (94.4)	79 (87.8)	0.018

<b>e) Reduced use of emergency services such as ambulance, A&amp;E visits, out-of-hours service? (n=89)</b>	6 (17.1)	14 (25.9)	20 (22.5)	0.332
<b>f) Reduced length of hospital stay? (n=88)</b>	5 (14.7)	10 (18.5)	15 (17.0)	0.643
<b>g) Prevented hospital admissions? (n=88)</b>	5 (14.7)	14 (25.9)	19 (21.6)	0.213
<b>h) Enabled more holistic care? (n=90)</b>	29 (80.6)	47 (87.0)	76 (84.4)	0.406
<b>i) Increased patient satisfaction? (n=88)</b>	25 (73.5)	49 (90.7)	74 (84.1)	0.032
<b>j) Improved access, e.g. can offer prescription when doctor not available or offer different services (e.g., out-of-hours, community)? (n=90)</b>	21 (58.3)	43 (79.6)	64 (71.1)	0.029
<b>k) Increased ability to select the most appropriate medication for the patient? (n=90)</b>	28 (77.8)	37 (68.5)	65 (72.2)	0.337
<b>l) Improved specificity &amp; responsiveness of prescribing (e.g. better placed to adapt or change treatment, titrate doses &amp; reduce exposure to risk or side effect)? (n=89)</b>	27 (77.1)	38 (70.4)	65 (73.0)	0.482
<b>m) Reduced unnecessary prescriptions? (n=81)</b>	16 (59.3)	24 (44.4)	40 (49.4)	0.209
<b>n) Improved communication with patients about medicine? (n=90)</b>	29 (80.6)	49 (90.7)	78 (86.7)	0.164
<b>o) Improved medicines management? (n=86)</b>	23 (71.9)	33 (61.1)	56 (65.1)	0.311
<b>p) Improved safety? (n=90)</b>	26 (72.2)	39 (72.2)	65 (72.2)	1.00
<b>q) Improved my knowledge (e.g. understanding of pharmacology and prescribing)? (n=91)</b>	32 (86.5)	54 (100.0)	86 (94.5)	0.005
<b>r) Increased my job satisfaction? (n=87)</b>	26 (78.8)	48 (88.9)	74 (85.1)	0.200
<b>t) Improved team working? (n=90)</b>	26 (70.3)	44 (83.0)	70 (77.8)	0.152
<b>u) Clarified lines of accountability &amp; responsibility for treatment decisions? (n=89)</b>	19 (54.3)	32 (59.3)	52 (57.3)	0.643

Using free text, participants were also asked to indicate the top three areas where independent and/or supplementary prescribing had been of most beneficial in their service (Figure 10). Categorised responses for the total sample indicated that improved specificity and responsiveness of prescribing (37.7%), access to medicines (19.9%), service streamlining (19.6%) and more holistic care (15.5%) were the four primary benefits.

**Figure 10 Top three areas where NMP is most beneficial to services**



### 5.5.6 Barriers and enablers

To determine views about implementing NMP, participants were asked to provide free text comments on factors that had delayed/prevented prescribing from maximising patient benefit as well as the factors perceived to support prescribing practice. The majority of barriers related to the legislative restrictions and administrative difficulties of implementing SP for dietitians and the lack of controlled drug access for therapeutic radiographers using IP Appendix 5 IX & X. Receiving adequate peer, team member, medical as well managerial support for the prescribing role was a key enabler for both dietitians and therapeutic radiographers Appendix 5 IX & X.

## 5.3 Questionnaire 2: Dietitian supplementary prescribers and therapeutic radiographer independent prescribers

### 5.3.1 Response rate

Thirty-four (37.0%) survey 1 respondents went on to complete survey 2, 16 (47.1%) dietitians and 18 (52.9%) therapeutic radiographers.

### 5.3.2 Sample demographics

Participants represented all 13 geographical regions across England, with the largest number based in the Midlands (21.7%, n=20) and lowest number based in the East of England (6.5%, n=6) (Table 20). A similar pattern of demographic characteristics was found to survey 1 in terms of age groupings, hours worked and highest educational attainment with 79.4% (n=27, p=0.240) aged 40 years or over, 82.4% (n=28, p=0.529) in full time employment and 67.6% (n=23, p=0.760) holding postgraduate degrees.

Categorised job titles indicated that survey 2 participants were also predominantly working as consultants, advanced practitioners and senior specialists (n=21, 61.8%) and were at the higher end of the salary scale, with 44.1% (n=15) at Agenda for Change band 8 (or equivalent) and 47.1% (n=16) at band 7. In keeping with survey 1 findings, more therapeutic radiographers were in band 8 roles than dietitians (61.7%, n=11 Vs 25.0%, n=4, p=0.04). Compared to survey 1, a similar proportion of survey 2 therapeutic radiographers (77.8%, n=14) and dietitians (56.3%, n=9, p=0.167) held postgraduate degrees.

**Table 20 Survey 2-Sample demographics**

	Dietitians (n=16)		Therapeutic Radiographers (n=18)		Total (n=34)	
	n	%	n	%	n	%
<b>Job title</b>						
Specialist/ Senior Specialist Dietitian	8	50.0	-	-	8	50.0
Lead Dietitian/Team lead/Manager	5	31.3	-	-	5	31.3
Dietitian	3	18.8	-	-	3	18.8
Consultant Radiographer	-	-	9	50.0	9	50.0
Advanced practitioner/senior Radiographer	-	-	5	27.8	5	27.8
Specialist radiographer	-	-	2	11.1	2	11.1
Review Radiographer	-	-	1	5.6	1	5.6
Manager	-	-	1	5.6	1	5.6
<b>Age (years)</b>						
<40	4	25.0	3	16.7	7	20.6
40-50	7	43.8	9	50.0	16	47.1
>50	5	31.3	6	33.3	11	32.3
<b>Geographical region</b>						
Midlands (East Midlands, West Midlands)	3	18.8	6	33.3	9	26.5
Northeast & Yorkshire (Yorkshire & Humber, North East)	7	43.7	1	5.6	8	23.5
North West (North West)	3	18.8	2	11.1	5	14.7
South West (South West, Wessex)	1	6.3	3	16.7	4	11.8
London (North, Central & East, North West, South)	2	12.5	1	5.6	3	8.8
South East (Kent, Surrey & Sussex, Thames Valley)	0	0.0	3	16.7	3	8.8
East of England (East of England)	0	0.0	1	5.6	1	2.9
> 1 geographic location	0	0.0	1	5.6	1	2.9
<b>Agenda for Change</b>						
Band 6	3	18.8	0	0.0	3	8.8
Band 7	9	56.3	7	38.9	16	47.1
Band 8	4	25.0	11	61.1	15	44.1
<b>Hours worked</b>						
Full-time (>30 hours)	12	75.0	16	88.9	28	82.4
Part-time (21-30 hours)	4	25.0	2	11.1	6	17.6
<b>Highest level of education</b>						
Diploma	0	0.0	1	5.6	1	2.9
Degree	7	43.8	3	16.7	10	29.4
Masters	7	43.8	13	72.2	20	58.8
Doctorate	2	12.5	1	5.6	3	8.8

### 5.3.3 Areas of service provision

#### 5.3.3.1 Total Sample

Details of the care settings and services provided by participants completing survey 2 are provided in Tables 21-23. Employment patterns and service provision was similar to survey 1 results, with the majority (94.1%, n=32) of dietitians and therapeutic radiographers working for acute trusts or acute specialist trusts, most dietitians (87.5%, n=14) providing NHS inpatient and outpatient services and therapeutic radiography provision predominantly NHS outpatient based (77.8%, n=14).

**Table 21 Care and service settings**

	Dietitians (n=16)		Therapeutic Radiographers (n=18)		Total (n=34)	
	n	%	n	%	n	%
<b>Employing organisation</b>						
Acute/Acute Specialist Trust	15	93.8	17	94.4	32	94.1
Combined Acute & Community Trust	1	6.3	0	0.0	1	2.9
Other (non-specified)	0	0.0	1	5.6	1	2.9
<b>Services provided (multiple responses possible)</b>						
NHS outpatient	14	87.5	14	77.8	28	82.3
NHS inpatient	14	87.5	0	0.0	14	41.2
NHS inpatient/outpatient	0	0.0	3	16.7	3	8.9
Community Service	1	6.3	0	0.0	1	2.9
Other	0	0.0	1	1.9	1	2.9
<b>Age range</b>						
Adult <sup>1</sup>	13	81.2	5	27.8	18	52.9
Adolescents <sup>2</sup> & Adults	1	6.3	2	11.1	3	8.9
Adolescents & Children <sup>3</sup>	1	6.3	0	0.0	1	2.9
All ages	0	0.0	1	5.6	1	2.9
Missing	1	6.3	10	55.5	11	32.4

<sup>1</sup>20 years+, <sup>2</sup>10-19 years, <sup>3</sup>1-9 years.

#### 5.3.3.2 Dietitians

Of the 16 dietitians, 8 (50.0%) were senior/specialists, 5 (31.3%) were in lead/team lead roles and 3 (18.8%) were dietitians. No ACP/trainee ACP roles were reported. The larger majority reported band 7 (56.3%, n=9) pay scales. Just over half (56.3%, n=9) held postgraduate degrees.

The majority (93.8%, n=15) worked in secondary care acute or specialist trusts, providing predominantly outpatient (87.5%, n=14) and inpatient (87.5%, n=14) services. Only 1 (6.3%) provided community care. Table 22 shows the range of clinical specialties managed by dietitians; around half provided renal services (43.8%, n=7), with 12.5% (n=2) managing patients with gastrointestinal disorders, or critical care, cystic fibrosis and diabetes and 6.3% (n=1) managing oncological, hepatobiliary, obesity/bariatric surgery or neurological disorders. Of those reporting patient age ranges (n=15, 93.8%), the majority (86.7%, n=13) provided adult services.

**Table 22 Dietitian service provision**

Dietetic service provision (can indicate > 1)	Dietitians (n=16)	
	n	%
Renal diseases ( <i>chronic kidney disease, dialysis, transplant, renal cancer</i> )	7	43.8
Gastro-intestinal failure & disorders	2	12.5
Critical care	2	12.5
Cystic fibrosis (+/- respiratory diseases)	2	12.5
Diabetes ( <i>type 1/type 2, gestational diabetes, transitional, insulin pumps, education, continuous glucose monitoring</i> )	2	12.5
Cancer - head & neck	1	6.3
Hepato-biliary disorders	1	6.3
Obesity & bariatric surgery	1	6.3
Neurology	1	6.3

### 5.3.3.3 Therapeutic radiographers

Of the 18 (52.9%) therapeutic radiography respondents completing survey 2, a slightly higher number reported consultant or advanced practitioner roles than in survey 1 (77.8%, n=14 Vs 57.4%, n=31) with fewer indicating specialist (11.1%, n=2 Vs 24.1%, n=13) or review roles (5.6%, n=1 Vs 18.5%, n=10). In keeping with the latter, all consultants (n=9, 50.0%) reported AfC band 8 pay scales, with the majority (87.5%, n=7) of remaining participants at pay band 7. Over three quarters (78.6%, n=11) of consultants and advanced practitioners held postgraduate degrees.

Nearly all therapeutic radiographers were employed by acute or specialist acute trusts (94.4%, n=17), with none reporting working in combined acute and/or community trusts or the independent sector and one (5.6%) not specifying their employer.

The main area of service provision was outpatient (n=14, 77.8%) with 3 (16.7%) therapeutic radiographers additionally providing inpatient services. Table 23 shows the range of cancer sites managed; 50.0% (n=9) of therapeutic radiographers provided services for multiple or unspecified cancer diagnoses, with 50.0% (n=9) specialising in single cancer sites. Of those reporting patient age ranges (n=8, 44.4%), 5 (27.8%) provided adult services, 2 (11.1%) provided services for adults and adolescents and 1 (5.6%) managed all age groups (Appendix 5 XIII).

**Table 23 Therapeutic radiographer service provision**

Cancer sites	Therapeutic Radiographers (n=18)	
Multiple (specified/unspecified sites)	9	50.0
Breast	3	23.1
Prostate	2	15.4
Colorectal & anal	1	7.7
Head & neck	1	7.7
Pelvic	1	7.7
Gynaecological	1	7.7

## 5.4 Medicines management

### 5.4.1 Total Sample

The proportion of survey 2 participants who reported prescribing (82.4%, n=28) was similar to survey 1 (76.1%, n=70, p=0.453), with 11 (68.8%, p=0.050) dietitians and 17 (94.4%) therapeutic radiographers actively prescribing in practice.

Of the 6 participants who were not prescribing, reasons given were similar to those cited in survey 1 (see Appendix 5 XI). Five dietitians had never commenced prescribing following qualification due to logistical difficulties in implementing/fitting the Clinical Management Plan (CMP) into the clinical service (n=3), post qualification confidence loss (n=1) or role change (n=1), and 1 formerly prescribing therapeutic radiographer subsequently changed to a non-patient facing role. Examples of the limitations of SP to dietitian autonomy for prescribing were cited within participant quotations, with the reliance on doctors, time infringements and lack of local systems fit cited.

Twelve (70.6%) therapeutic radiographers exclusively used IP with 5 (29.4%) additionally report use of SP. The total sample reported prescribing a mean of 9.2 (SD 12.4, median 3.5, range 0.0-50.0) medicinal items in a typical week (Table 24).

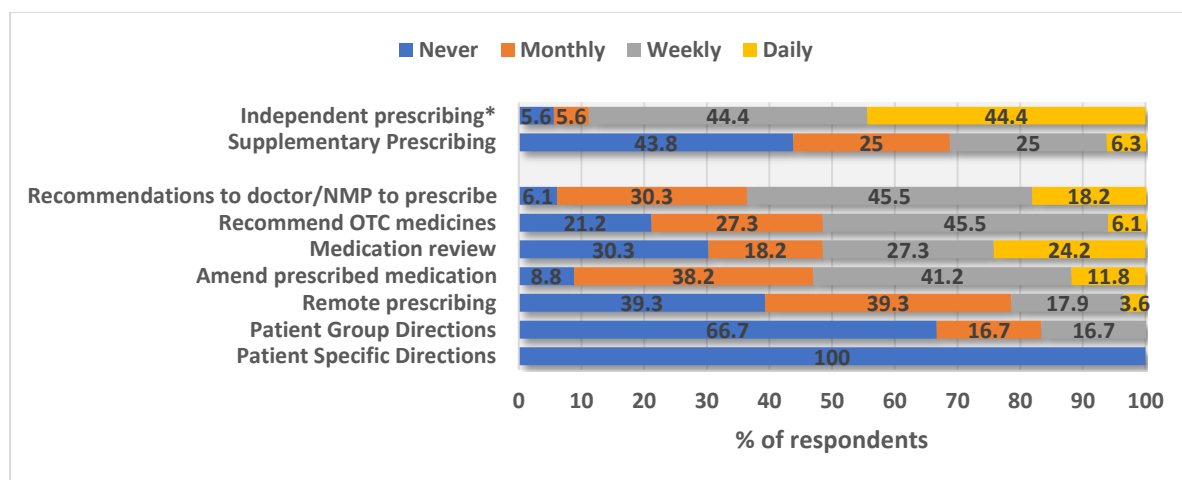
**Table 24 Number of items prescribed using independent and supplementary prescribing in a typical week**

Number of items per week	Dietitians (n=16)	Therapeutic Radiographers (n=18)			Total Sample (n=34)
	SP	IP	SP	Total items	Total items
0	6 (37.5%)	0 (5.6%)	13 (72.2%)	2 (11.1%)	8 (23.5%)
1-5	8 (50.0%)	7 (38.9%)	2 (11.1%)	5 (27.8%)	13 (38.2%)
6-10	0 (0.0%)	3 (16.7%)	3 (16.7%)	3 (16.7%)	3 (8.8%)
11-20	0 (0.0%)	6 (33.3%)	0 (0.0%)	6 (33.3%)	6 (17.6%)
>20	2 (12.5%)	1 (5.6%)	0 (0.0%)	2 (11.1%)	4 (11.8%)
Mean (SD)	5.9 (13.6)	10.7 (9.9)	1.6 (3.1)	12.1 (10.9)	9.2 (12.4)
Median (range)	1.0 (0.0-50.0)	10.0 (0.0-40.0)	0.0 (0.0-10.0)	10.0 (0.0-40.0)	3.5 (0.0-50.0)



Respondents also indicated engagement in a median of 5.0 (range 0.0-6.0, mean 4.3, SD 1.4) other methods for the administration, supply and/or optimisation of medicines as shown in Figure 11. Ten (33.3%) accessed medicines using PGD, with half (n=5, 50.0%) doing so on a weekly basis. Respondents also made recommendations to patients to buy OTC medicines (n=26, 78.8%) on a monthly, weekly or daily basis, in addition to amending prescribed medicines (n=31, 91.2%), performing medication reviews (n=23, 69.7%) and undertaking remote prescribing (n=20, 58.8%). Ninety four per cent (n=31) made recommendations to doctors or other NMPs for prescribed medicines; two thirds (n=21, 67.7%) on a weekly or daily basis.

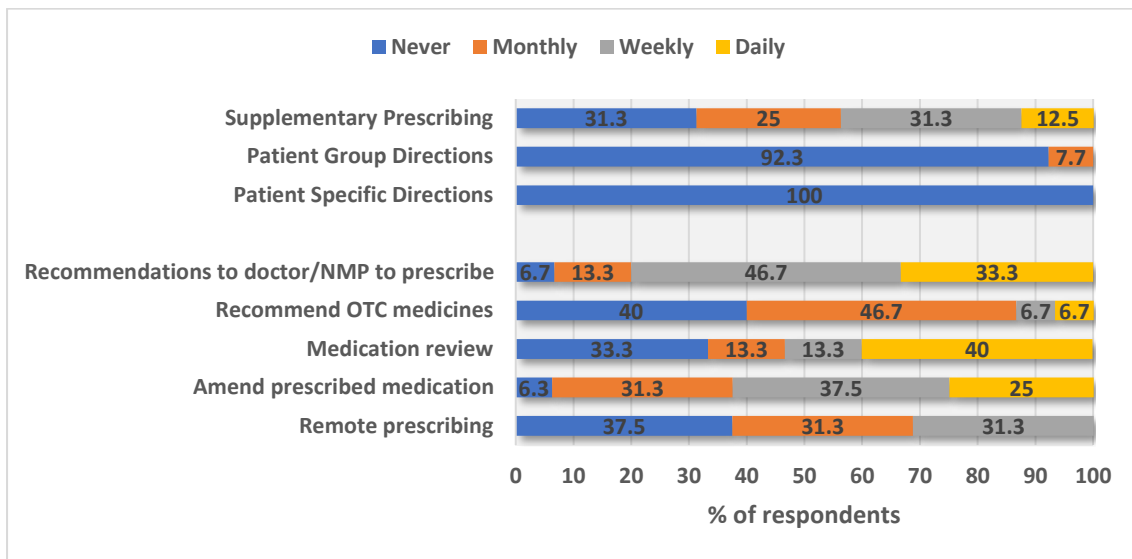
**Figure 11 Methods used by dietitians and therapeutic radiographers to supply, administer, prescribe or optimise medicines. \*Therapeutic Radiographers only**



### 5.4.2 Dietitians

Seven (43.7%) reported using SP on a weekly/daily basis (Figure 12). The most frequently employed other method was to amend prescribed medications, with 5 (31.3%) dietitians doing so monthly and 10 (62.5%) daily/weekly. Twelve (80.0%) made recommendations to doctors/other NMPs for prescribed medicines on a weekly/daily basis. Only one (7.7%) dietitian reported any form of (monthly) PGD use.

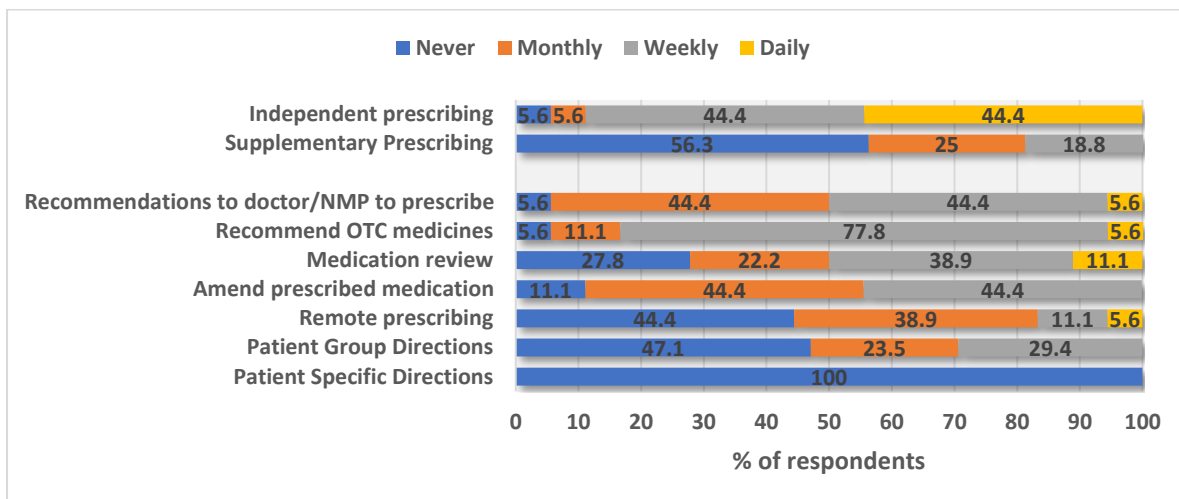
**Figure 12 Methods used by dietitians**



### 5.4.3 Therapeutic radiographers

Overall the sample (n=18) used a median of 6.0 (range 4.0-8.0) different methods. The frequency with which therapeutic radiographers engaged in the different methods was similar to survey 1, with half (52.9%, n=9) reporting PGD use, 94.4% (n=17) advising patients to buy over the counter medicine(s), 72.2% (n=13) undertaking medication reviews and 88.8% (n=16) amending medications (Figure 13). In addition 94.4% (n=17) made recommendations to doctors/other NMPs for prescribed medicines with 52.9% (n=9) doing so on a weekly or daily basis.

**Figure 13 Methods used by therapeutic radiographers**



## 5.5 Therapy areas where treatment is provided

### 5.5.1 Total Sample

There was little change between survey 1 and 2 in the key therapy areas (Table 25), with the total sample prescribing medicines from a median of 2.5 different areas (range 1.0-10.0, mean 3.7, SD 2.9), and with the greatest numbers prescribing medicines for gastro-intestinal disorders (n=24, 75.0%), infections (n=13, 40.6%), nutrition and blood products (n=12, 37.5%) and urinary tract disorders (n=11, 34.3%) and nutrition and blood products (n=9, 32.1%). Therapeutic radiographers continued to prescribe from a broader range of therapy areas (median 4.0, range 1.0-10.0, mean 5.3, SD 3.1) than dietitians (median 2.0, range 1.0-4.0, mean 1.8, SD 0.86, p<0.001).

**Table 25 Therapy areas in which therapeutic radiographers and dietitians currently prescribe medication**

Therapy areas in which therapeutic radiographers and dietitians currently prescribe medication	Dietitians (n=16)		Therapeutic Radiographers (n=18)		Total Sample (n=34)	
	n	%	n	%	n	%
Gastro-intestinal	9	60.0	15	88.2	24	75.0
Infections	0	0.0	13	76.5	13	40.6
Nutrition & blood	9	60.0	3	17.6	12	37.5
Urinary tract	0	0.0	11	64.7	11	34.4
Endocrine system	3	20.0	6	35.3	9	28.1
Ear, nose & oropharynx	1	6.7	7	41.2	8	25.0
Musculoskeletal	0	0.0	8	47.1	8	25.0
Skin	0	0.0	8	47.1	8	25.0
Central nervous system	0	0.0	7	41.2	7	21.9
Respiratory system	0	0.0	5	29.4	5	15.6
Other – renal system	4	30.8	0	0.0	4	30.8
Anaesthesia	1	6.7	2	11.8	3	9.4
Malignant disease	0	0.0	2	11.8	2	6.3
Eye	0	0.0	2	12.5	2	6.5
Cardiovascular	0	0.0	1	5.9	1	3.1
Obstetrics & gynaecology	0	0.0	0	0.0	0	0.0
Immunological	0	0.0	0	0.0	0	0.0

### 5.5.2 Controlled drugs

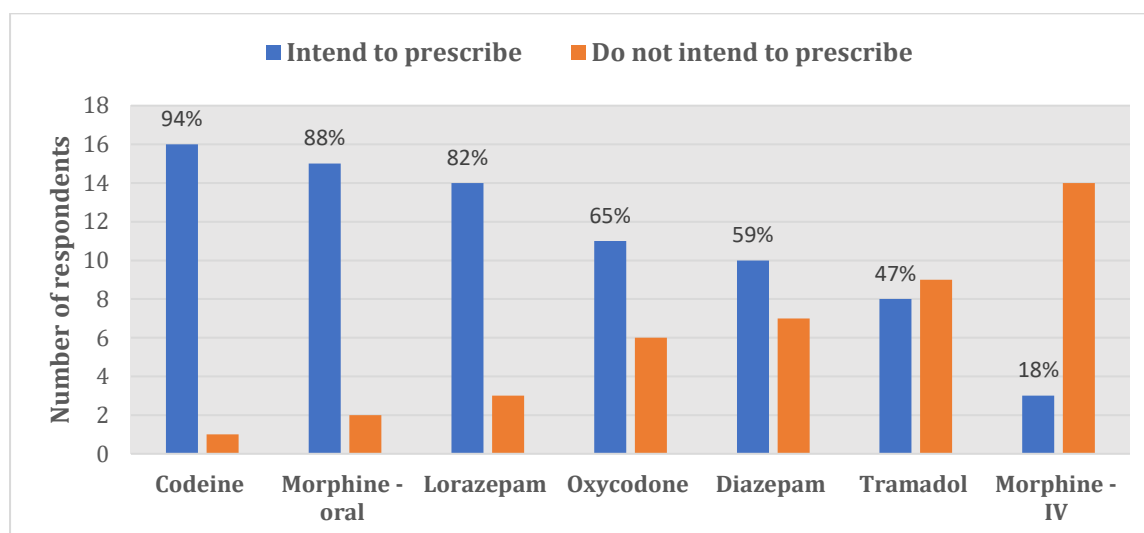
Eight (47.1%) therapeutic radiographers reported prescribing controlled drugs using SP, in addition to two (18.2%) dietitians (Table 26).

**Table 26 Controlled drugs prescribed by dietitians and therapeutic radiographers using SP**

	Dietitians (n=3)		Therapeutic Radiographers (n=8)		Total (n=11)	
	n	%	n	%	n	%
Morphine	1	50.0	8	100.0	9	90.0%
Codeine	2	100.0	5	62.5	7	70.0%
Benzodiazepines	0	0.0	3	37.5	3	30.0%
Fentanyl	0	0.0	1	12.5	1	10.0%
Pregabalin/Gabapentin	0	0.0	1	12.5	1	10.0%

Intentions to prescribe controlled drugs via IP should future legislation permit were also similar to that of survey 1, with over 80% intending to prescribe Codeine, Oral morphine and Lorazepam, and fewer than 50% intending to prescribe Tramadol or IV Morphine (Figure 14).

**Figure 14 Therapeutic radiography intentions for prescribing controlled drugs**



## 5.6 Changes in prescribing practice and service delivery

### 5.6.1 Changes in employment and/or service delivery

The majority of respondents indicated no change in employment (n=32, 94.1%) or service delivery (n=28, 82.4%) since survey 1 completion (Appendix 5 XIV). Changes to service delivery and roles were reported by 6 (17.6%) participants, with four (11.8%) dietitians indicating an increase in remote/virtual consultations and/or a reduction in clinic numbers, and two (5.9%) therapeutic radiographers reporting job role changes including promotion from specialist to consultant and a non-patient facing, strategic role change (Appendix 5 XVIII).

*Changes in clinical caseloads:* Over half of all survey 2 participants (57.6%, n=19) indicated that the number of patients requiring medicines management decisions had increased, with 50.0% (n=16) indicating an overall increase in caseload complexity (Appendix 5 XII).

While more therapeutic radiographers than dietitians (n=10, 58.8% Vs n=3, 18.1%, p=0.019) reported a rise in NMP team numbers since completion of survey 1, views about the ability to provide care in the absence of a doctor or other prescriber were similar, with just under 50% of both professions indicating team capability had increased. Sixty-five per cent (n=11) of therapeutic radiographers and 62.5% (n=10) of dietitians expressed awareness of plans to increase NMP numbers within their teams over the next few years.

### 5.6.2 Changes in prescribing practices

Twenty-two respondents provided free text comments regarding changes to prescribing practices over the last 18 months. Only 5 (17.9%) indicated that their prescribing activity had remained static, with the majority (n=17, 60.7%) reporting change. These included either a decrease or increase in prescribing frequency (n=10, 58.8%), a change to greater use of remote prescribing (n=4, 23.5%) or an alteration in the scope of prescribing practice (n=3, 17.6%). Participant quotations exemplifying each change category are shown in Appendix 5 XIV.

Of those indicating a decrease in the frequency of prescribing (n=6), the majority of responses related to the influence of Covid-19 on either reducing face-to-face patient contacts and diverting the demand for prescribed medicines to others healthcare professionals (GPs) or reducing service demand overall. Reports of increased frequency of prescribing conversely indicated taking on more prescribing because of reduced access to other services such as GPs, a return to face-to-face consultations, a change in clinical policy or for unspecified reasons.

The number of items prescribed by survey 2 dietitians in a typical week was similar to that of survey 1 (mean 5.9, (SD 13.6), Vs 3.1, (SD 4.4) p=0.251). Therapeutic radiographers also prescribed a similar number of items using IP (mean 10.3, (SD 13.1 Vs 10.7), (SD 9.9), p=0.915) and SP (mean 1.3, (SD 3.5, Vs 1.6), (SD 3.1), p=0.763) (Table 27).

**Table 27 Comparison of number of items prescribed using independent and supplementary prescribing in a typical week for surveys 1 and 2**

Number of items per week	Dietitians			Therapeutic radiographers		<sup>2</sup> p value
	Survey 1 (n=38)	Survey 2 (n=16)	<sup>1</sup> p value	Survey 1 (n=54)	Survey 2 (n=18)	
<b>SP</b>						
Mean (SD)	3.1 (4.4)	5.9 (13.6)		1.3 (3.5)	1.6 (3.1)	0.763
Median (range)	2.5 (0.0-20.0)	1.0 (0.0-50.0)	0.251	0.0 (0.0-20.0)	0.0 (0.0-10.0)	
<b>IP</b>						
Mean (SD)	-	-	-	10.3 (13.1)	10.7 (9.9)	0.915
Median (range)	-	-	-	6.75 (0.0-75.0)	10.0 (0.0-40.0)	
<b>Total number of items</b>						
Mean (SD)	-	-	-	11.6 (14.6)	12.1 (10.9)	0.900
Median (range)	-	-	-	7.5 (0.0-75.0)	10.0 (0.0-40.0)	

<sup>1</sup>Mann-Whitney U test, <sup>2</sup>t-test

### 5.6.3 NMP and challenges associated with Covid-19

Seventeen (60.7%) participants (12 therapeutic radiographers, n=5 dietitians) reported that the prescribing qualification had helped in meeting Covid-19 related challenges. Free text comments (n=16) indicated that NMP was considered to contribute to care during Covid-19 by improving staff cover during sickness & redeployment, reducing demands on staff and/or decreasing clinician workload, improving remote prescribing/medicines delivery, facilitating new service development and improving service access to medicines. Participant quotations illustrating each theme are shown in Table 28.

**Table 28 Impact of prescribing on your team ability to meet Covid-19 related challenges**

Impact of NMP on team's ability to meet Covid-19 challenges	Profession	Participant quote
<b>Improved staff cover (sickness &amp; redeployment)</b>	D	<i>"It has enabled the medical team to meet covid 19 related challenges whilst I've been able to focus on the prescribing".</i>
	D	<i>"It has helped when not many staff members are available."</i>
	TR	<i>"As an NMP I have been able to cover Drs clinics effectively and efficiently in the event of staff sickness and redeployment".</i>
	TR	<i>"Limited doctor availability due to staff sickness or shortages and demands on the services in oncology".</i>
<b>Reduced demands on staff /decreased clinician workload</b>	TR	<i>"Face to face clinics were cancelled or minimised during covid, I then saw more patients allowing for continued care."</i>
	D	<i>"Managing helpline for covid patients calling in (1/3 admitted covid patients had diabetes) DSN 2 nurses down due to covid sickness. i covered their lists for them. routine clinics to support our most complex patients while other MDT where on the ward rota."</i>
<b>Improved remote prescribing/ medicines delivery</b>	D	<i>"Introduction of outpatient NG service for head and neck patients undergoing radiotherapy".</i>
	TR	<i>"Being able to post medications home to patients".</i>
<b>Facilitated new service development</b>	TR	<i>"Prehabilitation work prior to CT scans."</i>
	TR	<i>"Ability to see patients outside of usual hours e.g. covid positive patients being treated at end of working day".</i>
	TR	<i>"Improved ability to meet challenges through electronic prescribing and courier service"</i>
<b>Improved service access to medicines</b>	D	<i>"For dealing with contingency prescriptions for patients on home parenteral nutrition as I had CMPs set up already for these patients I was able to deal with the prescribing challenges that came from lack of availability of suitable bags for delivery and alternative prescriptions that were needed".</i>
	TR	<i>"Patient had instant access where as they found it difficult to access GP services".</i>

### 5.7 Impact of NMP

There were no statistically significant differences in responses provided to the statements on potential benefits of NMP between survey 1 and 2 ( $p > 0.05$ , (Appendix 5 XVI), with over 80% of participants agreeing that NMP saved time arranging prescriptions from doctor or other prescribers, enabled more holistic care, improved knowledge and of pharmacology and prescribing, and increased job satisfaction.

## *5.8 Barriers and facilitators to NMP*

### *5.8.1 Governance*

Reported governance arrangements (Appendix 5 XV) remained unchanged over the past 18 months, with the exception of a decrease in access to regular data for the purposes of monitoring prescribing practice, for which 33.3% (n=11) of survey 2 participants confirmed access compared to 55.7% (n=39) of survey 1 participants (p=0.034).

### *5.8.2 Barriers and enablers*

Barriers and facilitators were similar to those reported in survey 1 with restrictions surrounding the models and legislative restrictions of SP and IP taking prominence, as well as difficulties with operating electronic/remote prescribing systems, IT and/or communication systems for both professions. Forty five percent (n=30,) of dietetic responses related to the difficulties of developing and implementing CMPs (Appendix 5 XIX & XX).

## 6. Results from Phase 3: Case studies

### 6.1 Overview of case sites

A total of 9 case sites were recruited comprising matched TR-IPs/TR-NPs and D-SPs/D-NPs, of which 3 were dietitian sites and 6 were therapeutic radiography sites one (case study 4) of which subsequently withdrew from the study. Sites were based across 7 Health Innovation Networks in England: West of England (n=2), London (Imperial College) (n=1), Oxford and Thames Valley (n=1), West Midlands (n=1), South West (n=1), North West Coast (n=1) and North East and North Cumbria (n=1). Sites comprised a mix of female (n=13) and male (n=2) dietitians and therapeutic radiographers, the majority (n=10) of whom worked full-time (> 30 hours per week), had an average age of 44.1 years (range 34-60) and n=4 (26.7%) of whom had completed either Masters or PhD level of academic study.

In case sites 1, 2, 5 to 9, an independent/supplementary prescriber was matched with a non-prescriber. At case site 3 a single therapeutic radiographer completed data collection as a trainee TR-IP (i.e., before qualifying as a prescriber) and after qualifying as a TR-IP. Matching was primarily based on the type of service, clinical role and care setting. Other considerations for matching included patient demographics and agenda for change banding. The 8 case study sites are summarised below on Table 29.

**Table 29 Characteristics of case study sites**

Case site	Profession	Status	Job Title	Setting	Location in England*
2	D	D-SP	Lead Intestinal Rehabilitation Dietitian	Specialist acute NHS hospital (in-patient/out-patient)	London (Imperial College)
	D	D-NP	Advanced Specialist Dietitian		
5	D	D-SP	Lead Clinical Dietitian	NHS community trust (out-patient)	West Midlands
	D	D-NP	Community Diabetes Dietitian		
7	D	D-SP	Specialist Renal Dietitian	Major acute specialist hospital (in-patient/out-patient)	North East & North Cumbria
	D	D-NP	Specialist Renal Dietitian		
1	TR	TR-IP	Review Therapeutic Radiographer	Major acute NHS hospital (out-patient)	West of England
	TR	TR-NP	Review/Treatment Radiographer		
3	TR	Trainee TR-IP	Review Therapeutic Radiographer	Major acute NHS hospital (out-patient)	West of England
	TR	TR-IP	Review Therapeutic Radiographer		
6	TR	TR-IP	Advanced Practitioner Therapeutic Radiographer	NHS tertiary cancer centre (out-patient)	Oxford & Thames Valley
	TR	TR-NP	Review/Treatment Therapeutic Radiographer		
8	TR	TR-IP	Macmillan Specialist Radiographer	Acute NHS hospital (out-patient)	South West
	TR	TR-NP	Review/Treatment Therapeutic Radiographer		
9	TR	TR-IP	Advanced Review Therapeutic Radiographer	Major acute NHS hospital (out-patient)	North West Coast
	TR	TR-NP	Review Therapeutic Radiographer		

\*According to Health Innovation Network regions



A summary about the case sites is provided below, with a more detailed overview including demographics and contextual information provided in Appendix 8.

### 6.1.1 Dietitian sites

*Site 2:* offered NHS in-patient and out-patient dietitian services at a specialist acute hospital, with a focus on intestinal rehabilitation. The D-SP was an Intestinal Rehabilitation Team Lead specialised in parenteral nutrition, and the D-NP managed a caseload with Intestinal Failure and Irritable Bowel Syndrome. Both worked within multi-disciplinary teams. The majority of care was in-patient, although the D-NP provided weekly dietetic-led out-patient clinics and domiciliary input by telephone.

*Site 5:* comprised a Lead Clinical diabetes specialist D-SP and diabetes specialist D-NP providing services via GP referral at an NHS community Trust. The D-SP undertook a split managerial/clinical role providing clinical services one day per week within a multi-disciplinary outpatient specialist diabetes team. The D-SP worked 2-3 days/week providing telephone-based specialist diabetes clinic services.

*Site 7:* were dietitians providing NHS out-patient and in-patient services to adults with renal disease at a major acute specialist hospital. The D-SP was a specialist renal dietitian and the D-NP a renal dietitian. Both were based in a renal services/haemodialysis unit, although the D-NP also provided dietitian services to critical care. The patient caseload was pre-allocated to prescriber/non-prescriber.

### 6.1.2 Therapeutic radiographer sites

*Site 1:* were a Review TR-IP and Review TR-NP, offering an outpatient TR-led review service for adult patients undergoing radiotherapy at a major acute NHS hospital oncology centre. The review team worked within a wider multi-disciplinary team, with the TR-IP managing a mixed general caseload of cancer sites, and the TR-NP specialising in urology and breast cancer.

*Site 3:* was a trainee and subsequently qualified TR-IP member of the Site 1 Review service, providing outpatient services to adults undergoing radiotherapy at a major acute NHS hospital oncology centre. Pre and post TR-IP qualification, site 3 focused on management of gastro-intestinal cancer, sarcoma and head and neck cancer, running clinics independently and jointly with other site 1 members. The patient caseload was predominantly shared although may be pre-allocated to specific prescribers/non-prescribers based on cancer site diagnosis.

*Site 6:* comprised an Advanced Practitioner TR-IP and Review/Treatment TR-NP working in a nurse led review team, offering NHS outpatient and (some) inpatient review services for adults undergoing radiotherapy at a major acute NHS hospital oncology centre. The TR-IP specialised in head and neck cancers during two daily review clinics per week, with the TR-NP in a split treatment/review role managing patients with all other tumour groups during one daily clinic per week.

*Site 8:* comprised a Macmillan Specialist Radiographer TR-IP and split role Review/Treatment TR-NP providing TR-led NHS outpatient review services for adults undergoing radiotherapy at an acute NHS hospital oncology centre. The TR-IP specialised in gynaecology, thoracic and lower gastrointestinal cancer, providing three daily clinics per week. The TR-NP managed all cancer sites during five daily clinics each week. Aside from the TR-IP specialist tumour groups, the patient caseload was not pre-allocated to a specific prescriber/non-prescriber.

*Site 9:* offered a large multi-disciplinary, TR-led review service for adults with all cancer diagnoses at a major acute hospital radiotherapy department. The TR-IP was an Advanced Review Therapeutic

Radiographer who provided review clinics 4.5 days per week, with the TR-NP a Review Radiographer who provided clinics 5 days per week. One dedicated telephone review clinic/week for stereotactic follow-up was held weekly. The TR-IP and TR-NP (with exception of chemo-radiotherapy and stereotactic review) managed all tumour groups.

Table 30 below provides an overview of the data collection at each site.

**Table 30 Data collected at each case site**

Case study site	Participant	No. Audits (n=513)	No. Patient Questionnaires (n=180)	No. Staff Interviews (n=33)	No. Patient Interviews (n=27)	No. Case Records (n=32)	No. Hours Observed (n=96)	No. Patients Observed (n=25)
1	TR-IP	12	0	4	0	0	0	NA
	TR-NP	22	5		0	0		NA
2	D-SP	43	9	5	1	0	0	NA
	D-NP	40	9		2	0		NA
3	Trainee TR-IP	40	0	5	0	0	30	0
	TR-IP	37	11		1	0		6
5	D-SP	7	0	0	0	0	0	NA
	D-NP	2	1		0	0		NA
6	TR-IP	40	22	4	1	5	6	0
	TR-NP	41	15		5	0		3
7	D-SP	41	16	5	2	5	30	3
	D-NP	36	14		1	5		3
8	TR-IP	41	11	5	3	5	15	3
	TR-NP	40	38		6	4		2
9	TR-IP	40	13	5	2	4	15	2
	TR-NP	31	16		3	4		3

## 6.2 Self-Report Audit

### 6.2.1 Sample profile

A total of 513 self-report audits were collected from the 8 case sites; 169 (32.9%) by dietitians of which D-SPs collected 91 (17.7%) and D-NPs 78 (15.2%); 344 (67.1%) were collected by therapeutic radiographers, of which 170 (33.1%) were from TR-IPs and 174 (33.9%) TR-NPs.

### 6.2.2 Results

#### *Overview of self-report audits*

Eighty-six per cent (n=441) of the self-report audits took place in NHS outpatient services, with 12.1% NHS inpatient (n=62) and 1.9% (n=10) community clinic based. The majority were conducted face-to-face (74.9%, n=384), with 128 (25.0%) undertaken by telephone and 1 (0.2%) delivered by video conference. Appointments were review/additional review (73.1%, n=385) follow-up (22.2%, n=14), initial (n=23, 4.5%) or emergency (n=1, 0.2% (Appendix 6 I). The characteristics of the patient sample are shown in Appendix 6 II. Patients were predominantly male (54.0%, n=277), from white British (92.8%, n=476), Asian or Asian British (3.9%, n=20), black African, Caribbean or British (1.6%, n=8) or mixed/multiple ethnic backgrounds (0.2%, n=1). Sixty five per cent (n=334) were aged 60 years or

over and 1.8% (n=8) were adolescents under 20.0 years. The median age was 66.0 years (range 19-90, mean 62.7, (SD 15.3)).

Where data were recorded (n=489), 146 (28.5%) patients were discharged, with 343 (66.9%) patients requiring further follow up (Appendix 6 III). Overall, more patients seen by non-prescribers than prescribers were discharged (35.4%, n=85 Vs n=61, 24.5%, p=0.008).

### 6.2.2.1 Dietitian consultations

Dietitians completed 169 (32.9%) self-report audits comprising NHS outpatients (57.4%, n=97), inpatients (36.7%, n=62) and community clinic settings (5.9%, n=10) with the majority (61.5%, n=104) recorded as follow up appointments. Case-sites 2 and 7 provided a mix of face-to-face and telephone consultations (Appendix 6 III) with case-site 5 delivering exclusively telephone appointments.

In contrast to D-SPs, D-NPs undertook more initial consultations (17.9%, n=14 Vs 6.6%, n=6) and review appointments (57.7%, n=45 Vs 0.0%, n=0, p<0.001), completing a greater proportion by telephone (28.2%, n=22 Vs 8.8%, n=8, p=0.002). D-SPs managed a caseload split between inpatients (47.3%, n=43) and outpatients (45.1%, n=41), whilst D-NPs were predominantly NHS outpatient based (71.8%, n=56, p=0.002). Overall, dietitians managed a broad range of age groups, with 53.8% (n=91) of patients aged between 20 and 59 years, 42.0% (n=71) 60 years and over in addition to managing a small group of adolescents (n=7, 4.1%). Half of all the clinical caseload constituted renal disease (46.2%, n=78, Table 31), although D-SPs managed more patients with enterocutaneous fistula and oesophageal dysmotility (31.9%, n=29). Episodes of care were completed in 12.4% (n=21) of consultations, with 74.6% (n=126) requiring on-going follow up/review.

**Table 31 Conditions managed by dietitian prescribers and non-prescribers**

Condition (n, %)	Dietitians		
	Prescribers (n=91)	Non-prescribers (n=78)	Total (n=169)
<b>Kidney disease/renal failure</b>	42 (46.2%)	36 (46.2%)	78 (46.2%)
<b>Enterocutaneous fistula/fistula</b>	14 (15.4%)*	2 (2.6%)	16 (9.5%)
<b>Oesophageal dysmotility/dysmotility</b>	15 (16.5%)*	0 (0.0%)	15 (8.9%)
<b>Crohn's disease</b>	3 (3.3%)	10 (12.8%)*	13 (7.7%)
<b>Ulcerative colitis</b>	1 (1.1%)	10 (12.8%)*	11 (6.5%)
<b>Short bowel syndrome</b>	1 (1.1%)	9 (11.5%)*	10 (5.9%)
<b>Diabetes</b>	7 (7.7%)	2 (2.6%)	9 (5.3%)
<b>Bowel obstruction/intestinal failure</b>	4 (4.4%)	2 (2.6%)	6 (3.6%)
<b>Colon &amp; rectum cancer</b>	2 (2.2%)	1 (1.3%)	3 (1.8%)
<b>Head &amp; neck cancer</b>	2 (2.2%)	1 (0.6%)	2 (1.2%)
<b>Gastroparesis</b>	0 (0.0%)	2 (2.6%)	2 (1.2%)
<b>Other (Desmoid disease, irritable bowel syndrome, high output stoma, alcoholic liver disease)</b>	2 (1.2%)	4 (5.1%)	4 (2.4%)

\*p<0.001

### 6.2.2.2 Therapeutic radiographer consultations

All therapeutic radiographer consultations (n=344, 67.1%) were NHS outpatient based with the vast majority (95.9%, n=330) recorded as review/additional reviews. TR case-sites 1, 3, 6 and 8 delivered

a mix of face-to-face and telephone consultations (Appendix 6 Figure 1), with case-site 9 providing almost exclusively face-to-face appointments (98.6%, n=70).

The mean age of patients was 67.2 years (SD 11.6), with three quarters (76.5%, n=263) aged 60 years or older. The characteristics of TR-IP and TR-NP consultations were similar, however, TR-NPs undertook more telephone consultations (39.7%, n=69 Vs 17.1%, n=29, p<0.001), saw more male patients commensurate with a higher caseload of prostate (26.4%, n=46) and gastro-oesophageal (12.6%, n=22) cancers while TR-IPs managed a greater proportion of head and neck cancer (26.5%, n=45, p<0.001) (Table 32). Therapeutic radiographers completed the episode of care in 125 (36.3%) consultations, with 217 (63.1%) requiring on-going follow up/review.

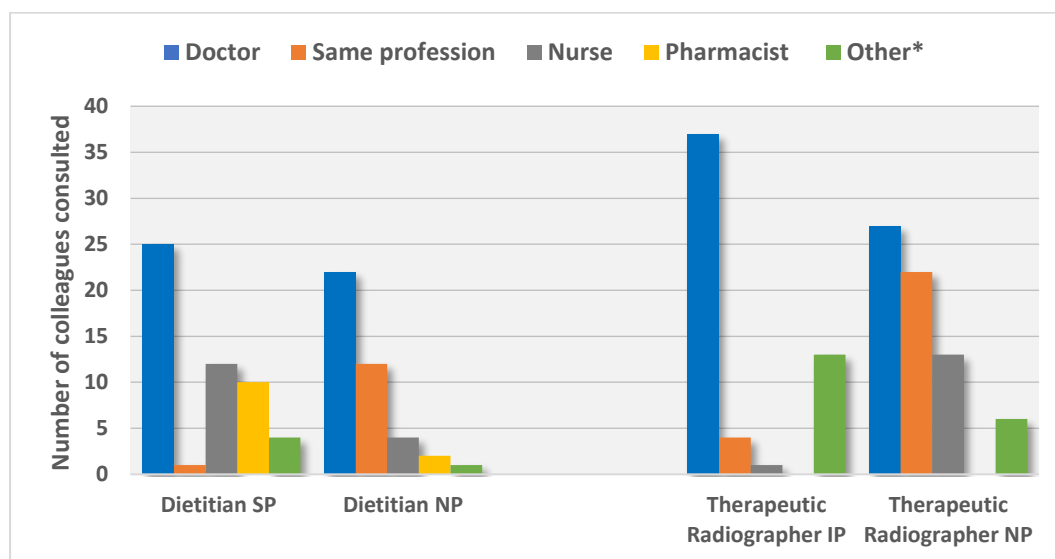
**Table 32 Cancer sites managed by therapeutic radiographer prescribers and non-prescribers**

Condition (n, %) *p<0.001	Therapeutic Radiographers		
	Prescribers (n=170)	Non-prescribers (n=174)	Total (n=344)
Prostate	23 (13.5%)	46 (26.4%)*	69 (20.1%)
Head & neck	45 (26.5%)*	12 (6.9%)	57 (16.6%)
Female breast	18 (10.6%)	35 (20.1%)*	53 (15.4%)
Gastro-oesophageal	19 (11.2%)	22 (12.6%)	41 (11.9%)
Colon & rectum	18 (10.6%)	21 (12.1%)	39 (11.3%)
Cervix & uterus	11 (6.5%)*	6 (3.4%)	17 (4.9%)
Sarcoma	8 (4.7%)	7 (4.0%)	15 (4.4%)
Bladder & kidney	4 (2.4%)	9 (5.2%)	13 (3.8%)
Skin	12 (7.1%)*	1 (0.6%)	13 (3.8%)
Lung	5 (2.9%)	5 (2.9%)	10 (2.9%)
Lymphoma	2 (1.2%)	6 (3.4%)	8 (2.3%)
Brain & neurological	5 (2.9%)	1 (0.6%)	6 (1.7%)

### 6.2.3 Discussion, referral and communications made in relation to medicines

Patient cases were discussed with colleagues in a total of 182 consultations; 110 (60.4%) with therapeutic radiographers and 72 (39.4%) dietitians (p=0.012) (Appendix 6 V). Doctors (n=111, 61.0%), members of the same profession (n=39, 21.4%), nurses (n=30, 16.5%) as well as pharmacists (n=12, 6.6%) and other health care professionals (e.g., pharmacy technicians, healthcare assistants, psychologists, speech & language therapists) were consulted (Appendix 6 IV). The number of consultations with discussions was similar for prescribers and non-prescribers for both therapeutic radiographers (n=49, 28.8% Vs n=61, 35.1%, p=0.215) and dietitians (n=40, 44.0% Vs n=32, 41.0%, p=0.410) (Figure 15).

**Figure 15 Healthcare staff consulted during colleague discussion**



Other\* - Pharmacy technician, healthcare assistant, psychologist, speech & language therapist, multidisciplinary team, dietitian (TRs only)

Overall therapeutic radiographers and dietitians generated referrals for 44 (8.6%) patients, with the majority made to doctors (n=23, 52.3%) and members of the same profession (n=9, 20.5%) (Appendix 6 VI). The overall rates of referral were higher for non-prescribers in both therapeutic radiography (14.9% Vs 6.5%, p=0.011) and dietetics (7.7% Vs 1.1%, p=0.032). Over half (54.5%, n=24) were for prescriptions (Appendix 6 VII), with information/advice from another service or department sought for 38.6% (n=17).

## 6.2.4 Medicines Management Activities

### 6.2.4.1 Dietitian medicines management

#### **Assessment of medication regimens, decision making and error identification**

D-SPs and D-NPs assessed a similar proportion of their patients' medication regimens (79.1%, n=72 Vs 79.5%, n=62, p=0.953), indicating a similar proportion in both groups required some form of action/intervention (48.6%, n=35 Vs 61.3%, n=38, p=0.142) (Appendix 6 VIII).

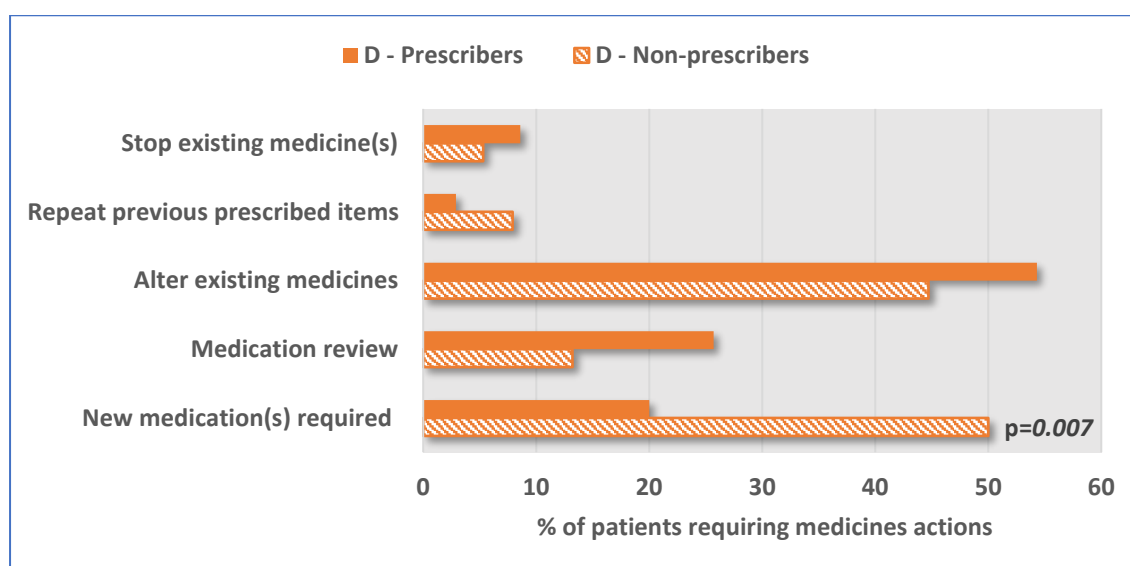
Where an action/intervention was considered necessary (n=73), medication regimen issues/errors were recorded for 41 (56.2%) patients (Table 33). The pattern of error identification was similar for D-SPs and D-NPs for sub-therapeutic drug doses (11.4%, n=4 Vs 26.3%, n=10, p=0.093) and inappropriate regimens (31.4%, n=11 Vs 26.3%, n=10, p=0.380), however, D-SPs were more likely to report the identification of an excess drug dose (17.1%, n=6 Vs 2.6%, n=1, p=0.041).

**Table 33 Issues/errors identified in medication regimens by Dietitians**

Consultations with medication regimen assessment & action required (n, %)	Dietitians			p value
	Prescribers (n=35)	Non-prescribers (n=38)	Total (n=73)	
No issue identified	14 (40.0%)	18 (47.4%)	32 (43.8%)	0.346
Sub-therapeutic drug dose identified	4 (11.4%)	10 (26.3%)	14 (19.2%)	0.093
Inappropriate regimen identified	11 (31.4%)	10 (26.3%)	21 (28.8%)	0.380
Excess dose of a drug identified	6 (17.1%)	1 (2.6%)	7 (9.6%)	0.041
Inappropriate repeat prescription	0 (0.0%)	1 (2.6%)	1 (1.4%)	NA
Other - missed dose	1 (2.9%)	0 (0.0%)	1 (1.4%)	NA

Thirty-six (49.3%) patients required an alteration to their existing medicines, with 26 (35.6%) requiring new medicines and 14 (19.2%) medication review respectively (Figure 16). More patients seen by D-NPs than D-SPs were reported to require new medications (50.0%, n=19 Vs 20.0%, n=7, p=0.007).

**Figure 16 Dietitian medicines optimisation activities**



**Medicines management activities by dietitians**

Dietitians undertook medicines management activities (i.e., instances where a medicine was prescribed, recommended, supplied, administered, reviewed and/or adjusted) in 71 (42.0%) consultations (Table 34). Despite some variation across the three case sites (Appendix 6 VIII), D-SPs and D-NPs showed a similar level of engagement in MMA, undertaking a mean of 1.05 ((SD 0.23), median 1.0, range 1.0-2.0) and mean of 1.21 ((SD 0.47), median 1.0, range 1.0-3.0, p=0.098) different activities respectively. However, D-SPs made fewer recommendations to doctors/other prescribers for medicines to be prescribed (n=1, 2.9% Vs n=31, 83.8%, p<0.001), with D-NPs recommending OTC medicines (10.8%, n=4) and medicines via hospital notes (16.2%, n=6). There was no difference

between D-SPs and D-NPs in the proportions of patients for whom adjustments to drugs/drug doses using pre-agreed protocols were made (17.6%, n=6 Vs 10.8%, n=4, p=0.341).

**Table 34 Medicines management activities undertaken by dietitians**

	<i>Number of D consultations with medication regimen assessment &amp; action required</i>			<i>p value</i>
	<i>Prescribers (n=34)</i>	<i>Non-prescribers (n=37)</i>	<i>Total (n=71)</i>	
<b>Consultations with MMA (n, %)</b>	34 (97.1%)	37 (97.4%)	71 (97.3%)	0.122
<b>Number of MMA (mean, SD)</b>	1.05 (0.23)	1.21 (0.47)	1.14 (0.38)	
<b>Number of MMA (median, range)</b>	1.0 (1.0-2.0)	1.0 (1.0-3.0)	1.0 (1.0-3.0)	0.098
<b>Type of MMA (n, %)</b>				
<b>Supplementary Prescribing</b>	28 (80.0%)	-	28 (38.4%)	NA
<b>Recommendation to another prescriber</b>	1 (2.9%)	31 (83.8%)	32 (43.8%)	<0.001
<b>Recommend over-the-counter medicine</b>	0 (0.0%)	4 (10.8%)	4 (5.6%)	0.048
<b>Issue/write prescription</b>	1 (2.9%)	-	1 (1.4%)	NA
<b>Patient Group Direction</b>	0 (0.0%)	0 (0.0%)	0 (0.0%)	NA
<b>Adjust dose/drug according to protocol</b>	6 (17.6%)	4 (10.8%)	10 (14.1%)	0.341
<b>Recommendation via hospital notes</b>	0 (0.0%)	6 (16.2%)	6 (8.5%)	0.014
<b>Patient Specific Direction</b>	0 (0.0%)	0 (0.0%)	0 (0.0%)	NA
<b>Exemptions</b>	0 (0.0%)	0 (0.0%)	0 (0.0%)	NA

#### *Dietitian supplementary prescribing*

D-SPs prescribed medicines using SP in 28 (16.5%) consultations. The majority of patients receiving prescribed medicines were diagnosed with renal disease/failure (n=11, 39.3%) and enterocutaneous fistula (28.6%, n=8) with the remaining diagnosed with oesophageal dysmotility (10.7%, n=3), bowel obstruction (10.7%, n=3), Crohn's disease (7.1%, n=2) and head and neck cancer (n=1, 3.6%).

#### *Assessment of patient medication adherence and medication taking behaviour by dietitians*

Medication adherence was assessed in 61.5% (n=56) of D-SP and 62.8% (n=49, p=0.864) of D-NP consultations respectively. Prescribers and non-prescribers recorded similar proportions of patients taking their medicines as prescribed, as well as those not taking them or taking them inappropriately. Possible reasons for current medication behaviour were similar between the two groups (p>0.05), although in contrast to D-SPs (n=1, 1.8%) D-NPs identified a delayed access to medicines for 12.2% (n=6) of their patients (Appendix 6 IX).

#### *Medicines Information given by dietitians*

D-SPs and D-NPs gave information/advice about medicines in two thirds of consultations (63.7%, n=58 Vs 70.5%, n=55, p=0.221). However, D-SPs provided information on a wider range of different items relating to the action/use of medicines and side effects/contraindications (median 5.0, range 2.0-10.0 Vs 3.0, range 1.0-10.0, p<0.001). D-SPs were also more likely to provide information about what medicines do (p=0.029), how they work (p<0.001), as well as to give information on side effects (p=0.026), their risks (p=0.018), what to do should they occur (p=0.010) and what to do if a dose was missed (p=0.003)(Appendix 6 X).

### *Medicines recommended, administered and/or prescribed by dietitians*

The medicines most frequently recommended, administered and/or prescribed by dietitians were nutrition and blood products (n=36, 33.0%), parenteral nutrition (n=27, 24.8%), vitamins (n=18, 16.5%) and IV fluids (n=15, 13.8%, Table 35). D-SPs and D-NPs recommended, administered and/or prescribed a similar number of medicines overall (mean 0.66, SD 0.89 Vs 0.63, SD 0.89, p=0.857).

**Table 35 Medicines recommended, administered and/or prescribed by dietitians**

<b>Medicines recommended, prescribed, administered (n, %)</b>	<b>D-SP (n=60)</b>	<b>D-NP (n=49)</b>	<b>Total (n=109)</b>
Nutrition & blood	15 (25.0%)	21 (42.9%)	36 (33.0%)
Parenteral nutrition	18 (30.0%)	9 (18.4%)	27 (24.8%)
Vitamins	11 (18.3%)	7 (14.3%)	18 (16.5%)
IV fluids	12 (20.0%)	3 (6.1%)	15 (13.8%)
Gastrointestinal	3 (5.0%)	4 (8.2%)	7 (6.4%)
Ear, nose and oropharynx	-	3 (6.1%)	3 (2.8%)
Nutritional supplements	1 (1.7%)	1 (2.0%)	2 (1.8%)
CNS	-	1 (2.0%)	1 (0.9%)
<b>Total</b>	<b>60</b>	<b>49</b>	<b>109</b>

### *6.2.4.2 Therapeutic radiographer medicines management*

#### *Assessment of medication regimens, decision making and error identification by therapeutic radiographers*

In total, therapeutic radiographers assessed the medication regimens of 268 (77.9%) patients, subsequently determining action/interventions were necessary in 108 (40.3%) (Appendix 6 XI). TR-IPs undertook a proportionally higher number of assessments than TR-NPs (87.1%, n=148 Vs 69.0%, n=120, p<0.001) also recording that a higher proportion of patients required subsequent actions (51.4%, n=76 Vs 26.7%, n=32, p<0.001).

Therapeutic radiographers determined that issues were present with medication regimes of 26 (24.1%) patients (Table 36), with TR-IPs and TR-NPs recording a similar pattern of error identification for sub-therapeutic drug doses (11.8% Vs 6.3%, p=0.380), excess drug doses (1.3% Vs 6.3%, p=0.154) and missed doses (n=1, 0.9%). However, TR-NPs were more likely to report inappropriate regimes than TR-IPs (21.9% Vs 5.3%, p=0.009).

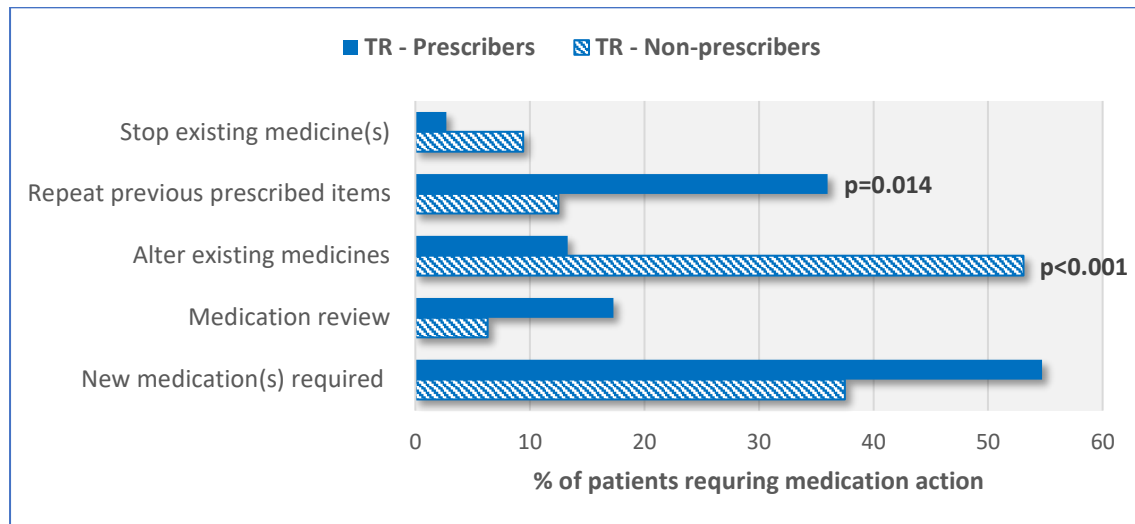
**Table 36 Issues/errors identified in medication regimens by therapeutic radiographers**

<b>Consultations with medication regimen assessment &amp; action required (n, %)</b>	<b>Therapeutic Radiographers</b>			
	<b>Prescribers (n=76)</b>	<b>Non-prescribers (n=32)</b>	<b>Total (n=108)</b>	<b>p value</b>
<b>No issue identified</b>	61 (80.3%)	20 (62.5%)	81 (75.0%)	0.052
<b>Sub-therapeutic drug dose identified</b>	9 (11.8%)	2 (6.3%)	11 (10.2%)	0.380
<b>Inappropriate regimen identified</b>	4 (5.3%)	7 (21.9%)	11 (10.2%)	0.009
<b>Excess dose of a drug identified</b>	1 (1.3%)	2 (6.3%)	3 (2.8%)	0.154
<b>Inappropriate repeat prescription</b>	0 (0.0%)	0 (0.0%)	0 (0.0%)	NA
<b>Other - missed dose</b>	1 (1.3%)	0 (0.0%)	1 (0.9%)	NA



Fifty-three (49.1%) patients required new medications, with 31 (28.7%) requiring a repeat of a previously prescribed item and 27 (25.0%) requiring alteration of existing medicines (Figure 17). Similar proportions of patients were reported by TR-IPs and TR-NPs to require new medications ( $p=0.104$ ), medication reviews ( $p=0.131$ ), or their existing medicines stopped ( $p=0.132$ ). However, more patients seen by TR-IPs required a previously prescribed item (35.5%,  $n=27$  Vs 12.5%,  $n=4$ ,  $p=0.014$ ) with fewer patients reported to require an alteration to their existing medicines (13.2%,  $n=10$  Vs 53.1%,  $n=17$ ,  $p<0.001$ ).

**Figure 17 Therapeutic radiographer medicines optimisation activity**



### *Medicines management activities by therapeutic radiographers*

In total, medicines management activities were undertaken in 97 (28.2%) consultations (Table 37). Despite variation in the level of activity exhibited across the case sites (see XI Appendix 6), TR-IPs were more active than TR-NPs overall, undertaking more consultations with MMA ( $n=73$ , 80.2% Vs  $n=24$ , 30.8%,  $p<0.001$ ) and delivering a higher number of different activities (mean 1.3, (SD 0.7) Vs 0.84, (SD 0.6),  $p=0.001$ ). TR-IPs made fewer recommendations to doctors/other prescribers for medicines to be prescribed (17.1%,  $n=13$  Vs 37.5%,  $n=12$ ,  $p=0.022$ ) whilst TR-NPs showed a greater use of PGDs (15.6%,  $n=5$  Vs 2.6%,  $n=2$ ,  $p=0.012$ ). In addition TR-NPs made more adjustments to drugs/drug doses using pre-agreed protocols (15.6%,  $n=5$  Vs 1.3%,  $n=1$ ,  $p=0.003$ ).

### *Therapeutic radiographer independent and supplementary prescribing*

TR-IPs used IP in 34.7% ( $n=59$ ) of all consultations, predominantly prescribing medicines for patients with head and neck ( $n=35$ , 59.3%), colon/rectal (11.9%,  $n=7$ ) and skin cancers (8.5%,  $n=5$ ). Two TR-IPs (CS-6 and CS-9) used SP in 10 (5.9%) consultations, all of which involved management of head and neck ( $n=5$ , 50.0%), colon/rectal ( $n=3$ , 30.0%), lung ( $n=1$ , 10.0%) or gastro-oesophageal cancer ( $n=1$ , 10.0%). Of the 69 instances of IP and SP, a prescription was issued or written in 15.9% ( $n=11$ ).

**Table 37 Medicines management activities undertaken by therapeutic radiographers**

	<i>Number of TR consultations with medication regimen assessment &amp; action required</i>			<i>p value</i>
	<i>Prescribers (n=76)</i>	<i>Non-prescribers (n=32)</i>	<i>Total (n=108)</i>	
<b>Consultations with MMA (n, %)</b>	73 (96.1%)	24 (75.0%)	97 (89.8%)	<0.001
<b>Number of MMA (mean, SD)</b>	1.34 (0.62)	1.12 (0.33)	1.28 (0.57)	
<b>Number of MMA (median, range)</b>	1.0 (1.0-4.0)	1.0 (1.0-2.0)	1.0 (1.0-4.0)	0.123
<b>Type of MMA (n, %)</b>				
<b>Independent Prescribing</b>	59 (77.6%)	-	59 (54.6%)	NA
<b>Recommendation to other prescriber</b>	13 (17.1%)	12 (37.5%)	25 (23.1%)	0.022
<b>Supplementary Prescribing</b>	10 (13.2%)	-	10 (9.3%)	NA
<b>Recommend over-the-counter medicine</b>	1 (1.3%)	5 (15.6%)	6 (7.4%)	0.003
<b>Issue/write prescription</b>	5 (6.6%)	5 (15.6%)	10 (9.3%)	0.139
<b>Patient Group Direction</b>	8 (10.5%)	-	8 (7.4%)	NA
<b>Adjust dose/drug according to protocol</b>	2 (2.6%)	5 (15.6%)	7 (6.5%)	0.012
<b>Recommendation via hospital notes</b>	0 (0.0%)	0 (0.0%)	0 (0.0%)	NA
<b>Patient Specific Direction</b>	0 (0.0%)	0 (0.0%)	0 (0.0%)	NA
<b>Exemptions</b>	0 (0.0%)	0 (0.0%)	0 (0.0%)	NA

### ***Assessment of patient medication adherence and medication taking behaviour by therapeutic radiographers***

Therapeutic radiographers assessed medication adherence in 221 (64.2%) consultations, with TR-IPs conducting assessment more frequently than TR-NPs (74.7%, n=127 Vs 54.0%, n=94, p<0.001). The majority of patients (78.7%, n=174) were determined to be taking medications as prescribed although 17.8% (n=38) were failing to take some or all of their medicines and 3.7% (n=8) were taking medicines inappropriately. Informed choice not to take medications (n=24, 10.9%), side effects concerns (n=23, 10.4%), lack of understanding of the correct way to take (n=11, 5.0%) or the purpose of medicines (n=10, 4.5%) were the most frequently reported reasons for non-compliance (Appendix 6 XII).

### ***Medicines Information given by therapeutic radiographers***

Therapeutic radiographers gave patients information and/or advice about medicines in 237 (68.9%) consultations, overall providing a median of 5.25 (range 1.0-14.0) different elements relating to their action and use and/or their side effects and contraindications (Appendix 6 XIII). TR-IPs provided a wider range of information than TR-NPs (median 6.0, range 1.0-14.0, Vs 4.0, range 1.0-12.0, p<0.001) and were more likely to indicate for example, the medicine's name (p=0.006), what the medicine was for (p=0.046), what it did (p=0.007), how it worked (p=0.009), how to tell if it was working (p<0.001), how to use it (p=0.001) and how to get a further supply (p<0.001). TR-IPs also gave more information to patients about side effects (p<0.001), their risks (p=0.007), and what to do should they occur (p<0.001).

### *Medicines recommended, administered and/or prescribed by therapeutic radiographers*

The medicines most frequently recommended, administered and/or prescribed by therapeutic radiographers were analgesics (n=87, 29.5%), ear, nose and oropharynx products (n=65, 22.0%), gastrointestinal drugs (n=52, 17.6%) and skin preparations (n=40, 13.6%, Table 38). TR-IPs recommended, administered and/or prescribed a higher number of medicines overall than TR-NPs (mean 4.5, (SD 3.62) Vs 2.7, (SD 2.7), p<0.001).

**Table 38 Medicines recommended, administered and/or prescribed by therapeutic radiographers**

<b>Medicines recommended, administered and/or prescribed (n, %)</b>	<b>TR-IP (n=199)</b>	<b>TR-NP (n=96)</b>	<b>Total (n=295)</b>
<b>Analgesics</b>	57 (28.6%)	30 (31.2%)	87 (29.5%)
<b>Ear, nose and oropharynx</b>	61 (30.6%)	4 (4.2%)	65 (22.0%)
<b>Gastrointestinal</b>	28 (14.1%)	24 (25.0%)	52 (17.6%)
<b>Skin</b>	24 (12.1%)	16 (16.7%)	40 (13.6%)
<b>CNS</b>	15 (7.5%)	8 (8.3%)	23 (7.8%)
<b>Urinary Tract disorders</b>	4 (2.0%)	8 (8.3%)	12 (4.1%)
<b>Malignancy &amp; immunosuppression</b>	4 (2.0%)	4 (4.2%)	8 (2.7%)
<b>Infections</b>	4 (2.0%)	-	4 (1.4%)
<b>Nutritional supplements</b>	1 (0.5%)	2 (2.1%)	3 (1.0%)
<b>MSK</b>	1 (0.5%)	-	1 (0.3%)
<b>Total</b>	199	96	295

The following section provides a separate presentation of data collected from case-site 3; the only longitudinal pre-post NMP training case-site.

#### **6.2.4.2 Therapeutic radiographer trainee case site**

The TR at case site 3 completed 77 self-report audits; 40 (51.9%) as a trainee NMP and 37 (48.1%) following subsequent qualification and enactment of prescribing in practice (Appendix 6 XIV). During prescribing training, the majority (67.5%, n=27) of consultations were undertaken by telephone, with subsequent provision exclusively face-to-face (n=37, 100.0%). All other characteristics including the type of consultation, patient demographics, consultation outcomes and the numbers of patients for whom discussions with colleagues and referrals were made were similar pre and post becoming a prescriber. The clinical caseload appeared similar across the two time points with no statistically significant differences in the pattern of cancer diagnoses, although there was an increase in head and neck cancer cases (Appendix 6 XV). An assessment of medication regimens was made for a similar proportion of patients during (85.0%, n=34) and after undertaking NMP training (94.6%, n=35, p=0.158), however, after qualification a greater proportion of patients were considered to require subsequent actions by the TR (62.9%, n=22 Vs 23.5%, n=8, p=0.002) (Appendix 6 XVI).

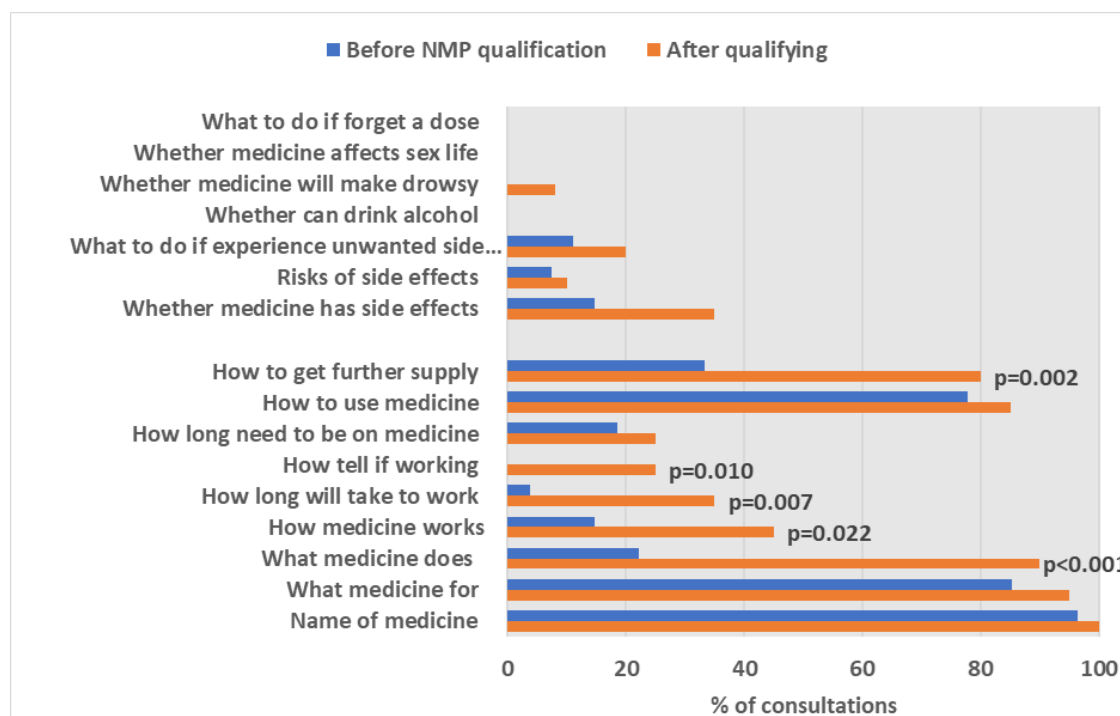
Following NMP training and working as a TR-IP the number of patients receiving MMA increased from 7 (17.5%), to 21 (56.8%, p<0.001) (Table 39). IP was used in 48.6% (n=18) of all consultations to prescribe medicines predominantly for head and neck (n=10, 32.3%) and colon/rectal cancers (n=4, 12.9%). Fewer recommendations to doctors/other prescribers for prescribed medicines were also made following qualification (28.6%, n=6 Vs 85.7%, n=6, p=0.008).

**Table 39 Medicines management activities undertaken at case site 3 during and after NMP training**

Medicines management activities	Case site 3		
	During NMP Training n=7	After NNP training as TR-IP n=21	p value
<b>Number of medicines management activities</b>			
Mean, SD	1.00 (0.00)	1.19 (0.40)	
<b>Types of medicines management activities (n, %)</b>			
IP	-	18 (85.7%)	-
SP	-	0 (0.0%)	-
PGD	1 (14.3)	1 (4.8)	0.440
Exemptions	0 (0.0%)	0 (0.0%)	-
PSD	0 (0.0%)	0 (0.0%)	-
Recommend OTC	0 (0.0%)	0 (0.0%)	-
Recommend doctor/other prescriber	6 (85.7%)	6 (28.6%)	0.008
Recommend hospital notes	0 (0.0%)	0 (0.0%)	-
Adjust dose	0 (0.0%)	0 (0.0%)	-
Issue or write prescription	0 (0.0%)	0 (0.0%)	-

A similar number of patients were given information about medicines before (67.5%, n=27) and after TR-IP qualification (54.0%, n=20, p=0.284). However, the pattern of information provision changed. Once qualified as TR-IP a wider range of information was provided along with an increase in the actual number of items of information given following qualification (median 6.5 items, range 3.0-10.0 Vs median 4.0 items, range 1.0-7.0, p<0.001) (Figure 18).

Figure 18 Information given about medicines during and after NMP training



### 6.3 Semi-structured Interviews

#### 6.3.1 Participant profiles

A total of 33 staff (TR and D prescriber/non-prescriber and team member) interviews lasting a median of 34.5 minutes (range 13-82) were conducted; 23 from therapeutic radiography case-sites and 10 from dietetic case-sites (Table 40).

Table 40 Case-site interview data collection

Therapeutic radiographers				Dietitians			
Case-site number	Number of participants			Case-site number	Number of participants		
	TR-IP	TR-NP	Team member		D-SP	D-NP	Team member
CS1	1	1	2	CS2	1	2	2
CS3	1	1	3	CS7	1	1	3
CS6	1	1	2				
CS8	1	1	3				
CS9	1	1	3				
<b>Total</b>	<b>5</b>	<b>5</b>	<b>13</b>	<b>Total</b>	<b>2</b>	<b>3</b>	<b>5</b>

Participants included 7 TR-IPs, 10 TR-NPs, 3 D-SPs, 3 D-NPs, 6 consultants, 3 service managers and 1 nurse. Details of participant profiles are shown in Table 41.

**Table 41 Participant characteristics**

Case-site	Interview ID	Job description
CS1	CS1-TR-IP	Review Radiographer IP
	CS1-TR-NP1	Review/treatment Radiographer NP
	CS1-manager	Radiotherapy Services Manager
	CS1-TR-NP2	Advanced Practice Treatment Radiographer NP
CS2	CS2-D-SP	D-SP lead intestinal rehab dietitian SP
	CS2-D-NP1	Advanced Specialist dietitian NP
	CS2-D-NP2	Advanced Specialist Intestinal Rehabilitation Dietitian NP
	CS2-consultant	Consultant Gastroenterologist
	CS2-pharmacy	Pharmacy Manager NP
CS3	CS3-TR-IP	Review radiographer IP
	CS3-TR-trainee	Review radiographer NP
	CS3-consultant	Consultant Clinical Oncologist
	CS3-nurse	Advanced Clinical Practitioner in Breast Oncology IP
	CS3-TR-NP	Senior Therapeutic Treatment Radiographer NP
CS6	CS6-TR-IP1	Advanced Practitioner therapeutic radiographer IP
	CS6-TR-NP	Review/treatment radiographer NP
	CS6-TR-IP2	Consultant Therapeutic Radiographer IP
	CS6-consultant	Consultant Oncologist
CS7	CS7-D-SP1	Specialist renal dietitian SP
	CS7-D-NP	Dietitian NP
	CS7-consultant1	Renal consultant
	CS7-D-SP2	Lead renal dietitian SP
	CS7-consultant2	Consultant nephrologist
CS8	CS8-TR-IP	Macmillan Specialist Radiographer IP
	CS8-TR-NP1	Review/treatment radiographer NP
	CS8-TR-NP2	Advanced practice radiographer NP
	CS8-TR-NP3	Consultant Radiographer NP
	CS8-TR-NP4	Treatment Radiographer NP
CS9	CS9-TR-IP1	Advanced Review Therapeutic Radiographer IP
	CS9-TR-NP	Review radiographer NP
	CS9-manager	Radiotherapy Services Manager
	CS9-TR-IP2	Radiotherapy Review Advanced Radiographer IP
	CS9-consultant	Consultant Clinical Oncologist

Details of themes, data codes generated during analysis and additional supporting quotations are available in Appendix 6 XVII.

### 6.3.2 Dietitians

#### Topic 1. Views on the impact of supplementary prescribing by dietitians

##### 1a. Access to medicines & service efficiency

While most agreed that D-SP helped to **streamline care** by reducing the number of people involved in prescribing decisions, freeing consultants for other tasks, the extent of impact on patient access to medications varied according to setting and context. The impact on **access to medication for patients** depended upon the usual process for prescribing in that setting and the availability of an alternative prescriber. For inpatients, it was argued that other members of the multi-disciplinary team could easily prescribe, therefore access was seldom delayed unless there was a problem.

*'I know that different nutrition teams have different setups. So, it could be the case that you don't have a pharmacist on the team, you don't have a nurse and it's just the dietitian going around by herself, or himself. So, in that case, yes, I can see that because then they can just do everything, prescribe it and send it off. It depends on the makeup of the team. So, in our team it's probably less of an issue because we have four or five independent prescribing pharmacists, and the doctors aren't always too far away.'* [CS2-Pharm]

In outpatient settings, medication was often prescribed initially in the hospital with few problems and D-SP was considered speedier. However, it was the norm for D-SPs or doctors to make recommendations to the patients GPs to continue medication for ongoing conditions on discharge and here delays were reported, for example, where GPs had not followed recommendations. Despite this, patients were still considered to get faster access to medicines when this process was overseen by a D-SP.

*'I think the benefit for the patient is that we can write straight away to their GP. So, 1) that they get the prescription straight away from us because we see them, we agree to the CMP and we can straight away write a prescription, and there's no delay in patients getting the medication. Also, the continuity of writing to the GP and getting that prescription sorted for the patient happens in a good time period, so it's quicker, so patients don't have to wait for their medication; I think that's the biggest advantage for the patient.'* [CS7-D-SP1]

There was little impact for non-prescribing colleagues as they held separate patient caseloads and D-SPs tended not to prescribe for patients they had not assessed.

### **1b. Impact of D-SP on quality and safety of care**

Participants were generally positive about the impact of D-SP in terms of improving quality and safety of patient care. Undertaking the prescribing programme was reported to **enhance knowledge and awareness of pharmacology**, potential drug interactions, side effects and consultation skills. This included raising awareness of the impact of co-morbidities that were covered on the prescribing programme. D-SPs reflected on their previous lack of knowledge and potentially poorer quality of care given when using methods such as patient group directions (PGD) before they undertook the prescribing course. As a result of increased awareness of pharmacology, D-SPs were reported to be more thorough and careful to double check prescriptions are correct and appropriate.

*'Things like looking at the side effects of medications, checking patient allergy information, documenting stuff more carefully, I would say, so the things that they teach you on courses and making sure that you're checking all this before prescribing. So that has helped, and of course the pharmacological side of things like how the particular medication works and it's all about the timing of the medication and whether it interacts with any other medication, to check all that. So I think I'm probably doing it in a better way after doing the course.'* [CS7-D-SP1]

Dietitians were acknowledged as having detailed knowledge and expertise to inform prescribing within their area of practice and that D-SP clarified the accountability for prescribing decisions and well as improving the **safety and appropriateness** of prescribing decisions.

*'If you have a dietitian that comes to you and goes, "Oh, I think they need this, that, or the other," you're then prescribing on behalf of someone else's opinion and expertise. And I think sometimes that feels almost ridiculous because they know far more than you do, and particularly with the dietetic stuff, with the nutritional support things.'* [CS7-Consultant1]

Patients were thought to benefit from the **patient-centred and holistic approach** to prescribing by dietitians. Working closely with the patient and knowing the patient's history was flagged as beneficial to the quality of prescribing decisions made by dietitians.

*'The holistic as in 'bigger picture', what's going on... when you're looking at someone's diet and social interactions and family dynamics and who brings food, who buys food and those sorts of things, I don't think most doctors consider those.'* [CS7-consultant1]

As a result, prescribing decisions made by D-SPs were considered in line with evidence-based practice, i.e. patient-centred, appropriate decisions based on the patient's history, patient preferences and current best practice. D-SPs increased knowledge of pharmacology also improved the way that they communicated with patients about their medications, further enhancing quality of care.

### **1.c. Personal and professional impact**

Increased **job satisfaction** was a widely agreed benefit of D-SP, mainly resulting from being able to complete an episode of care autonomously for the benefit of the patient. Satisfaction was also gained from learning new skills and **role development**, and this was considered important for staff retention. However, role progression and remuneration were not incentives, the following participant explained that their main motivation of becoming a D-SP was as a stepping stone towards independent prescribing.

*'But I don't think it [D-SP] is helping in any way because [laughter] I am quite keen to progress onto a Band 7, but Renal is anyway super-specialised. I did it solely because I thought it is a stepping stone for independent prescribing... It adds to your knowledge and if you want to become an independent prescriber, you are ready for it.'* [CS7-D-SP1]

In addition to being a positive step for individual job satisfaction, gaining prescribing responsibilities for dietitians was considered positive for raising the profile and **reputation of the profession**.

*'I think it's a great element to our profession, I think it raises our profile, so I think it's a hugely positive move.'* [CS7-D-NP]

## **Topic 2. Innovation or Implementation issues**

### **2.a. Factors influencing the uptake or implementation of D-SP**

A supportive, pro-active culture with **NMP leadership** were reported as facilitators to D-SP uptake. Gaining managerial support to train could be a hindrance due to the need to find cover for those undertaking the course, whereas pro-NMP leadership from individual managers helped facilitate uptake of D-SP. The support of **multi-disciplinary team (MDT)** members, particularly consultants and



pharmacists, was a key facilitator. Although not all consultants were initially supportive, this increased over time and was considered important at all stages of implementation from uptake, during transitioning and for ongoing development and implementation of D-SP. For D-SPs to have good working relationships, ease of communication and regular contact with consultants when needed was considered essential. MDT meetings provided opportunities to review patient medications, learn and share decision making, thus developing mutual trust in the quality of decision-making, especially for complex cases.

*'We have regular MDT meetings with the Consultants to discuss bloods and discuss complicated patients for whom we prescribe, so that's quite a good support. We meet them every couple of months, the Consultants, and discuss difficult patients with them, ask them questions or we can always email them if needed. So they're quite approachable, yes, and we get good support from them.'* [CS7-D-SP1]

**Supplementary prescribing** and its use of a clinical management plan (CMP) agreed with a doctor and patient, was a key barrier to D-SP. Consultants reported that D-SPs were already working at a high level of independence within their specialised areas of practice without needing much input from them. Signing of CMPs was, in their opinion, a tick box exercise. These consultants thought dietitians would benefit from having independent prescribing status as it would be better for job satisfaction and reduce the paperwork involved.

*'I suppose, they politely inform me, they send me a message. I wouldn't necessarily even question it to be like... I wouldn't change anything that she's doing particularly. There's no reason why I would be faffing about with the phosphate binders because she knows what she's doing.'* [CS7-Consultant1]

Dietitians reported that the supplementary prescribing process was time consuming, particularly when there were high numbers of patients on the caseload, creating a deterrent to expansion of D-SP. Agreeing a CMP was easier in hospital settings where there were regular MDT meetings and straight forward to use once set up. However, problems occurred if patient's consultant changed or was on leave, or if the CMP had expired. It was also sometimes complicated and potentially confusing to recall which patients have a current CMP and what is included on it. In some contexts, CMPs were not feasible and acted as a deterrent to uptake of D-SP. For example, where patients were receiving short term treatment, or where there was a high turnover of patients or high turnover of consultants.

*'I think the only thing that has stopped me prescribing is the CMP really. So, for example, I've just been to see a patient this morning and they're probably only going to be on parenteral nutrition less than a week, so it is quite a bit of extra work to create a CMP for a patient who is only going to be on short-term parenteral nutrition. So, I would say that's the only barrier to short-term prescribing, is the CMP.'* [CS2-D-SP]

An additional barrier was a lack of information and guidance about when and how CMPs are suitable for dietetic prescribing and how to set up a CMP. This led to some qualified D-SPs being unable to use supplementary prescribing due to unsuitable high patient or clinician turnover, changeable patient conditions or prescribing for patients from several general practices.

*'My other colleagues in this hospital who did the course ..it's not been straightforward for them to implement it. Therefore, they haven't really implemented it. And part of the problem was at the outset, I don't think it was made clear to people what supplementary prescribing involved. And actually, you really need that chronic patient group who are not changing their clinician frequently. I think there was a little bit of unclearness at the outset of what was involved and what the benefits would be in the long term to actually... people just thought, "Oh, it sounds a great idea, I fancy being a prescriber. Therefore, I'll go on the course.'* [CS7-D-SP2]

The difficulty of CMP use reduced **staff motivation** to become a D-SP. Motivation for those that had already qualified was mainly derived from the belief that SP was a stepping stone to independent prescribing. Some D-SPs did not feel that they had benefited in terms of career progression or remuneration due to undertaking the course and often the first D-SP in the trust experienced delays as governance procedures had not yet been put in place.

*'I qualified but then it took four months to actually issue my first prescription. That's just because I was obviously the first Dietitian in my hospital, so they were like "What is this? What is it? Never heard of you." There were a lot of hoops to jump through.'* [CS2-D-SP]

The level of **governance and support** varied. One case site (CS2) mentioned trust level NMP meetings, attending conferences and the BDA supplementary prescribing forum as CPD, however these were not specific to her prescribing practice. No NMP specific CPD was mentioned for CS7. Undertaking an annual audit of prescribing was written into trust NMP policy in case site 2 and then discussed within appraisal. In case site 7, the process for audit of NMP was not yet finalised. The organisational procedures for providing feedback from audit or monitoring of prescribing practice were unclear. SP is intended to provide a framework of support, including regular contact with doctors to agree CMPs. However, doctors involved in D-SP reported minimal contact:

*'My dietitian for the dialysis cohort, they will do things relatively independently in terms of prescribing, and then just double-check with me if I'm happy with what they have done or what they're suggesting. But there isn't, in all honesty, a great deal of interface. So we'd say 'let's catch up and try and do this more regularly', but so far we've had one meeting since I've started about going through all the bone profile stuff and all the mineral bone disease stuff, and that's it in nine months.'* [CS7-Consultant1]

Typically, the first dietitian to undertake prescribing prepared the ground for future D-SPs in terms of organisational procedures, agreements and local NMP policy. Both case sites reported to have up to date NMP policies and guidance. Lack of organisational preparation, for example, obtaining pin numbers for D-SPs to access electronic prescribing, were reported as barriers to implementation during initial stages of implementation.

*'We weren't fully on electronic records and electronic prescribing, and then we've moved on to electronic prescribing, and the trust haven't known what to do with it really for us. And because there are no other dietitian prescribers, we couldn't have a specific PIN or access to do it. So, in the end, we've finally got there, we've had to, kind of, use the nursing login to do it, so that's another barrier really that has made it harder.'* [CS7-D-SP2]

There were different local restrictions to prescribing in place in the two case sites; one site allowing dietitians to prescribe for outpatients only (cs7), whereas the other allowed prescribing for inpatients only. The rationale for this seemed to be budgetary arrangements for paying for prescriptions.

## **2.b Concerns and unexpected consequences**

No concerns were raised by D-SPs, however some team members raised concerns. Low levels of exposure to pharmacological knowledge during pre-registration training and beyond led to concern about potential errors, and fears about dietitians practicing outside of scope if they were to become independent prescribers. A lack of awareness of NMP course content and monitoring of practice seemed to underlie these concerns.

*'There is this theoretical possibility of not necessarily dietitians but supplementary and independent practitioners passing the course but not sticking to the principles and going rogue.'* [CS2-Consultant]

A couple of participants mentioned that doctors may become deskilled if all the prescribing related to dietetics was undertaken by dietitian prescribers, although the following consultant did not think this was a disadvantage.

*'When it comes to my field and junior doctors, it might be deskilling in prescribing complex things like parenteral nutrition, but I don't actually see this as a disadvantage. I don't think junior doctors should be prescribing very complex medicines like parenteral nutrition and they often do, it's written out by the dietitian and all they do is sign it and I don't think that's good practice. So actually, this is an advantage, and I don't think there's a huge disadvantage in deskilling.'* [CS2-Consultant]

One non-prescriber was concerned about increased workload should dietitians be expected in the future to prescribe for all patients on their caseload. The challenge of providing an equitable service to patients regardless of who they are treated by was an issue noted by one D-SP.

## **2.c. Service innovation, future development and sustainability**

There was little evidence of current service innovation via D-SP in the two case sites as D-SP had not changed the way that the service was run. However, there were plans for more dietitians to undertake the prescribing programme and ideas for service innovation included: dietitian-led satellite clinics, and involvement in other specialist areas such as hypokalaemia, neonatal intensive care, anaemia management and community dialysis clinics.

*'I think we are going to be less reliant on traditional prescribers like junior doctors. There's going to be more responsibly on the dietitians in the fields of both inpatient and outpatient. I think it opens up the ability to run independent clinics where prescribing is needed and therefore traditionally doctors would be needed for that. So it could do. I haven't seen that happen yet. I think it's just bolstered our current services. I haven't seen a change to services because of it yet.'* [CS2-Consultant]

One of the key factors influencing the long-term sustainability was the perceived limitation of supplementary prescribing. This reduced motivation to undertake the prescribing programme, as well as limiting the scope for innovation, such as the feasibility of developing dietitian-led services.

*'I guess my major bugbear is with this restriction that is placed on supplementary prescribers like dietitians, and I'd really like to see that lifted and for them to then be able to proceed to becoming independent prescribers, because that's a huge barrier.'* [CS2-Consultant]

In addition to CMP issues, other barriers included the current overwhelm in the NHS following the Covid-19 pandemic, the lack of evidence-base to support D-SP and concerns about dietitians leaving the trust once qualified as a D-SP due to the competitive workforce.

*'we're such a fluid, kind of, workforce, that there's often quite a lot of movement. The best cases are where we've got that long-term commitment... which is initially why I think it was the higher grades of staff, putting them through the course makes more sense because there are less opportunities to move than there are lower down. But you're never going to be able to guard against that.'* [CS7-D-SP2]

### **3. Views on NMP training and transition period**

The perceived difficulty of the prescribing programme, coupled with the restriction to supplementary prescribing, deterred uptake of D-SP. Undertaking NMP training was said to require dedication, often including the use of annual leave for study.

*'To be honest, because it's a big commitment, a lot of work and then for not being able to do it (prescribe) 100% properly, definitely, yes. I don't think I would do it if I could only do what they currently do; it's a lot of paperwork.'* [CS7-D-NP]

Team members noted that D-SPs took longer to make medicines management decisions when first qualified and that time was required to build confidence. Multi-disciplinary team members, such as doctors and pharmacists, particularly those who understood NMP, could facilitate supporting D-SPs through the transition period. Contact with the designated medical prescriber was maintained for a period after qualifying by some D-SPs.

*'When I first started prescribing, I continued to have monthly meetings with my designated medical prescriber...again, because I was like "Aargh, [laughter] I want someone to make sure I'm doing it right." And he said "Well, I didn't get taught how to prescribe properly!" It was fascinating, the discussions that we had. They've become less frequent now, but again, he's there if and when I need his support.'* [CS2-D-SP]

Use of CMPs were said to help during the transition period as it necessitated continued contact and support from consultants, helping to build confidence. The defined scope of prescribing specified within CMPs was also considered to protect dietitians from being asked to prescribe beyond their scope of practice.

#### **6.3.3 Therapeutic Radiographers**

## Topic 1. Views on the impact of independent prescribing in therapeutic radiography

### 1a. Access to medicines & service efficiency

Participants agreed that TR-IP had improved **patient access to medicine**. It enabled prompt management of the side effects of radiotherapy with more timely initiation of medicines essential to enhance treatment effectiveness and prevent symptom escalation, as well as reduce the potential for subsequent emergency intervention.

*'... if we get in sooner with this medication, the chances of them having to go to acute oncology or be seen as an emergency is reduced.'* [CS1-TR-IP]

The impact of this was to **streamline care and improve service efficiency**. Prompt access to treatment facilitated recovery for patients, reducing scheduling delays and improving waiting times. Reducing the number of people involved in prescribing decisions helped improve service efficiency and improve workflow, saving time for consultants and radiographers. TR-IP also helped build team capacity to offer **greater service flexibility and choice** around medicines management, enhancing team resilience to manage care. Scheduling for patients with more complex conditions, for example, could occur outside of core hours, giving patients more choice in appointment timing, especially where a critical mass of prescribers covered different shifts. For non-prescribing team members, access to a TR-IP team member was quicker than other options of obtaining a prescription for patients.

*'Radiotherapy is more self-sufficient...and that means that the Trust's management of patients has been able to change, get more efficient, become more resilient; it doesn't rely on having different groups of people around...Four out of the five of us (on the review team) are prescribers ...we've all got the same scope of practice, and the amount of autonomy it gives us each... loads of flexibility in our team.'* [CS9-TR-IP]

### 1b. Quality & safety of care, medicines management and advice

Training as a prescriber helped TRs to **mobilise** to better effect the scientific and inter-personal skillset for managing patients undergoing cancer treatment. Professional accountability for decisions was improved, as was knowledge of medicines and their interactions. The enhanced knowledge of pharmacology impacted on **team members** who gained informal learning opportunities from discussing patients with TR-IPs. In three sites, **standards and safety** of departmental engagement in medicines management was revised in light of TR-IP to ensure standardised practices.

*'We've also pulled medicines management up. We're not taught drugs in our degree. So our review team and our non-medical prescribers...they've written a medicines management package...and all of the staff now get training and they complete a competency to be able to sign off and give out controlled drugs.'* [CS9-TM1]

Greater knowledge was integral to improving the quality of medicines management decisions and advice giving, enhancing communication with patients about medications and encouraging a thorough approach to checking for potential interactions. Review TR-IPs considered their consultations to be more **holistic** than those of doctors, with more thorough assessment and explanation of side effects, as well as greater focus on the impact of radiotherapy on general health and well-being. A key benefit

of the TR-IP led model of review was that it gave small, highly specialist teams the capacity to manage care needs independently across the treatment and recovery trajectory. This reduced fragmentation of care from multiple health care contacts, and helping foster trusting patient-radiographer therapeutic relationships, was perceived to improve **continuity**. Regular contact with patients enabled TR-IPs to pick up on changes to a patient's condition, resulting in prompt treatment.

*'The review radiographers will sometimes pick up on a patient that's just going off... If they bump into them in the waiting room or something, between reviews, they'll often go 'How are you? You look a bit peaky today' and say 'Do you want to come and have a little chat?' They know there's something not quite right and they can pick things up quite quickly and act and prevent their toxicities getting worse.'* [CS1 -TM2]

TR-IPs had access to a broader range of more appropriate medicines and hence more **treatment options** for patients than available under PGD. Responsive, timely medicinal intervention through IP was felt to positively influence overall patient coping and experience of radiotherapy. Undertaking IP training also improved assessment and diagnostic skills, instilled a greater sense of responsibility and empathy for patients, and heightened feelings of advocacy when working to formulate personalised care plans.

### **1c. Personal & professional impact**

The **personal** impact of TR-IP included greater learning, clinical debate, job enjoyment, confidence, plus enhanced communication and empathy with patients. As a **profession**, TR-IP was seen as enhancing the profile and status of therapeutic radiography, and a step towards gaining greater recognition and visibility for advanced TR roles.

*'And I think it's also highlighted the job role because Therapeutic Radiographers are really unknown still; unless you've had an experience of cancer treatment or radiotherapy, most people don't still know what a Therapeutic Radiographer is, so I think it's great that it's highlighted to Government officials and policy makers that actually we are an important profession.'* [CS6-TM1]

## **Topic 2. Innovation and implementation issues**

### **2a. Factors influencing the uptake & implementation of IP**

Strategic vision, good relationships and strong, pro-NMP **managerial and medical leadership** support were key facilitators for implementing TR-IP. While cultural barriers such as medical or nursing opposition could surface initially, these were generally overcome as multi-disciplinary team (MDT) members gained trust in TR-IP and its benefits became more transparent. Lack of follow-through on commitments for medical supervision, staff release, study leave and backfill could jeopardise the climate of support for trainees. Tangible evidence of service benefit was important for sustaining TR-IP over time.

*'I think they have had good leadership here. And I think the lead review radiographer is very leadership/ service development driven and as soon as she's finished sorting out one*

*thing, she'll be looking for the next thing. And so I think that's why (it's) successful.'* [CS9-TM3]

Prescribing enhanced TR workforce skills and, where embedded in career pathways, was an important vehicle for **workforce development**, enhancing scope of practice and progressing staff to specialist/advanced roles. It was an important tool for transforming the workforce amidst oncology shortages and improving staff retention, however, there were concerns that national shortages of therapeutic radiographers limited the pipeline of staff available for IP roles, with a national lack of availability of NMP training places potentially impeding future implementation. While lack of remuneration for IP roles, given the added level of responsibility, were perceived deterrents, TR-IP was considered to aid career progression. Most managers and non-prescribing TRs reported that staff aspired to becoming prescribers and departmental appetite for undertaking the qualification was strong.

*'It's (TR-IP review role) an option for them to then go from there to ACPs to consultants. It can be a stepping stone or it can be that's the pinnacle of your .. for a couple of the girls that is exactly what they want to do, but for a couple of them it is it is a stepping stone because they want to go to other things.'* [CS9-TM1]

During the study period, TRs were not authorised to independently prescribe **controlled drugs** (legislation in December 2023 permitted access to six drugs). This was considered an essential component for scope of practice and the inequity between ability of different NMPs to prescribe CD was noted as problematic. In terms of **governance arrangements and support**, well-established support was reported for CPD, clinical supervision, NMP forums/meetings and was considered essential to build competence and ensure safe prescribing. Aside from HCPC annotation and Trust registration delays, IP participants reported no barriers or “red tape” when transitioning prescribing into practice. Clinical supervision was predominantly provided through daily informal peer support and weekly MDT meetings. Case-site engagement in audit of prescribing practices varied, with TR-IPs and their prescribing colleagues reporting either never having undertaken audit or unaware of how to formally access personal data. However, four TR-IPs reported keeping personal records of their prescribing in support of annual Trust registration requirements. Team members reported high levels of patient satisfaction with review services, perceiving IP to have had a positive overall impact on the experience of radiotherapy. However, whilst accepting of non-medical prescribing, most TR-IPs considered patients indifferent as to who prescribed their medicines, with confidence in expertise, knowledge of background multi-disciplinary working and convenience and speed superseding any preferences.

## **2b. Concerns and unexpected consequences**

Overall, there were few concerns about TR-IP raised in comparison to the number of benefits. Most non-prescribing TRs preferred to approach TR-IPs to access prescribed medicines for their patients, considering this route easier and more efficient than contacting doctors. Concerns were however expressed about the pressures this placed on **prescribers' workload**. TR-IPs affirmed that managing non-prescriber expectations and lack of understanding about the legalities and risks of NMP added workload and could disrupt workflow and reduce motivation to become a TR-IP. Participants at all case-sites stated that while IP reduced the need for consultant input, the enhanced service autonomy was accompanied by a **reduction in overall departmental medical presence**. While this was a positive

reflection of medical trust in TR skills, some negative consequences were reported. Patients were reported not to know or have a relationship with their consultant and staff had difficulty contacting doctors for support, working relationships were perceived to lack former cohesion and there were concerns that the removal of learning opportunity around side effects might **de-skill** oncology registrars.

*'One of the only negatives that I've seen is, you don't have that closeness that you used to with the consultants of the past. Because we're so autonomous, we've almost lost a bit of that cohesive working with the clinicians. Sometimes you don't always see the registrars and when they come round, they're not as familiar with the side effects, because things are just managed by us. So you have a little bit less of that working together.'* [CS9-TM2]

## **2c. Service innovation and future development**

**Strategy & new developments:** In addition to facilitating innovative role development, there was evidence that IP had facilitated changes to the way that review services were run or organised (e.g., enabling out-of-hours access, enhancing medicines management governance). As benefits became more apparent, additional areas where TR-IP could expand were identified, for example, case-site 8 had introduced a two-week follow-up review to ensure optimal steroid weaning for palliative patients undergoing radiotherapy, case-sites 3 and 9 had embarked on developing late effects clinics.

*'And we also introduced a follow-up clinic as well. So we caught patients two weeks after radiotherapy just to make sure if we started them on steroids, that they've weaned down their doses, that they managed with their side effects, so we've introduced that as well.'* [CS8-TM2]

Participants believed TR-IP would become increasingly important for future service innovation as workforce shortages and population demand for cancer care rises. One site (CS9) was planning to use IP within an ACP role for patients experiencing acute deterioration whilst in the department. Despite these developments, the extent of IP adoption within review services varied, with some case-sites (CS9, CS3, CS1) realising an ambition of all staff becoming prescribers and others limiting numbers to one or two staff (CS6, CS8). There was limited evidence of deliberate strategic service planning around IP with most services achieving piecemeal implementation as funding for supporting roles and NMP training became available. A notable exception was case-site 9 where a TR-IP led review service set an objective of substituting 30% of all consultant oncologist reviews. To ensure the necessary level of clinical autonomy, IP skills were mandatory for all band 7 staff.

**Sustainability:** Clinical need and national oncologist shortages were the primary drivers for developing TR led review services, however, only case-site 9 suggested an approach to implementing IP that considered long-term sustainability. Benefitting from the size of the service (n=6), IP was, written into all band 7 TR job descriptions with NMP training mandated within 18 months of recruitment into the service and expectation that band 6 review positions would also ultimately become prescribers. This and newly developed rotational band 5 and 6 review roles ensured exposure to IP and a route to succession planning:



*'the other thing we're going to introduce in the next year is rotational positions through review. So that will be our band 5s or band 6s who are on the machines who might just go through reviews for six months. So they won't be prescribers, but it's just about starting to get them interested in reviews, exposing them to that...'* [CS9-TM1]

Alternatively at other case-sites, there was evidence that NMP review roles lacked sustainability as there were no plans for succession planning once a TR-IP left:

*'Having had discussions about the way my service is going with the managers, I'm not convinced if I was to leave, that I would be replaced. And so my service would end up being possibly shrunk, or led by a Band 6. But I think from a prescribing perspective, the consultant prescribers would have to take on the lion's share of everything that I do, and I'd say I do more prescribing than they do, currently.'* [CS8-TR-IP]

### **3. Views on IP training programmes & transition period**

#### **3a. NMP training programmes**

TR-IPs reported adequate **preparation for entering NMP training**. Prior training in communication, assessment and clinical reasoning helped consolidate learning on the NMP programme. However, limited medicines management exposure pre-training was perceived to disadvantage TRs relative to other NMP professions, with better pharmacology preparation considered necessary.

*'And it's quite hard as a radiographer because you feel we have least experience of everybody going into that course. The nurses were already doing the jobs, they all knew about more medications. We were going in at the very bottom. And it's hard, it was a hard course.'* [CS1-TR-IP]

Organisational support for training varied, with CS1 and CS9 TR-IPs not receiving the recommended study leave and/or having to seek higher managerial intervention for its sanction. A precedent set by former TR NMP trainees facilitated CS3 and CS6 TR-IPs in granting the full 12 days. However, inter-professional differences in allocation were perceived unjust. No case-site TR-IPs received backfill, with absorptive capacity largely dependent upon colleague goodwill.

In terms of **course content and support**, NMP programmes were in general reported to be rigorous and demanding, requiring a high level of personal commitment. All TR-IPs expressed satisfaction with the overall content, perceiving themselves adequately prepared for prescribing following training. However, online course delivery during Covid varied in quality. All TR-IPs reported easy access to course supervisors, with the majority experiencing good support networks including pharmacy and peer NMPs. Consultant oncologists as Designated Medical Practitioners (DMPs) were preferentially encouraged by managers for the mutual benefits of clarifying value and scope of IP roles, building lasting supervisory relationships and promoting confidence in the benefits of TR-IP for future implementation.

*'I think if you involve the medics, you make sure that they're supervisors, then they can see the benefits. They (TR-IPs) present back what they're prescribing through clinical supervision, so therefore they (medics) know that they're doing a good job...Yes, (they're) quite happy and*

*they come forward asking to. Because if they mentor and supervise you, then you're going to look after their patients. And they also know that it means it's going to free them up... we've given them more time to do their planning.'* [CS9-TM1]

Despite initial fears, all TR-IP participants reported engaging prescribing skills quickly during transition, expressing **confidence** and awareness of their boundaries and being cautious to remain within their scope of practice. Continued contact with oncologist DMPs was maintained. Other strategies for building **confidence** were commencing with a limited, pre-agreed review formulary, prescribing 'safe' drugs initially and double checking with colleagues. Having experienced NMPs in the team improved awareness of transitional fears, facilitated support and provision of supervision.

*'I think having that set list of medications is also really important because you can be put in a position where patients might ask you to prescribe something, but actually if that's not in your domain of reference that you are used to...so I think it's important to stick within a more refined framework when it's a non-medical prescriber.'* [CS6-TM2]

### 6.3.4 Patients

A total of 27 interviews were conducted with patients who had consulted with a dietitian (n=6) or therapeutic radiographer (n=21) within case sites. Interviews were transcribed verbatim and identifying features removed. Poor quality on one recording (patient of TR) meant that one interview was not transcribed.

Quotations have been included to illustrate findings. In order to protect the anonymity of participants, codes have been used to indicate the case site (CS) and patient number.

#### 6.3.4.1 Dietitian patient findings

##### *Participant characteristics*

A total of 6 patients were interviewed. Five were male, one female. All participants had been seen by a dietitian in an NHS hospital setting, 5 in outpatient clinics (Table 42). Half (n=3) of the patients interviewed had seen a dietitian supplementary prescriber at their last consultation.

**Table 42 Dietitian patient interview data**

No	Age	Gender	Appointment	Condition/treatment	Model of practice
CS2-D1	Missing	Male	Dietitian SP Acute care  CS2	Chrones disease Daily parenteral nutrition	Dietitians seen as part of MDT including consultants, pharmacist and specialist nurses.
CS2-D2	72	Male	Dietitian non-prescriber Outpatient clinic	Ulcerative colitis and Chrones disease	Dietitians seen every 6 weeks but also phone contact between. Also see consultant separately
CS2-D3	65	Female	Dietitian Non-prescriber Outpatient Clinic	Ulcerative colitis Colectomy	Separate 6 month appointments for dietitian and consultant
CS7-D4	65	Male	Dietitian Non-prescriber Outpatient Clinic	Renal disease Dialysis	Attends nurse led clinic for dialysis 3 times a week. See dietitian and consultant every few months.
CS7-D5	71	Male	Dietitian SP Outpatient Clinic	Diabetes and renal disease Dialysis	Dialysis 3 times a week managed by nurses. Dietitian SP seen once a month on request. See consultant every 3 months.
CS7-D6	missing	Male	Dietitian SP Outpatient Clinic	Renal disease Dialysis	Dialysis 3 times a week managed by nurses. Sees dietitian when have question/problem.

### *Patient journey*

Patients were regular visitors to clinics for total parenteral nutrition (TPN) or renal dialysis and could spend 4-5 hours or more travelling to and from appointments each week. Some patients had to attend hospital on separate occasions to see the dietitian and the consultant. Dietitians were part of multidisciplinary teams and played a role in monitoring the patient's condition. Consultants (or junior doctors) prescribed most of the medications with dietitians focusing on nutritional supplements and prescribing for side effects such as constipation. Standard practice in the two case sites was for clinicians (including D-SPs) to make recommendations to the patient's general practitioner to prescribe medications unless there was an emergency.

Most patients reported problems accessing a GP and delays in getting prescriptions from GPs for medicine recommended by either dietitians or consultants at the hospital, sometimes needing multiple trips. Additional delays were reported in obtaining medication from pharmacy due to shortages, particularly during the Covid-19 pandemic. Some patients had additional trips to collect medication from community pharmacy and some paid to have them delivered. Travel time was less important than the need for specialist care required for the patient's condition.

## Key findings

Theme	Subtheme
1. Awareness of D-SP	
2. Acceptance of D-SP	
3. Concerns and conditions of acceptance	
4. Benefits	4.a. Speed of access and efficiency
	4.b. Quality of consultation, specialist knowledge and continuity

### 1. Awareness of dietitian prescribing

Awareness that dietitians could prescribe medication was low amongst patients. Only one participant was aware that D-SPs can prescribe medicine, others were either not aware until the interview (n=1) or had an idea that some professions other than doctors could prescribe but this had not been made explicit (n=4).

### 2. Acceptance of dietitian prescribing

All patients were supportive of prescribing by dietitians, so long as the appropriate training and experience was in place and dietitians prescribed within their area of competence.

*'Well, probably a little bit resistant to it in the past, but as things have changed gradually over the years, providing they've done all the training and got the qualifications and the ability to do it, I can't see too much of a problem. I'm sure they won't be able to prescribe anything more than is associated with their job that they do.'* [CS2-D3]

Confidence in D-SP was influenced by how well the dietitian knew the patient and their depth of knowledge expressed through communicating and checking information about diet and medicine. For some, it was less important which profession prescribes than their ability to check for contraindications, communicate clearly about the medicine and help select medicine that is right for that individual.

*'I think it's really about their ability to be able to communicate the pros and cons of what the prescription is going to be and how helpful it may or may not be, because you can't guarantee that it's actually going to be suitable for everybody.'* [CS2-D2]

*'I thought the advice and stuff I got from the dietitian was excellent. You know, like, I didn't have any questions unanswered, always helpful, always giving good advice and they did a great job.'* [CS7-D6]

Four patients said they prefer a dietitian to prescribe nutritional supplements as dietitians have specialist knowledge of this that other professionals don't have.

*'[D-SP is] definitely the right thing, it is the right thing to do, they are the specialist in the field in terms of what needs to be in the parenteral nutrition. I mean yes, the consultant can prescribe it, in a clinical perspective, but in terms of which bits and bobs and the liquid mix, you need a specialist in dietetics, possibly pharmacy.'* [CS2-D1]

### 3. Concerns about dietitian prescribing

Four participants mentioned concerns which mainly revolved around awareness of the level or training, knowledge and experience that dietitians have to be able to prescribe. This included questioning what training had been undertaken to be able to prescribe:

*'With dietitians that are prescribers and not prescribers, I really don't know what training they undergo and what kind of approved list they're on.'* [CS2-D2]

There was a recognition that not all dietitians have the specialist experience required for complex conditions. One patient explained that they accept prescribing by a dietitian that they know has the specialist experience to prescribe for their condition but would be reluctant to be prescribed by a dietitian, or other healthcare professional, without that experience.

*'I guess, my experience going round various acute hospitals and going into the IU when I need to go into, I am much less confident about dietetic advice outside of the specialised unit. And again, that is due to my condition. But there is a lot of dietitians do not appreciate what the treatment options are for short intestinal failure.'* [CS2-D1]

In addition, one participant was concerned about where accountability would lie for decision-making if there was an error:

*'For me the point is probably the accountability, if something goes wrong, who is clinically accountable for that decision? And I guess, the difference there is, the dietitians signing of will be accountable. Most people will expect it is the consultant who ultimately is clinically responsible for it.'* [CS2-D1]

#### **4. Benefits of dietitian prescribing**

Participants identified a range of benefits that could arise from dietitians prescribing.

**4.a. Speed of access and efficiency:** There was little to suggest that D-SP had improved access to medicines, but participants could see there was potential to improve efficiency. Most patients had to wait for medications recommended by the dietitian or consultant to be prescribed by their GP, resulting in delays ranging from one week to up to 3 months. As it was easier to get an appointment with a dietitian than a doctor, it would be quicker if dietitians could prescribe in hospital.

*'I've not even been able to see the consultant so far, it's just been one cancellation after another, and it's just got to the point now where it's really the dietitian that I see face-to-face.[] if you've got a dietitian that can actually prescribe in the hospital at the appointment, that makes life a lot easier.'*[CS2-D2]

*'I have a problem a lot of the time because, even the consultant, when they prescribe something, it never gets through to [GP]. So then I have to wait generally until I next see the consultant, which could be three months down the line. So I've taken three months' worth of medicines that I shouldn't be taking. Oh that's quite common.'* [CS7-D4]

As well as being more convenient for patients, there was an awareness that dietitian prescribing could improve efficiency by helping to 'spread the workload' across multi-disciplinary teams.

**4.b. Quality of consultation, specialist knowledge and continuity:** Participants noted a range of characteristics of consultations with dietitians, both prescribers and non-prescribers, that they believed benefited their understanding of their condition and treatment. Dietitians played an active

role in medicines decisions relating to nutrition and undertook a patient centred approach, using their knowledge and experience to find bespoke solutions to problems by working with individual patients and involving the patient in the decision. Building a relationship with the same dietitian over time was important for patients on long term treatments as the dietitian knew details of their individual condition. This meant patients didn't need to repeat information, improved confidence and trust.

*'I've been quite happy because I've seen the same person each time. I mean, it's more that relationship where you think, well, someone is actually keeping an eye on you. And that's the thing where, as I said, you don't normally get that when it's with the consultants because you don't always see the same consultant. So, it's about the reassurance that that person actually knows you, knows your condition. And also, there may be something that's come from a new drug or a new whatever it may be, that can be suggested. Because things have moved on.'* [CS2-D2]

Patients reported that they had time to discuss their treatment in detail with the dietitian making for a better quality of consultation than would be possible from a doctor. Importantly, patients were aware that dietitians have specialist knowledge and experience that help them to make more informed and appropriate decisions than you might get from a clinician without that specialist knowledge.

*'A dietitian, they are talking to people with my sort of problems all the time. So they get a much bigger view of the whole thing, whereas a doctor, they get a much, much bigger net, they cover all sorts of areas.'* [CS2-D3]

Both prescribing and non-prescribing dietitians identified and corrected patient's misunderstandings about medications, or the interaction between food and medical treatments.

*'I was taking the phosphate tablets wrong. Because what it says on the bottle is take three times a day, with food. It's not always possible to have a tablet with you when you're having food. Especially if you're out walking and you decide to have something to eat. So I was tending to skip a bit on that. And then I started taking them more like an antibiotic, so every six to eight hours I was popping one, whether I had eaten or not. So she put me right on that. And what I do is I keep a couple of tablets in the car or I keep a couple of tablets in my bag when I come here.'* [CS7-D4]

The safety of dietitian prescribing, due to their specialist knowledge and trust that they would be thorough in checking their decisions was also mentioned.

*'And as I say [dietitian] is probably one that would probably double, triple, quadruple check before she put pen to paper.'* [CS7-D4]

#### 6.3.4.2 Therapeutic radiographer patient findings

##### **Participant characteristics**

A total of 20 interviews were included with patients attending review consultations with therapeutic radiographers in radiography outpatient clinics. Fifteen participants were male and five female, ages ranged from 34 to 80. Patients were undergoing radiotherapy for cancer, predominantly prostate cancer. Of the 20 interviews, 6 participants had a review appointment with a therapeutic radiographer independent prescriber (TR-IP) and the rest had seen a non-prescribing (NP) therapeutic radiographer (see Table 43).

**Table 43 Therapeutic Radiographer patient interview data**

No	Age (years)	Gender	TR-IP or Non-Prescriber (NP)	Condition/treatment
CS3-T1	68	Female	TR-IP	Cancer. Radiotherapy 7 weeks, 5 days per week. Mid treatment.
CS6-T2	66	Male	NP	Prostate cancer Radiotherapy 20 sessions, completed 12
CS6-T3	71	Male	NP	Prostate cancer Radiotherapy 6 sessions completed
CS6-T4	77	Male	NP	Prostate cancer Radiotherapy 24 sessions, 14 completed
CS6-T5	76	Male	NP	Prostate cancer Radiotherapy 20 sessions, completed.
CS6-T6	71	Male	TR-IP	Throat cancer. Radiotherapy 30 sessions, 5 days for 6 weeks. Completed
CS6-T7	76	Male	NP	Lung cancer Radiotherapy 6 weeks, 5 days per week. Completed
CS8-T8	34	Male	NP	Lymphoma Radiotherapy 15 sessions, 7 completed
CS8-T9	71	Male	TR-IP	Colon cancer Radiotherapy 25 sessions
CS8-T10	71	Female	TR-IP	Melanoma and hysterectomy Radiotherapy 25 sessions over 5 weeks. Half completed.
CS8-T11	70	Female	NP	Breast cancer Radiotherapy 15 sessions over 3 weeks, 5 per week.
CS8-T12	75	Male	NP	Prostate cancer Radiotherapy 20 sessions, 4 weeks, 5 days per week.
CS8-t13	72	Male	NP	Prostate cancer Radiotherapy 20 sessions, 5 days per week.
CS8-T14	80	Male	NP	Prostate cancer. Radiotherapy 20 sessions, 5 days per week.
CS8-T15	76	Male	NP	Prostate cancer. Radiotherapy 20 sessions, 5 days per week.
CS9-Y16	78	Male	NP	Prostate cancer Radiotherapy 20 sessions.
CS9-T17	66	Male	TR-IP	Prostate cancer Radiotherapy 35 sessions, 6/7 weeks, 5 days a week. Completed
CS9-T18	-	Female	TR-IP	Unspecified cancer Radiotherapy 20 sessions. Completed
CS9-T19	71	Female	NP	Rectal cancer Radiotherapy. Completed.
CS9-T20	66	Male	NP	Prostate cancer Radiotherapy 20 sessions. Completed

### *Patient journey*

The patient journey, as derived from interviews, was the same for both sets of patients except for how medications were prescribed. A schedule of appointments for radiotherapy treatment and review were given to patients in advance. Typically, the patient would arrive at the clinic, book in (mostly electronic) and wait to be called for treatment. For those with pancreatic cancer, the wait involved taking an enema and a bladder fullness check. Delay for treatment was rare and not longer than 30 mins. Once treatment finished, the patient would leave. Review appointments were typically scheduled for after the first week of treatment and towards the end of treatment and could be face-to-face or by telephone. Additional reviews were arranged for patients with complications. Patients could be seen by a different treatment review radiographer for each session. Prescriptions for side

effects of treatment were either prescribed by the TR-IP, or (if seen by a TR-NP) by a consultant (additional 10-15 minutes). Some medications (such as creams) were given to patients at clinic. When prescribed, the patient usually picked up the medicine the next day from hospital pharmacy (about 20 minutes wait). This system worked well for patients and was preferred to a recommendation to go to general practice. Problems occurred for some patients if medicine was recommended for the GP to prescribe; this generally took longer (3 days) and communications between hospital and GP did not always run smoothly.

### Key findings

Theme	Subtheme
1. Awareness of TR-IP	
2. Acceptance of TR-IP	2.a. Knowledge and experience
	2.b. Personal approach and trust
3. Concerns and conditions of acceptance	3.a. Training and governance
	3.b. Record keeping and communication
4. Benefits	4.a. Speed of access and convenience
	4.b. Efficiency
	4.c. Quality of care and adherence
	4.d. Continuity of care

#### 1. Awareness of TR-IP

A minority (n=4) of patients were aware, prior to engaging in the study, that therapeutic radiographers could prescribe. Most had seen a non-prescribing TR. Two of the patients seeing a TR-IP recalled being told by the TR-IP that they could prescribe, however patients said there was a lot of information to take in at the start of treatment. In general, some patients found it hard to distinguish between professions within the hospital unless they were told or studied the uniforms. One patient remarked on the difficulty of being able to tell who could prescribe or who issues prescriptions within the health service in general:

*'It's the same with the GP, actually, isn't it, when you go in and nowadays you always see two or three people before you ever get to see a doctor, if you ever do, and you're never quite sure who prescribes anything or whether it always goes back to the doctor and then comes back down the line again.'* [CS8-T10]

#### 2. Acceptance of TR-IP

All 20 patients were accepting of TR-IP and were confident in the ability of TRs to prescribe. The following factors influenced confidence.

*2.a. Knowledge and experience:* TRs were valued for their detailed knowledge of the symptom profile that patients experienced when undergoing radiotherapy that was gained from regular contact with patients. The way TRs communicated this information gave patients confidence in the TRs ability to prescribe and manage medication.

*'She already knew what she was talking about, she knew what the side effects were, she understood the effects of the medication, positive and negative, so ... I had confidence in her if she had been able to prescribe that, yeah.'* [CS9-T20]



Due to the regular contact with patients, it was felt that TRs had a better understanding of the side effects and how best to treat them than perhaps an oncologist or GP. It was also felt that TRs had a better understanding of the patient's individual journey through the treatment regime.

*'Because it's their area of expertise, that's where they're working every day and seeing the patients. They're at close contact with the patients, probably closer than a doctor.'* [CS9-T18]

2.b. *Personal approach and trust:* Confidence in TR-IP was gained influenced by the professional manner and approach of TRs, including demonstrating personalised care and concern for patients.

*'I was very happy, because first of all, she had a very pleasant and engaging manner. She was interested and she listened whilst I was allowed to prattle on, and overall I certainly got the impression that she knew her brief.'* [CS9-T16]

It was noted by some patients that undergoing radiotherapy for cancer required them to have a great deal of trust in the team:

*'I'm also giving my body to them, on the table for them to [laughs] zap on a daily basis. And so I'm trusting my body to them anyway.'* [CS6-T2]

### 3. Concerns or conditions of acceptance

3.a. *Training and governance:* patients trusted the organisation to have the necessary governance and training in place for TR-IPs to prescribe safely. This included an assumption that TR-IPs are appropriately trained to be able to prescribe, that practice is monitored, and that they only prescribe medications within the range of their competence and specialist scope of practice.

*'Provided the person giving the prescription or making the prescription is adequately and properly and appropriately trained, I don't see a problem. Presumably, there are checks and balances to make sure that people who get through the course are actually up to it over a period of time when they're put to the test.'* [CS8-T12]

*'I think if it's an area that they have expertise in, if they are a senior radiographer and they are able to prescribe within their sphere of knowledge, that's fine. I think I'd be obviously less keen if they were prescribing medicine in an area that they didn't know anything about... if it was some other kind of medical need.'* [CS9-T20]

3.b. *Record keeping and communication:* acceptance of prescribing was conditional for some patients upon good record keeping and communication with doctors. It was assumed that a prescribing TR would be able to refer to an oncologist if they were unsure about a treatment, and that any medications related decisions would be recorded and seen by a relevant consultant or GP.

*'The only thing I would obviously... I'm assuming this would go on my health records that at some stage a doctor would actually view that I'd actually seen some treatment.'* [CS6-T4]

*'As long as the procedure is followed, like I was saying, as long as everything's written down, then I don't see a problem. If I did have side effects or comebacks, then obviously somebody else would be looking at the paperwork.'* [CS8-T13]

It was also important for patients to know that they would still be able to see an oncologist when appropriate, such as if their condition deteriorated.

*'I suppose if it was serious and getting serious, if things weren't getting better, and things weren't improving, then perhaps, yes, head for the doctor.'* [CS8-T13]

#### **4. Benefits of Therapeutic radiographer independent prescribing**

**4.a. Speed of access and convenience:** Many patients thought that TR prescribing would cut down the time they have to wait for medicines and be more convenient. When a TR-NP asked a consultant to prescribe, this was said to add an extra 10-15 mins, depending on availability.

*'I'd say 10 minutes, 15 at the most, so I didn't have a great length of time [to wait for oncologist to prescribe medicine]... but I could see, if there wasn't anybody... I mean, obviously it was Friday afternoon, they always had a clinic there on that day. If it were at a time when there wasn't anybody there to do that, they would have said, "Right, you need to go and see your GP," and that's where the problem would have been at, I feel.'* [CS9-T19]

While a short wait was acceptable for some, for other patients on intense treatment regimes, time in hospital was tiring and a reminder of their illness and so initiatives to reduce this were welcome:

*'The time. Yes, I mean my life's on hold at the moment, maybe. But still, every five or ten minutes extra that I spend at the hospital reminds me I'm not well. It's nice to go in and see them but I don't want to be hanging around forever afterwards whilst they track someone down.'* [CS6-T2]

**4.b. Efficiency:** Patients were impressed by the efficiency of the radiotherapy services where TR-IP was in place. Few delays were reported other than having to wait a short period of time if there was a problem with the machines. There was acknowledgment of the advantages of TR-IP in freeing up time for consultants to work with other patients.

*'Well, the advantages are clearly that the demands placed upon doctors in that scenario is immense. Their time is absolutely at a premium... They're obliged to cover a huge range of questions and considerations in a day's work, and if some of those considerations need not be answered by a doctor but someone suitably qualified to take some of that burden away, then clearly that's big advantage to the health service and to the doctor's concerned.'* [CS9-T16]

TR-IP was valued for improving the overall efficiency of the service and streamlining care. Prompt treatment of patient side effects was seen to help keep the system flowing smoothly, avoiding unnecessary delay.

*'Well to the team it makes keeping the patients rolling, keeping the system going, if you will. If there's delays in patients getting medication that's going to alleviate side effects that's going to mean that there's missed appointments potentially. That means that there's an impact then on future appointments that they need to slot patients back in.'* [CS9-T18]

**4.c. Quality of consultation and adherence:** Patients felt that there were advantages to being prescribed by TRs due to their more relaxed, calm approach and the detailed amount of information TRs gave them about their medication. Consultations with TRs were compared positively to those of busy consultants and doctors.

*'They [TR-IPs] get very busy as well, but they still give you that amazing feeling that you don't want to keep them, but that they've got all the time in the world to see you and sort out your problems. Whereas sometimes you're lucky if you see a doctor or not in the hospital because*

*they're all so busy. But even with some doctors, they just don't really explain anything.'* [CS3-T1]

The specialist knowledge held by experienced TRs was very much valued by patients and considered to be an advantage to TR medications adherence. The following patient explained how gaining a better understanding of why and how to take medicines, when this was explained by a TR-IP, improved their confidence and adherence:

*'When they tell you, "You should take paracetamol with the codeine," you assume that it's just additionally that help things along, but you don't know that actually, by taking them both together, they trigger each other and that sort of thing. So, you know, it's useful to learn the exact reasoning behind things, and people like [TR] who listens and are talking to lots of people who are going through radiotherapy, learn a lot of the side effects and that sort of thing.'* [CS6-T6]

4.d. *Continuity of care:* was important in a number of ways for patients. Firstly, there was the benefit of medications being managed by the TR-IP who knew the patient and their condition well, who assessed the patient daily and who could pick on deterioration of side effects and provide personalised care.

*'They're seeing you every day. They're asking you on a day-to-day basis, "How are you feeling?" That's the very first question they ask you every morning, "How are you feeling today?" Because you could feel fine today, but tomorrow you might not feel as well. I mean, it's quite a changing process over that five-week period. So, because they're very hands-on, I feel, arguably even more comfortable than the oncologist who's one step removed, or the doctor, the oncologist, doctor, GP.'* [CS8-T9]

Secondly, as patient would be prescribed by the person that assessed them, this continuity helped to avoid having to explain everything again to another clinician, plus they would get the medication more immediately, which improved the speed of recovery:

*'Because you're getting that care straightaway rather than delaying. Better outcomes of therapy. [ ] So if say they've got a skin condition that is too unbearable for them to have another therapy session, if they're getting prompt care with that, then they're more likely to be able to continue the therapy as scheduled at the beginning.'* [CS9-T18]

## 6.4 Patient Questionnaire

### 6.4.1 Participant profile

#### Overview of sample and response rate

Of the 268 patients who consented to participate in the study, 268 consented to take part in the patient questionnaire and 180 questionnaires were returned: a response rate of 67.1%. Of the 180 questionnaires, 54.4% (n=98) were from prescribing and 45.6% (n=82) were from non-prescribing therapeutic radiographers/dietitians. There were more participants from therapeutic radiographer sites (72.8%, n=131) than dietitian sites (27.2%, n=49), due to incomplete data collection owing to lack of clinician availability and/or small numbers of patients and case-sites. Questionnaires were completed on paper (78.3%, n=141), online (16.7%, n=30) and over the telephone (5.0%, n=9), with

the majority (n=178, 98.9%) completed by the patient, and the remainder (1.2%, n=2) completed by a spouse or partner on the patient's behalf.

### **Demographic overview**

The patient sample was predominantly male (n=101, 56.1%) with a mean age of 64.9 years. The majority of patients were living with other adults and/or children (70.6%, n=127), in owner occupied houses/flats (74.4%, n=134), were retired (37.2%, n=67) or unemployed/on long term sick (31.7%, n=57) and had not continued formal education beyond the age of 18 (53.9%, n=97). The sample was white (92.2%, n=166), black African/Caribbean/British (1.7%, n=3), Asian/Asian British (1.7%, n=3) or from mixed/multiple ethnic backgrounds (2.2%, n=4) Full details of the sample characteristics are provided in Table 44.

No differences were found for participants in dietitian and therapeutic radiographer groups in relation to gender, living arrangements, type of accommodation, level of education and ethnic group. Patients in the dietitian group were significantly younger with a mean of 59.2 years compared to 67.0 years in the therapeutic radiography group (p=0.002). Dietitian group patients also reported poorer health ratings than the therapeutic radiography group (73.5%, Vs 23.7%, p<0.001) with a greater proportion unemployed or on long-term sick leave (46.9% Vs 29.0%, p=0.010).

### ***Consultation overview***

Reflecting the different clinical/professional services, the majority (73.2%) of therapeutic radiographer consultations were hospital outpatient based with patients predominantly seen by dietitians on hospital wards (73.5%) (Appendix 6 XVIII). Therapeutic radiographers also undertook more telephone consultations (27.5%, n=36) than dietitians (12.5%, n=3, p=0.002), the larger majority (86.1% n=31) of whom were under the care of TR-NPs. Two thirds of patients reported seeing the TR-IP (61.4%, n=35) and TR-NP (66.2%, n=49) for the first time, with most patients of dietitians reporting prior consultations with a D-SP (72.0%, n=18) or D-NP (66.7%, n=16). The majority of therapeutic radiography consultations were booked in advance (70.1%, n=89), with dietitian patients seen same day (47.6%, n=20), or waiting less or more than 7 days for a consultation (34.3%, n=14).

**Table 44 Patient demographic data**

	<b>Dietitian (n, %)</b>	<b>Therapeutic Radiographer (n, %)</b>	<b>Total n=number of responses</b>	<b>% of total sample</b>
	n=49 (27.2%)	n=131 (72.8%)	n=180 (100.0%)	
<b>Gender</b>			<b>n=179</b>	
Female/transgender women	16 (32.7%)	59 (45.4%)	75	41.9%
Male/ transgender men	31 (63.3%)	70 (53.8%)	101	56.4%
Prefer not to say	2 (4.1%)	1 (0.8%)	3	1.7%
<b>Age</b>				
Dietetic group: n=46, mean 59.2, SD 15.6, (range 19.0-87.0)				
Therapeutic radiographer group: n=124, mean 67.0, SD 10.3, (range 34.0-89.0)				
Total: n=170, mean 64.9, SD 12.4, (range 19.0-89.0)				
<b>Living arrangements</b>			<b>n=175</b>	
Living alone	13 (27.1%)	33 (26.0%)	46	26.3%
Live with other adults/ children	33 (68.8%)	94 (74.0%)	127	72.6%
Care home resident	2 (2.1%)	0 (0.0%)	2	1.1%
<b>Type of accommodation</b>			<b>n=173</b>	
Owner occupied flat/house	31 (66.0%)	103 (81.7%)	134	77.5%
Local authority/housing association/ cooperative	9 (19.1%)	14 (11.1%)	23	13.3%
Privately rented house/flat	7 (14.9%)	8 (6.3%)	15	8.7%
Residential or care home, hospice	0 (0.0%)	1 (0.8%)	1	0.6%
<b>Employment group</b>			<b>n=172</b>	
Retired/medically retired	14 (31.1%)	53 (42.5%)	67	39.0%
Unemployed/student/long-term sick/disabled	23 (51.1%)	34 (26.8%)	57	33.1%
Paid/voluntary employment	8 (17.8%)	40 (31.5%)	48	27.9%
<b>Educated beyond 18 years</b>			<b>n=172</b>	
Yes	22 (45.8%)	53 (42.7%)	75	43.6%
No	26 (54.2%)	71 (57.3%)	97	56.4%
<b>Ethnic group</b>			<b>n=176</b>	
White	43 (91.5%)	123 (95.3%)	166	94.3%
Asian or Asian British	1 (2.1%)	2 (1.6%)	3	1.7%
Black African, Caribbean or Black British	3 (6.4%)	0 (0.0%)	3	1.7%
Mixed/multiple ethnic groups	0 (0.0%)	4 (3.1%)	4	2.3%
<b>General health rating</b>			<b>n=180</b>	
Good/Very Good/Excellent	13 (26.5%)	100 (76.3%)	113	62.8%
Fair/Poor	36 (73.5%)	31 (23.7%)	67	37.2%

## 6.4.2 Key findings

### 6.4.2.1 Satisfaction with services

Participants were asked about their satisfaction with the care received from the therapeutic radiographer or dietitian on the day that the questionnaire was administered using two tools: the Consultation Satisfaction Questionnaire(CSQ)<sup>79-81</sup> and the Generic Medical Interview Satisfaction Scale (G-MISS)<sup>85</sup>.

Results for these are reported for the total sample and by sub-group analysis by profession and prescribing status. Results for the Consultation Satisfaction Questionnaire are presented as the percentage of participants who responded with a positive (agree/strongly agree) and negative

(disagree/strongly/disagree) response to each of the 17 items, with Fischer's exact tests used to compare findings from TR-IP/TR-NP and D-SP/S-NP groups.

### *Consultation Satisfaction Questionnaire (CSQ)*

The total mean (SD) CSQ scores for patient experience of dietitian and therapeutic radiographer consultations were high at 78.1 (12.3) and 81.7 (11.6) and respectively, indicating a high level of satisfaction among all patients Appendix 6 XIX. Patients were equally satisfied with the care they received from dietitian and therapeutic radiographer prescribers and non-prescribers with no differences found to be statistically significant across each profession for the total, Quality of Care, Access to Care or Timeliness of Care scores.

Detailed findings on the CSQ are shown in Table 45. Of the 17 items designed to assess patient satisfaction with consultations, levels of satisfaction for the sample as a total were high with over 75% positive agreement on all items and less than 12% agreement on all negatively worded (reverse coded) items. Over 90% of respondents expressed satisfaction with the care received, agreeing that the therapeutic radiographer/dietitian listened carefully, checked everything and gave explanations for advice given. Perceiving the dietitian/therapeutic radiographer's advice was right, intent to follow instruction was high at 97.2% (n=171). No statistically significant differences in satisfaction were reported between the D-SP or D-NP group and TR-IP and TR-NP groups for any of the 17 items, suggesting dietitian and therapeutic radiographer prescribers and non-prescribers provided equivalent care as rated by patients.

Smaller numbers of patients of dietitians reported that it was easy to make an appointment compared to patients of therapeutic radiographers (64.5%, n=20 Vs 80.5%, n=66) and that an appointment could be made at a convenient time (58.6%, n=17 Vs 82.3%, n=65). However, both patient groups showed lower levels of agreement with the statement (Q15) indicating capacity to access the service quickly or in an emergency (61.1%, n=22 and 74.7%, n=80 respectively). Overall, fewer patients of dietitians (73.5%, n=25) than therapeutic radiographers (94.0%, n=108) considered the consultation waiting time acceptable. This may reflect fundamental service differences, with the larger majority (67.9%, n=89) of patients seen by therapeutic radiographers reporting pre-booked appointments and proportionally more patients seen by dietitians indicating waiting for their consultation or lacking awareness about how long they waited (42.9%, n=21 Vs 16.8%, n=22,  $p < 0.001$ ).

**Table 45 Patient views and experience of satisfaction with care received from dietitians and therapeutic radiographers**

Patient views and satisfaction with therapeutic radiographer or dietitian care  (R) indicates reverse score item	Dietitian Supplementary Prescriber (n=25)		Dietitian Non-prescriber (n=24)		P*	Therapeutic Radiographer Independent Prescriber (n=57)		Therapeutic Radiographer Non-prescriber (n=74)		P*	Total n=180	
	Strongly Agree/Agree (compared with strongly disagree/strongly disagree/no opinion)					Strongly Agree/Agree (compared with strongly disagree/disagree/no opinion)					Strongly Agree/Agree	
	n	%	n	%		n	%	n	%		n	%
1. Overall I was satisfied with the consultation from this therapeutic radiographer/dietitian (n=180)	25	100.0%	23	95.8%	0.49	56	98.3%	74	100.0%	0.44	178	98.9%
2. The therapeutic radiographer/dietitian was very careful to check everything when carrying out my care (n=179)	24	96.0%	22	91.7%	0.61	55	98.2%	73	98.7%	1.00	174	97.2%
3. I will follow the advice of this therapeutic radiographer/dietitian because I think she/he is right (n=176)	23	92.0%	22	91.7%	1.00	55	98.2%	71	100.0%	0.44	171	97.2%
4. The time I was able to spend with this therapeutic radiographer/dietitian was a bit too short (R) (n=180)	5	20.0%	4	16.7%	1.00	3	5.3%	6	8.1%	0.73	18	10.0%
5. The therapeutic radiographer/dietitian explained the reasons for the advice given (n=177)	23	92.0%	23	95.8%	1.00	53	96.4%	71	97.3%	1.00	170	96.1%
6. Some things about the consultation with the therapeutic radiographer/dietitian could have been better (R) (n=176)	4	16.0%	4	19.1%	1.00	4	7.0%	9	12.3%	0.39	21	11.9%
7. The therapeutic radiographer/dietitian listened very carefully to what I had to say (n=177)	24	96.0%	23	100.0%	1.00	54	96.4%	71	97.3%	1.00	172	97.2%
8. I understand my treatment much better after seeing this therapeutic radiographer/dietitian (n=176)	22	88.0%	21	91.3%	1.00	50	89.3%	61	84.7%	0.60	154	87.5%
9. The therapeutic radiographer/dietitian was interested in me as a person not just my illness (n=177)	22	88.0%	20	87.0%	1.00	50	89.3%	70	95.9%	0.18	162	91.5%
10. I am NOT completely satisfied with the advice received from this therapeutic radiographer/dietitian (R) (n=174)	2	8.3%	2	9.1%	1.00	1	1.8%	5	6.9%	0.23	10	5.8%

11. It was easy to make an appointment to see the therapeutic radiographer/dietitian (n=113)	11	64.7%	9	64.3%	1.00	27	75.0%	39	84.8%	0.40	86	76.1%
12. There was an acceptable wait to obtain an appointment with the therapeutic radiographer/ dietitian (n=110)	10	58.8%	8	57.1%	1.00	23	89.7%	39	84.8%	0.16	80	72.7%
13. It was possible to obtain an appointment on a convenient day or hour (n=108)	9	56.3%	8	61.5%	1.00	25	80.7%	40	83.3%	0.77	82	75.9%
14. I can contact someone in the radiotherapy/dietitian service by phone for help or advice in case of problem (n=168)	17	81.0%	17	81.0%	1.00	54	96.4%	66	94.3%	0.69	154	91.7%
15. In an emergency, I can get a quick appointment/consultation at this service (n=143)	12	57.1%	10	66.7%	0.73	40	81.3%	40	69.0%	0.18	102	71.3%
16. I saw the therapeutic radiographer/ dietitian at the appointed time (n=151)	12	80.0%	11	68.8%	0.69	51	94.4%	59	89.4%	0.51	133	88.1%
17. The waiting time was acceptable (n=149)	14	82.4%	11	64.7%	0.44	49	96.1%	59	92.2%	0.46	133	89.3%

***P\* = Fischer's exact test***



### *Generic Medical Interview Satisfaction Scale (G-MISS)*

The total mean (SD) G-MISS scores for patient experience of dietitian and therapeutic radiographer and consultations were high at 80.8 (11.1) and 84.3 (12.1) respectively, indicating a high level of satisfaction among all patients Appendix 6 XX. Patients were equally satisfied with the care they received from dietitian and therapeutic radiographer prescribers and non-prescribers with no differences found to be statistically significant across each profession for the total, relief, communication, and compliance scores.

Detailed findings on the G-MISS statements are shown in Table 46. Levels of satisfaction for the sample as a total were high with over 70% positive agreement on all items and less than 12% agreement on all negatively worded (reverse coded) items. No statistically significant differences in satisfaction were reported between the D-SP or D-NP groups and TR-IP and TR-NP groups for any of the 16 items, suggesting D and TR prescribers and non-prescribers provided equivalent care as rated by patients.

Patients seen by dietitians however, were less inclined than those seen by therapeutic radiographers to agree with statements concerning information about their illness, with proportionally fewer indicating they had an idea of when they would be well again (Q5 - 48.6%, n=18 Vs 80.2%, n=85) or that they were given all the information they wanted about their illness (76.7%, n=33 Vs 88.2%, n=85). This may reflect differences in the diagnostic profiles of the patient cohorts, with patients seen by dietitians experiencing more long-term/chronic illness.

#### **6.4.2.2 Patient attitudes towards prescribing by dietitians and therapeutic radiographers**

Attitudes towards prescribing were generally positive with the majority of respondents (93.9%, n=169) in agreement that dietitian and therapeutic radiographers should be able to prescribe medicines for patients (Appendix 6 XXI). When asked about preferences as to whether a doctor or dietitian/therapeutic radiographer prescribed their medicine, 56.7% (n=102) of respondents agreed/strongly agreed that they had no preference. When asked if they would prefer a doctor to prescribe their medicine, 67.2% (n=121) disagreed, 9.4% (n=17) agreed and 23.3% (n=42) had no opinion. Thirty-seven per cent (n=67) had no opinion on whether they would prefer a dietitian or therapeutic radiographer to prescribe medication, with a further 56.7% (n=102) expressing a preference for D/TR prescribing and 9.4% (n=11) indicating they would prefer a doctor to prescribe. There were no significant differences between prescribing and non-prescribing groups in responses to these statements.

Measured by a linear numeric scale rating from 1 to 7, overall respondents expressed high levels of comfort with dietitian/therapeutic radiographer prescribing (mean 6.59, SD 0.87) and confidence in their ability to prescribe the most appropriate medicine (mean 6.54, SD 0.97, Table 8). Patients seen by therapeutic radiographer prescribers reported higher levels of comfort (mean 6.75, SD 0.66) than those seen by non-prescribers (mean 6.49, SD 0.93, p=0.043) although they reported feeling equally confident in their ability to prescribe the most appropriate medicine (p=0.161). There were no significant differences between prescribing and non-prescribing dietitians in response to these questions.

**Table 46 Patient views and experience of care received from dietitians and therapeutic radiographers**

Patient views and experience of consultation with therapeutic radiographer or dietitian  (R) indicates reverse score item	Dietitian Supplementary Prescriber (n=25)		Dietitian Non-prescriber (n=24)		Fisher's exact  p	Therapeutic Radiographer Independent Prescriber (n=57)		Therapeutic Radiographer Non-prescriber (n=74)		Fisher's exact  p	Total n=180	
	Strongly Agree/Agree (compared with strongly disagree/disagree/no opinion)					Strongly Agree/Agree (compared with strongly disagree/disagree/no opinion)					Strongly Agree/Agree	
	n	%	n	%		n	%	n	%		n	%
1. The therapeutic radiographer/dietitian gave me a poor explanation of my illness (R) (n=167)	1	4.0	2	9.5	0.59	1	2.0	2	2.9	1.00	6	3.6
2. The therapeutic radiographer/dietitian told me what my illness is (n=134)	18	90.0	11	61.1	0.06	33	89.2	49	83.1	0.56	11	82.8
3. After talking with the therapeutic radiographer/dietitian, I know just how serious my illness is (n=137)	21	91.3	12	75.0	0.21	33	86.8	49	81.7	0.58	115	83.9
4. The therapeutic radiographer/dietitian told me all I wanted to know about my illness (n=154)	19	82.6	14	70.0	0.47	40	88.9	58	87.9	1.00	131	85.1
5. After talking with the therapeutic radiographer/dietitian, I have a good idea of how long it will be before I am well again (n=143)	10	50.0	8	47.0	1.00	40	88.9	45	73.8	0.08	103	72.0
6. The therapeutic radiographer/dietitian seemed warm and friendly to me (n=178)	24	96.0	23	100.0	1.00	55	96.5	73	100.0	0.19	175	98.3
7. I felt this therapeutic radiographer/dietitian did not treat me as an equal (R) (n=177)	0	0.0	0	0.0	-	1	1.8	2	2.8	1.00	3	1.7
8. I felt embarrassed while talking with the therapeutic radiographer/dietitian (R) (n=177)	0	0.0	0	0.0	-	1	1.8	3	4.1	0.63	4	2.3
9. I felt free to talk to this therapeutic radiographer/dietitian about private matters (n=170)	22	88.0	16	84.2	1.00	50	94.3	69	94.5	1.00	157	92.4
10. The therapeutic radiographer/dietitian gave me a chance to say what was really on my mind (n=166)	21	91.3	15	75.0	0.22	48	94.1	67	93.1	1.00	151	91.0
11. The therapeutic radiographer/dietitian did not allow me to say everything I had wanted about my problems (R) (n=173)	2	8.0	0	0.0	0.49	1	1.9	3	4.1	0.64	6	3.5

12. The therapeutic radiographer/dietitian seemed to know what he/she was doing (n=179)	24	96.0	21	91.3	0.60	55	96.5	71	96.0	1.00	171	95.5
13. The therapeutic radiographer's/ dietitian's visit has not at all helped me (R) (n=170)	1	4.2	1	4.4	1.00	2	3.7	1	1.5	0.58	5	2.9
14. The therapeutic radiographer/dietitian seemed to know just what to do for my problem (n=173)	23	95.8	20	90.9	0.60	50	94.3	68	91.9	0.73	161	93.1
15. I expect that it will be easy for me to follow the therapeutic radiographer's/ dietitians' advice (n=176)	19	79.2	17	77.3	1.00	54	96.4	71	96.0	1.00	161	91.5
16. It may be difficult for me to do exactly what the therapeutic radiographer/dietitian told me to do (R) (n=170)	4	16.0	3	14.3	1.00	6	11.5	8	11.1	1.00	21	12.4

### 6.4.2.3 Advice and information about medicines

One hundred and twenty-five (69.4%) patients reported that the dietitian or therapeutic radiographer had provided advice or information about medicines during the consultation on that day. A significantly higher proportion of the D-SP/TR-IP group (78.0%, n=64 Vs 62.2%, n=61) reported to they had received medicines advice or information during the consultation (p=0.022).

Detailed findings for the SIMS subscale and total score are shown in Appendix 6 XXII. In general respondents reported high levels of satisfaction with advice/information about medicines, scoring a mean of 14.96 (SD 3.31) for the total score and 8.26 (SD 1.60) and 6.70 (SD 2.24) for the Action & Usage and Potential Problems subscales respectively. While there were no statistical differences in findings for dietitians when prescriber and non-prescribers groups were compared, patients seen by TR-IPs reported higher levels of satisfaction for the Action & Usage subscale (8.63 v 7.78, p=0.030). Examination of the results for the individual statements (Table 47) showed that these patients were significantly more likely to be told how to use their medicine (p=0.008) and how to tell whether the medicine was working (p=0.013), as well as to be told whether the medicine had any unwanted side effects (p=0.032), interfered with other medicines (p=0.027) or would induce drowsiness (p=0.041). Rating their intentions on a numerical linear scale from 1 to 7, respondents receiving advice/information from therapeutic radiographer prescribers also indicated that they were more likely to take their medicine than those seen by non-prescribers (mean 6.93 Vs 6.63, p=0.012).

Overall, the statements receiving the highest level of satisfaction across both dietitian and therapeutic radiographer groups related to information given on what the medicines were for (98.4%, n=123), the name of the medicines (97.6%, n=122), what the medicines does (97.6%, n=122), how to use the medicine (93.6%, n=117) and how it works (92.8%, n=116), and how to get a further supply (90.4%, n=113). The least positive responses were in relation to receiving information on how long a medicine would be needed (80.8%, n=101) and whether the medicine would affect the sex life (80.8%, n=101).

**Table 47 Patient views about medicines advice and information given by dietitians and therapeutic radiographers**

Patient satisfaction with advice/information about medicines given during therapeutic radiographer or dietitian consultations	Dietitian Supplementary Prescriber (n=24)		Dietitian Non-prescriber (n=18)		Fisher's exact	Therapeutic Radiographer Independent Prescriber (n=40)		Therapeutic Radiographer Non-prescriber (n=43)		Fisher's exact	Total n=125			
	Satisfied (About right/None needed) compared with Dissatisfied (Too much/Too little/None received)					p	Satisfied (About right/None needed) compared with Dissatisfied (Too much/Too little/None received)				p	Satisfied (About right/None needed)		
	n	%	n	%			n	%	n			%	n	%
1. What your medicine is called	23	95.8%	18	100.0%	0.571	40	100.0%	41	95.3%	0.265	122	97.6%		
2. What your medicine is for	24	100.0%	18	100.0%	-	40	100.0%	41	95.3%	0.265	123	98.4%		
3. What it does	24	100.0%	18	100.0%	-	40	100.0%	40	93.0%	0.134	122	97.6%		
4. How it works	24	100.0%	18	100.0%	-	37	92.5%	37	86.0%	0.279	116	92.8%		
5. How long it will take to act	21	87.5%	18	100.0%	0.176	38	95.0%	35	81.4%	0.057	112	89.6%		
6. How you can tell if it is working	23	95.8%	17	94.4%	0.679	37	92.5%	30	69.8%	0.013	107	85.6%		
7. How long you will need to be on your medicine	19	79.2%	15	83.3%	0.527	35	87.5%	32	74.4%	0.109	101	80.8%		
8. How to use your medicine	24	100.0%	17	94.4%	0.429	40	100.0%	36	83.7%	0.008	117	93.6%		
9. How to get a further supply	23	95.8%	17	94.4%	0.678	38	95.0%	35	81.4%	0.057	113	90.4%		
10. Whether the medicine has any unwanted side effects	19	79.2%	14	77.8%	0.602	38	95.0%	34	79.1%	0.032	105	84.0%		
11. What are the risks of getting side effects	20	83.3%	15	83.3%	0.656	38	95.0%	36	85.7%	0.148	109	87.2%		
12. What you should do if you experience unwanted side effects	19	79.2%	16	88.9%	0.344	37	92.5%	35	83.3%	0.177	107	85.6%		
13. Whether you can drink alcohol whilst taking this medicine	19	79.2%	18	100.0%	0.050	35	87.5%	36	85.7%	0.535	108	86.4%		
14. Whether the medicine interferes with other medicines	18	75.0%	16	88.9%	0.233	37	92.5%	32	74.4%	0.027	103	82.4%		
15. Whether the medicine will make you feel drowsy	17	70.8%	16	88.9%	0.151	37	92.5%	32	76.2%	0.041	102	81.6%		
16. Whether the medicine will affect your sex life	20	83.3%	17	94.4%	0.275	30	75.0%	34	81.0%	0.350	101	80.8%		
17. What to do if you forget to take a dose	19	79.2%	17	94.4%	0.172	34	85.0%	33	76.7%	0.251	103	82.4%		

## 6.5 Observations

A total of 17 patient consultations were observed: 5 at 1 dietitian site (site 7) and 12 at 4 therapeutic radiographer sites (sites 3, 6, 8 and 9). Observations continued for the duration of face to face or telephone patient contact, and if medicines were prescribed/provided, where possible the patient pathway to receipt of medicines was observed. Dietitian consultations (D-SP n=2; D-NP n=3), were face to face and lasted 13-19 minutes (median 15). Therapeutic radiographer consultations (TR-IP n=5, TR-NP n=7) were telephone (n=6) or face to face (n=6) and lasted 26 to 53 minutes (median 35). An overview of dietitian and therapeutic radiographer consultations and pathways for medicines access gained from observations is reported. See Appendix 6 XXIII for a general overview of observed consultations/patient pathways for dietitians and therapeutic radiographers.

## 6.6 Case-record review

### 6.6.1 Sample profile

A total of 32 patient case records were assessed: 22 from 3 therapeutic radiographer sites (sites 6, 8 and 9), and 10 from 1 dietitian site (site 7). Each set of case records was assessed by two independent reviewers, yielding a total of 64 assessments. Records were assessed from 19 prescribers (n=14 TR-IP, n=5 D-SP) and 13 non-prescribers (n=8 TR-NP, n=5 D-NP). Eighteen records were from initial consultations (n=14 TR, n=4 D) and 14 (n=8 TR, n=6 D) were follow-up consultations.

### 6.6.2 Source documents

In general, therapeutic radiographer records were more complete than dietitian records, with full details on patient information (e.g., age, gender, date, consultation reason) and current medications available in 75% (n=33) and 98% (n=43) of assessments respectively (See Appendix 6 XXIV & XXV, Section B). Presented information in therapeutic radiographer records was lacking key elements in the following: prescription records for discharge planning/recommendation (38.6%, n=17), prescription records for new drugs issued or changes made during the consultation (25.0%, n=11) and documentation of allergies (29.5%, n=13). Full information on current medications was reported available in 95% of dietitian assessments although the majority (75%) were considered partially complete for patient information (e.g., age, gender, date, consultation reason). The key information elements that were deficient in dietitian records were: prescription records for discharge planning/recommendation (60.0%, n=12) and current medications (5.0%, n=1).

### 6.6.3 General quality of records and decision making

In total, there were discrepancies reported in quality ratings (> 2 points) in 5 records. Following adjudication the average (SD, range) quality scores for therapeutic radiographer records was 6.91 (1.99, range 1-10), with 7.05 (1.09, range 1-9) for dietitians. Assessors considered enough information was present to judge the appropriateness of medicines management/prescribing decisions in 39 (84.1%) therapeutic radiographer records and 14 (70.0%) dietitian records. Thirty-seven (89.3%) therapeutic radiographer and 14 (70.0%) dietitian decisions were subsequently considered appropriate.

#### 6.6.4 Medication errors

Assessors reported that enough source document information was available to permit the assessment of prescribing/medicines management medication errors in 31 (70.5%) therapeutic radiographer and 19 (95.0%) dietitian record assessments. There was 1 case record out of the total 32 where assessors agreed that a medication error had occurred. Undertaken by a D-SP, the error related to the incorrect documentation of the unit in which the calcium supplement Evacal D3 was measured (See Appendix 6 XXIV). Two further potential dietitian medication errors were reported by 1 reviewer. These related to incomplete documentation of recommended/prescribed drug schedules in dietitian clinical records. Correct details were indicated on prescriptions/GP letters and therefore on adjudication these were not deemed to meet the classification for an error. No errors were reported in therapeutic radiographer record assessments.

## 6.7. Economic Evaluation

### 6.7.1 Findings from the scoping review

Four hundred and twenty records were identified from which nine studies (eight original research studies and one grey literature paper) evaluating and comparing non-medical prescribing with patient group discussions, general practitioner-led usual care or services provided by non-prescribing colleagues were included. All studies assessed the costs and economic values of prescribing services by non-medical prescribers, and eight assessed patient, health or clinical outcomes. Papers were published between 2010 and 2022 and evaluated the impact of non-medical prescribing practices by pharmacists, nurses, physiotherapists and podiatrists, and one report published in 2015 estimated non-medical prescribing cost-savings in primary and secondary care for a range of health professions. The types of non-medical prescribing services evaluated in these studies included supplementary or independent prescribing and community nursing. Although the findings from this scoping review were found useful in identifying relevant costs and consequences associated with non-medical prescribing and methodological and reporting gaps in the literature, there was no relevant data to be used in our data analysis for dietitians and therapeutic radiographers.

### 6.7.2 Supplementary prescribing by dietitians

#### 6.7.2.1 Cost of training dietitian supplementary prescribers

The cost of training included the training programme fee, employer-paid additional study time and time off work to complete the programme. The summary characteristics of 20 NMP training programmes and correspondent fees are summarised in Appendix 7 I. The summary of costs and assumptions used for estimating the cost of training is shown in Appendix 7 II. The average fee for the NMP training programme was £1,801 (range £1,200–£3,500). The employers paid, on average, six days (range 1–11 days) of additional study time, which was estimated at £797 per trainee (range £133–£1,400). This was calculated using the average pay band for dietitians in the study sample (average of £48,456, range £44,606–£52,305) multiplied by study time (measured in day) paid for by the employers. Each trainee spent 26 taught days of training, 12 days of supervised learning as a minimum requirement, and an average of six days of study time. Based on the interviews with trained dietitians, we assumed the trainees spent approximately 50% of their work time on the training course. Therefore, the time off work to complete the course was costed using the average pay band for dietitians in the study sample multiplied by half the time spent on the programme. This was £2,522 per trainee based on the “required” time to complete the course (Appendix 7 II).

The out-of-pocket (OOP) expenses paid during training included travel, textbook and study material, and personal study time. The trainees paid on average £132 (range £10–£400) for travel, £105 (range £10–£400) for textbook and study material, and £193 (range £30–£400) for other OOP expenses. The dietitians spent on training an average of 29 days (range 7–60 days), which were costed using the average pay band. The personal study time was estimated to cost on average £3,791 for each trainee (range £929–£7,965) (Appendix 7 II).



### 6.7.2.2 Training costs per prescriber and per patient contact

The cost of training per prescriber and per patient contact was estimated for two costing scenarios, as shown in Appendix 7 III. In the base-case scenario, the OOP expenses were included in the analysis as it was assumed that trainees may receive reimbursement for their OOP expenses. In this scenario, the mean cost of training was £9,341 per prescriber (range £4,834–£16,654).

In the second scenario, the OOP expenses were assumed to be paid by trainees and, therefore, were excluded from the analysis. The mean training cost excluding OOP expenses was £5,120 per prescriber (range £3,855–£7,489).

The average training cost per patient contact was £21 (range £20–£23) with OOP expenses and £12 (range £10–£16) without OOP expenses. Given that not all patients were required to manage their medication, an additional analysis was conducted to estimate the costs per patient contact required to manage a prescription. The mean prescribing cost per contact required to manage a prescription was £19 (range £17–£26) excluding OOP expenses, and £34 (range £32–£37) including OOP expenses.

### 6.7.2.3 Patient consultations with dietitians and referrals to other prescribers

Appendix 7 IV summarises data on patient consultations and referrals to other specialists for prescribing. On average, both D-SPs and D-NPs had nine patient consultations per week (range 5–15). The average number of consultations required to manage prescriptions by D-SPs was six (range 3–9). The percentage of patients referred to other prescribers was 2% in the prescriber group and 30% in the non-prescriber group. A year of 48 working weeks was assumed to estimate the number of patient consultations annually (Appendix 7 IV). The average cost of referral to other healthcare professionals for both D-SP and D-NP was £188 (£76–£364). For a list of referral services, see Appendix 7 III.

### 6.7.2.4 Costs of consultations and prescribing-related activities

Appendix 7 V summarises data on time spent on prescribing-related activities (communicating with patients, writing notes, reviewing medication and consulting with colleagues). The unit costs for face-to-face and non-face-to-face consultations with dietitians were obtained from the NHS reference cost 2021–22 (see Appendix 7 III).

On average, dietitians spent 28% of their work time reviewing medications. This estimate was used to cost the consultations with D-SPs. The average cost of consultations which required prescribing was £157 (range £125–£190). For consultations which did not require prescribing the estimated cost of consultation was £123 (range £98–£149).

The estimated average total cost of non-medical prescribing (including the cost of training, cost of consultations and cost of referrals to other specialists for prescribing) in the first year following training was £74,820 for D-SPs compared to £79,206 for D-NPs. The average five-year costs were £360,469 for D-SPs and £424,738 for D-NPs. On average, supplementary prescribing by dietitians could save £4,386 per prescriber in the first year following training and £64,269 per prescriber over five years.

### 6.7.2.5 Effectiveness outcomes

Appendix 7 VI summarises the effectiveness outcomes used in economic analysis. The values were adjusted for covariates using a mixed-effects linear model (see Methods). Non-adjusted values are shown in Appendix 7VII. Appendix 7 VIII summarises EQ-5D-5L responses for each of the five dimensions (e.g. mobility, self-care, usual activities, etc) for patients managed by D-SPs and non-prescribers. The mean adjusted QALY was lower in the D-SP group (0.7403, SD=0.0223) compared to the D-NP group (0.7526, SD=0.0269). There was no significant difference between the two groups (p-value=0.080). The wide 95% confidence intervals (-0.0824–0.0566) indicate that the difference in QALY between the prescriber and non-prescriber groups can be positive as well as negative. (Appendix 7 VI)

The mean patient overall satisfaction with consultation score was 77.29 (SD=7.35) in the D-SP group and 76.31 (7.61) in the D-NP group (100 is the maximum score). The difference in scores between the prescriber and non-prescriber groups (0.98) was not statistically significant (p-value=0.212) (Appendix 7 VI). The mean patient overall experience of the consultation score was 65.17 (SD=7.35) in the D-SP group and 63.23 (5.60) in the D-NP group (100 is the maximum score). The difference in scores between the prescriber and non-prescriber groups (1.94) was not statistically significant (p-value=0.301) (Appendix 7 VI).

The data on patient waiting time is shown in Appendix 7 IX. Data were primarily derived from 20 patient questionnaires (Appendix 7.1) which included filter questions that narrowed down the sample to N=5 for patients managed by D-SPs and N=3 for those managed by D-NPs. The mean waiting time was 1.67 (SD=0.6) for D-SPs and 3.7 (SD=2.3) for D-NPs (Appendix 7 VI). However, this finding was inconclusive due to a very small sample size and therefore, it was not used in the model.

### 6.7.2.6 Cost-effectiveness of supplementary prescribing by dietitians

The model-based cost-effectiveness analysis was carried out using the model parameters listed in Appendix 7 X to compare services provided by D-SPs and D-NPs. The analysis was carried out using patients' QALY and patient overall satisfaction with the service and patient overall experience of the consultation. We did not conduct the cost-effectiveness analysis using patient waiting time due to a very small number of responses. The summary of the base-case cost-effectiveness analysis is presented in Appendix 7 XI. The difference in average total costs between D-SPs and D-NPs was -£10. This was due to a lower number of referrals to other specialists by D-SPs, which offsets the cost of training. The difference in QALY was negative (-0.0122) due to the lower patient QALY in the prescriber group. The ICER point estimate was £816 per QALY lost (supplementary prescribing was less costly but less effective). A probabilistic sensitivity analysis was conducted to assess uncertainty with ICER estimates. Appendix 7 XII shows the cost-effectiveness plane (A) and the cost-effectiveness acceptability curve (B) for supplementary prescribing by D-SPs compared to services provided by D-NPs. Appendix 7 XII.2 shows 5,000 Monte-Carlo simulations of incremental costs and QALYs. 19% of simulations were in the southeast quadrant where services provided by D-SPs were less costly and more effective compared to consultations with D-NPs; 18% in the northeast quadrant (services provided by D-SPs were more costly and more effective); 31% were in the northwest quadrant (services provided by D-SPs were more costly and less effective); and the remaining 32% in the southwest quadrant (services provided by D-SPs were less costly and less effective). Appendix 7 XII B

shows the cost-effectiveness probability at different WTP thresholds. The probability of supplementary prescribing being cost-effective at the NICE threshold of £30,000 was around 37%. This means that there is high uncertainty about the cost-effectiveness of supplementary prescribing by dietitians although it may save money in the long term with little or no effect on patients' quality of life.

Appendix 7 XIV shows the deterministic sensitivity analyses for supplementary prescribing. The model parameters were varied within the specified ranges to assess their effect on the outcome of the cost-effectiveness analysis. Results of the deterministic analysis show that in the majority of the simulations, the services provided by D-SPs were less costly but slightly less effective than those services provided by D-NPs.

The cost-effectiveness analysis using both patient satisfaction and patient experience of the consultation as two additional outcome measures resulted in negative incremental cost and positive incremental effectiveness scores (Appendix 7 XI) indicating that consultations with D-SPs were less costly and more effective than consultations with D-NPs in terms of patient satisfaction. However, there is high uncertainty around this estimate, as shown by the Monte-Carlo simulations (Appendix 7 XV & XVI), where estimates fell in all four quadrants of the cost-effectiveness plane. We do not report ICERs and probabilities of being cost-effective for this outcome since there is no WTP threshold for patient satisfaction.

### 6.7.3 Independent prescribing by therapeutic radiographers

#### 6.7.3.1 Cost of training therapeutic radiographer independent prescribers

The cost of training included the training programme fee, employer-paid additional study time and time off work to complete the programme. The summary characteristics of 20 NMP programmes (for both professions) and correspondent fees are summarised in Appendix 7 I. The summary of costs and assumptions used for estimating the cost of training is shown in Appendix 7 II. The average fee for training a therapeutic radiographer was £1,951 (range £1,070–£4,000). The employers paid on average seven days (range 2–14 days) of additional study time, which was estimated at £951 per trainee (range £266–£1,859). Each trainee spent on average 26 taught days of training, 12 days of supervised learning as a minimum requirement, and an average of seven days of study time. The time off work to complete the course was costed using the average pay band for therapeutic radiographers in the study sample multiplied by half the time spent on the programme. This was £2,522 per trainee based on the “required” time to complete the course (Appendix 7 II).

The out-of-pocket (OOP) expenses paid by trained therapeutic radiographers included travel expenses, textbook and study material, and personal study time. The trainees paid, on average, £209 for travel (range £36–£600), £62 for textbook and study material (range £20–£150), £45 for other OOP expenses (range £25–£60). The trainees spent on study an average of 27 days (range 4–60 days), which were costed using the average pay band by therapeutic radiographers. The personal study time was estimated to cost £3,584 on average for each trainee (range £531–£7,965) Appendix 7 II).

### 6.7.3.2 Training costs per prescriber and per patient contact

The cost of training per prescriber and per patient contact was estimated for two costing scenarios, as shown in Appendix 7 III. In the base-case scenario, the OOP expenses were included in the analysis as it was assumed that trainees may receive reimbursement for their OOP expenses. In this scenario, the mean cost of training was £9,324 per prescriber (range £4,470–£17,223).

In the second scenario, the OOP expenses were assumed to be paid by trainees and, therefore, were excluded from the analysis. The mean training cost, excluding OOP expenses was £5,425 per prescriber (range £3,858–£8,447).

The average training cost per patient contact was £10 (range £10–£16) with OOP expenses and £6 (range £5–£14) without OOP expenses. Given that not all patients were required to manage their medication, an additional analysis was conducted to estimate the costs per consultation required to manage a prescription. The mean cost per consultation required to manage a prescription was £9 (range £7–£22) excluding OOP expenses, and £16 (range £15–£26) including OOP expenses.

### 6.7.3.3 Patient consultations with therapeutic radiographers and referrals to other prescribers

Appendix 7 IV summarises data on patient consultations and referrals to other specialists for prescribing. On average, both TR-IPs and TR-NPs had 19 patient consultations per week (range 6-38). The average number of consultations required to manage prescriptions by TR-IPs was 12 (range 4–24). The percentage of patients referred to other prescribers was 7% in the prescriber group and 23% in the non-prescriber group. A year of 48 working weeks was assumed to estimate the number of patient consultations annually. The average cost of referral for both D-SP and D-NP was £179 (£76–£364). For a list of referral services, please see Appendix 7 III.

### 6.7.3.4 Costs of consultations and prescribing-related activities

Appendix 7 V summarises data on time spent on prescribing-related activities (communicating with patients, writing notes, reviewing medication and consulting with colleagues). The unit costs for face-to-face and non-face-to-face consultations with therapeutic radiographers were obtained from the NHS reference cost 2021-22 (see Appendix 7 XXIII). On average, TR-IPs spent 33% of their work time reviewing medications. This estimate was used to cost the consultations with TR-IPs. The average cost of a consultation which required prescribing was £116 (range £69–£168). For patient consultations which did not require prescribing the estimated cost of consultation was £87 (range £52–£127).

The estimated average total cost of non-medical prescribing (including the cost of training, cost of consultations and cost of referrals to other specialists for prescribing) in the first year following training was £121,918 for TR-IPs compared to £117,422 for TR-NPs. The average five-year costs were £613,102 and £629,672 for TR-IPs and TR-NPs, respectively. On average, independent prescribing by therapeutic radiographers would save £16,570 per prescriber over five years.

### 6.7.3.5 Effectiveness outcomes

Appendix 6 VI summarises data on the effectiveness outcomes used in economic analysis. The values were adjusted for covariates using a mixed-effects linear model (see Methods). Non-adjusted values are shown in Appendix 7 VII. Appendix 7 VIII summarises EQ-5D-5L responses for each of the five dimensions (e.g. mobility, self-care, usual activities, etc) for patients managed by TR-IPs and TR-NPs.

The mean adjusted QALY calculated from EQ-5D-5L was lower in the TR-IP group (0.7299, SD=0.0250) compared to the TR-NP group (0.7359, SD=0.0291), although this difference was not statistically significant (p-value=0.207). The wide 95% confidence intervals (-0.0816–0.0686) indicate that the difference in QALY between the TR-IP and TR-NP groups can be positive as well as negative. (Appendix 7 VI)

The mean patient overall satisfaction with consultation scores were 79.2 (SD=7.5) in the prescriber and 79.61 (SD=7.04) in the non-prescriber groups. The small difference in satisfaction scores (-0.4067) between the two groups was not statistically significant (p-value=0.312) (Appendix 7 VI). The mean patient overall experience of the consultation scores was 65.75 (SD=6.89) in the prescriber group and 66.06 (SD=5.48) in the non-prescriber group. This small difference in patient experience scores (-0.3173) between the two groups was not statistically significant (p-value=0.212) (Appendix 7 VI).

#### 6.7.3.6 Cost-effectiveness of independent prescribing by therapeutic radiographers

The model-based cost-effectiveness analysis was carried out using the model parameters listed in Appendix 7 X to compare services provided by TR-IPs and TR-NPs. The analysis was carried out using patients' QALY and overall satisfaction with the service. We did not conduct a cost-effectiveness analysis using the waiting time to obtain a prescription due to a small sample size. The summary of the base-case cost-effectiveness analysis is presented in appendix 7 XI. The difference in cost of patient contacts with TR-IPs and TR-NPs was £5. The incremental QALY was negative (-0.0060) due to the lower patient QALY in the prescriber group. The ICER point estimate was -£824 per QALY lost (independent prescribing was more costly but less effective). A probabilistic sensitivity analysis was conducted to assess uncertainty with ICER point estimate. Appendix 7 XVIII shows the cost-effectiveness plane (A) and the cost-effectiveness acceptability curve (B) for services provided by TR-IPs compared to TR-NPs. Appendix 7 XVIII A shows 5,000 Monte-Carlo simulations of incremental costs and QALYs. 20% of simulations were in the southeast quadrant where consultations with TR-IPs were less costly and more effective compared to consultations with TR-NPs; 23% in the northeast quadrant (consultations with TR-IPs were more costly and more effective); 31% were in the northwest quadrant (consultations with TR-IPs were more costly and less effective); and the remaining 26% in the southwest quadrant (consultations with TR-IPs were less costly and less effective). Appendix 7 XVIII B shows the cost-effectiveness probability at different WTP thresholds. The probability of independent prescribing being cost-effective at the NICE threshold of £30,000 was around 44%. In summary, there is high uncertainty about the cost-effectiveness of independent prescribing although it may save money in the long term with little or no effect on patients' quality of life.

Appendix 7 XX shows the deterministic sensitivity analyses for independent prescribing by therapeutic radiographers with QALY as an effectiveness outcome. The model parameters were varied within the specified ranges to assess their effect on the outcome of the cost-effectiveness analysis. Results of the deterministic analysis show that in all simulations the services provided by TR-IPs were in some cases less costly and in other cases slightly more costly but in all cases less effective than services provided by TR-NPs.

The cost-effectiveness analysis using patient overall satisfaction with consultations resulted in a positive incremental cost and positive incremental effectiveness scores (Appendix 7 XI) indicating that consultations with TR-IPs were slightly more costly and more effective than consultations with TR-NPs in terms of patient satisfaction. However, there was high uncertainty around these estimates as shown by the Monte-Carlo simulations in Appendix 7 XVIII & XIX (estimates fell in all four quadrants of the

cost-effectiveness plane). We do not report the ICER point estimate and probability of independent prescribing being cost-effective for this outcome since there is no WTP threshold for patient satisfaction.

## 7. Phase 4: Development of D-TR model of implementation and online tool kit

### 7.1 Tool kit content development

Four meetings were held with the primary focus of establishing and supporting the development of the NMP toolkit.

**Meeting 1 (April 2021):** An overview of Allied Health Prescribing was provided, followed by interim project findings reporting barriers and facilitators to prescribing. Participants were asked to consider priorities and content for the NMP toolkit, including types of resources, functionality, structure/ level of interaction, wants/ needs and must during facilitated group activities (n=3), the content of which was discussed during the feedback session in the larger group. Consideration was also given to the i) timeline and commitment; ii) resourcing, for development, short and long term; iii) contributions, who will do what and when; iv) strategy for adoption: tactics and evidence of use and usefulness, ensuring case for longevity.

**Priority areas:** Advice on preparation for prescribing (including how to demonstrate need, pre-course expectations, releasing staff, frequently asked questions, 'a day in the life' of a prescriber); guidance and support for mentors; guidance to support understanding and use of SP/CMP; templates and resources to guide implementation in practice, ongoing CPD and support for expanding prescribing practice and audit; information for patients.(see Table 48)

There was a high level of agreement across the three groups regarding the toolkit priority areas.

**Type of tool kit:** using 'blue sky' thinking, the ideal vision for the toolkit was a multi-professional 'one-stop' resource for guidance on all aspects of prescribing (e.g. preparation, clinical supervision, CPD, examples of innovative practice, templates, signposting to special interest groups, information on revalidation) with individual log in allow NMPs to track and monitor their own progress and develop a portfolio of evidence to support their prescribing practice. In keeping with the TRaDiP resources, a realistic solution was agreed that it should be a web- based resource, which could be kept up to date with low ongoing costs.

**Generic or specific:** generic with specific areas of guidance; profession specific case studies to highlight pathways.

**Who is it for:** for everyone who is interested, could have different streams of information; individuals NMPs, NMP leads, practice supervisors, managers.

**Action:** Following the initial workshop, where the desire for availability of online resources beyond the scope of the project was identified the project team worked to find a suitable hosting platform. Numerous conversations and discussions were held with professional bodies, and the National Health Service April 2021- October 2022 to establish available options. There was however a dearth of available options in terms of what any specific organisation was able or willing to host and support in the long-term. The NHS Learning Hub (<https://learninghub.nhs.uk/>), which supports organisations and individuals across the NHS health and social care workforce, including local government and universities was therefore identified as the most suitable hosting platform for the NMP toolkit.

**Meeting 2 (January 2023):** A summary of the initial tool kit meeting was provided revisiting key priorities identified during the first workshop. It was acknowledged that some of the requests from the initial meeting were outside the scope of the project (e.g. a database of training to help with local/national audits). During the second meeting it was agreed that the content should be a mixture of both generic and profession specific i.e. related to dietitians and therapeutic radiographers, and that work should focus on the top three areas (Table 48). Areas were prioritised using a consensus event held during the online meeting and a subsequent plan of action agreed. It was identified that a number of areas overlapped with the existing Surrey Toolkit ‘Preparing to Prescribe’, developed through co-production with nurses and allied health professionals<sup>133</sup>. This widely accessible and free-to-use Toolkit consists of trigger questions, signposting and links to current guidance, and was designed to support those who wish to become a non-medical prescriber. It was agreed that the ‘Preparing to Prescribe’ toolkit should be updated, transferred to the NHS Learning Hub and expanded to include post training implementation in practice, and patient experience. Additionally, it was agreed to create something for patients who were interested in the benefits to them, and additionally could be shown to managers.

**Table 48 NMP Toolkit priority areas**

1	Implementing prescribing in practice (1st)
2	Patient experience (joint 2nd)
3	Demonstrating need/preparation (3rd)
4	Tips for managers
5	Support for DPPs (or other supervisors)
6	Ongoing support/CPD
7	Templates for policies

**Meeting 3 (May 2023):** Meeting 3 focussed on the three target areas: i) *Patient information:* examples of existing patient information leaflets on NMP were shared, and a discussion around what information patients would want, and preferred format: ii) *Demonstrating need:* the current content of the ‘Preparing to Prescribe’ toolkit was reviewed. Discussion then focussed on how this could be improved, including the suggestion of asking people to provide quotes of how they demonstrated need for prescribing to their organisation: iii) *Implementing prescribing in practice:* discussions focussed on where example of practice could be obtained, format i.e. video, quote, worked examples and identifying volunteers to provide examples. Working groups were set up to action each priority.

Additional meetings and short-life working groups were also used to support content development as outlined below:

- i) *Patient leaflet* Working with our PPI investigator, PPV volunteers and additional PPI volunteers (n=4) who were part of an NHS England national PPI group the ‘Who’s who guide to prescribing’ was developed with support from the project team. Existing patient facing material was scanned and reviewed as being information heavy and not developed with patient/service user input. Guidance on patient leaflet development was followed<sup>134, 135</sup> to develop a leaflet providing general information about which professional groups can prescribe in the UK. A paragraph was drafted by prescriber representatives from each profession before being reviewed and simplified by patient leaflet group members, the toolkit group and project team. A review of the leaflet was



undertaken by 4 PPI volunteers and discussed at an online meeting. Following revisions, the leaflet was reviewed at meeting 4. This resource is freely accessible to NHS from the learning hub and is also available in an easy read version.

- ii) *Demonstrating need:* An e-learning design and development company, run by an academic pharmacist and a learning technologist were employed to prepare the existing toolkit for migration to the NHS Learning Hub. In order to ensure smooth transition and ongoing functionality a series of meetings were held with project team April- September 2023, and the toolkit updated. Examples of innovative practice leaflets were also added to this section of the toolkit.
- iii) *Transitioning:* Working with volunteer TR-IP (n=1) and D-SPs (n=2), leaflets were produced to provide real life examples of the prescribing journey, innovative practice and tips/recommendations on how to stay prescribing ready.

**Meeting 4 (October 2023):** The final meeting reviewed the Patient Leaflet- “who’s who guide to prescribing”, the updated version of the ‘Preparing to Prescribe’ Toolkit and new content related to implementation of prescribing. Outstanding actions were identified and allocated to team members to take forward. A need for more content related to ‘staying prescribing ready’ and best practice was shared with the group, and requests for suggestions of volunteers to help support this.

The NMP tool kit and its resources can be found on the following link:

<https://learninghub.nhs.uk/Catalogue/prescribingtoolkit>. In order to access resources users need to set up a login and password following the online instructions.

## 8. Findings

### **Objective 1:** *Review evidence to inform D-TR prescribing*

The literature review revealed a dearth of literature evaluating AP roles or NMP. This was the case for both professions but was more marked in therapeutic radiography where only a small number of empirical papers were found. There was some evidence that dietitian involvement in medicines management decisions (mainly prescribing and order-writing) can reduce inappropriate resource use (such as parenteral and enteral feeding, referrals), minimise prescription writing errors, decrease incidences of infections and prevent admissions.

A lack of role understanding and associated infrastructure to support advanced dietetic practice (ADP) was evident, with no detail regarding the ADP roles or the nature of what they are prescribing or recommending. As a result, there was little evidence to inform scope of D-SP, service delivery, or implementation. In therapeutic radiography, evidence was sparse and descriptive, with one small scale service evaluation of supplementary prescribing in the UK. The extent of MMAs and NMP in TR in the UK remains essentially unknown. Definitions of advanced TR incorporated some aspects of ACP as defined in the UK and consistently included medicines management activity, particularly for assessing and managing side-effects of radiotherapy via treatment review clinics. Few details were provided of what these activities comprised, and no details were provided regarding the actual medicines prescribed. As with dietitians a lack clarity regarding the AP role often led to ambiguity. Despite the recognition of the multiple potential service improvements that AP and SP could offer TR services, progress was hampered by a lack of support resulting in inadequate organisational infrastructure and governance frameworks that are required to help drive change in practice.

AP, and NMP is an emerging topic for DTRs which has to date received modest attention. Subsequently, it is not possible to determine with any certainty how and where AP or NMP uptake has occurred in dietetics and therapeutic radiography, or what its effect (if any) has been on patient care. This is despite over a decade of TR-SP in the UK.

### **Objective 2:** *Describe and classify dietitian supplementary prescribing and therapeutic radiographer independent prescribing services and identify innovative service models across England.*

Findings from the two prescriber surveys, NHS Manager surveys and case study interviews provided a picture of D-SP and TR-IP services. In line with policy intentions findings indicate that D-SPs and TR-IPs are mainly highly qualified, experienced practitioners working in specialist or senior roles. Knowledge and skills gained from NMP were reported to be integral to improving quality of care. Enhanced knowledge of pharmacology and related safety implications coupled with specialist knowledge was felt to enhance communication with patients about medications, encouraging a more holistic approach to patient care. There was some evidence that prescribing had led to innovation in TR services, but less so for dietitians.

Organisations are employing DTR prescribers to improve access and care quality in a range of settings. There is however variation between and within professions in the profile of those adopting the prescribing role and service configuration. TR-IP is adopted amongst those in more senior, advanced

practice or consultant roles; with higher levels of educational attainment and at the higher end of the NHS AfC pay scale. Adoption of D-SP is predominantly by those in specialist or team lead roles with lower uptake reported by APs or ACPs dietitians. Patterns suggest that dietitians have more experience in their specialist area of practice before becoming a prescriber, with fewer options available to undertake master's level educational, compared to therapeutic radiographers. This may be indicative of AP being further developed in TR than for dietitians.

*Therapeutic radiographer services:* TR-IP was found to be predominantly implemented in the acute/specialist acute out-patient setting, with some in-patient presence, mostly providing on-treatment review services. A novel nurse and TR-IP-led on-treatment review clinic was in place in one organisation where TR-IPs treated patients with complex care needs. Innovative service models under development, involving novel TR roles managing patients at other points in the cancer care trajectory (e.g., pre-treatment consenting, post-treatment/late effects services), were described during manager and staff interviews. Within generalist services TR-IPs manage either a range of different tumours or are specialists in single tumour groups, with more complex caseloads e.g. head and neck cancer, gynaecology that than non-prescribing TRs.

*Dietetic services:* D-SP was found to be spread across acute, acute/ community and community organisations. Dietitians who completed the survey were mainly based in acute/ specialist acute trust, the majority of whom provided more than one service. Key areas where D-SP had been implemented were renal, intestinal/nutritional and diabetes. There was overall less evidence of D-SP being used to support innovation in service delivery. Ideas for service innovation for dietitian-led satellite clinics, and involvement in specialist areas such as hypokalaemia, neonatal intensive care, anaemia management and community dialysis clinics were discussed during interviews but had not yet developed beyond this stage.

**Objective 3:** *Examine dietitian supplementary prescribing and therapeutic radiographer independent prescribing activity and trends and factors that support or inhibit uptake or implementation.*

Results from our prescriber and NHS manager surveys, self-report audit and staff interviews provide an overview of prescribing activity and trends overtime. Prescribing uptake was found to be higher for TRs (65%) than dietitians (40%) in the NHS manager survey, with progress in adoption of both D-SP and TR-IP described at follow up. Plans to increase the number of prescribers in teams were also found in the follow-up prescriber survey, with slower rates of uptake predicted by dietitians.

### ***Prescribing activity and trends***

Our data indicate that a higher proportion of TR-IPs (87.0%) than D-SPs (60.5%) were prescribing in practice, with slightly higher rates in each profession at follow-up (TR-IPs 94.4%: D-SPs: 68.8%). There was evidence of a higher number of items being prescribed per week by TR-IPs (11.6) than D-SPs (3.1), with no major changes reported over time for either group. Those with higher degrees were however found to prescribe from a broader range of therapy areas than those with degrees/diplomas ( $p=0.010$ ). TR-IPs frequently prescribed gastrointestinal medicines, skin treatments and drugs for urinary tract disorders and infections. D-SPs prescribed nutrition and blood products, gastrointestinal medicines and endocrine system drugs most often.

The prescribing qualification was regularly used by both professions to optimise medicines using a range of medicines management activities. Making recommendations to doctors/other NMPs; for use of over-the-counter medications; amending prescribed medications and undertaking medication reviews were most frequently reported by survey respondents.

Further evidence of the extended role that DTR prescribers take in optimising medicines beyond the act of prescribing was found in the data from our novel comparative audit. Of 513 self-report audits medicines management activities occurred in over 70% of all consultations with most involved in assessing medicines regimens, adherence and information provision on at least a daily/weekly basis. TR-IP engagement in these activities was significantly more frequent and across a wider range of MMAs than TR non-prescribers ( $p < 0.001$ ). By comparison D-SPs and D-NPs showed similar levels of MMAs. The results overall showed a high level of engagement in MMA for both professions irrespective of prescribing qualification. This suggests that MMA is routine practice reflecting caseloads with a high need for prescription medicines. This is an important finding given the low profile of medicines management activities in the literature review.

### ***Factors that support or inhibit implementation D-SP and TR-IP***

Overall, the study results identify a range of factors that can inhibit or facilitate the uptake and implementation of D-SP and TR-IP. Results from our prescriber and manager surveys, along with staff interviews indicate that D-SP and TR-IP is largely acceptable to both service users and health care professionals. Prescribing was reported to streamline services, improve efficiency, and flexibility along with the resilience to cope with service changes i.e. increased demand in services and extending the availability of DTR led services for patients.

Our theoretical analysis identified that barriers and facilitators were active at macro, meso and micro levels and across key stages of implementation: preparatory, training, transition, sustainment. Most of these barriers and facilitators are well documented in relation to prescribing by other groups of healthcare professional groups<sup>136</sup>. However, novel barriers and facilitators reflecting the unique climate of the covid-19 pandemic and the increasingly diverse NMP workforce were also identified. This included increased visibility of the value of D-SP and TR-IP and competition for NMP course funding against other eligible groups i.e. nurses and AHPs. Stage of adoption at first manager interview (such as 'early', 'late', and 'laggard') did not predict progress in adoption at follow-up. Additionally, no patterns regarding geographical location or type of organisation and uptake of TR-IP were evident.

Four key determinants to DTR prescribing were identified:

**i) Leadership, culture and MDT support (*relevant to all stages of implementation*):** Strong, pro-NMP managerial leadership facilitated D-SP and TR-IP uptake and implementation across all stages. Managers played a key role in either encouraging or discouraging staff to undertake the prescribing programme and overcoming challenges, depending on their own attitude towards NMP. Gaining MDT support, particular consultants, was a key facilitator in both professions at all stages and support increased over time, reducing resistance. Personal motivation, backed by managerial support were key facilitators for early adoption, whereas demonstrating clinical need facilitated later adoption.

Tangible evidence of benefits encouraged support and became more visible through the covid-19 pandemic. For D-SPs in particular, good working relationships, trust and regular contact with consultants was essential, due to the need to agree CMPs. The nature of service delivery for each profession, (i.e., dietitians work in more multi-disciplinary roles whereas TRs provide more independently led services) suggest both the need for, and opportunity to use the prescribing role was more evident in therapeutic radiography.

**ii) Organisational preparation (*relevant to preparation, training and transition stages*):** Typically, the first NMP to undertake prescribing in either profession in an organisation prepared the ground in terms of ensuring organisational procedures, agreements and local NMP policy were in place. Longer term planning was more developed for TR-IPs with the existence of business plans, the inclusion of TR-IP into job specifications, and support for innovative TR-led service development reported.

**iii) Supplementary prescribing (*relevant to preparation and transition stages*):** The time required to set up CMPs was a deterrent to its use, and it was considered unsuitable for patients with short term conditions or where there was a high turnover of patients or staff. This was evident across all phases of data collection and was reflected in the low uptake and transition to use of D-SP reported in the prescriber surveys. D-SP was considered more burdensome, discouraging uptake and preventing more widespread use and innovation. However, SP did have benefits as a stepping stone for learning and building confidence for D-SPs and MDTs. A lack of guidance on where D-SP fits into different DT roles and contexts was noted.

**iv) Workforce development and motivation (*relevant to preparation, training and sustainment stages*):** IP was an important vehicle for enhancing skills within advanced practice career pathways for TRs, potentially enhancing staff retention, and motivating TRs to train as prescribers. Results indicated that the Health Education England ACP framework<sup>2</sup> and alignment of NMP with AP has had a stronger influence within TR than for dietitians. This has aided TR-IP role modelling but was less evident in D-SP, with lower motivation for future staff to train as D-SPs. There were examples of TR-IP sites where prescribing was embedded within businesses plans and TR job descriptions, increasing its sustainability. However, this was inconsistent, and some organisations had no succession plans. There were concerns about potential future workload pressures, doctor deskilling and subsequent weakening of patient relationships with consultants.

**Objective 4:** *Explore patient/carer views and experiences of dietitian supplementary prescribing and therapeutic radiographer independent prescribing.*

Overall, our findings from the prescriber surveys, patient questionnaire, self-report audit and interviews with healthcare workers and patients suggest that D-SP and TR-IP did have a positive effect on patient experience, choice and access to healthcare, and a high level of patient acceptability was found.

Most patients (94%) agreed that D-TRs should be able to prescribe, expressing comfort and confidence in DTR prescribing skills. Patient interviews indicated that awareness of TR-IP or D-SP was low prior to study participation, however, acceptance was high with patients citing a range of benefits that they had directly experienced or could anticipate would arise, as long as it was safely governed. DTR prescribers were reported to have ongoing contact and strong relationships with patients, and

considered to have high levels of specialist knowledge and expertise. The combined effect of which was considered to enhance the quality and person-centredness of consultations and advice provided.

High levels of satisfaction with the care received (>80%) from DTR prescribers and non-prescribers were reported. A significantly higher proportion of patients who saw a prescriber reported they had received medicines advice or information during the consultation (p=0.0022). Highest levels of satisfaction across both groups related to information on 'what the medicine was for', 'name of the medicine' and 'how it works'. Least positive responses related to information 'on how long to take the medicine for' and 'if it would affect sex life'.

Potential for improving access to medicines, service efficiency and convenience for patients were noted, although the difficulties in access experienced by patients of dietitians were largely due to organisational arrangements for prescriptions to be recommended to GPs to prescribe. Conditions of acceptance of TR-IP and D-SP were similar, and revolved around governance, competence and monitoring of prescribing decisions. Continued involvement of a consultant was expected. Staff interviews also indicated that patients had limited awareness of who issued their prescription, but this seemed to be of low importance to most.

**Objective 5:** *Identify impact of dietitian supplementary prescribing and therapeutic radiographer independent prescribing on patient choice, experience, access to medicines and outcomes.*

Overall, our findings from the prescriber and manager surveys, self-report audit, patient questionnaires and case site interviews suggest that D-SP and TR-IP did have a positive effect on patient experience, choice, access to medicines and outcomes.

#### ***Patient choice***

Patient choice was felt to be supported by TR-IP with increased service flexibility, a wider range of times for appointments, covering when doctors were unavailable or when services were based in community satellite clinics by manager and staff interview participants. Although the models of service provision remain unchanged for D-SP, prescribing was reported to streamline services and efficiency. A wider choice of treatment options was reported to be available to patients due to D-SPs increased knowledge and/or greater access to medicines beyond those available using patient group directions (PGDs). Improved provision of information about medicines, including more focus on safety and side-effects, was evident in the self-report audit, suggesting that this could contribute to enhanced patient choice and involvement in medicines decision making.

#### ***Waiting time***

Clinicians in staff interviews agreed that DTR prescribers help streamline services by reducing the number of healthcare professionals involved in prescribing decisions, with greater impacted reported in TR review clinics. Patient and staff interviews revealed a minimum 10-15minute wait for prescriptions when consultations were with a non-prescribing DTR, and only if a doctor or another prescriber was immediately available. However, this delay could easily extend to >3 days, particularly if the consultation was at the end of the week. Given that nearly four times as many patients seeing a TR-NP than a TR-IP had to wait for someone else to issue their prescription, this constitutes a substantial reduction in waiting time for patients. The patient questionnaire confirmed an overall

reduction in waiting time for prescriptions for D-SPs (but not for TRs), but the low number of responses means that caution should be used when interpreting this result.

### ***Access and experience***

Data collected in the self-report audit found that DTR prescribers were more actively involved in MMA (including recommending, administering or prescribing medicine) than DTR non-prescribers, therefore making effective use of their prescribing qualification.

Advantages in the amount and type of information patients received were found in the audit data. Medicines information was provided in over 60% of DTR consultations irrespective of prescribing status. DTR prescribers provided a wider range of information than non-prescribing DTRs ( $p < 0.001$ ). D-SPs provided information on a wider range of different items relating to the action/use of medicines and side effects/contraindications, and were more likely to provide information about what medicines do and how they work ( $p < 0.001$ ). Similarly TR-IPs were more likely to indicate the medicine's name what the medicine was for, what it did, how it worked, how to tell if it was working ( $p < 0.001$ ), how to use it ( $p = 0.001$ ) and how to get a further supply ( $p < 0.001$ ). Both D-SPs and TR-IPs were more likely to provide medicines information about side-effects, and their risks compared to non-prescribers. Quality of medicines information provision is central to shared decision making and linked to medication adherence. This was reflected in TR-IP patients indicating that they were more likely to take their medicine than patients of TR-NPs ( $p = 0.012$ ).

Equal levels of satisfaction with most aspects of care received from D-TR prescribers and non-prescribers was evident in our patient questionnaire data. Additionally, satisfaction with professional care, time, general satisfaction, communication, compliance between DTR prescribers and non-prescribers were similar, demonstrating high levels of satisfaction in all aspects of care provided.

**Objective 6:** *Assess quality, safety and clinical appropriateness of dietitian supplementary prescribing and therapeutic radiographer independent prescribing practice.*

The contribution of D-SP-TR-IP to quality, safety and clinical appropriateness was evident across multiple sources of data i.e. prescriber survey 1 & 2, audit, interviews and case record review. Findings from the self-report data demonstrated the diverse ways that prescribing supported more clinically appropriate decisions. A high level of involvement in amending medicines was reported by 85.6% of DTR prescriber survey 1 respondents. Survey respondents also reported improved knowledge of pharmacology and prescribing (94.5%), and being better placed to adapt or change treatment, titrate doses and reduce exposure to risk/side effect (73.0%). An increased ability to select the most appropriate medicines, improved safety and clarified lines of accountability were also reported by 72% of prescriber survey 1 respondents.

Irrespective of prescribing status dietitians and therapeutic radiographers reported they were frequently involved in identifying medication errors. Dietitians reported they identified medication regimen errors in over 50% of patients, with errors related to an excess drug dose more likely to be reported by DSPs. Issues in medication regimens were identified in nearly a quarter of all patients by TRs, with similar patterns of error identification for sub-therapeutic drug doses, excess drug doses and missed doses reported by both TR-IPs and TR-NPs.

Case records that were assessed were complete and of high quality, and a high level of agreement noted between independent assessors. Only one D-SP medication error relating to documentation of an incorrect calcium supplement unit was present. No medication errors were identified in the therapeutic radiographer records. However, the complexity of modern health care records, split across multiple electronic platforms, our dependence on sites to provide this information and a large number of additional case records that were incomplete reduced the amount of data available for this aspect of the study. Our ability to link each of the various aspects of patient data (i.e. audit, patient questionnaires, case record including prescriptions) was also extremely limited as participants had the option to select which aspects of data collection they agreed to participate in.

**Objective 7:** *Explore cost-consequences of dietitian supplementary prescribing and therapeutic radiographer independent prescribing service models*

A model-based economic evaluation was undertaken to compare the costs and outcomes of D-SP and TR-IP over the one- and five-year time horizons. A decision-analytic model included the cost of training prescribers, the cost of prescribing activities and the cost of referrals to other specialists for prescribing. The effectiveness outcomes included health-related quality of life (QALY) and patient satisfaction.

The training course fees varied from £1,200–3,500 for dietitians and from £1,070–£4,000 for therapeutic radiographers depending on the provider. The total cost of training including paid study time, unpaid study time, travel, accommodations and out-of-pocket expenses (which may or may not be paid by the employer) was £5,120 (range £3,855–£7,489) for dietitians and £9,324 (range £4,470–£17,223) for therapeutic radiographers.

The estimated average cost of prescribing (including the cost of training, cost of consultations and cost of referrals to other specialists for prescribing) in the first year following training was £74,820 per prescriber for D-SPs compared to £79,206 for D-NPs. The average five-year costs were £360,469 for D-SPs and £424,738 for D-NPs. Similar 5-year costs for TRs were estimated to be £613,102 for prescribers and £629,672 for NPs, respectively. Cost savings for both professions were identified per prescriber over 1 and 5 years, D-SP £4,386 in year 1 and £64,269 over five years, and TR-IP £16,570 over five years.

DTR prescribers were more likely to consider changes in prescribing (e.g. issuing new prescriptions, changing existing prescriptions, or de-prescribing) in ≥70% consultations compared to ≤30% by DTR non-prescribers. Only a small proportion of patients were referred by D-SP and TR-IPs (2 & 7% respectively) to other specialists for prescribing compared to non-prescribers (30% and 23% respectively).

Health-related quality of life, patient satisfaction and consultation experience were similar in both DTR prescribers and non-prescribers. Results from the cost-effectiveness analysis suggest that D-SP and TR-IP may save money in the long term with minimal or no effect on patients' quality of life. However, due to the small sample size and high uncertainty, the probability of non-medical prescribing being cost-effective at the NICE threshold of £30,000 per QALY was around 37%, for D-SPs and 44% for TR-IPs.



The decision analytic model developed in this study can be used for planning purposes. The model is user-friendly and allows changing the number of prescribers, the cost of training, the number of consultations, the number of prescriptions, and the number of referrals to other specialists for prescribing. The model can estimate cost savings (losses) and cost-effectiveness of supplementary or independent prescribing in a particular setting in the short and long term.

**Objective 8:** *Evaluate quality, effectiveness and cost of dietitians and therapeutic radiographers prescribing educational programmes.*

High levels of satisfaction with the prescribing programme, accessed at numerous HEIs across England, were identified from the prescriber surveys with the majority reporting they felt prepared to prescribe in their area of practice. There was strong alignment between factors motivating DTRs to undertake the prescribing qualification and the range of benefits that they reported once qualified. The ad-hoc nature of AHP advanced practice training found in the literature review was reflected in the survey results which indicated a lack of standardised formal training in key skills required for good prescribing practice.

While survey respondents had high levels of clinical experience and education pre-course preparation in pharmacology, numeracy or assessment and diagnosis was limited. Only 50% reported any type of pharmacology or numeracy training prior to undertaking the course, most of which was reported to be experiential or non-accredited. A lack of experience or training in assessment and diagnosis was also evident, with 40% of dietitians reporting no experience in this area prior to undertaking the prescribing programme. Manager and DTR interview findings however, highlighted difficulties in supporting DTRs to undertake the recommended pre-course requisites and progressing DTRs to become prescribing ready. This was primarily due to a lack of exposure to medicines management and inconsistent funding availability.

The majority of DTRs had undertaken the combined IP and SP programme, with less than a third of TRs completing the IP conversion course. Once on the programme respondents reported a high level of preparation and organisational support during preparation for the prescribing role. Despite this 25% felt that their scope of prescribing practice had not been sufficiently agreed in advance, with a small number reporting difficulty in meeting the course objectives.

Staff interviews highlighted variation in the quality and availability of supervision and support during NMP training, with difficulties securing study leave in some organisations. The majority were satisfied with the supervision and support received and there were mixed reports of how Covid-19 had impacted on the learning experience. Difficulties securing a suitable designated medical practitioner or practice assessor were experienced by some survey respondents., but interestingly only one TR reported being supervised by a designated prescribing practitioner during the period of practice learning.

Programme fees (range £1,070-£4,000) and out of pocket expenses (range £133-£1,859) varied, with most participants (97%) receiving funding for NMP training from their employer or other sources. Most respondents stated that increase in income was not a motivating factor for gaining the qualification, with 68% indicating they thought it would improve their professional status.

**Objective 9:** *Develop a non-medical prescribing implementation toolkit for dietitians and therapeutic radiographers*

Priorities for the NMP implementation tool kit were identified and agreed with a consultative group and a subsequent plan of action. The 'Preparing to prescribe' toolkit was updated and transferred to the the NHS Learning hub identified as a suitable hosting platform. Using a co-production approach with patients content was developed in 3 key areas i) Patient Leaflet; 'who's who to prescribing'; ii) demonstrating need; online preparing to prescribe toolkit and innovative practice leaflets iii) transitioning; how to stay prescribing ready with examples form practice.

## 9. Conclusions

This evaluation demonstrates steady uptake and progress in implementation of dietitian supplementary prescribing and therapeutic radiographer independent prescribing across England with many benefits. This is the first research to investigate effectiveness and efficiency of dietitian supplementary prescribing and therapeutic radiographer independent prescribing and provides valuable information for key stakeholders. D-SP and TR-IP is acceptable to the majority of patients with reported high levels of satisfaction with information and access to services. The study confirms that D-SP and TR-IP is developing in line with original policy intentions to improve care across a range of services, by advanced practitioners who regularly engage in medicines management. A lack of standardised formal training in key skills required for good prescribing for dietitians and therapeutic radiographers was identified. A more strategic organisational approach to workforce planning is therefore required, with greater attention given to the development of advanced clinical practice roles and career pathways for the D and TR professions. Personal motivation, backed by managerial support were key facilitators for early adoption, whereas demonstrating clinical need facilitated later adoption. Evidence at this stage of implementation and from case sites suggest that D-SP and TR-IP is likely to save money with minimal or no effect on patients' well-being. However, the process of SP hampered uptake, use and innovation for dietitians. Evaluation of the educational programme was satisfactory. The vast majority of medicines decision were found to be safe and appropriate. A toolkit, co-produced with patients, was developed to support healthcare workers get the most out of the prescribing qualification.

## 10. Project outputs

### Journal articles

Babashahi S, Carey N, Jani Y, Hart K, Hounsborne N. (2022) Costs and consequences of services provided by non-medical prescribers: a scoping review protocol. *Journal of Prescribing Practice* <https://doi.org/10.12968/jprp.2022.4.4.160>

Babashahi S, Carey N, Jani Y, *et al* (2023) Costs, consequences and value for money in non-medical prescribing: a scoping review *BMJ Open* ;**13**:e067907. [doi: 10.1136/bmjopen-2022-067907](https://doi.org/10.1136/bmjopen-2022-067907)

Crowther, K, McFadden, S, Carey, N, Stenner, K, Hughes, C (2024):Therapeutic radiographer prescribing practices in the United Kingdom: Questionnaire survey: *Radiography* Vol 30 Issue 3 P 964-90 <https://doi.org/10.1016/j.radi.2024.04.008>

### Conference Proceedings

Shaw, K Stenner, K, van-Even S, Hounsborne N, Jani, Y, Hart, K, Griffiths, S, Sherrington, S, Davidson, B, Carey N: *Dietitian Supplementary prescribing and Therapeutic Radiographer Independent Prescribing: A national evaluation: a case study protocol* HSRUK Sheffield July 2022

Carey, N, Babashahi S, Stenner, K, *Dietitian and Therapeutic Radiographer prescribing: A rapid review of the literature* HSRUK Sheffield July 2022

Stenner, K, van-Even S, Carey N *Innovation in the Allied Health Professions: interim findings from national questionnaire survey and service manager views on the implementation of prescribing by dietitians and therapeutic radiographers* HSRUK Sheffield July 2022

Carey, N, van-Even S, Stenner, K *Innovation in the Allied Health Professions: interim findings from national questionnaire survey and service manager views on the implementation of prescribing by dietitians and therapeutic radiographers* NHS Highland RD&I conference November 17<sup>th</sup> 2023

Crowther, K, McFadden, S, Carey, N, Hughes, C: *Prescribing practices of therapeutic radiographers for medicines in the United Kingdom* Association for Prescribers Annual Conference, Birmingham November 15<sup>th</sup> 2023

Hart, K, Stenner, K, Carey N: *Innovation in the Allied Health Professions: service manager views on the implementation of prescribing by dietitians*. British Dietetic Association Research Symposium Birmingham, December 6<sup>th</sup> 2023

Crowther, K, McFadden, S, Carey, N, Hughes, C: *Prescribing practices of therapeutic radiographers for medicines in the United Kingdom* ESTRO, Glasgow, May 3-7 2024

Carey, N, Babashahi S, Stenner, K, *Dietitian and Therapeutic Radiographer prescribing: A rapid review of the literature* International Council of Nurses: NP/APN 13th Network Conference, Aberdeen, 9-12 September 2024

Carey, N, Edwards, J, Stenner, K *Service manager views on the implementation of prescribing by dietitians and therapeutic radiographers* NP/APN 13th Network Conference, Aberdeen, 9-12 September 2024

Carey, N, Edwards, J, Liu, P, Stenner, K *Development of the Prescribing Implementation Model (PIM): A review of systematic reviews;* NP/APN 13th Network Conference, Aberdeen, 9-12 September 2024

### Additional output

Carey, N, Shaw, K, Edwards, Ivashikina, N, J Jani, Y, Hart, K, Griffiths, S, Sherrington, S, Davidson, B, Babashahi S, Stenner, K <https://learninghub.nhs.uk/Catalogue/prescribingtoolkit>

## 11. Policy Relevance

- 1) Uptake, implementation and use of D-SP and TR-IP is in line with original policy intentions for optimising allied health professional skills, improving care quality, sustainability and cost savings<sup>137, 138</sup>. Findings demonstrate that D-SP/TR-IP enables greater medicines management involvement and provision of patient information about medicines. Patient choice and access to medicines is enhanced, with care rated equivalent to that provided by doctors. To support the NHS long term plan for workforce skill optimisation and innovative role development<sup>5</sup>, we recommend that DTRs who are involved with medicines management activities are supported to adopt the independent and or supplementary prescribing role.
- 2) Findings of this research indicate progress with implementation of D-SP in some organisations. However, a clear and consistent finding throughout the project was that the process of SP hampered uptake, use and innovation in D-SP. Supplementary prescribing was a poor fit where patient turnover was high, patients were clinically unstable and/or where services provided short term acute care. Greater utility of D-SP occurred in services managing patients with more stable complex chronic conditions, although the model of SP remained cumbersome to implement. A complex picture emerged whereby difficulties with the CMP negatively impacted leadership/team support, dietitians' motivation to become prescribers and the availability of funding for D-SP training and posts. We recommend urgent review for progressing the dietitian profession to independent prescribing, to facilitate greater optimisation of prescribing skills for advanced practice dietitians.
- 3) A more strategic organisational approach to workforce planning is required, with greater attention given to the development of advanced clinical practice roles and career pathways for the D and TR professions. Strategic planning to incorporate D-SP/TR-IP within care pathways or to develop new services featured in only a minority of services. Where strategic leadership was strong, and clear objectives for prescribing and its alignment with ACP were in place, long term sustainability was more likely. Strategic vision is of utmost importance for implementing D-SP/TR-IP, with robust workforce planning to ensure succession. Leadership at a national level would help raise the visibility and awareness of the value of advanced DTR. We recommend implementation of an advanced practice framework by the professional regulating body.
- 4) Following from the above point, our study highlights novel findings of inequitable access and inter-professional competition for funding against more established NMP professions, such as nurses. The different legal standing across NMP professions regarding IP responsibilities and ability to prescribe controlled drugs caused, in some cases, marginalisation and unequal access to funding for NMP training and job positions. As some organisations are slow to develop a coherent AHP NMP strategy, there is potential for unwarranted regional variation in DTR workforce upskilling, which may widen regional inequalities in access to healthcare. Whilst recognising the need for local decision-making, we recommend targeted funding

streams (such as the NHS Additional Roles Reimbursement Scheme) to support AHP NMP. To promote equal standing, we also recommend forward thinking in policy development towards greater alignment in legislation for prescribing responsibilities across professions.

- 5) Findings indicate that DTRs are disadvantaged by a lack of skills in pharmacology, assessment and diagnosis and numeracy that are required prior to undertaking the prescribing programme. Our recommendation is that professional preparation programmes are reviewed with respect to improving integration of basic pharmacology, assessment & diagnosis and numeracy skills. Progressing staff to the point of readiness for prescribing was also hampered by lack of funding and access to develop these skills. Steps to improve pre and post registration exposure to these skills and medicines management in general is recommended once qualified, for example, use of rotational model for newly qualified DTRs.
- 6) Despite positive self-report findings in this study, the difficulty of measuring objective change means that the impact of D-SP/TR-IP on patient outcomes remains poorly defined. The heterogeneity across DTR service provision, the variety and complexity of index conditions treated, and the different illness trajectory of patients seen by DTRs, made it challenging to find appropriate outcome measures other than generic measures of satisfaction with services and consultations. We recommend future research that focuses on specific conditions and longitudinal data collection. This would enable a more robust study design with outcomes measures specific to those conditions and measurement of change over time.
- 7) Findings demonstrate that D-SP/ TR-IP involvement in medicines optimisation extends beyond the act of prescribing, with high levels of engagement in assessment, medicines management decision-making and information provision. However, support for NMPs to audit their prescribing practice remains an underdeveloped aspect of governance. This was highlighted as a priority by our toolkit development group. The novel electronic data collection tool developed in this project offers an original contribution to the methodology of NMP research, and with no nationally agreed core set of outcomes to define or measure implementation success, may have applicability in other care contexts and by other NMP professions. There is a need to establish robust systems to capture data on NMP involvement in medicines management activities to support ongoing evaluation and clinical audit. We recommend support to develop a generic electronic audit platform that can be used by NMPs across the NHS to demonstrate effectiveness in the long term.
- 8) DTRs and managers reported a lack of practice educator availability for supervising NMP training was a barrier to implementation. Our data showed that the vast majority of DTRs were supervised by doctors with limited engagement of other suitably qualified independent prescribers as practice educators. This is despite 2019 regulatory changes permitting NMPs to undertake this role<sup>139-141</sup>. We recommend that organisations and DTR professions embrace and implement the new model for NMP supervision to improve access and supervision experience during the period of practice learning.

## 12. Dissemination

Ongoing information about the study was published on a dedicated web, established in 2019 and updated every 6 months during the study period, study twitter/ X account. The website provides details of the study and progress reports with downloadable information.

<https://www.surrey.ac.uk/research-projects/evaluation-supplementary-prescribing-dietitians-and-independent-prescribing-radiographers>



@TRaDiPstudy

Six monthly updates detailing key elements of the study and progress were distributed to PPI group members, professional and regulatory bodies, government departments, and HEIs, via the project advisory group and to the case-study sites and NIHR Clinical Research Network during data collection.

Findings will be disseminated through multiple routes including:

- 1) Final report distributed to British Dietetic Association, Society of Radiographers, Health and Care Professions Council, Commission on Human Medicines and Advisory Council of Misuse of Drugs, AHP Research Network
- 2) Executive summary distributed to Allied Health Professions officer, service commissioners, Royal College of General Practitioners, Royal Pharmaceutical Society, HEIs, Health Education England, Centre for Workforce Intelligence
- 4) Presentations at national and international conferences, e.g. BDA Live, BDA Vision Annual Radiotherapy Conference, European Society for Radiotherapy and Oncology
- 5) Papers for high impact factor journals related to health services, dietetics, therapeutic radiography, implementation science including literature review, prescriber survey, NHS Manager Survey, Case study and Economic Evaluation. A publication plan has been agreed with team members taking responsibility for lead authorship
- 6) Feedback events for local providers, commissioners and clinicians i.e. NW NMP Lead Meeting 10<sup>th</sup> May 2024

To further maximise the impact of the study findings dissemination will be achieved through multiple routes including social media, voluntary organisations, distribution of the executive summary and LAY summary and a National online Dissemination event.

A national online dissemination event will provide an opportunity to maximise publicity to individuals, healthcare organisations, voluntary organisations, service user and carer organisations, regulatory bodies, service commissioners, professional bodies, Health Education England, Higher Education Institutes, Department of Health, NHS England communicate key messages from the completed study, help identify priorities for the future and further inform the dissemination of the research. The recently developed prescribing implementation tool kit for non-medical prescribing <https://learninghub.nhs.uk/Catalogue/prescribingtoolkit> will also presented at this event. Data will be collected on attendance and number of hits to the project website to download the executive summary. Additional data will be collected regarding usage and adoption of the on-line



implementation tool kit, and social media. Analysis of user comments will provide insight in to its usefulness and inform future toolkit developments.

## 13. Actual and anticipated Impact

- i) This study provides evidence for commissioners and managers regarding how the prescribing role can help optimise AHP skills, improving care quality, sustainability, and cost savings. This will help inform plans for extension to other healthcare professionals.
- ii) Dietitians will gain IP rights, supporting increased use, optimisation of prescribing skills and patient benefit.
- iii) A toolkit supporting NMP adoption and integration is freely available on the NHS Learning Hub to facilitate NMP uptake and performance.
- iv) With further development our novel electronic audit tool may have applicability for other NMPs across the NHS to demonstrate long term effectiveness.

## 14. Intellectual Property and commercial adoption

### *IP Outputs:*

- i) Materials developed for data collection e.g. D-SP and TR-IP Questionnaires, NHS Trust Manager surveys (Appendix 3), electronic self-report Audit, interview schedules, patient questionnaire, and case record review (Appendix 4).
- ii) The team has developed the prescribing implementation tool kit for non-medical prescribing available for use via the NHS Learning Hub Portal <https://learninghub.nhs.uk/Catalogue/prescribingtoolkit>. See Section 7.1 for overview of contents.

The team are keen to explore opportunities to develop and commercialise the electronic self-report audit for use across the NHS across the United Kingdom.

## 15. Added Value Example

### 1. CONTACT DETAILS

**Project title:** Innovation in the Allied Health Professions: Evaluation of supplementary prescribing by dietitians and independent prescribing by therapeutic radiographers

**NIHR PRP reference number:** PR-R19-0617-21001

**Lead Investigator:** Professor Nicola Carey

**Institution:** University of the Highlands and Islands

#### **Contact details of the author**

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***Please note that the NIHR CCF, or DHSC may approach the individual named above for further information on the Example.***

## 2. TITLE OF THE ADDED VALUE EXAMPLE

Improving access to medicines via non medical prescribing

## 3. DESCRIPTION OF THE ADDED VALUE EXAMPLE

Our research makes recommendations for service changes to improve efficiency in dietitian and therapeutic radiographer prescribing roles: a freely available online resource, the NMP toolkit is designed to facilitate implementation and performance of NMP.

### *Impact on legislation*

This study clearly articulated benefits of dietitian and therapeutic radiographer prescribing for service efficiency, cost saving and patient benefit. Limitations of supplementary prescribing and how it restricts innovation in practice were apparent.

We anticipate that this research will be instrumental in influencing and informing changes to legislation i.e. extend independent prescribing rights to dietitians, and to include other groups of healthcare professionals, along with streamlining future policy changes around prescribing.

### *Impact on access to medicines*

The above policy recommendations will lead to increased numbers of non-medical prescribers, facilitating patient access to medicines, providing equitable access to medicines removing unwarranted variation. This will lead to increased predicated cost savings compared to historical doctor centric models of service delivery and medicines access.

### *Impact on adoption of NMP internationally*

This research contributes to the evidence for extending NMP roles beyond the UK, and highlights the limitations of the collaborative model, emphasizing the benefits of adopting the independent prescribing approach.

### *Impact of successful implementation of NMP*

This research identified numerous barriers and facilitators, most of which are previously reported in the literature. These in combination with novel barriers and facilitators identified were used to inform the NMP prescribing toolkit and a need for real-life example of innovative practice. Examples included in the toolkit will help to raise visibility and increase awareness of the potential for advanced clinical practice therapeutic radiographer independent prescribing led service delivery, paving the way for future development across the UK.

The resources demonstrate how the advanced clinical practice pathway leads to the development of advanced skills for therapeutic radiographers and gives advice and inspiration for those who wish to undertake prescribing training, as well as those who already qualified.

Development of innovative therapeutic radiographer independent prescribing facilitated services will further benefit patients by advancing care provision and improving access to medicines from highly trained and specialised advanced clinical practitioners.

#### **4. STAGE OF MATURITY AND NEXT STEPS REQUIRED TO ACHIEVE FULL IMPACT**

NMP toolkit resources are at an early stage of impact, having only recently been made available on the NHS learning hub in February 2024 and are yet to be widely promoted.

A dissemination event, in which the resources will be promoted, will take place later in 2024.

Use of the toolkit will be monitored to measure its use and feedback entered on the NHS Learning Hub will be monitored.

Impact on practice will be indicated by an increase in the number of therapeutic radiographers undertaking the prescribing qualification and the development of innovative TR-IP led services.

#### **5. CONTRIBUTION OF THE NATIONAL INSTITUTE OF HEALTH RESEARCH POLICY RESEARCH PROGRAMME (NIHR PRP), DEPARTMENT OF HEALTH AND SOCIAL CARE (DHSC) AND OTHER STAKEHOLDERS**

NIHR PRP provided funding to develop the prescribing toolkit however ongoing costs for dissemination and promotion are outside the scope of this commissioned project. Ongoing development and monitoring of impact will be hampered by capacity of the project team who are not funded to continue this work.

Our work was supported by having an expert patient advisor as a co-applicant, and additional funding to support PPI activity at the point of contracting. Support from the CRN portfolio was also helpful in terms of identifying potential case sites and attempting to expedite the approval process. The PRP commissioning team were highly supportive throughout facilitating revised plans of work during covid, work packages, timelines and costed extensions.

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## Appendix 1: Project Advisory group members

Barbara Stuttle: CBE (Chair)

Trishna Bharadia: Visiting Lecturer, Institute of Pharmaceutical Science, King's College London University

Dr Dala Dawoud: Senior Scientific Advisor- National Institute for Health and Clinical Excellence

Sally Gilborson: Non-Medical Prescribing Lead - Royal Devon University Healthcare NHS Foundation Trust

Sue Johnson: Professional Officer at Society and College of Radiographers

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Dr Alison Culkin: Consultant Dietitian Intestinal Rehabilitation - London North West University Healthcare NHS Trust

Liz Rai: Lead Renal Dietitian -Newcastle upon Tyne Hospitals NHS Foundation Trust

David Bourne: Specialist Dietitian – Newcastle Upon Tyne Hospitals NHS Foundation Trust

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Jonathan Gill: Department of Health & Social Care (DHSC).

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Tanya Klopper: Head of Dietetics, Royal Surrey County Hospital NHS Foundation Trust

Heather Nisbet: Supervision and Assessment Lead, Faculty of Advancing Practice, NHS England – South East Region

Dr Bernadette Rae: Associate Professor, Non-Medical Prescribing Course Director - London South Bank University

Claire Potter: Policy lead for Medicines Regulation and Prescribing: Department of Health & Social Care (DHSC).

Jason Cox: Science, Research & Evidence Department of Health & Social Care (DHSC).

Barbara Bird: NMP lead Lancashire and South Cumbria NHS Foundation Trust

Lois Quayle: Medicines Lead for NHS England and NHS Improvement

Zoe Gale: Trust CQC Project Lead & Macmillan Radiographer: Christie Hospital, Manchester

Olivia Bird: Policy Manager: Health and Care Professionals Council

Professor Jenny Whitty: Head of Health Economics Group, University of East Anglia

Alison Bardsley: Associate Professor: Non Medical Prescribing Course lead Coventry University

Eleanor Johnson: Head of Education and Professional Development, British Dietetic Association

## Appendix 2: Literature review-additional information

- i) Example Search-string
- ii) PRISMA flow chart
- iii) Summary of Dietitian Literature
- iv) Summary of Therapeutic Radiographer Literature
- v) Barriers and Facilitators to Advanced Practice and Medicines Management Activity
- vi) Summary of Barriers and Facilitators to Advanced Practice and Medicines Management Activity

i) Example search-string

**Dietitian Search String**

Query	Limiters/Expanders	Last Run Via
S9	S8 AND S3	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase
S8	S4 or S5 or S6 or S7	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase
S7	consultant*	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase
S6	"advanc* clinical practi*"	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase
S5	"advanc* practi*"	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase
S4	advanc*	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase
S3	S1 or S2	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase
S2	dietitian* OR dietician* OR dietetic*	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase
S1	(MM "Nutritionists")	Limiters - English Language Expanders - Apply equivalent subjects Search modes - Boolean/Phrase

**Therapeutic Radiographer search string**

#	Query	Limiters/Expanders
S9	S3 and S8	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase
S8	S4 or S5 or S6 or S7	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase
S7	MJ consultant	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase
S6	AB "advanc* clinical practi*"	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase
S5	MJ "Advanc* Practi*"	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase
S4	MJ Advanc*	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase

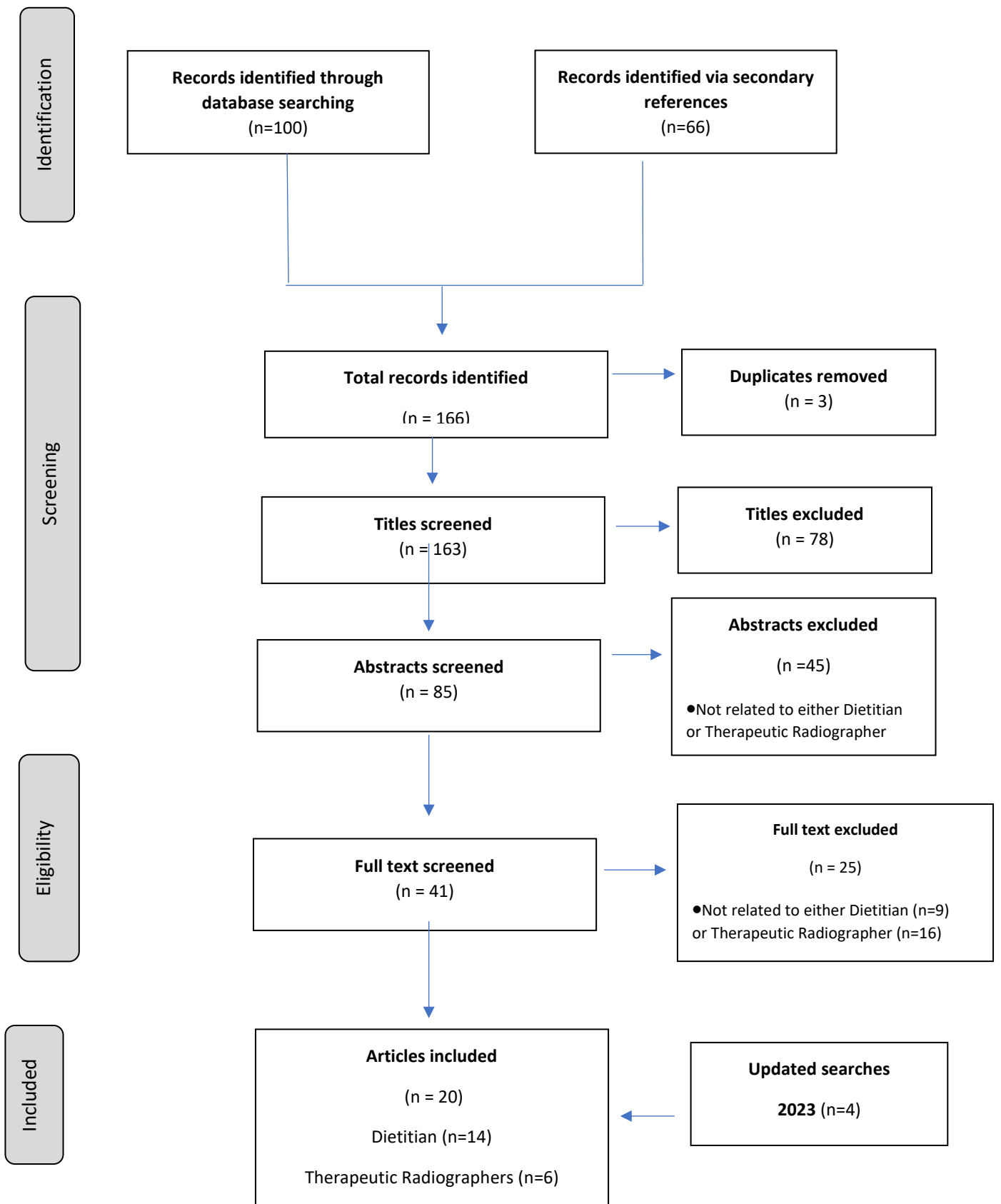
S3	MJ S1 OR S2	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase
S2	MJ radiotherap* OR MJ radiographer OR MJ "Therapy radiographer" AND MJ "Therapeutic radiograph*" AND MJ "radiation therap*"	Limiters - English Language Expanders - Apply equivalent subjects Search modes - Boolean/Phrase
S1	(MM "Radiography+")	Limiters - English Language Expanders - Apply equivalent subjects Search modes - Boolean/Phrase

### Medicines Management and other factors search string

#	Query	Limiters/Expanders
S11	S1 or S2 or S3 or S4 or S5 or S6 or S7 or S8 or S9 or S10	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase
S10	(MH "Drug Prescriptions+")	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase
S9	TX "medicine* optimisation"	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase
S8	TX "medicine* management"	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase
S7	(MH "Health Planning Organizations")	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase
S6	(MH "Organization and Administration")	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase
S5	(MH "Cost-Benefit Analysis")	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase
S4	(MH "Economics, Hospital")	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase
S3	(MH "Treatment Outcome+")	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase
S2	(MH "Patient Outcome Assessment+")	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase
S1	(MH "Organization and Administration+")	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase



ii) PRISMA flowchart of paper selection process





### iii) Summary of Dietitian Literature

Author(s), year, country	Aim of study	Design	Sample/ number of participants/ response rate	Content of Medicines Management or prescribing activity	Methods used to support reliability and validity	Main findings: evidence of effectiveness, facilitators and barriers, other relevant findings	MMAT score
Brody et al (2014) <sup>113</sup> US	To establish consensus on practice activities of registered dietitian nutritionists who provide direct clinical care	Three round Delphi survey [ electronic and mail surveys]	117 eligible experts, 72.6% (n=85) completed round 1 1 76/85 (89%) completed all three rounds	129 practice activity statements across four sections of nutrition practice were used obtain consensus: i) assessment ii) diagnosis; iii) intervention; iv) monitoring and evaluation	Statements informed by 1991 ADA Dietetic Practice inventory	Order-writing privileges were agreed to be essential to AP, as was in-depth knowledge of nutrition support formulation, delivery and indications for use.  <i>Facilitators:</i> advanced knowledge & expertise, including medical nutrition therapy, ability to offer advanced interviewing, counselling and education, ability to communicate with multiple groups (patients, families, multi-professional colleagues); undertaking education or training in counselling	4
Cochran (2004) <sup>114</sup> , US	To explore the number of registered dietitians in Tennessee who perceive they are practicing at advanced levels versus those making recommendations only	Questionnaire	Hospital based (>150 beds) nutrition support RDs hospitals in Tennessee n=33/37 (89%) responses	Explored how many Ds believe they are practising at advanced level, and their job satisfaction, with and without order -writing privileges.	Not stated	n=25 (75%) identified as an Advanced level practitioner: n=18 (55%) reported order writing privileges & n=7 (21%) recommendations only.  N=16 (89%) with order-writing privileges considered themselves to be AP compared to n= 4 (57%) without.  <i>Facilitators:</i> Increased job satisfaction was associated with order-writing and accountability: Benefits included: greater speed, efficiency and safety, professional development	4

Author(s), year, country	Aim of study	Design	Sample/ number of participants/ response rate	Content of Medicines Management or prescribing activity	Methods used to support reliability and validity	Main findings: evidence of effectiveness, facilitators and barriers, other relevant findings	MMAT
Delaney et al (2019) <sup>129</sup> Australia	To explore current practice roles of Australian dietitians working with patients requiring pancreatic enzyme replacement therapy (PERT), and opinions and influences on these practices	Online survey and interviews	Self-nominated dietitians with extended scope of practice with patients on PERT Online survey disseminated to 6,000 members of Dietitians Association Australia=74/81 respondents described extended scope of practice  Semi-structured interviews with Ds > 5 years experience n=9	Explored current practice in Ds who had any experience with patients requiring PERT, and behaviours performed when engaging in pancreatic exocrine insufficiency patient management, in three levels of practice (traditional, advanced and extended)  Explored contextual elements of participants' D practice & components of advanced or extended scope of practice	Content informed by guidelines established by a forum related to disease of the pancreas (Australasian Pancreatic Club) for pancreatic exocrine insufficiency (PEI) management <sup>142</sup> & Victorian Department of Health's Allied Health capacity framework <sup>143</sup>	61.7%(n=50) classed as advanced practice: providing recommendations for dose adjustment or initiation from medic, and patient education 29.6% (n=24) extended scope of practice classed as adjusting medication doses,or discussing recommendation with patients without medic input.  <i>Facilitators:</i> professional relationship with MDT; attitudes & beliefs about advanced practice; patient safety consideration; practice area; dietitian confidence, professional respect; support  <i>Barriers:</i> Traditional medic views and attitudes on roles	3

Mohamed-Elfadil et al (2022) <sup>131</sup> US	To assess wastage of oral nutritional supplements (ONS) in hospitalized patients and factors associated with wastage	Cross-sectional survey	99/103 hospitalized patients (>18 years) prescribed ONS by either a physician, advanced practice clinician, nurses, dietitian or dietetic technician asked to complete online survey (March- July 2019)	Explored use of ONS including prescriber information, patient tolerance, and consumption information.  Electronic medical records reviewed to determine who ordered the supplements	Not stated.	78% patients aware ONS ordered; 59% involved in ONS selection; only 41% fully consumed ONS provided.  70% prescribed by dietitians; 17% physicians/ ACPs; 13% nurses.  58% ONS ordered by nurses; 42% physicians/ACPs; 40% dietitians not consumed. Significantly less wastage associated with dietitian prescribing compared to nurses or physicians (P<0.0001)	4
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<p>Farrer et al (2008)<sup>115</sup> UK</p>	<p>To determine if suitably trained pharmacists and dietitians can safely and effectively prescribe peri-operative parenteral nutrition.</p>	<p>Prospective study</p>	<p>Specially trained Dietitians and pharmacists were allowed to make decisions about PN formulation and administration on a surgical unit of one hospital</p> <p>One dietitian and one pharmacist provided training to each other and were assessed by medical consultant to be competent</p> <p>370 nutrition support decisions were assessed for clinical significance, and clinical importance by 2 independent assessors (unclear how many decisions were made by the dietitian or pharmacist)</p>	<p>Clinical significance of each decision was assessed using grading system from 1 (an extremely significant, actual or potentially life-saving intervention) to 7 (an intervention which resulted in an adverse event of actual or potentially life-threatening significance).</p> <p>Indication for treatment, route of administration of parenteral nutrition, length of time on parenteral nutrition, nutritional status, nutritional requirements for fluid, macro and micronutrients, and justification for any clinical decision which was thought to directly influence the provision of nutritional support were recorded.</p>	<p>Overhage and Lukes- 7 --point grading system used to assess clinical significance</p> <p>Each decision assessed by 2 independent reviewers</p>	<p>1/3rd decisions related to and/or formulation of PN, on initiation of treatment or in respect of changes that were felt to be subsequently required.</p> <p>Agreement that 50% decisions improved patient care, with 2-8% classed as significant interventions averting adverse events; no adverse effects on patient safety</p> <p><i>Facilitators:</i> Appropriate training, carefully constructed governance frameworks, support from senior clinicians</p> <p><i>Barriers:</i> Lack of formerly recognised training and accreditation for Ds working in this capacity.</p>	<p>3</p>
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Author(s), year, country	Aim of study	Design	Sample/ number of participants/ response rate	Content of Medicines Management or prescribing activity	Methods used to support reliability and validity	Main findings: evidence of effectiveness, facilitators and barriers, other relevant findings	MMAT
Green et al (2005) <sup>116</sup> , US	To examine current professional practices of registered dietitians (RDs) in the Diabetes Care and Education dietetic practice group (DPG)	Secondary analysis of questionnaire data from 2002-2003 membership survey	1,232 members who had previously completed survey (no response rate on original survey) Advanced RD n=320, Speciality RD n=851 Entry RD n=61	Examined 16 functions performed by RDs including: Treatment and prevention of hypoglycaemia, developing nutrition prescriptions, recommending medication change to physicians, making recommendations based on outcome, making initiate medication adjustments, etc.	Survey developed by Diabetes Care and Education membership committee	Commonly performed activities reported by 320 RDs who self-identified as advanced practitioners included 'treatment and prevention recommendations of hypoglycaemia' (93.1%), 'developing nutrition prescriptions' and 'instructing patients in glucose pattern management' (92.5%), 'recommending medication changes to physicians' (86.9%), and 'initiating medication adjustments' (81.3%) .  <i>Facilitators:</i> number of functions increased at the speciality and advanced level of practice	3
Liljeberg et al (2021) <sup>130</sup> , Sweden	To explore dietitians' experiences of prescribing oral nutritional supplements (ONS)	Qualitative interviews	Purposive sample: n=13/1300 members of Swedish Association of Clinical Dietitians invited to participate range of practice settings	Experiences of (i) prescription occasion; (ii) follow- up of a former prescription; (iii) patient usage of ONS and potential struggles faced; & (iv) dietitians' conceptualisation of ONS.	Interview schedule informed by literature review:  Pilot interview	Ds worked with patients to share tailoring requests for ONS; adopted a flexible approach to products and amount prescribed. Variety of communication strategies were used, including addressing practical issues (ONS delivery and support from others) to support ONS use.  <i>Facilitators:</i> formulary, flexible approach to dose adjustments	4

Olree & Skipper (1997) <sup>117</sup> , US & Puerto Rico,	To determine current and ideal frequencies with which nutrition support dietitians perform 15 tasks and evaluate preparation for practice of nutrition support	Modified 2-round Delphi Technique (surveys)	Hospital based (>.300 beds) 121/134 chief clinical dietitians & 120/129 nutrition support dietitian responses (n=244 total)  (2 <sup>nd</sup> round response rate not provided)	15 nutrition support tasks were used to obtain consensus on practice activities including: prescribing enteral feeding; medications and nutrition, therapeutic vitamins, micro and macro nutrients in PN, completing nutrition orders	15 Functions informed by literature review and expert group, and validated by 20 out of state experts	Determining macronutrient content for parental nutrition (56%), transitional feeding (50%), prescribing enteral feeding (49%), medications and nutrition (49%) and completing parental nutrition orders (16%) reported to be undertaken often or always  <i>Facilitators:</i> on the job training; additional post registration needed to support specialist clinical skills	4
Peterson et al (2010) <sup>118</sup> , US	To examine the efficacy of PN administration when RDs are responsible for PN use.	Retrospective cohort using hospital medical and nutrition support records and flow charts	Tertiary care urban medical centre  2,047 patients >18 years admitted to adult t care unit & started PNs 01/01/2003-31/12/2004 and 1/1/2006-31/13/2007	Comparison of number of patients with order of PN pre- post RD order writing privileges; inappropriate PN, reason and duration of PN, Length of stay; difference in macro nutrient delivery, costs	American Society for Parenteral and Enteral Nutrition (ASPEN) adult PN guidelines used to determine PN appropriateness	Inappropriate use of PN reduced by 18% once RDs had order-writing privileges, most notably in those with inadequate oral intake, mucositis, pancreatitis, nausea and vomiting (p<0.0001); increased number discharges with PN in-situ; no difference in infections, length of stay or admissions PN costs reduced by 20%\$1.35M- \$1.08 M  <i>Facilitators:</i> Ds better aware of complexities of nutrition and more up to date with current guidelines. Support from local governance and colleagues (e.g. nurses, pharmacy department).	4



Author(s), year, country	Aim of study	Design	Sample/ number of participants/ response rate	Content of Medicines Management or prescribing activity	Methods used to support reliability and validity	Main findings: evidence of effectiveness, facilitators and barriers, other relevant findings	MMAT
Peterson et al (2020) <sup>119</sup> , US	To explore RDN PN and EN ordering privileges	Questionnaire	702/5,672 members of ASPEN Dietetics Practice Section and Academy Dietitians in Nutrition support (12% response rate) 558 (79.4%) provided care for adults and used for analysis	Assessed dietetic practice information, parental and enteral ordering privileges, and barriers to RDN to place PN and EN orders	Survey reviewed by ASPEN Clinical Practice Committee and Academy's Council on Research for content validity	52% (n=306) had PN ordering privileges and 81% (n=407) EN. Majority ordered <10 PN and or EN orders per week.  <i>Facilitators:</i> possessing NSC, working in a community or academic setting. Developing more collaborative institutional relationships and lobbying state and professional regulatory bodies on the potential benefits of dietitian order-writing <i>Barriers:</i> Physician opposition and pharmacy opposition, along with state dietetic regulations meant another 65 had been refused ordering privileges. Lack of support and limitations by state licensing, insufficient education, experience and legal concerns were also reported.	3
Simmmance et al (2019) <sup>120</sup> , Australia	Evaluate the impact of introducing novel advanced practice dietitian roles in gastrostomy tube (g-tube) management and develop competency framework for progressing opportunities in dietetics practice and policy	Longitudinal survey	Service lead dietitians at 6 participating healthcare networks x1 and 12 months later	Assessed service changes, adverse patient events, wating time for g-tube, enablers and barriers to implementation of novel advanced practice roles; economic analysis to estimate health system financial impact	Non stated	Service changes: 5/6 reported development and implementation of AP dietitians: 10 credentialled dietitians, 120 g-tube removals,>200 service events i.e. medical inpatient consultations or specialist outpatient clinics., admission avoidance; Waiting times decreased, and estimate of \$185K AUD 12 month saving.  <i>Facilitators:</i> Strong management and stakeholder support funding for backfill during training. Availability of supervision, other AP roles already in place provided useful examples. Increased job satisfaction, opportunity to work to full scope and sharing professional experiences, enhanced patient satisfaction <i>Barriers:</i> Staff recruitment delays, inflexible internal governance procedures, some limited role boundary conflict amongst staff.	3

Author(s), year, country	Aim of study	Design	Sample/ number of participants/ response rate	Content of Medicines Management or prescribing activity	Methods used to support reliability and validity	Main findings: evidence of effectiveness, facilitators and barriers, other relevant findings	MMAT
Skipper & Lewis (2006) <sup>121</sup> , US & Canada	To generate a model of advanced medical nutrition therapy practice (MNT)	Grounded theory-interviews	Purposeful sample of RDs in MNT practice with an advanced practice credential in dietetics or had published or conducted research on advance practice topics. (n=21) from 14 US states and Canada	Exploration of advanced practice, and differences between advanced and basic level practice.	Member validation of draft model after data analysis	Ability to independently order, modify and monitor MNT most frequently cited example of autonomous practice Several had order writing privileges for PN and EN, diets and modify medications i.e. insulin, phosphate binders, calcium and iron supplements  <i>Facilitators:</i> specialist expertise and knowledge , pharmacology knowledge, experience, and formal post- reg qualification, MDT and collaboration	4
Skipper & Lewis (2006) <sup>122</sup> US	To explore clinical RDs, employers, and educators' interest in advanced practice competencies and professional doctorate degree programs in clinical nutrition.	Questionnaire	Convenience sample of 440/ 978 (45%) RDs, 61/107 (57%) employers, and 76/114 (67%) educators Total sample- 577/1199 (48% response rate)	Three versions of the survey explored competencies and educational programs, barriers, and benefits to practice doctorate degree	Modified Delphi used for content validity of survey	90% RD (n=391) stated advance practice RDs required, 76% considered themselves to be AP, but only 38% had a degree or met entry level criteria; only 49% employers recognised need for AP  <i>Facilitators:</i> employer's: improved quality of care (n=53; 87%), better documentation of patient care outcomes (n=45; 74%). RD's increased salary (70%), sense of accomplishment (70%), career satisfaction (58%), job opportunities (56%)  <i>Barriers</i> salary costs of advanced RDs (92%), lack of funding (65%) or faculty (83%), administrative support (70%).	4

Author(s), year, country	Aim of study	Design	Sample/ number of participants/ response rate	Content of Medicines Management or prescribing activity	Methods used to support reliability and validity	Main findings: evidence of effectiveness, facilitators and barriers, other relevant findings	MMAT
Wildish & Evers (2010) <sup>123</sup> Canada	To explore advanced practice (AP) across the diversity of dietetics to develop a definition, description, and framework for guiding future education, research agendas, and policy development.	Modified 2 round Delphi Technique (surveys)	P1 Stakeholders: 54/136 (40% response rate) P2: RDs members of Dietitians Canada 310/885 (35% response rate)	P1:18 items survey based on literature review and international collaborations; roles and responsibilities of AP dietitians in a range of settings  P2: 50 items survey based on P1 results and previous survey by Skipper and Lewis (2006)	Modified Delphi approach was applied to establish content validity, engaging seven dietitians from different geographical locations and practice areas.	84% RDs & manages strongly agreed that AP increases professional autonomy, with 73.4% reporting order-writing privileges were associated with increased job satisfaction. 87,9% agreed that AP roles benefit RDs  <i>Facilitators:</i> Ability to work autonomously necessary to function on margins of traditional tasks of Ds. Mentoring and support from within professions. Progressive organisational cultures. Collaboration with other stakeholders both within and outside professions. Support from professional associations. AP roles linked to increased job satisfaction, better career paths, increased retention in profession.  <i>Barriers:</i> Inflexible organisation structures. Lack of funding and opportunity to access continuing education. Absence of senior management support. Lack of recognition from colleagues.	4

Note: MMA: medicine management activities; RR: response rate; D: dietitians; AP: advanced practice; RD: registered dietitian; RDN: registered dietitian nutrition; NST: nutritional support team; ADA: American Dietetic Association; DCE: diabetes care and education, ONS: oral nutritional supplements; PERT: pancreatic enzyme replacement therapy; PN: parenteral nutrition; EN: enteral nutrition; MNT: Medical Nutrition Support; ASPEN: American Society for Parenteral and Enteral Nutrition

iv): Summary of Therapeutic Radiographer Literature

Author(s), year, country	Aim of study	Design	Sample/ number of participants/ response rate	Content of Medicines Management or prescribing activity	Methods used to support reliability and validity	Main findings: evidence of effectiveness, facilitators and barriers, other relevant findings	MMAT
Griffiths (2012) <sup>124</sup> , UK	To investigate the effectiveness of the implementation of supplementary prescribing in on-treatment review clinics in a radiotherapy department of one hospital	Questionnaires	Radiographer supplementary prescribers: n=5/5 (100%)  Stakeholders (healthcare professionals in a radiotherapy department): n =53/65 (82% response rate)  Patients seen in an onsite review clinic: n=67/76 (88% response rate) Jan- Dec 2011	TR- SP: impact of SP on patient care and safety, effect on practice and support received.  Stakeholders; attitudes, view and impact of TR- SP  Patients: service satisfaction, and medicines information, intentions re use of medicines, attitude towards prescribing	Tools developed by Drennan et al  Consultation Satisfaction Questionnaire (CSQ) developed by Poulton	TR-SPs: low prescribing frequency (4/5), only x1 weekly or more, all agreed improved access to medicines, reduced number of AHP interactions; more convenient for patients and positive impact on patient care Patients: high level of satisfaction (87%), amount and type of medicines information, increased efficiency (94%) Stakeholders: Agreement re TRs prescribing, only certain drugs, only for advanced TRs (68%), within scope of practice, reduced waiting times, and better use of Doctor time.  <i>Facilitators:</i> Highly acceptable to all groups, increased job satisfaction, many patient and service benefits: efficiency and waiting for patients, more convenient, improved team working  <i>Barriers</i> Lack of support and understanding from some colleagues of what SP can and cannot do and role in the organisation. Infrequent opportunities to prescribe due to workload, lack of treatment review role, availability of unsigned CMP's. Limitations of SP hamper autonomy	4

Author(s), year, country	Aim of study	Design	Sample/ number of participants/ response rate	Content of Medicines Management or prescribing activity	Methods used to support reliability and validity	Main findings: evidence of effectiveness, facilitators and barriers, other relevant findings	MMAT
Harnett et al. (2019) <sup>125</sup> , Canada	To assess perceived value and feasibility of AP roles for RTTs in a variety of settings across Ontario	Mixed methods	7 Pilot APRTs roles assessed at 4 cancer centres  APRT Role profiles informed by literature review and expert consensus  Online survey: 81/175 stakeholders	Key characteristics of AP comprised 7 key traits focused on clinical, technical, and professional competencies  APRTs were deployed at four cancer centres to gather contextual information on the development and integration of the new role	Expert consensus agreed key characteristics of APRT role	<p>Framework for AP identified different stages in journey, entry- expert</p> <p>Key characteristics of AP: included: Prescribe/dispense pharmaceuticals from defined and approved formulary; increased autonomy, extended scope of practice.</p> <p>Role testing showed support for the role and demonstrated that APRTs can deliver specialized services, perform delegated tasks and their work can lead to program efficiencies, reduced waiting times and new services. The new role may also lead to improved radiation therapist recruitment rates and work satisfaction.</p> <p><i>Facilitators</i> positive feedback and stakeholder support, improved recruitment rates, job satisfaction and retention greater efficiency, continuity of care and minimising hand-offs. Improved team working, better use of skills, service efficiency. Need to relieve staffing pressures and improved patient access to care generated interest in AP role development.</p> <p><i>Barriers</i> widespread lack of role clarity around AP</p>	4

Author(s), year, country	Aim of study	Design	Sample/ number of participants/ response rate	Content of Medicines Management or prescribing activity	Methods used to support reliability and validity	Main findings: evidence of effectiveness, facilitators and barriers, other relevant findings	MMAT
Kinamore (2014) <sup>126</sup> , Canada (British Columbia (BC))	To explore attitudes and opinions of RTs and establish what the term AP means to BC RTs, and also to discover what they consider to be benefits, and barriers to implementing AP.	Questionnaire	Entire population of Radiation Therapists in BC n= 183/266 (69% response rate)	Scope of AP, barriers, and role benefits to RT and patients	Non- stated	<p>AP Scope: post reg education and preparation; extended scope of practice; leadership and competency. Key tasks: prescribing routine medicines (83%), taking medical history (46%)</p> <p><i>Facilitators:</i> increased job opportunities (70%) and satisfaction (73%), improved recruitment (48%) and retention (49%), enhanced importance in multidisciplinary teams (47%), gaining specialist knowledge (94%), autonomy (75%) and respect for other professions (e.g. radiation oncologists, nurses and physicists) (64%). Enhanced patient care as a result of better collaboration (81%) and increased specialist knowledge (82%).</p> <p><i>Barriers:</i> insufficient financial resources to gain training (68%) and time commitment (85%), lack of support (49%) from employers, lack of support from radiation oncologists, physicists, nurses regarding sharing duties (61%), fear of increased responsibility (19%), reluctance of other professions to share duties (45%), lack of clarity of what AP means (49%) and its benefits (48%), insufficient guidance and training from employer (76%) and insufficient interest from RTs themselves (36%).</p>	4

Author(s), year, country	Aim of study	Design	Sample/ number of participants/ response rate	Content of Medicines Management or prescribing activity	Methods used to support reliability and validity	Main findings: evidence of effectiveness, facilitators and barriers, other relevant findings	MMAT
Martens et al. (2018) <sup>127</sup> , Canada, Alberta	To describe radiation therapists' (RTs) perceptions of advanced practice (AP) and determine perceived barriers and benefits to the role.	Questionnaire	Cross sectional survey of Radiation Therapists in Alberta n= 56/191 (29% response rate)	Perceptions of AP in Alberta, perceived barriers and benefits	Content informed by previous survey <sup>126</sup>	<p>AP definition: requires post qualification education, extended scope of practice, leadership and competency. Key tasks prescribing routine medicines (75%); taking medical history (60%); AP benefits: increased knowledge, job satisfaction and increased autonomy.</p> <p><i>Patient benefits:</i> improved patient care and continuity of care</p> <p><i>Facilitators:</i> increased job satisfaction (88.6%), autonomy (88.6%), specialist knowledge as both personal (97.7%) and professional (97.2%), improved patient care (88.6%) and continuity of care (86.4%).</p> <p><i>Barriers</i> insufficient RT interest; lack of support &amp; training: personal (93.6%) and professional (91.3%).</p>	3
Oliveira et al. (2023) <sup>132</sup>	To assess advance practice roles amongst Therapeutic Radiographers/ Radiation Therapists (TRs/ RTTs) and identify educational gaps for this level across Europe	Questionnaire	<p>Convenience sample of advanced RT/ RTTs working in AP roles</p> <p>Online survey 189 responses from 21 European countries</p>	Scope of advanced practice role, support, education and training needs	<p>Content informed by previous, research, selected reports and surveys about current practices in healthcare</p> <p>Content validity by external RT experts, pilot test-retest.</p>	<p>Master's degree crucial to AP work; 53% (n=100/189) reported AP postgraduate education; including prescribing (n=1): Self- reported education needs: pharmacology &amp; radiopharmacology n=29</p> <p>AP activity associated with direct care including patient information (pre/ during and post treatment); patient assessment and management and site specific roles. Pharmacological intervention noted (but n not reported)</p> <p><i>Barriers:</i> Low level of professional recognition; lack of role recognition; lack of post-graduate education opportunities in several European countries.</p> <p><i>Facilitators:</i> Development of minimum education and practice support standards;</p>	3

Author(s), year, country	Aim of study	Design	Sample/ number of participants/ response rate	Content of Medicines Management or prescribing activity	Methods used to support reliability and validity	Main findings: evidence of effectiveness, facilitators and barriers, other relevant findings	MMAT
Shi et al. (2008) <sup>128</sup> , Singapore	To determine whether radiation therapists (RTTs) and radiation oncologists (Ros) believe RTTs can lead patient treatment reviews.	Mixed methods	<p>P1: Observation of oncologist led treatment reviews (n= 6 Doctors) n=80 consultations</p> <p>P2: Random selection of observations of radiation oncologist treatment reviews over 4 weeks: n=160 consultations</p> <p>P3: Survey: radiation oncologists n= 53/65 (81% response rate) &amp; radiation therapists n=22/29 (76% response rate) (2 cancer centres)</p>	<p>P1: Assessed nature and type of activities during consultations</p> <p>P2: Used checklist developed from P1 to record frequency of activities</p> <p>P3: Assessed RO &amp; RTs views and opinions regarding RTT ability to undertake activities observed during P1 &amp; P2</p> <p>Activities related to treatment assessment, medical intervention, psycho-social support, nutrition advice and decision making</p>	P1 & P2 informed P3 questionnaires	<p>Agreement that RTTs were capable of leading treatment reviews; giving patients advice on side effects &amp; answering questions related to treatment; providing information on cancer, in general and related to nutrition and were supportive of role development.</p> <p>Neither group believed that RTTs were capable of recommending drugs for standard side effects, or answering questions about medicines or those related to complementary and alternative medicines</p> <p><i>Facilitators:</i> patient rapport; more responsive to patient condition; with training should be able to lead treatment reviews; need to support not replace radiation oncologists</p> <p><i>Barriers:</i> lack of training; concerns regarding scope of practice&amp; medico-legal responsibility; constraints on time, resources and manpower, lack of remuneration and support, patients' perspective, increased workload; lack of licensing- prescription and recognition</p>	4

MMA; Medicines management activities; RR: response rate; SP: supplementary prescribing; TR: therapeutic radiographers; CMP: clinical management plan; APRT: advanced practice radiation therapist; AP: advanced practice; NMP: non-medical prescribing; RT: radiation therapist; RO: radiation oncologist.



V): Barriers and Facilitators to Advanced Practice and Medicines Management Activities

	Dietitians																
	FACILITATORS							BARRIERS									
	Advanced training/ post reg qual	Knowledge & Skills	Improved communication with patients and families/ highly acceptable	Increased job satisfaction	Team working	Support/ supervision/ funding	Governance structures	Practice setting	Patient satisfaction & outcomes	Service improvement- efficient, waiting times etc	Lack of training & Accreditation/ state regulation	Resistance from other professional groups	Lack of support / governance/ role understanding	Lack of experience/ interest	Lack of education	Legal concerns	Lack of manpower & resources
Orlee (1997)	X	X															
Brody (2004)	X	X	X														
Cochran (2004)				X						X							
Delaney (2019)		X	X	X	X	X		X			X	X					
Green (2005)	X																
Liljberg (2021)		X	x					X									
Skipper (2006)a	X	X			X	X											
Skipper (2006) b			X	X					X				X				X
Farrer (2008)	X					X	X				X						

Wildish (2010)			X	X	X	X					X	X	X				X
Peterson (2010)		X				X	X										
Simman (2019)				X		X			X			X	x				X
Peterson (2020)	X				X			X			X	X	X	X	X	X	
<b>TOTAL D</b>	<b>6</b>	<b>6</b>	<b>5</b>	<b>5</b>	<b>4</b>	<b>6</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>3</b>

Therapeutic Radiographers																	
	FACILITATORS									BARRIERS							
	Advanced training/ post reg qual	Knowledge & Skills	Improved communication with patients and families/ highly acceptable	Increased job satisfaction	Team working	Support/ supervision/ funding	Governance structures	Practice setting	Patient satisfaction & outcomes	Service improvement- efficient, waiting times etc	Lack of training & Accreditation/ state regulation	Resistance from other professional groups	Lack of support/ governance/ role understanding	Lack of experience/ interest	Lack of education	Legal concerns	Lack of manpower & resources
Shi 2009			X						X	X	X		X			X	X
Griffiths 2012			X		X				X	X		X	X (SP specific s)				
Kinamore 2014	X	X		X	X				X		X	X	X	X		X	X
Martens 2018		X	X	X					X	X		X	X	X			
Harnett 2019				X	X	X				X			X				
Oliveira 2023	X										X		X		X		
<b>TOTAL TR</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>1</b>			<b>4</b>	<b>4</b>	<b>3</b>	<b>3</b>	<b>6</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>2</b>

vi): Summary of Barriers and Facilitators to Advanced Practice and Medicines Management Activities

FACILITATORS		BARRIERS	
Dietitians (n=14)	Therapeutic Radiographers (n=5)	Dietitians (n=14)	Therapeutic Radiographers (n=5)
Having advanced knowledge, expertise & post reg qualification (n=6)	Service improvements, efficiency, reduced waiting times etc, patient satisfaction & outcomes (n=4 each)	Lack of support/ governance/ role understanding (n=5)	Lack of support/ governance/ role understanding (SP specifics) (n=5)
Access to support, supervision and funding (n=6)	Team working improved communication with patients, family, and stakeholders & Increased job satisfaction, retention, career and professional opportunities (n=3 each)	Lack of training/ accreditation/ state regulation, resistance from other professional group, manpower and resources (n=5 each)	Resistance from other professional groups (n=3)
Increased job satisfaction, retention, career and professional opportunities (n=5)	Knowledge and skills (n=2)	Legal concerns, lack of education, lack of experience/ interest (n=1 each)	Lack of training/ accreditation/ state regulation, manpower and resources, lack of experience/ interest, legal concerns (n=3 each)
Team working, knowledge and skills, improved communication with patients, family, and stakeholders (n=5 each)	Having advanced knowledge, expertise & post reg qualification, Access to support, supervision and funding (n=1 each)		
Governance structures, patient satisfaction & outcomes (n=3 each)			
Practice setting, service improvements, efficiency, reduced waiting times etc. (n=3)			

## **Appendix 3 Phase 2 Data Collection Tools**

3.1 D-SP & -TR-IP Questionnaires

3.2 NHS Trust Manager surveys

## 1. D-TR Prescriber Survey 1



IAHP Survey  
Question Schedule I

*Dietitian SP Survey 1*



IAHP Survey  
Question Schedule I

*Therapeutic Radiographer IP survey 1*

## 2. D-TR Prescriber Survey 2



Dietitian Q2  
16042021.pdf

*Dietitian SP Survey 2*



TR Q2 16042021.pdf

*Therapeutic Radiographer IP survey 2*

***Evaluation of Independent Prescribing by Therapeutic Radiographers and Supplementary  
Prescribing by Dietitians***

**Question Schedule for Service Managers-1**

**Part 1: Researcher's checklist**

- Participant ID
- Job title/role
- Do they manage dietitians or therapeutic radiographers?
- Any other notes (preferred contact times etc)?
- Ethics checks: P has received PIS, P has received Consent Form, Informed Consent successfully obtained

**Part 2: Overview of context**

We want to find out how Dietitian/Therapeutic radiographer services are organised in your area.

1. Can you start by telling me your role in terms of Dietary/Therapeutic Radiographer service organisation. eg. Are you a department manager or regional manager?
2. Please describe how many D/TR specialties there are in the Trust?
3. How is your Trust/ department structured? For example, is there a hub with satellite clinics in the community? How do these services operate?
4. What type of geographical area is [the main site of?] your Trust located in? eg. rural, urban, mixed etc
5. Can you tell me which patient groups the service caters for and what sorts of specialties are offered?

**Part 3: Details of Non-Medical Prescribers**

We would like to get an idea of the number of Dietitian/Therapeutic radiographer prescribers within the trust and any plans for expanding this in the future.

6. Can you tell me how many dietitians/therapeutic radiographers work in the Trust overall? [total number and full time equivalent]
7. What proportion/number of these are eligible to prescribe? i.e. how many are working at an advanced level?
8. How many of these are currently prescribers? (if none, probe as to why this is)
9. What plans are there for future NMP training? i.e. How many are currently undertaking training? Estimated number to go forward for training each year? Any planning to do the training in the next 6-12 months?

#### **Part 4. Support for NMP and its use in the trust**

10. Do you know if current NMPs are actually using their prescribing qualifications?
11. In which service areas is non-medical prescribing currently being used in your Dietitian/Therapeutic Radiographer services?
12. Which service areas do you think most benefit from NMP and which do not (and why)?
13. Does your Trust have a non-medical prescribing strategy/policy/guidelines?
14. Is there a service plan or another sort of written plan for Dietitian/Therapeutic Radiographer services that mentions non-medical prescribing and how it is to be used?
  - Interviewer note: Elicit general attitude towards NMP within org if possible
15. What, if anything, has helped to increase uptake or use of NMP by Dietitians/Therapeutic Radiographers in these services?
  - for example, trailblazers, leadership, support of consultants or managers, geographical context e.g. rural setting etc
16. What barriers have been encountered in relation to increasing/sustaining NMP?
  - For example resistance [from whom?], prescribing budget, red tape, cost of training, low numbers in team to cover study leave.
17. Is there anything that helped your organisation prepare for non-medical prescribing by Dietitians/Therapeutic Radiographers?
18. Is there anything that would help (or would have helped) your organisation to be better prepared for the introduction/growth of NMP in the future?

#### **Part 4 4: Next research steps**

19. Would you be willing to pass on an invitation to complete the online survey to your Dietitian Supplementary Prescribers/Therapeutic Radiographer Independent Prescribers? If not, perhaps you can suggest someone who might be able to do this?

20. Would you be willing to discuss this again in about 18 months' time as we're very interested to see how the provision for non-medical prescribing and its outcomes develop over time?



***Evaluation of Independent Prescribing by Therapeutic Radiographers and Supplementary Prescribing by Dietitians***  
**Follow-up question schedule for service managers**

**Part 1: Researcher's checklist**

- Participant ID
- Job title/role
- Do they manage dietitians or therapeutic radiographers?
- Any other notes (preferred contact times etc)?
- Ethics checks: P has received PIS, P has received Consent Form, Informed Consent successfully obtained

**Part 2: Overview of context**

1. In the last 18 months has there been any changes to how Dietitian/Therapeutic radiographer services are organised in your area?
2. If yes: please can you provide detail of the change(s)
3. Please give a brief description of the kind of service you provide:
  - Are you a department manager or regional manager?
  - how many D/TR specialties there are in the Trust?
  - How is your Trust/ department structured? For example, is there a hub with satellite clinics in the community? How do these services operate?
  - What type of geographical area is [the main site of?] your Trust located in? e.g. rural, urban, mixed etc
  - Which patient groups the service caters for and what sorts of specialties are offered?

**Part 3: Details of Non-Medical Prescribers**

1. Please describe any changes that have occurred within the trust in the last 18 months, and/or plans for expanding number of Dietitian/Therapeutic radiographer prescribers
  - How many dietitians/therapeutic radiographers work in the Trust overall? [total number and full time equivalent]
  - What proportion/number of these are eligible to prescribe? i.e. how many are working at an advanced level?
  - How many of these are currently prescribers? (if none, probe as to why this is)
  - What plans are there for future NMP training? i.e. How many are currently undertaking training? Estimated number to go forward for training each year? Any planning to do the training in the next 6-12 months?

#### Part 4. Support for NMP and its use in the trust

1. Please describe any changes that have occurred within the trust in the last 18 months regarding the support for NMP and its use in the trust
  - Do current NMPs actually using their prescribing qualifications?
  - In which service areas is non-medical prescribing currently being used in your Dietitian/Therapeutic Radiographer services?
  - Which service areas do you think most benefit from NMP and which do not (and why)?
  - Does your Trust have a non-medical prescribing strategy/policy/guidelines?
  - Is there a service plan or another sort of written plan for Dietitian/Therapeutic Radiographer services that mentions non-medical prescribing and how it is to be used?

*Interviewer note: Elicit general attitude towards NMP within org if possible*

2. In the last 18 months, what do you consider have been the top three things that have helped to increase uptake or use of NMP by Dietitians/Therapeutic Radiographers in these services?

*Prompts: trailblazers, leadership, support of consultants or managers, geographical context e.g. rural setting etc.*

3. In the last 18 months, what do you consider have been the top three things, if any that have delayed or prevented increasing/sustaining NMP?

*Prompts: resistance [from whom?], prescribing budget, red tape, cost of training, low numbers in team to cover study leave.*

4. Over the last 18 months, what are the top three things, if any that have helped your organisation prepare for non-medical prescribing by Dietitians/Therapeutic Radiographers?

5. Is there anything that would help (or would have helped) your organisation to be better prepared for the introduction/growth of NMP?

6. In the last 18 months, to what extent has your service been able to provide care when there is no doctor (or other prescribing professional) available:

*Decreased/ increased/ stayed the same*

7. Please comment on how the presence/ absence of NMPs in your service has impacted on your ability to meet Covid-19 related challenge

## Appendix 4: Phase 3 Data Collection Tools

4.1 Self- Report Audit (D TR/ NP TR) docs

4.2 Interview Schedules

4.3 Patient Questionnaire

4.4 Case Record Review

## 4.1 Self-Report Audit



TRadDiP\_Prescriber  
\_Audit\_MASTER\_v2.C

*Prescriber Audit tool*



TRadDiP\_Non-Prescriber  
\_Audit\_MASTER

*Non-prescriber/ trainee Audit tool*

## 4.2 Interview schedules

**Project title: *Evaluation of supplementary prescribing by dietitians and independent prescribing by therapeutic radiographers***

### **Dietitian/Therapeutic Radiographer Prescriber**

#### **Interview Schedule**

*Confirm consent to be interviewed and for audio-recording*

- **Could you tell me a bit about yourself and your role?**

**Including:**

- Job title
- Age
- Gender
- Full time or part time
- Highest level of educational qualification
- Length of time in current job
- When qualified as a prescriber (if a prescriber)
- Percentage of time/role spent in clinical practice
- If part of a multi-professional team or working as single practitioner

- **Can you explain more about the services you provide?**

Prompts:

- Range of services provided and their settings
- Typical patient caseload
- How are patients referred in and out of the service
- How easy is it for patients to access the service (e.g. waiting times)

- **To what extent have you been able to use the IP/SP qualification so far?**

Prompts:

Are there instances where you would use another route to prescribe or administer medicines?  
[e.g. supplementary prescribing, PGD] –If, so why?

Do you use guidance/protocols to support your prescribing decisions?

- **What, if any, do you consider to be the main benefits of you being able to use independent/supplementary prescribing?**

Prompts: in relation to a) patients b) services c) other health care professionals c) yourself

- **Have there been any difficulties or anything else that has prevented you from using SP/IP?**

Prompts:

Difficulties in setting up/starting to use SP/IP in practice  
Prescribing budget  
Relationships with patients and/or professionals  
Access to patient records

- **Have there been any changes to the way that care is organised as a result of your being able to prescribe?**

Prompts:

- appointment times/slots,
- type of clinics,
- number of doctor or other healthcare professional appointments
- **Thinking back, which aspects of the prescribing programme have been most useful?**  
[prompt: taught days and time with DMP]

- **What do you regard as the key strengths and weaknesses of current governance arrangements for your prescribing practice?**

Prompts:

- access to own prescribing data
- availability of suitable CPD/training
- guidance for audit of prescribing practice
- access to supervision/support for prescribing decisions
- **Can you describe how you communicate prescribing decisions to other relevant healthcare professionals, such as the patient's GP?**
- **How would you describe the impact that SP/IP has had on you as an individual?**

Prompts:

- How does prescribing fit within your broader scope of practice?
- Has it changed your role in any way?
- Has it influenced your job satisfaction?
- Changes to relationships with colleagues or patients
- **How do you think prescribing impacts on the development of therapeutic radiography/dietitian as a profession?**
- **Is there anything that you would like to add?**

**Finish**

Thank you for your time

**Project title: *Evaluation of supplementary prescribing by dietitians and independent prescribing by therapeutic radiographers***

## **Non-Prescriber/ Trainee- Dietitian/Therapeutic Radiographer Prescriber**

### **Interview Schedule**

*Confirm consent to be interviewed and for audio-recording*

- **Could you tell me a bit about yourself and your role?**

**Including:**

- Job title
- Age
- Gender
- Full time or part time
- Highest level of educational qualification
- Length of time in current job
- Percentage of time/role spent in clinical practice
- If part of a multi-professional team or working as single practitioner
- *If trainee-* course details and expected completion date.

- **Can you explain more about the services you provide?**

Prompts:

- Range of services provided and their settings
- Typical patient caseload
- How are patients referred in and out of the service
- How easy is it for patients to access the service (e.g. waiting times)

**3. What are your views about dietitians/ therapeutic radiographer prescribing?**

Prompts:

- Potential advantages of supplementary/independent prescribing
- Potential disadvantages to supplementary/independent prescribing
- Would you personally consider undertaking the prescribing course [if not a trainee]?

**4. What involvement, if any, do you have in providing advice or information to patients about medicines?**

Prompts:

- How often do you provide advice to patients about medicine (discuss both existing medicines and the need for new medication)?
- Are you involved in assessing patients and making decisions about their medicines?
- What happens if you think a patient requires medicine, e.g. do you refer them to a GP or other health professional?
- Who else is involved in prescribing or managing medicines for your patient group?
- How easy is it, in your opinion, for patients to access the medication required for the conditions that you treat?

5. **Can you explain how decisions about patients' treatment are communicated between different service providers?** (e.g. from D/TR to general practice, or between primary and secondary care)

6. **Is there anything that you would like to add?**

**Finish**

Thank you for your time



**Project title: *Evaluation of supplementary prescribing by dietitians and independent prescribing by therapeutic radiographers***

## **Team Member Interview**

### **Prescribing Sites**

Take consent (reading each item on consent form)

**1. Role and relationship to Dietitian/ Therapeutic Radiographer participant**

- Can you tell me a bit about yourself?
- What is your role in relation to the service provide by the Dietitian/ Therapeutic Radiographer prescriber?
- How long have you been in this role or worked with D-TR service?
- Do you have direct contact with patients seen by the D-SP-TR-IP service?

**2. What involvement, if any, do you have in providing advice or information to patients about medicines?**

Prompts:

- How often do you provide advice to patients about medicine (discuss both medicine they are already taking and the need for new medication)?
- Are you involved in assessing patients and making decisions about their medicines?
- What happens if you think a patient requires medicine, e.g. do you refer them to your D/TR prescriber colleague, GP, other health professional?
  - How long does this process usually take? (estimate time for D/TR prescriber colleague, GP or consultant to issue prescription, does it involve an additional appointment for the patient? Is this different when a team member has NMP status?)
- Who else is involved in prescribing or managing medicines for your patient group?
- How easy is it, in your opinion, for patients to access the medication required for the conditions that you treat?

**3. What are your views about Dietitian/Therapeutic Radiographer prescribing?**

- What is your opinion about D/TRs taking on a prescribing role?
- Do you think there are any advantages to the D/TRs being able to prescribe? [benefits for the patient, for the service/organisation, for the D-SP-TR-IP, for other staff]
- Do you think there are any disadvantages to D-SP-TR-IP?
- Are there any barriers to making the best use of SP/IP in this service
- If so, how could these be overcome?
- Do you think having a DSP-TR-IP has or will change the way that care is organised?[Prompts: educational preparation, safety and governance]
- Would you personally consider undertaking the prescribing course?

**4. Is there anything else that you would like to add?**

Thank you

**Project title: *Evaluation of supplementary prescribing by dietitians and independent prescribing by therapeutic radiographers***

**Team Member Interview**

**Non-Prescribing/ Trainee Prescriber Sites**

Take consent (reading each item on consent form)

**5. Role and relationship to Dietitian/ Therapeutic Radiographer participant**

- Can you tell me a bit about yourself?
- What is your role in relation to the service provide by the Dietitian/ Therapeutic Radiographer?
- How long have you been in this role or worked with D-TR service?
- Do you have direct contact with patients seen by the D-SP-TR-IP service?

**6. What involvement, if any, do you have in providing advice or information to patients about medicines?**

Prompts:

- How often do you provide advice to patients about medicine (discuss both medicine they are already taking and the need for new medication)?
- Are you involved in assessing patients and making decisions about their medicines?
- What happens if you think a patient requires medicine, e.g. do you refer them to your D/TR prescriber colleague, GP, other health professional?
  - How long does this process usually take? (estimate time for D/TR prescriber colleague, GP or consultant to issue prescription, does it involve an additional appointment for the patient? Is this different when a team member has NMP status?)
- Who else is involved in prescribing or managing medicines for your patient group?
- How easy is it, in your opinion, for patients to access the medication required for the conditions that you treat?

**7. What are your views about Dietitian/Therapeutic Radiographer prescribing?**

- What is your opinion about D/TRs taking on a prescribing role?
- Do you think there are any advantages to the D/TRs being able to prescribe? [benefits for the patient, for the service/organisation, for the D-SP-TR-IP, for other staff]
- Do you think there are any disadvantages to D-SP-TR-IP?
- Are there any barriers to making the best use of SP/IP in this service
- If so, how could these be overcome?
- Do you think having a DSP-TR-IP has or will change the way that care is organised?[Prompts: educational preparation, safety and governance]
- Would you personally consider undertaking the prescribing course?

**8. Is there anything else that you would like to add?**

Thank you

**Innovation in the Allied Health Professions: Evaluation  
of supplementary prescribing by dietitians and independent prescribing by therapeutic  
radiographers**

**Patient experience interviews**

Introduce self/project, structure of the interview i) consultation experience and ii) patient journey. Recap ethical issues – confidentiality, audio-recording, anonymity, gain written consent.

**Background Information (including age, sex)**

- 1) Tell me a bit about yourself and your relationship to this D/TR service.  
- how long have you been coming to this D/TR service?

**Part 1: Consultation experience**

**D/TR Prescribing**

- 2) Are you aware that some D/TR are able to prescribe medicines?

*What are your thoughts or opinions about this?*

*Prompt: awareness or opinion of prescribing by professions other than doctors.*

- 3) Do you know whether the D/TR you recently saw can prescribe medicine for you?

- 4) Do you think there are any benefits to having a D/TR prescribe for your condition?

- Benefits for yourself, e.g. convenience, quicker, reduced waiting times, can ask questions, D/TR knows you well
- Benefits for service e.g. saves time for doctor/other prescriber, streamlines service
- For patients of prescribing DT/TR – can you give specific examples of the benefits you have experienced?

- 5) Do you think there are any disadvantages to having a D/TR prescribing for your condition?

*Prompts*

- Do you have any concerns about level of training or experience compared to a doctor/other prescriber?
- Do you feel you would miss out on having a consultation with a doctor?
- Are you confident that the D/Tr would have the knowledge and ability to decide the best medication for you (e.g. taking into account your personal preferences and medical history?)
- Are you confident that the D/TR would be able to pick up and respond if something went wrong, e.g. side effects or a drug reaction?
- For patients of prescribing DT/TRs- are there specific examples that you have experienced?

## Medicine taking

6) Does anything make it either easier or more difficult for you to keep to your treatment plan or take your medicines as you are supposed to?

- Have (*or* "could" for non-prescribers) these difficulties been affected by
- having a D/TR who can prescribe medicines?

### Prescribing consultations

7) Do you tend to see the same D/TR each time? (if relevant)

- If YES: does this make a difference to you?
- Are there other more factors that are more important to you than seeing the same DTR each time?

8) To what extent do you feel able to talk openly to the D/TR about your condition and ask questions about your treatment?

- How well is the D/TR able to answer questions about medications?
- Does the D/TR give you enough information about your medicines i.e. side effects
- Do you think that the D/TR gives you enough information about medicines, and if not what additional information would you like to have?

9) How confident are you in the decisions your D/TR makes about your treatment?

- What influences this level of confidence?
- Have the decisions your D/TR has made about your medication always turned out well?

10) To what extent have you been involved in decisions made about your treatment?

- Are you happy with this level of involvement?
- are there times when you want to be more/less involved?

11) Do you think the kind of care you might receive from a doctor would be any different to the care you receive from the D/TR prescriber, if so, how?

- Have discussions you've had about your medications with your D/TR been different in anyway from those you've had with doctors or nurses, if so how?
- Do you have any suggestions for improving the way your condition is managed?
  - prompts: length of consultation

## Part 2: Patient journey

I will now explain the patient journey mapping process.

*Recap: I understand that when you visited the D/TR recently, it was decided that you needed some medicine, or that your medicine needed to be changed. Is that correct?*

We are interested in how long it takes and how many people (healthcare professionals) are involved in getting your medicines to you. Focusing on the most recent appointment that you had with the D/TR, I'd like you to talk me through each step of the process starting from arranging the appointment, through to when you received your medication.

Prompt as below:

### 1. Pre-Appointment:

What type of appointment was it?

- first/follow-up
- routine/emergency
- face-to-face/phone/video
- at hospital/clinic/other
- the appointment type/location you wanted or not

How did you make the appointment?

- in person
- via phone
- email
- online booking system
- during previous visit

How long did it take to make the appointment?

- did you have to wait for the appointment and if so how long?

### 2a. The appointment (face to face)

Talk me through what happened on the day of your appointment.

- How long did it take to get there/park/find location etc.
- Did getting to the right place on time create any problems
  - (mobility, getting lost etc)
- Did you speak to anyone on arrival?
  - reception, D/TR, other staff, automated booking-in machine

- How long did you have to wait?
  - running behind schedule/arrived early?

Please describe what happened when you were called to your appointment.

- Did you have to go far from the waiting area to find your D/TR
  - if so, was this a problem (mobility, getting lost etc)
- Did you speak to your D/TR immediately or other staff member first?
  - if other staff member, who were they and you discuss your condition with them?

Please talk me through what happened from the point your actual appointment began.

- Was anyone else present in the room besides your D/TR
  - if so, did you understand why each person was there?
- Did you already know the D/TR your appointment was with and/or others present?
- Who made the decision that you needed a new/changed prescription?
- What was the decision?
  - prescription required immediately, or were they:
    - referred elsewhere for prescription
      - where/to whom?
    - recommended over-the-counter medicine
- Who prescribed the medicine (any additional appointments made)?
- What information were you told about the medicine?
  - reason for changes
  - if a new medicine was prescribed, were you told:
    - what it was called
    - what it was intended to do
    - how to take it
    - any side effects
- How long did the appointment with the D/TR last in total overall?
  - was this longer/shorter than you wanted/expected?
- Did you need to see another member of hospital/clinic staff on the same day in order to complete your prescription? If so:
  - who were they?
  - did you have to go far to find them?
    - if so, was this a problem (mobility, getting lost)?

- did you have to wait long to see them?
- how long did you speak to them for

How long did your visit to the hospital/clinic last in total?

### *2b. The appointment (via phone or video)*

Please talk me through what happened from the point your actual appointment began:

- Did your appointment begin on time?
  - if not, were there delays? technical problems?
- Was anyone else present on the call besides your D/TR
  - if so, did you understand why each person was there?
- Did you already know the D/TR your appointment was with and/or others present?
- Who made the decision that you needed a new/changed prescription?
- What was the decision?
  - prescription required immediately, or were they:
    - referred elsewhere for prescription
      - where/to whom?
    - recommended over-the-counter medicine
- Who prescribed the medicine (any additional appointments made)?
- What information were you told about the medicine?
  - reason for changes
  - if a new medicine was prescribed, were you told:
    - what it was called
    - what it was intended to do
    - how to take it
    - any side effects
- How long did the appointment with the D/TR last in total overall?
  - was this longer/shorter than you wanted/expected?

### *3. Receiving your medicine*

- How long did it take for the medicine to be prescribed- i.e. a prescription to be issued?
- How long did it take for you to actually receive your medicine?

- How did you get your medicine (hospital or local pharmacy etc)?
- How satisfied were you overall with the overall experience of having your medication needs met?
  - How could the process be improved?



### 4.3 Patient Questionnaire



18. Dietitian patient questionnaire versic

*Dietitian Patient Questionnaire*



19. Radiotherapy patient questionnai

*Therapeutic Radiographer Patient Questionnaire*

#### 4.4 Case Record Review

**A. Source Documents:** Please indicate which of the following type of information was provided:

	Yes	No	N/A
1) Information of presenting/current condition/complaint			
2) Past medical history			
3) Current medications			
4) Allergies			
5) Rationale for prescribing/medicines management decision			
6) Prescription records a) All drugs related episode of care b) Discharge plan/recommendation			
7) Other give details			
8) General quality of available records (1=poor, 10-excellent)			

#### B. Patient Information and background

Age	Sex	Date of consultation	Reason for consultation

Current prescribed medicines:

<b>List all medication patient prescribed during the index consultation</b>
<b>List any other recommended medicines</b>

**C. Appropriateness of prescribing/medicines management decision(s)**

		Comments
<b>1. Was enough information provided in order to make an assessment regarding the appropriateness of the decision(s)</b>	Yes	
	No	
<b>2. Based on the available information, was an appropriate decision(s) made?</b>	Yes	
	No	
	Unsure	

**D: Medication Errors** (Please use the pre-defined categories of medication errors on the following page)

		Comments
1. Did the document(s) contain enough information for you to assess any medication errors that occurred during the prescribing or administration stages?	Yes	
	No	
2. Based on the available information, did the patient experience any prescribing or administration related medication errors?	Yes	
	No	
	Unsure	

#### D: Error Details

Prescribing stage or stage of medicines management decision	Prescribing	Medicines Management Decision	Comment
	Yes/No/NA	Yes/No/NA	
1. Incorrect/ missing drug dose			
2. Incorrect /missing units			
3. Incorrect/ missing frequency			
4. Drug name incorrect			
5. Unclear, incomplete or illegible prescription			
6. Medicines not written up as prescribed			
7. Selection of drug			
8. Selection of dose			
9. Selection of formulation			

Any other comments?

**E. Any other overall comments? (e.g., patient experienced delay in receiving prescribed or recommended medicines).**

## **Checklist and Process for Assessing Case Records**

Use all sources of available evidence relating to the patient and episode of care to complete **Sections A to E** of the form.

**A. Source documents**

Read medical records, progress notes and any other associated documents to record the type of information provided.

**B. Patient information and background**

Record age, sex, date of consultation, reason for consultation, medicines prescribed and any other medicines recommended during consultation. Also list current prescribed medications.

**C. Appropriateness of prescribing and medicines management decisions**

Use the source documents to determine the above.

**D. Check medication errors or potential errors**

Use the pre-defined categories of medication errors to assess what, if any, errors or potential errors occurred.

If any drugs stopped please comment in any other comments on **Section E**.

**Resolving differences between reviewers - once all case records have been checked by both people, any disparity in the collected data will be discussed and resolved where possible. We will contact you if we have any follow up questions.**

**Collated data from each patient record will subsequently be entered and recorded on an excel spreadsheet.**

## Appendix 5: Phase 2 Additional tables

### NHS Trust Manager Survey

- i) D-SP uptake by geographical location or catchment area
- ii) Overview key barriers and facilitators of D-SP and additional issues at follow-up
- iii) TR-IP uptake by geographical location or catchment area
- iv) Overview key barriers and facilitators of TR-IP and additional issues at follow-up

### Prescriber Survey 1

- v) Reasons for not prescribing
- vi) Number of items prescribed using independent and supplementary prescribing in a typical week
- vii) Methods used by prescribing dietitians to supply administer or prescribe medicines
- viii) Methods used by prescribing therapeutic radiographers to supply administer or prescribe medicines
- ix) Barriers and facilitators to supplementary prescribing
- x) Barriers and facilitators to therapeutic radiographer independent prescribing

### Prescriber Survey 2

- xi) Reasons for not prescribing
- xii) Changes in employment and service provision over past 18 months
- xiii) Changes to clinical caseload reported by dietitians and therapeutic radiographers
- xiv) Changes in prescribing practice reported by prescribing dietitians and therapeutic radiographers
- xv) NMP governance systems at 18 months
- xvi) Impact of NMP
- xvii) Top three areas where prescribing has been of benefit to services
- xviii) Top three barriers to NMP reported by dietitians and therapeutic radiographers
- xix) Barriers and facilitators to implementation of dietitian supplementary prescribing
- xx) Barriers and facilitators to therapeutic radiographer independent prescribing

i) DSP uptake by geographical location or catchment area

Categories	0 qualified D-SPs	1 D-SP	2 D-SPs	2+ D-SPs
<b>Catchment demographics</b>				
Urban	15	8	1	2
Rural	3	0	1	0
Setting not discussed	0	0	0	1
<b>FTE D's</b>				
Under 20FTE	8	2	0	0
20-40 FTE	7	3	2	2
40-60 FTE	3	2	0	1
60-80 FTE	0	0	0	0
Over 80 FTE	0	0	0	0



ii) Overview key barriers and facilitators of D-SP and additional issues at follow-up

Theme	Barrier	Facilitator	
<p><b>a) Demonstrating need for SP</b></p> <p><b>Stages</b></p> <p><i>Important but not necessary for early adopters (individual drive and motivation more influential in early adoption)</i></p> <p><i>Increasingly important for late adopters and for ongoing development and sustainability</i></p>	Other systems in place which were deemed sufficient, e.g., availability of medical prescribers, nurse prescriber, PGD.	<p>D-SP improved efficiency and facilitated service innovation and improvement.</p> <p>Reduced staffing during Covid-19 increased recognition of value of D-SP.</p>	<p><i>"I don't think it's terribly relevant for us at [trust] because... it's quite a lot of training and commitment for relatively little gain for an acute team.... there's usually doctors in the clinic, it's not that hard to sort out if you do need something there and then." (MS1-D9)</i></p> <p><i>"What we do have in our dietetics team are patient group directives. So, we order food supplementary to medicines, you know FSMPs, all of those we prescribe, but it's not on a prescription.... Any supplements on the wards or enteral feeds, we write those on the drug chart, so it's just accepted that we're the experts and that's what we prescribe.... our trust has always been very supportive of patient group directives and given us the autonomy, to do it." (MS1-D11)</i></p>
	Use of CMP is time consuming at set up.	D-SP is cost-effective, saving time for doctors.	<i>"...the fact it's SP and not IP, it's a huge obstacle. Because we've got to get signatures there's so much additional paperwork, in a world that's trying to go electronic. And the medical teams' time in signing all the CMPs; when you first qualify, I had 150 dialysis patients, and I had to get 150 CMPs signed, and trying to pin a consultant down... And it's fine once they're all done, and you get a new person once a week, or a couple a month, .. But that first couple of months of trying to get all their CMPs done, so you knew that they were all covered...(MS2-D4)</i>
	CMP inappropriate for settings where multiple GP agreements are required, or for acute care with few patients. Worsened by Covid-19 due to shortage of doctors and remote working.	Provide patients with timely and appropriate care. Appropriate for patients with long-term conditions.	<p><i>"My understanding is that you can sort of prescribe but you actually have to get a doctor to back you up on it and that just wouldn't work in the community because you're out and about all the time, each patients got a different GP, it just wouldn't work. So, I think supplementary prescribing in our role isn't really beneficial." (MS1-D15)</i></p> <p><i>"I can definitely see it would benefit some roles more than others. For example the FCP role where we have a direct line to a number of GPs...easy. Same of the acute ones; if we know then that for TPN prescribing for example, the Consultants are going to support those (CMPs for) individual patients. For community, for our wider teams where they span across a whole heap of GP surgeries, it's going to be really difficult to have all those agreements in place...so those posts are going to make it a lot more difficult to then realise the benefit of SP. I would say that would be a hindering factor". (MS2-D22)</i></p>
	Doctors prescribing on recommendations of dietitians is considered safe and acceptable.	Improved accountability and safety of prescribing decisions.	<i>"I think because most of these patients are seen as part of an MDT, so there will be a doctor there, erm and I suppose from a practical point of view the doctor can just prescribe. Erm the process is a lot more difficult for us at the moment what with it being supplementary prescribing." (MS1-D19)</i>

<p><b>b) Leadership, MDT support and organisational culture</b></p> <p><b>Stages</b></p> <p><i>Organisational support and leadership vision essential for adoption and sustainment of D-SP as it influenced the organisations stance on how to demonstrate need, access to funding and approach to problem solving.</i></p>	<p>Negative views towards D-SP and AHP prescribing roles within organisations. Preference for nurse prescriber roles.</p>	<p>Positive and supportive pro- NMP culture. Team attitude towards and trust in D-SP improved with exposure to D-SP during covid-19.</p>	<p><i>"We're just at that very much disadvantage in that why would someone want to invest within dietetics to do those roles when - when they could fund a diabetes specialist nurse who then has that ability to prescribe and doesn't have all that red tape preventing them from doing their job as efficiently as they could." (MS2-D22)</i></p> <p><i>"Covid...highlighted how helpful it can be to have non-medical prescribers. I think there is quite a positive move towards having medical prescribers, particularly as...I think there's a shortage in every profession but previously... and particularly in this team, there were more nurse prescribers, but I think there's so much more of a move towards how AHPs can contribute in the workforce. So, I think there's a positive move towards that". (MS2-D13)</i></p>
	<p>Weak or non-existent local leadership promoting D-SP.</p>	<p>Strong local leadership promoting D-SP along with AHP prescribing.</p>	<p><i>"I think it's about leadership within your team, so if you haven't got buy-in from the manager, the professional manager and lead, which I can see that, actually, across the country, there is very limited enthusiasm for it, because .... they can't maybe see it, it's not visionary". (MS2-D11)</i></p>
	<p>Advanced dietitian roles including prescribing not well-established or promoted.</p>	<p>Role models and vision for advanced D-SP role.</p>	<p><i>"We've been able to pick up on opportunities where perhaps other departments haven't been able to use what they've put in for. Or we've been able to access - we've put in for ACP funding but actually said "what we'd actually prefer to do is just do HEE or what we really want until we've figured out how ACP is necessarily going to work for dietetics, we just want the prescribing element of it" and that's how we got a few more of the places funded." (MS1-D2)</i></p> <p><i>"I think it's just I fought for the funding really hard. Every year, I've been told that there wasn't any funding for dietitians, that dietitians couldn't be prioritised, it needed to go to the nursing ACPs, and in the end, I just said, "Look, I'm sorry, but every year I've said no, every year I've put people off, at some point it's got to be our time to go." (MS2-D7)</i></p>
	<p>Low visibility of advanced dietitian roles and evidence to support D-SP at national level.</p>	<p>Covid-19 expanded possibilities and vision for advanced dietetic roles.</p>	<p><i>"So, the acknowledgement that dietitians can practice wider than just their little dietetic bubble, and that we do that already at say a Band 7 level, and this is almost giving the permission to do it. So, some of it is that acknowledgement that we have a bigger boundary than what we traditionally were thought of, and we're pushing that boundary further and further for all roles". (MS2-D22)</i></p> <p><i>"...during the waves of Covid, the doctors have been redeployed to other areas. So, I think the other professions have had to take on more responsibility (and) there has been that recognition that the AHPs can do that". (MS2-D13)</i></p>

<p><b>c) Organisational preparation</b></p> <p>NMP Policy and procedures in place to support D-SP. Access to funding for D-SP training and backfill.</p>	<p>Lack of strategic vision or lack of inclusion of D-SP within NMP policy. Poor understanding of CMP/SP process.</p>	<p>Strategic vision for D-SP included within NMP policy. Agreements for advanced D-SP positions.</p>	<p><i>"Because nobody else in the trust really used supplementary prescribing erm.... I just felt that no one really understood what it was because nobody else used it. So, they just think you're a prescriber and they think you're an independent prescriber even though you're not." (MS1-D19)</i></p> <p><i>"...that ability to work together to totally and truly transform workforce etc. and how pathways work has not been forthcoming, so that's hindered things. So, they go "Well, why would I give money to your division when you should be doing that for us?" No, we need to work together on business cases etc. That's been a big hindering point". (MS2-D22)</i></p>
<p><b>Stages</b></p> <p><i>Poor preparation hampers uptake of D-SP and transition to implementation. Need for long term planning to prepare dietitians for future prescribing role to support development and sustainability. Aligning funding, career/skills development, team capacity and staff readiness remained a key barrier to innovation at follow-up.</i></p>	<p>Procedures to enable prescribing are lacking and lead to delay, including budgetary arrangements.</p>	<p>Procedures are in place to smooth the transition period once qualified.</p>	<p><i>"So, she went on the course. Fabulous...passed it, all is lovely and then had to go through millions of hurdles locally in order to be able to prescribe here. So, she had to go through the medicines management committee, we had to meet with the director of pharmacy a number of times to get the paperwork done, and it was - we were in all support, it was just the length of time it took to get the paperwork signed... the red tape, the in-house red tape." (MS1-D17)</i></p>
	<p>Poor access to timely funding for D-SP training. Delayed due to covid-19.</p>	<p>Timely access to funding for D-SP NMP training.</p>	<p><i>"We've put in HEE bids, got funding, but then we haven't had the posts for those people to go into, so then HEE go "Right, you can't put them on the training." So it's the other way round for us where we have been fortunate but just not at the right time. It's almost the HEE process; it happens once a year, you have to plan almost two or three years ahead so you're really clutching at straws at what you're going to have, what it's going to look like". (MS2-D22)</i></p>
	<p>Difficulty releasing staff from small teams without backfill. Worsened due to Covid-19 and national staff shortages.</p>	<p>Preparation for staff release and backfill. Keen to invest in staff development.</p>	<p><i>"I think the one thing I wasn't anticipating as much was the number of clinical hours they needed to complete the course in such a short time scale... it makes it more difficult in a smaller department" (MS2-D4)</i></p> <p><i>So, across some of our teams in Acute, we've had about 50% vacancy rates...across the whole team it's been about 20%. So, if you're then sending someone on training, you've then got to think about that hit of the backfill and the fact that you're already about 20% short, including annual leave and sickness on top of all of that; that makes it difficult. So if we were better staffed...." (MS2-D22)</i></p>
	<p>Lack of agreed SP process and D-SP scope of practice.</p>	<p>Agreed scope of practice and preparation for team on process of D-SP.</p>	<p><i>"I think particularly from the diabetes side, they really do want dietitians to be able to adjust insulin, we're really short on diabetes specialist nurses, and (they're) not all prescribers. And some of them don't work for our organisation, they work for the community (and) accessing them and being able to have conversations with them can be really challenging. So, I think the feedback from the doctors has been that if they can just refer to the dietitian, we can do the dietary management and the insulin management all at the same time. So, I think they see it as a real positive". (MS2-D7)</i></p>

	Difficult finding the right D-SP candidates with background requirements to undertake training.	Planning and preparing future NMPs so can apply at short notice.	<i>"I think it's staff in the right place at the right time. However much you think you might want it, if you haven't got the experience in that place at the right time, it's not appropriate". (MS2-D11)</i>
	Competition with nurses and AHP prescribers for funding/advanced positions and shortage of local NMP training programmes.	Capitalising on funding for new dietetic roles including D-SP.	<i>"I think it's just I fought for the funding really hard. Every year, I've been told that there wasn't any funding for dietitians, that dietitians couldn't be prioritised, it needed to go to the nursing ACPs."(MS2-D7).</i>  <i>"I think it's because there are more and more ACP roles being brought out, it will be something that penalises Dietitians from going for those roles. ...if me and a nurse were up for the same role, they can prescribe without all the paperwork and I can't...the team are going to say "Well, obviously this person can do everything I want without extra work, so why would we have the Dietitians do the role?." (MS2-D23)</i>
<b>d) Job satisfaction and career progression</b>  Motivation to undertake D-SP and its relation to career progression and job satisfaction.	Lack of vision and clarity over advanced dietitian career pathways and alignment of D-SP within advanced roles.	D-SP aligned to career pathway for extended roles and considered beneficial for career progression. E.g. D-SP as 'desirable' in job descriptions.	<i>"We just need the people and the posts to be able to access D-SP...So you've kind of got to access it from all angles...." (MS2-D22)</i>  <i>"...we've struggled across probably all of our Therapies to get them to that ACP role. So, recently we've identified a whole host of ACP roles that we think would be helpful for the Trust, we could see the transformation. We've put in for the HEE bids, got the HEE funding for it, but then we haven't had the posts for those people to go into...." (MS2-D22)</i>
<b>Stages</b>  <i>Job satisfaction and motivation key in adoption phase. Career progression and development of ACP roles within organisations supports sustainability.</i>	Lack of support for educational preparation for advanced roles. Lack of experience. Lack of training in physical assessment, clinical reasoning.	Educational preparation supported for D-SP. Dietitians with the right level of experience and knowledge.	<i>"I think we're quite lucky, it's a forward-thinking department and area and trust so you know we were really keen to get people on the course and get support, we didn't have any problems getting support." (MS1-D23)</i>  <i>"You've got to have the dietitians behind you, who are confident and comfortable in doing (D-SP), and you need quite a lot of experience, I think, to feel that "Actually, I could cope with that." I think you've got to have been working for quite a while, I think, to be safe". (MS2-D11)</i>
	Low incentive and motivation for dietitians to become NMPs (no change in status or increase in pay).	High personal motivation of dietitians to do NMP course.	<i>"...there was three (dietitians) that I wanted to move to an advanced practice level, and one of them wants to do his SP... But the other two, even though they're top of their grade, they've been working at that level for many years; they don't want to do it. And I think that's the biggest thing, if you haven't got the staff who want to do it, then you can't force them to go and do the course. Because actually, they are doing their jobs really well without it, it would just be the icing on the cake..." (MS2-D7)</i>

			<p>“...they don’t see it’s necessary because they’ve got systems in place (and) they work so closely with other prescribers. I think they just see that it’s a lot of work, time, and stress to go through six months, when actually all they’d need to is just take a bit of paper to someone else, and say, “Please can you prescribe this?. And...if you’re not going to earn any more money, why are you going to go and do a course? And so, they don’t see that benefit of working with (the) increased level of autonomy you get from being a supplementary prescriber... they see it would be quite a big responsibility”. (MS2-D11)</p>
	Belief that it is better to wait to see if dietitians are given IP rights.	Belief that demonstrating value and safety of D-SP may lead to dietitians gaining D-IP.	<p>“It’s a really exciting thing that’s happened for the profession and everyone was really hyped up and it’s really great, but in reality, when people really stand back and look at it, they’re thinking “it’s not that much different from a PGD.”.... I think there’s a feeling, you know, regionally, within the profession that it would be helpful to be at the next (IP) level and then it really has got its worth.” (MS1-D5)</p> <p>“...it’s trying to work out where they best sit whilst we’re supplementary because of the added paperwork and things like that. So, there are people keen to do it, but realistically when you look at how much work it is for what somebody else who is already trained – so the nursing team – they can do it very quickly, so would it be better to fund them and wait until hopefully we get IP for the Dietitians?”. (MS2-D23)</p>
<p><b>e) The prescribing programme and supervision support</b></p> <p><b>Stages</b></p> <p><i>Primarily relevant to the preparation and training stages and influencing uptake of D-SP. Succession planning for future D-SP influences sustainability</i></p>	Reluctance to undertake D-SP training due to course difficulty or timing of career. Lack of perceived benefit of SP and remuneration. Burnout.	Strong motivation to become D-SPs and career development opportunity.	<p>“When we got funding to do the course, we had a quick turnaround in terms of getting someone who was able to do it, who wanted to do it, who had the clinical skillset to do it, the support from clinicians to do it, and all the other things you need in place to enable it to happen....” (MS1-D4)</p> <p>“[There is a problem with] the enthusiasm level of the staff to take on that level of responsibility when at the minute there’s potentially not a lot of gain for them, you know, no financial gain even though it potentially increases their workload.” (MS1-D7)</p>
	Shortage of consultants willing to supervise D-SP trainee in practice.	Willingness of consultants to supervise D-SP trainees.	“Yes, it’s all of that work, the implications for their time, and actually is it then advantageous doing the course? I worry that the consultants will (feel) the same, unless we have a really clear understanding that for certain pathways, like for example pancreatic cancer, that it will be this defined list of Creon etc., vitamins and minerals that might come into it, and that will be the pathway if it goes ahead, so that’s the challenge..” (MS2-D22)
	Skilling up potential NMPs to meet course pre-requisite takes time and planning.	Forward planning – succession planning for course pre-requisites.	“I would say that the physical assessment in clinical reasoning module is probably a better one to do first, because it enhances the non-medical prescribing, and gives the clinician confidence....But until you do the physical assessment course, you don’t have that absolute strength of conviction that the history-taking is the

			<p><i>most valuable...So, I would say that will hold back people who haven't done either, being a bit scared from doing it..." (MS2-D11)</i></p> <p><i>"You've got to have the dietitians behind you, who are confident and comfortable in doing (D-SP), and you need quite a lot of experience, I think, to feel that "Actually, I could cope with that." I think you've got to have been working for quite a while, I think, to be safe". (MS2-D11)</i></p>
	Lack of ongoing support.	Ongoing support provided for trainees.	<p><i>"I got time out to attend the college things but all the kind of writing up and things I ended up doing in my own time, really, because we're a small service so they can't kind of like support me."(MS1-D12)</i></p> <p><i>"I think it probably depends on, unfortunately, the Consultant team behind you. I know that some of the teams won't have that support and supervision, which is quite good that they've changed the supervision rules in that it can be somebody who's been prescribing for X number of years, that that will help because then they don't need that Consultant behind them, But ultimately they still do as a Dietitian because of the CMP side of things, so I think that is probably the biggest thing is actually support, and the time to do it because it is a huge amount of work. I was not backfilled when I did mine, so I did it all through and outside of work, so it's a huge amount of work". (MS2-D23)</i></p>
	Lack of confidence in using D-SP in unfamiliar (deployed) roles or for remote consultations (influenced by covid-19).		<p><i>"Look, SP, it's messy, and you find workarounds but working within something that messy, it's not easy. Especially for the new roles, who are working at an advanced clinical level (that are) suddenly doing things they've never done before.....it's definitely challenging working with clinical management plans". (MS2-D7)</i></p> <p><i>"I can definitely see it would benefit some roles more than others. For example the FCP role where we have a direct line to a number of GPs...easy. Same of the acute ones; if we know then that for TPN prescribing for example, the Consultants are going to support those (CMPs for) individual patients. For community, for our wider teams where they span across a whole heap of GP surgeries, it's going to be really difficult to have all those agreements in place...so those posts are going to make it a lot more difficult to then realise the benefit of SP. I would say that would be a hindering factor". (MS2-D22).</i></p>

iii) TR-IP uptake by geographical location or catchment area

Categories	0 TR-IPs	1 TR-IP	2 TR-IPs	2+ TR-IPs
<b>Catchment demographics</b>				
Urban	8	5	6	3
Rural		1		
<b>FTE TRs</b>				
Under 20FTE				1
20-40 FTE	3	4	4	
40-60 FTE	5		1	
60-80 FTE		1	1	1
Over 80 FTE		1		1

iv) Overview key barriers and facilitators of TR-IP and additional issues at follow-up

Theme	Barrier	Facilitator	
<p><b>1. Demonstrating need for TR-IP</b></p> <p>Ability to demonstrate need/benefits of TR-IP to make a case for resources to train and employ TR-IP.</p> <p><b>Stages</b></p> <p><i>Important but not necessary for early adopters (individual drive and motivation more influential in early adoption)</i></p> <p><i>Increasingly important for late adopters and for ongoing development and sustainability</i></p> <p><i>Ability to demonstrate need was enhanced by</i></p>	<p>Other systems in place which are deemed sufficient, e.g., availability of medical prescribers, nurse prescriber, PGD.</p>	<p>Lack of available prescriber (e.g. shortage of consultants), weekend cover and out-of-hours. Existing mechanisms are less efficient, e.g. setting up PGDs takes too long. PGD is restrictive in scope.</p>	<p><i>“We have to establish what the need is. There’s no point in training up prescribers if there’s nothing to prescribe. So, for me, it’s got to be about once this person is qualified as a prescriber, how do we use them?” (MS1-TR9)</i></p> <p><i>“There’s this realisation now that we can’t continue to work in these restricted roles with no overlap between the different disciplines, especially in radiotherapy. You know, that just doesn’t work anymore, there’s not enough medical staff, there’s not enough physical staff. So, where we can take over parts of people’s roles in an area where we already exist – so the radiographers are already in the department, this is their base, they’re already seeing the patients, they have the knowledge and experience. So, I think partly the lack of resources has made people more adaptable or have to consider different options.” (MS1-TR8)</i></p> <p><i>“If they (consultant oncologists) do not have to come down and do that (prescribing) job...they are overworked, and have got at least two vacancies ... most of our consultants have three sub-specialities rather than the two recommended. I mean, [region of the UK] has the worst oncologist to patient ratio in the country.... If there is something we can do for them, then that is something that they are usually happy for us to take on.” (MS2-TR21)</i></p>
	<p><b>Difficulty achieving balance in skills mix within MDTs over the long term. Issues of deskilling,</b> role blurring and duplication of care between prescribing professions.</p>	<p><b>Covid pandemic reduced availability of nurse and consultant prescribers.</b> Increased complexity of patient care needs exposed gaps in treatment pathway to access medicine, making TR-IP need more visible.</p>	<p><i>“With just one when she’s not here there’s no service and then with two there’s some cross-cover, but really to have a proper service it needs to have that resilience.” (MS1-TR8)</i></p> <p><i>“It’s almost been driven by need; with all the Covid pressures, the middle grade doctors that would normally support if the radiographers needed prescriptions, they’ve been very thin on the ground and very stretched so we’ve stepped up to fill that need. I think without having those independent prescribers in post it would have been incredibly challenging, and we’d have had a lot of patients waiting a long time for prescriptions and possibly trying to put pressure back on to GPs to send them out for prescriptions...”. (MS2-TR21)</i></p>



staff shortages during covid-19			<i>"We just need to be clear that we're not (implementing NMP) to the detriment of the development of others and really adding value. We've already got a CNS who's got IP, and actually we need to work in ways that allow us to tap into existing skills and existing expertise rather than trying to silo our own needs". (MS2-TR19)</i>
	Cancer type requires few prescriptions for side effects. <b>'One size fits all' approach (doesn't work as TR-IP need is context specific).</b>	Cancer types where medications are frequently required for side effects or treatment. Need for TR-IP is specific to each context/ patient group.	<i>"We (need) to ensure that we are utilising resource appropriately and that we are thinking about patient pathways much more cohesively....and not just hearing "Well, it's worked in a different tumour group so (it'll) work here". (MS2-TR19)</i>
	Prescribing controlled drugs by SP time consuming	Cost saving of using a TR-IP as opposed to a clinical oncologist	
	Negative effect where there are no demonstrable benefits of TR-IP, e.g. qualified TR-IP who did not go on to register as a prescriber and use their qualification over 2 years.	Demonstrable improved patient access to medications, reduced waiting times, streamlining patient pathway, quality and continuity of care. Facilitated by benefits evident from existing TR-IPs in trust.	<i>"It's good if the patients can come to one place and get all the support they need without sending them off to different individuals and they see the radiotherapy staff every day, they get to know them, they feel comfortable with them. So, I think it's best for the patient if they get that support within radiotherapy." (MS1-TR12)</i>  <i>"I think because of the failure of this one individual to move us forward and to evidence that it is doable is... in of itself has acted as a barrier to us actually prescribing, making this a wider project, so... I do think that if we can get the first one through and show a positive effect, then I think the barriers would then be around staffing because if I then release the others to backfill their previous job as they are taking on more roles where they would utilise this skill, so workforce is an issue". (MS2-TR21)</i>
	Smaller teams	Greater resilience and flexibility in teams of more than 1 TR-IP	
		Greater accountability of prescribing decisions	
<b>a. Leadership, MDT support and organisational culture</b>  Attitudes and approach towards TR-IP within the organisation, including	Lack of support, or cautious style of managerial leadership for driving TR-IP roles  (Focus on concerns, e.g. TR-IPs may leave once qualified, limited scope of practice, risk averse)	Pro-TR-IP and AHP prescribing leadership, enthusiasm and drive  (Focus on benefits e.g. efficiency, improving access to medicines, innovation, best use of skills, staff retention). Managers receptive to change. Facilitated by seeing benefits	<i>"When the independent prescribing came in it coincided with the time when we had a new general manager who was a paramedic by background who'd also just done independent prescribing himself who's quite a strong character... so we sort of hit the sweet spot where they were feeling a bit more open to suggestions about moving forward." (MS1-TR10)</i>

<p>managerial and Multi-disciplinary Team (MDT).</p>	<p>Hampered by lack of benefits if TR-IP not fully implemented. AHP lead is a nurse.</p>	<p>mentioned in theme 1. Change in management to a more pro-AHP manager.</p>	<p><i>"We've got a new chief AHP... and she's starting to drive a lot more of the conversations around, "We are AHPs, we can do lots of different things, we need to have things on an equal footing, and it needs to be nurses and AHPs, not just nurses." (MS2-TR18)</i></p>
<p><b>Stages</b></p> <p><i>Some element of support is essential for adoption, although TR-IP can succeed with resistance from some MDT members.</i></p> <p><i>Wider and high level support required for ongoing development and sustainability.</i></p> <p><i>Support increases where benefits of TR-IP are visible.</i></p>	<p>Low visibility and awareness of advanced TR-IP roles and their benefits within organisation</p> <p>Misunderstanding or resistance to TR-IP by MDT, (clinicians, nurses, pharmacists, AHPs). Nurse-IP led trust ethos continues to hamper TR-IP.</p> <p>Lack of trust of TR-IPs trained outside of organisation. Lack of agreement between managers at different levels in organisation.</p>	<p>Role modelling, visibility, of consultant and ACP TR-IP posts within organisation. Facilitated by Covid-19.</p> <p>Understanding and acceptance of TR-IP roles by MDT. Pro-active approach to promoting understanding of TR-IP roles.</p> <p>Trust increased over time, especially with TR-IPs trained within trust.</p> <p>Unity of approach between radiotherapy managers and divisional managers.</p>	<p><i>"I don't think you necessarily need to be an ACP to be a prescriber. As a manager you need to make it very clear that just because you are doing this, you are not necessarily going to move on to be an ACP. It is an additional skill. Prescribing in itself doesn't make you an ACP but it is starting you in the manner that you need to be thinking if you want to go down that ACP route to be able to work autonomously and follow clear guidelines and ultimately be responsible". (MS2-TR19)</i></p> <p><i>"We had somebody from outside the Trust, and somebody trained inside the Trust. The one trained inside gained much more support than the person from outside. Because the person outside came with the independent prescribing already, there was a reticence to acknowledge it within the medical profession. It was really frustrating...I can only take it, (that) because it was a non-doctor, they almost wanted them to prove themselves again, even though they had the prescribing qualification". (MS2-TR18)</i></p> <p><i>"Our clinic nurses here, their resistance on the basis that they feel that we would be taking over their work. They are very suspicious ... My head and neck practitioner found out that (nurses) were giving radiotherapy advice to all head and neck cancer patients and he asked to come and observe what information was being handed out ...they are not cooperating. He is not getting access to these clinics. If we mention getting review radiographers into the clinics, the nurses go further up the chain to say, 'This is going to interfere with my service and my income that I am generating from this service.' It is a very nurse-led trust". (MS2-TR21)</i></p>
<p><b>b. Organisational preparation</b></p> <p>NMP Policy and procedures in place to support TR-IP.</p> <p>Access to funding for TR-IP training and backfill.</p>	<p>Lacks up to date NMP policy inclusive of TR-IP. Restricted scope of prescribing practice allowed in organisation.</p> <p>Lack of ACP strategy and funding to support role development. Inconsistency in AP/ACP role definition, alignment with ACP framework and banding.</p>	<p>Has up to date NMP policy in place, inclusive of TR-IP, as part of a wider strategic vision. Flexibility to expand scope of prescribing practice.</p> <p>Strategy and/or clarity over role advancement to advanced and consultant radiographer roles and banding.</p>	<p><i>"I think because there were already some non-medical prescribers who were independent prescribers in place we weren't sort of bashing down barriers if you like...There was a process in places, there was a clear pathway for how to enable it through pharmacy etc and who were the links that we needed to get everything set up through and how we acknowledge with the trust that [IP] has passed his non-medical prescribing and that he'd got the right processes behind him to set it up and review it going forward." (MS1-TR9)</i></p> <p><i>"(AP has) created for the profession as a whole... the career stream that we didn't have before. Within radiotherapy it was generally you either treated a patient, you planned a patient, or you're a manager. But now we've got this whole other route for clinical expertise, that you can get to a reasonable level and not go into management. So, it is creating another career stream. And that then improves accessibility to opportunities, and having the NMP along with that, for a lot of people it's aspirational. And that's what we're starting to see, that people want to aspire to</i></p>

<p>Clarity of organisational stance on the alignment of ACP with TR-IP, job banding and funding to support this.</p> <p><b>Stages</b></p> <p><i>Preparation usually poor for early adopters who tend to prepare the ground for future TR-IP.</i></p> <p><i>Preparation improves over time where TR-IP supported, but poor support can continue to hamper uptake, transition to implementation and sustainability.</i></p> <p><i>Role of funding for ACP TR-IP roles and career planning is increasingly important over time for sustainability.</i></p>			<i>get to that, and can start to see the different steps that they need to take to get there. I definitely think we've seen it over the last two or three years". (MS2-TR18)</i>
	Procedures to enable prescribing once qualified are lacking and lead to delay.	Procedures are in place to smooth the transition period once qualified.	
	Difficulty accessing funding for TR-IP training. Funding unpredictable or given at short notice. Aligning fundings opportunity with readiness of practitioner. Time limits to funding at odds with duration of NMP programmes.	Ease of access to funding for TR-IP training. Funding consistent and reliable. Flexibility.	<i>"I think every year we get our health education funding for the region, and we can tap into that, but it gets swallowed quite quickly and each year there's no guarantee that you're going to have – I mean, we do our learning needs analysis and say how many we need each year but there's no guarantee we'll get that by any stretch of the imagination. It just seems rather ad hoc as to how that pot is disseminated." (MS1-TR9)</i>
	Competition with other NMPs such as nurse prescribers.	TRs given equal consideration as other NMP candidates.	<i>"Each year we do a training needs analysis, but we never quite know what the pot of money is and you find out from HE in September, when you did your training needs analysis April to April. It's just a flawed system. We put in for two non-medical prescribing posts this year (our APs) and we almost like to do that on a recurring basis until we reach saturation point. And it's just really difficult to plan ahead when you don't know what funding you're going to have for these roles and development". (MS2-TR18)</i>
			<i>"We have not really had one (AHP lead) for the last five years because the person who was... they were a nurse. They were nominally our AHP, but they did not see anything wrong with that. I think certainly the AHP voice needs to be stronger within the trust. It is not just radiographers who want to prescribe. I mean, the whole raft of AHPs have a role to play and potentially could do independent prescribing, so, I think we need a strong AHP lead to push things like this". (MS2-TR21)</i>
	Difficult to find the right candidate and fill places.	Planning and preparing future NMPs so can apply at short notice. Succession planning to prepare for future development of TR-IP.	<i>"I think they are becoming more aware of non-nursing, non-medical prescribers, so I think it's not huge changes, but more of an acknowledgement that there are staff groups beyond nursing. I think in particular, pharmacy have been very supportive, and they've supported our new non-medical prescribers through the processes that they needed to do that". (MS2-TR18)</i>
			<i>"I think from the feedback I've received from some individuals it can be quite challenging. So that would probably be one of my concerns... whilst probably being very good at their job the treatment review radiographer might not necessarily be able to cope with the demands of the training." (MS2-TR7)</i>

			<p>"I cannot progress them and move them on into a higher role if I cannot fill the role that they are currently fulfilling. You are again in a Catch-22 situation, so you keep taking these baby steps and then we will get there, but it is not an easy deliver....I have got seven vacancies, which constitutes about twenty percent of my workforce". (MS2-TR21)</p>
	<p>Difficulty finding staff cover during NMP training. Further hampered by staff shortages due to Covid-19.</p>	<p>Access to backfill for staff.</p>	<p>"I think the one thing I wasn't anticipating as much was the number of clinical hours, they needed to complete the course in such a short time scale... it makes it more difficult in a smaller department." (MS1-TR1)</p> <p>"I think the biggest problem for me has been freeing up staff, so it's just about making sure I've got plenty of backfill". (MS1-TR10)</p>
<p><b>c. Job satisfaction and career progression</b></p> <p><b>Stages</b></p> <p><i>Job satisfaction and motivation key in adoption phase.</i></p> <p><i>Career progression and development of ACP roles within organisations supports sustainability. Balancing equity of access to career progression to maintain staff motivation increases in importance over time.</i></p>	<p>Lack of clarity over alignment of TR-IP with career pathway. Lack of definition and role modelling. Expectation that TR-IP will lead to higher job banding.</p> <p>Lack of equity in progression.</p>	<p>TR-IP facilitating new clinical career pathways, either AP or ACP. Pathway is becoming more visible, defined, role modelled and established.</p> <p>Aspiring to equity in approach to career progression for all staff.</p>	<p>"Just because we might support you doing your independent prescribing does not mean you're going to get a shoo-in on an ACP, there's no guarantee of that. We haven't had those conversations of "You're going to do this," because it's not an easy course to do, there's a lot of blood, sweat and tears that goes into it for them individually, so if they're going to do it, they have to do it because they want to do it for themselves rather than because they think it's going to be that next step into an 8A ACP role, because there's no guarantee of that". (MS2-TR19)</p> <p>"Do you develop individual staff where you see they've got competence and drive and desire to make things better, but actually then when it comes to it in three years' time we may have an ACP post, and how will we then fare if we've only been able to give resource to one individual? You're almost making a job for the individual, and that kind of goes against what we're used to in healthcare. Maybe it is the right thing; maybe we need to drive passion and inner drive (and) it is about talent management...." (MS2-TR19)</p>
	<p>Cost implications of higher band ACP prescribing roles.</p>	<p>Including TR-IP in job descriptions. 'Talent management': designing bespoke jobs to match individuals.</p>	<p>"So, succession planning on a piece of paper and talent management on a piece of paper are so far away from the realities of running a clinical rota where you can't even guarantee someone's going to be on the same machine two days in a row, never mind that they're going to be on this or that course". (MS2-TR19)</p>
	<p>Length of time and planning required to progress staff to ACP level</p>	<p>Increased motivation, job satisfaction, autonomy and flexibility. Facilitated by new career opportunities mentioned above.</p>	<p>"I think one of the biggest challenges is that staff expectation piece. How do we justify when we've got one person who very well understands that they're doing this practice under their own belt because they want to do it, not because they're being asked necessarily by other managers because of service needs, how do we then make it fair to other people at the same banding who want to do the same yet we might say "We can't free you off rota because the rota's now worse." So I think that managing staff expectation in itself becomes an element of a barrier, because you want to run happy teams and give people good development opportunities and clear career pathways, and it's not that straightforward". (MS2-TR18)</p>

	Difficulty recruiting and retaining staff. Further hampered by national staff shortages. Stronger barrier for smaller and rural trusts.	Improving staff recruitment and retention.  Attracting and retaining staff is easier in larger trusts.	<i>“Succession planning is a significant issue for all departments. Some of the big well-known ones, [hospital names] attract staff. Little departments like myself here in [town name] or some of the more rural towns struggle more to attract staff to be able to push staff towards that. And it is the same with consultant practitioners... it depends on the size of your department and all those factors as to whether or not you can actually push a business case through, get the staff there to release them to do those roles”. (MS2-TR21)</i>
<b>d. The prescribing programme and supervision support</b>	Reluctance of TRs to undertake NMP training due to course difficulty or timing of career.	Strong motivation of TRs to become TR-IPs and career development opportunity. Continued to be key driver at follow-up.	<i>“And that then (AP framework) improves accessibility to opportunities, and having the NMP along with that, for a lot of people it’s aspirational. And that’s what we’re starting to see, that people want to aspire to get to that, and can start to see the different steps that they need to take to get there. I definitely think we’ve seen it over the last two or three years... a real aspiration to do these sort of clinical expertise roles”. (MS2-TR18)</i>
<b>Stages</b>	Shortage of consultants willing to supervise TR-IP trainee in practice	Willingness of consultants to supervise TR-IP trainees	
<i>Primarily relevant to the preparation and training stages and influencing uptake of TR-IP.</i>	Skilling up potential NMPs to meet course pre-requisite takes time and planning.	Forward planning – succession planning for course pre-requisites. Inclusion of physical assessment training within NMP course.	<i>“I think it’s staff in the right place at the right time. However much you think you might want it, if you haven’t got the experience in that place at the right time, it’s not appropriate”. (MS2-D11)</i>
<i>Succession planning for future TR-IPs influences sustainability</i>	Lack of support. Loss of confidence if there is a gap between qualifying and prescribing (e.g. maternity leave)	Ongoing support provided for trainees. Buddying system to improve confidence after gap.	<i>“One of the four (TR-IPs) is actually on maternity leave, so she didn’t really get very much experience with the prescribing before she went off so we’re going to do a bit of a buddy system when she comes back to get her confidence back up and get her... She’s due back early next year so we’ll just give her some support to get her skills back up and any training she needs”. (MS1-TR10)</i>
	Perceived lack of relevance of course content		
	Lack of locally available courses	Improved access to NMP courses	
	Covid-19 related disruption and delay to preparatory training (e.g. assessment & diagnosis) and to NMP training programmes.		

## Prescriber Survey 1

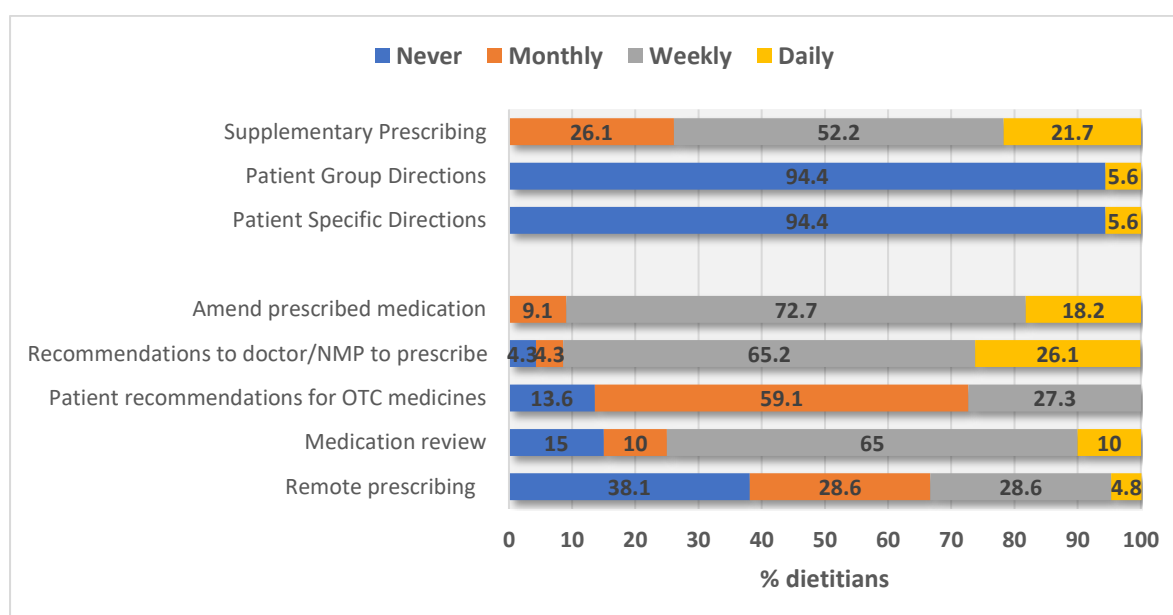
### v) Reasons for not prescribing

Reasons for not prescribing (can indicate > 1)	Dietitians (n=15)	Therapeutic radiographers (n=7)
Delayed HCPC registration/organisational approval of NMP	3	6
CMP (time to arrange/approve CMP, no designated doctor)	5	
Covid-19 related delays or role change	4	
Lack of organisational infrastructural support	3	
Lack of MDT understanding/support for NMP	3	
Role change	1	1

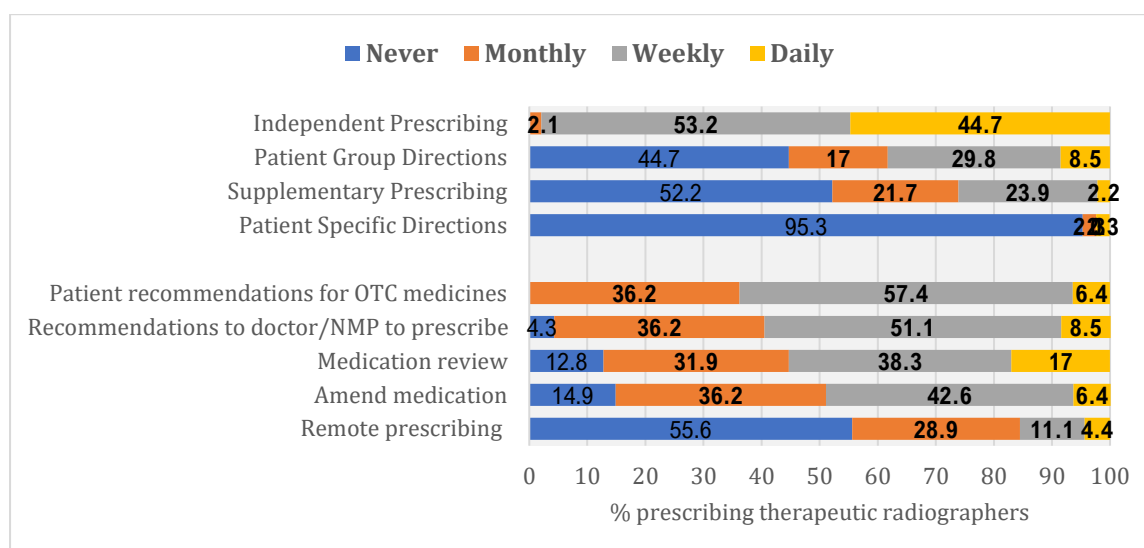
### vi) Number of items prescribed using independent and supplementary prescribing in a typical week

Number of items per week	Dietitians (n=38)	Therapeutic Radiographers (n=54)			Total sample (n=92)
	SP	IP	SP	Total Items	Total items
0	15 (39.5%)	7 (13.0%)	37 (68.5%)	7 (13.0%)	22 (23.9%)
1-5	16 (42.1%)	18 (33.3%)	15 (27.8%)	14 (25.9%)	30 (32.6%)
6-10	6 (15.8%)	15 (27.8%)	0 (0.0%)	16 (29.6%)	22 (23.9%)
11-20	1 (2.6%)	8 (14.8%)	2 (3.7%)	7 (13.0%)	8 (8.7%)
>20	0 (0.0%)	6 (11.1%)	0 (0.0%)	10 (18.5%)	1 (10.9%)
Mean (SD)	3.1 (4.4)	10.3 (13.1)	1.3 (3.5)	11.6 (14.6)	8.1 (12.2)
Median (range)	2.5 (0.0-20.0)	6.75 (0.0-75.0)	0.0 (0.0-20.0)	7.5 (0.0-75.0)	4.75 (0.0-75.0)

### vii) Methods used by prescribing Dietitians (n=23) to supply, administer or prescribe medicines



viii) **Methods used by prescribing Therapeutic Radiographers (n=47) to supply, administer or prescribe medicines**



ix) **Barriers and facilitators to dietitian supplementary prescribing**

Barrier	n (%)	Facilitator	n (%)
CMP/SP restrictions	29 (38.7%)	Peer/team member support	14 (20.6%)
COVID	5 (6.7%)	Medical support	12 (17.6%)
Time constraints	5 (6.7%)	Managerial support	8 (11.8%)
Trust systems	5 (6.7%)	NMP lead/Trust NMP groups	7 (10.3%)
Inter-professional conflicts	4 (5.3%)	Ongoing CPD	6 (8.8%)
Lack of SP/CMP understanding	4 (5.3%)	Trust support/ systems	4 (5.9%)
Restricted scope of practice/ formulary	4 (5.3%)	Pharmacy	3 (4.4%)
IT/electronic prescribing	3 (4.0%)	BDA groups/ forums	3 (4.4%)
Lack of opportunity to prescribe	3 (4.0%)	Previous experience	1 (1.5%)
Bureaucracy	3 (4.0%)	Confidence	1 (1.5%)
Lack of budget	2 (2.7%)	BNF and EMC	1 (1.5%)
Patient consent for SP/CMP	2 (2.7%)	Personal motivation & commitment	2 (2.9%)
Lack of supervision/ support	2 (2.7%)	Drug company representatives	1 (1.5%)
Lack of confidence	1 (1.3%)	COVID	1 (1.5%)
Lack of ACP/AP roles	1 (1.3%)	NMP lecturer support	1 (1.5%)

x) **Barriers and facilitators to therapeutic radiographer independent prescribing**

Facilitator	n (%)	Facilitator	n (%)
Peer/team member support	14 (20.6%)	Medical support	32 (25.4%)
Medical support	12 (17.6%)	Peer/team member support	26 (20.6%)
Managerial support	8 (11.8%)	NMP lead/Trust NMP groups	11 (8.7%)
NMP lead/Trust NMP groups	7 (10.3%)	Ongoing CPD	11 (8.7%)
Ongoing CPD	6 (8.8%)	Trust support/ systems	9 (7.1%)
Trust support/ systems	4 (5.9%)	Pharmacy	9 (7.1%)
Pharmacy	3 (4.4%)	Managerial support	7 (5.6%)
BDA groups/ forums	3 (4.4%)	BNF	5 (4.0%)
Previous experience	1 (1.5%)	Patients	4 (3.2%)

<b>Confidence</b>	1 (1.5%)	<b>Peer/self-reflection</b>	3 (2.4%)
<b>BNF and EMC</b>	1 (1.5%)	<b>Medicines management team</b>	2 (1.6%)
<b>Personal motivation &amp; commitment</b>	2 (2.9%)	<b>Prescribing experience</b>	2 (1.6%)
<b>Drug company representatives</b>	1 (1.5%)	<b>Motivation to improve care</b>	2 (1.6%)
<b>COVID</b>	1 (1.5%)	<b>SCoR support</b>	1 (0.8%)
<b>NMP lecturer support</b>	1 (1.5%)	<b>Clinical time</b>	1 (0.8%)
		<b>Work practice changes</b>	1 (0.8%)

*BNF – British National Formulary, CPD – continuous professional development, ECM - Electronic Medicines Compendium, SCoR – Society & College of Radiographers,*



## Prescriber Survey 2

### xi) Reasons for not prescribing

Reasons for not prescribing	Therapeutic radiographers (n=1)	Dietitians
		(n=5)
CMP logistics (difficulties with implementation or contextual fit)	-	<p>"Am unable to use SP due to ongoing problems with electronic medical records and ordering of PN. The system allows dietitians to propose orders of PN that are then signed off by a Dr – (it) only allows us to be a full prescriber or to propose. There is no way that I can effectively use my SP qualification under the current system"</p> <p>"Been difficult to incorporate (SP) into cystic fibrosis clinics (because of the) tripartite agreement, as the consultant still needs to speak with patient and get agreement for dietitian to prescribe and does not save time. Consultant feels just as quick to prescribe without need to hand over to dietitian. Use of IP would be lot more useful"</p> <p>"Unable to overcome barriers that come with SP with regards to changing independent prescribers on a weekly basis and burden of completing a CMP vs. requesting someone else prescribes on my behalf. Also issue of patient consent if sedated"</p>
Lack of confidence	-	"My previous team made it difficult to put my prescribing skills into practice. I moved to new employer during 1st COVID wave and SP wasn't priority. Have lost all the skills gained during the course, so would not feel safe prescribing"
Role change	"No longer in patient facing role."	"Role changed since completing prescribing qualification, was clinical, now in management role"

### xii) Changes in employment and service provision over past 18 months

	Dietitians (n=16)		Therapeutic Radiographers (n=18)		Total Sample (n=34)	
	n	%	n	%	n	%
<b>Change in employment</b>						
No change	15	83.7	17	94.4	32	94.1
Change in employer	0	0.0	1	5.6	1	2.9
Change in employer & geography	1	6.3	0	0.0	1	2.9
<b>Change in service delivery over past 18 months</b>						
No change	12	75.0	16	88.9	28	82.4
Role change – job title, non-patient facing role	0	0.0	2	11.1	2	5.9
Remote/virtual consultations, reduced number of clinics	4	25.0	0	0.0	4	11.8

xiii) Changes to clinical caseload reported by dietitians and therapeutic radiographers

In the last 18 months, have there been changes in the following:	n (%) indicating "Increased" versus "Decreased"/"Stayed the same/Don't know"			p value
	Dietitians	Therapeutic Radiographers	Total sample	
Q28: The number of patients in my case load that require a medicines decision (n=33)	11 (68.8)	8 (47.1)	19 (57.6)	0.208
Q29: The proportion of patients in my case load who have complex care needs (n=32)	10 (62.5)	6 (37.5)	16 (50.0)	0.157
Q30: The ability of the team to provide care when there is no doctor (or other prescribing professional) available (n=33)	7 (43.8)	8 (47.1)	15 (45.5)	0.849
Q31: The number of therapeutic radiographer/ dietitian prescribers in my team (n=33)	3 (18.8)	10 (58.8)	13 (39.4)	0.019
Q32: Are there plans to increase the number of therapeutic radiographers/ dietitians who can prescribe in the team over the next few years? (n=33)	10 (62.5)	11 (64.7)	21 (63.6)	0.794

xiv) Changes in prescribing practice reported by prescribing dietitians and therapeutic radiographers

Change	Profession	Participant quote
<b>Prescribing frequency decreased</b>	TR	"More frequent use of GP advisory letter for prescription. More frequent telephone follow up/review rather than face to face".
	TR	"Dictate more letters to GP asking them to prescribe hormone therapy for patients".
	D	"Prescribing less often since COVID as change in service demand meant less input given to dialysis patients."
	D	"Adjustments using downloads from diabetes technologies during covid."
	D	"Made the decision not to prescribe remotely at beginning of the pandemic, have not prescribed for over 1 year. Am an isolated new SP (only dietitian in department) and was not familiar to remote prescribing and working outside my usual area to help out in the pandemic."
	D	"Was on leave for 12 months so less prescribing - required to complete a return to practice form so just started prescribing again."
<b>Prescribing frequency increased</b>	TR	"Patients have difficulty getting to GP whilst on daily RT especially since the pandemic - doing more repeat prescribing"
	D	"Now have an outpatient NG policy which has increased the need for me to prescribe re feeding prophylactics and nutritional replacements".
	D	"Frequency is slowly increasing as face to face clinics have started to increase".
	D	"Prescribing more frequently"
<b>Change in delivery of prescribing</b>	TR	"Now main mode of prescribing is electronic - changed due to Covid".
	TR	"Since covid more remote prescribing due to telemed reviews where face to face reviews not possible".
	TR	"When self-isolating was using remote prescribing for some medications".
	TR	utilising shared care agreements more often
	TR	"Range of prescriptions has increased".

<b>Change in scope of prescribing practice</b>	TR	<i>"I now specialise with breast cancer, prescribe more hormone and bisphosphonates".</i>
	D	<i>"Taken over the cinacalcet MDT prescription from a consultant using SP".</i>

xv) NMP clinical governance systems- survey 2

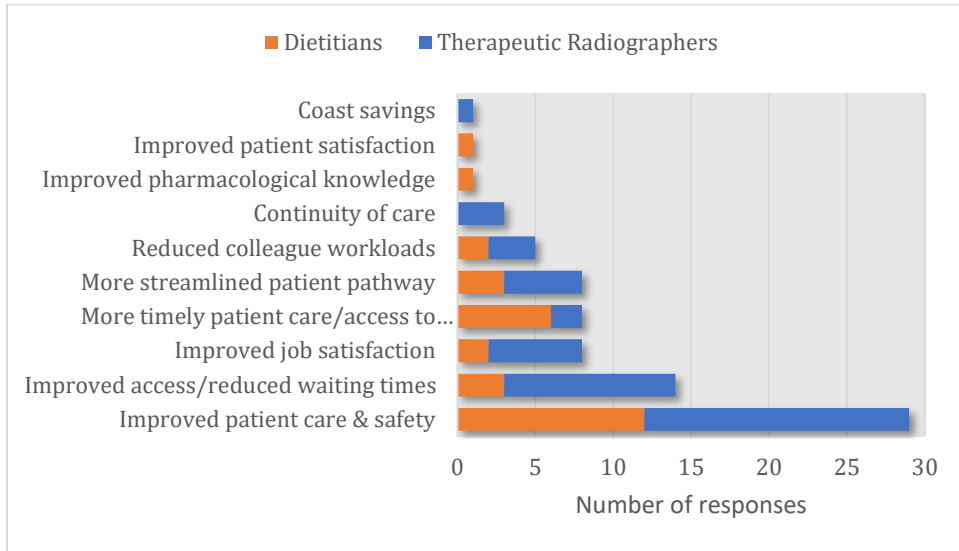
To what extent are the following aspects of non-medical prescribing clinical governance in place in your area of practice?	n (%) stating "yes" (vs. no/unsure)			
	Dietitians	Therapeutic Radiographers	Total Sample	p value
<i>a) An up-to-date non-medical prescribing policy relevant to my profession &amp; prescribing practice (n=33)</i>	10 (62.5)	15 (88.2)	25 (75.8)	0.212
<i>b) Specimen signature provided to employer/local pharmacist (n=30)</i>	11 (78.6)	16 (100.0)	27 (90.0)	0.051
<i>c) Access to all relevant clinical information e.g. Patient Safety Notices, Drug Alerts and Hazard Warnings (n=33)</i>	15 (93.8)	15 (88.2)	30 (90.9)	0.582
<i>d) Access to each edition (electronic/print) of the British National Formulary (BNF) (n=33)</i>	15 (93.8)	17 (100.0)	32 (97.0)	0.295
<i>e) An agreed scope of practice (n=32)</i>	14 (93.3)	16 (94.1)	30 (93.8)	0.927
<i>f) Non-medical prescribing lead contact details (n=33)</i>	15 (93.8)	16 (94.1)	31 (93.9)	0.367
<i>g) Access to continued professional development (CPD) to support me in prescribing role (n=32)</i>	12 (80.0)	14 (82.4)	26 (81.3)	0.986
<i>h) Involvement, now or in the future, with regular clinical audit &amp; review of my clinical services (n=33)</i>	12 (75.0)	14 (82.4)	26 (78.8)	0.796
<i>i) Involvement, now or in future, in the development of local formularies &amp; guidelines (n=32)</i>	7 (46.7)	9 (52.9)	16 (50.0)	0.298
<i>j) Access to regular data to monitor my prescribing practice (n=31)</i>	5 (35.7)	6 (35.3)	11 (35.5)	0.990
<i>k) Access to my own prescribing data (via prescribing analysis &amp; cost tabulation (PACT) or otherwise) (n=30)</i>	4 (30.8)	3 (17.6)	7 (23.3)	0.520

xvi) Impact of NMP

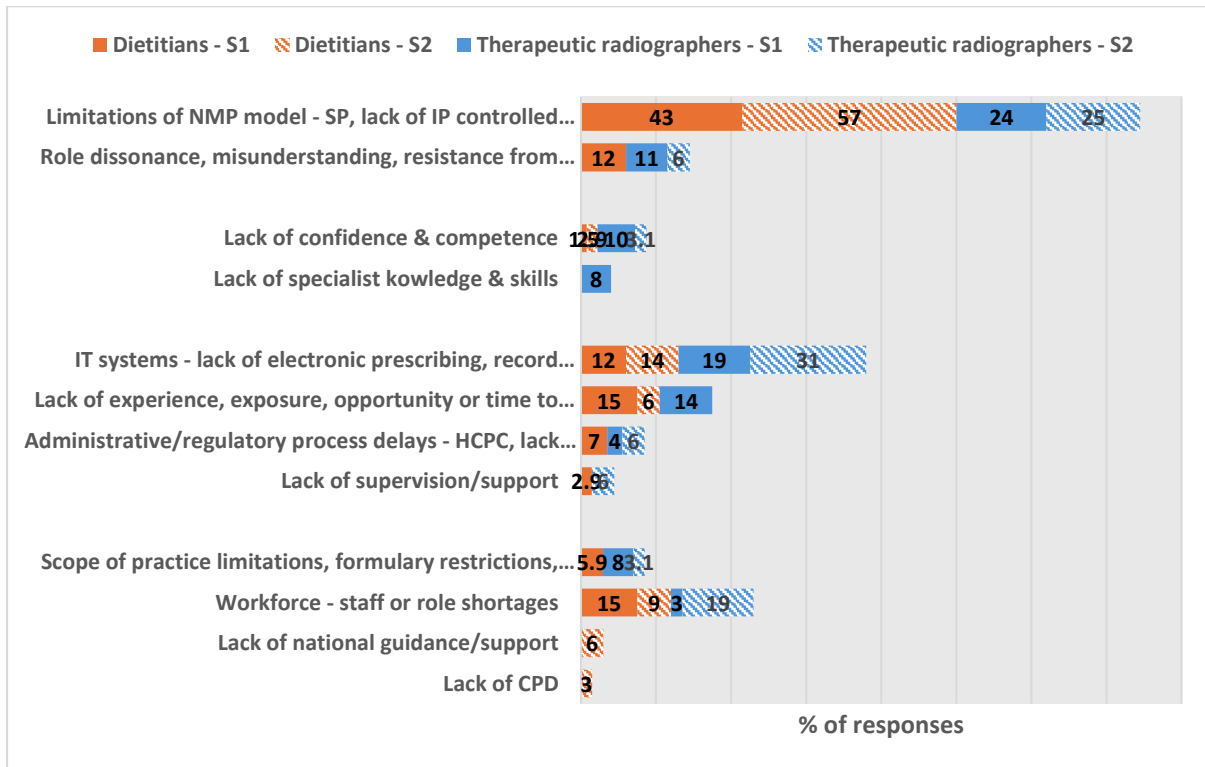
To what extent has your prescribing practice resulted in the following benefits?	n (%) stating "A Lot" (vs. A Little/Not At All)				S1 compared to S2 total sample
	Dietitians	Therapeutic Radiographers	Total Sample	p value	
<i>a) Reduced waiting times for patients once at appointment? (n=30)</i>	8 (61.5)	15 (88.2)	23 (76.7)	0.177	0.257

<b>b) Streamlined services, i.e. fewer patient appointments with fewer health care professionals? (n=30)</b>	8 (61.5)	15 (88.2)	23 (76.7)	0.177	0.304
<b>c) Increased patient choice with regards to healthcare professional accessed and convenience? (n=30)</b>	5 (38.5)	11 (64.7)	16 (53.3)	0.202	0.480
<b>d) Saved time arranging prescription from doctor or other prescriber? (n=31)</b>	10 (71.4)	16 (94.1)	26 (83.9)	0.046	0.580
<b>e) Reduced use of emergency services such as ambulance, A&amp;E visits, out-of-hours service? (n=30)</b>	1 (7.7)	3 (17.6)	4 (13.3)	0.208	0.281
<b>f) Reduced length of hospital stay? (n=30)</b>	1 (7.7)	3 (17.6)	4 (13.3)	0.183	0.633
<b>g) Prevented hospital admissions? (n=30)</b>	3 (23.1)	7 (41.2)	10 (33.3)	0.044	0.197
<b>h) Enabled more holistic care? (n=31)</b>	10 (71.4)	15 (88.2)	25 (80.6)	0.130	0.623
<b>i) Increased patient satisfaction? (n=31)</b>	8 (57.1)	15 (88.2)	23 (74.2)	0.135	0.222
<b>j) Improved access, e.g. can offer prescription when doctor not available or offer different services? (n=31)</b>	7 (50.0)	15 (88.2)	22 (71.0)	0.011	0.988
<b>k) Increased ability to select the most appropriate medication for the patient? (n=31)</b>	8 (57.1)	15 (88.2)	23 (74.2)	0.079	0.832
<b>l) Improved specificity and responsiveness of prescribing (e.g. better placed to adapt or change treatment, titrate doses and reduce exposure to risk/side effect)?(n=31)</b>	8 (57.1)	13 (76.5)	21 (67.7)	0.100	0.573
<b>m) Reduced unnecessary prescriptions? (n=29)</b>	4 (33.3)	8 (47.1)	12 (41.4)	0.156	0.459
<b>n) Improved communication with patients about medicine? (n=31)</b>	10 (71.4)	14 (82.4)	24 (77.4)	0.110	0.222
<b>o) Improved medicines management? (n=30)</b>	6 (46.2)	13 (76.5)	19 (63.3)	0.141	0.860
<b>p) Improved safety? (n=30)</b>	7 (53.8)	12 (70.6)	19 (63.3)	0.191	0.358
<b>q) Improved my knowledge (e.g. understanding of pharmacology and prescribing)? (n=31)</b>	10 (71.4)	16 (94.1)	26 (83.9)	0.127	0.062
<b>r) Increased my job satisfaction? (n=31)</b>	10 (71.4)	16 (94.1)	26 (83.9)	0.087	0.875
<b>t) Improved team working? (n=31)</b>	8 (57.1)	16 (94.1)	24 (77.4)	0.044	0.967
<b>u) Clarified lines of accountability and responsibility for treatment decisions? (n=31)</b>	7 (50.0)	8 (47.1)	15 (48.4)	0.643	0.390

**xvii) Top three areas where prescribing had been of benefit to services**



**xviii) Top three barriers of NMP reported by dietitians and therapeutic radiographers**



***xix) Top barriers and facilitators to implementation of dietitian supplementary prescribing***

<b>Top Barriers</b>		<b>Top Facilitators</b>	
<b>Barrier 1 (n =16)</b>	<b>n (%)</b>	<b>Facilitator 1 (n=10)</b>	<b>n (%)</b>
CMP problems	9 (56.3%)	Support from colleagues	6 (42.9%)
Red tape	1 (6.3%)	Organisation wide NMP support	2 (14.3%)
Staffing shortages	1 (6.3%)	Managerial support	1 (7.1%)
Moved jobs	1 (6.3%)	Individual motivation	1 (7.1%)
Lack of confidence	1 (6.3%)	None	4 (28.6%)
Lack of support from team	1 (6.3%)		
Remote consultations	1 (6.3%)		
<b>Barrier 2 (n=12)</b>	<b>n (%)</b>	<b>Facilitator 2 (n=8)</b>	<b>n (%)</b>
CMP problems	8 (50.0)	Support from colleagues	3 (33.3%)
Red tape	1 (6.3)	Organisation wide NMP support	2 (22.2%)
Covid-19	1 (6.3)	Managerial support	1 (11.1%)
Lack of national support/ guidance	1 (6.3)	Access to paper prescriptions	1 (11.1)
Lack of time	1 (6.3)	Patient satisfaction	1 (11.1)
<b>Barrier 3 (n=8)</b>	<b>n (%)</b>	<b>Facilitator 3 (n=5)</b>	<b>n (%)</b>
CMP problems	3 (18.8%)	Support from colleagues	2 (40.0%)
Red tape	2 (12.5%)	Organisation wide NMP support	1 (20.0)
National support/guidance	1 (6.3)	Experience	1 (20.0)
Lack of relevant CPD	1 (6.3)	None	1 (20.0)
Availability of other prescribers	1 (6.3)		

***xx) Top barriers and facilitators to implementation of therapeutic radiographer independent prescribing***

<b>Top Barriers</b>		<b>Top Facilitators</b>	
<b>Barrier 1 (n=15)</b>	<b>n (%)</b>	<b>Facilitator 1 (n=16)</b>	<b>n (%)</b>
Inability to prescribe controlled drugs	8 (53.3)	Support from colleagues	8 (50.0)
Poor access to medics/pharmacists	1 (6.7)	Remote prescribing	3 (18.8)
Workload	1 (6.7)	Managerial support	1 (6.3)
Red tape	2 (13.3)	Patient satisfaction	1 (6.3)
Remote prescribing	1 (6.7)	Organisation wide NMP support	1 (6.3)
Role misunderstanding	1 (6.7)	Flexibility	1 (6.3)
Less time with patients	1 (6.7)	CPD	1 (6.3)
<b>Barrier 2 (n=11)</b>	<b>n (%)</b>	<b>Facilitator 2 (n=12)</b>	<b>n (%)</b>
Poor access to medics/pharmacists	1 (9.1)	Support from colleagues	9 (75.0)
Red tape	7 (63.6)	Managerial support	1 (8.3)
Remote prescribing	1 (9.1)	Remote access to meds	1 (8.3)
Role misunderstanding	1 (9.1)	Electronic prescribing	1 (8.3)
Lack of confidence	1 (9.1)		
<b>Barrier 3 (n=6)</b>	<b>n (%)</b>	<b>Facilitator 3 (n=5)</b>	<b>n (%)</b>
Workload	2 (33.3)	Support from colleagues	2 (40.0)
Red tape	2 (33.3)	Managerial support	2 (40.0)
Lack of support	2 (33.3)	Patient satisfaction	1 (20.0)



## Appendix 6: Phase 3 Additional tables

### Self-Report Audit

- i) Characteristics of case site consultations
- ii) Audit patient characteristics
- iii) Outcome of consultations
- iv) Mode of consultation delivery at dietitian and therapeutic radiographer case sites
- v) Consultations with colleague discussions and referrals
- vi) Healthcare staff referrals made by dietitians and therapeutic radiographers
- vii) Referral reasons and methods used by dietitians and therapeutic radiographers
- viii) Medicines related activities undertaken by dietitians
- ix) Reasons for patient non-compliance with prescribed medicines
- x) Medicines Information given by dietitian prescribers and non-prescribers
- xi) Medicines related activities undertaken by therapeutic radiographers
- xii) Reasons for patient non-compliance with prescribed medicines
- xiii) Medicines Information given by therapeutic radiographer prescribers and non-prescribers
- xiv) Case site 3 consultation characteristics and outcomes during and after NMP training
- xv) Clinical caseload of case site 3 therapeutic radiographer during and after NMP training
- xvi) Medicines related activities undertaken during and after NMP training

### Semi -structured Interviews

- xvii) Themes from qualitative analysis of case-site staff interviews

### Patient Questionnaire

- xviii) Characteristics of Dietitian and therapeutic radiographer consultations
- xix) CSQ scores for patients attending dietitian and therapeutic radiographer consultations
- xx) G-MISS scores for patients attending dietitian and therapeutic radiographer consultations
- xxi) Respondent attitudes to dietitian and therapeutic radiographer prescribing
- xxii) SIMS scores for patients receiving information about medicines

### Observation field notes

- xxiii) Overview of dietitian and therapeutic radiographer consultations

### Case Record Review

- xxiv) Dietitian case record assessments
- xxv) Therapeutic radiographer case record assessments



## Self- Report Audit

### i) Characteristics of case site consultations

	Dietitians				Therapeutic Radiographers				Total sample (n=513)
	Prescribers (n=91)	Non-prescribers (n=78)	Total (n=169)	p value	Prescribers (n=170)	Non-prescribers (n=174)	Total (n=344)	p value	
<b>Service location (n, %)</b>									
NHS hospital outpatient	41 (45.1%)	56 (71.8%)	97 (57.4%)	0.002	170 (100.0%)	174 (100.0%)	344 (100.0%)	NA	441 (86.0%)
NHS hospital inpatient	43 (47.3%)	19 (24.4%)	62 (36.7%)		0 (0.0%)	0 (0.0%)	0 (0.0%)		62 (12.1%)
NHS community clinic	7 (7.7%)	3 (3.8%)	10 (5.9%)		0 (0.0%)	0 (0.0%)	0 (0.0%)		10 (1.9%)
<b>Consultation type (n, %)</b>									
Face-to-face	83 (91.2%)	55 (70.5%)	138 (81.7%)	0.002	141 (82.9%)	105 (60.3%)	246 (71.5%)	<0.001	384 (74.9%)
Telephone	8 (8.8%)	22 (28.2%)	30 (17.8%)		29 (17.1%)	69 (39.7%)	98 (28.9%)		128 (25.0%)
Video	0 (0.0%)	1 (1.3%)	1 (0.6%)		0 (0.0%)	0 (0.0%)	0 (0.0%)		1 (0.2%)
<b>Type of consultation (n, %)</b>									
Review	0 (0.0%)	45 (57.7%)	45 (26.6%)	<0.001	155 (91.2%)	162 (93.1%)	317 (92.2%)	0.392	362 (70.6%)
Follow-up	85 (93.4%)	19 (24.4%)	104 (61.5%)		7 (4.1%)	3 (1.7%)	10 (2.9%)		114 (22.2%)
Initial consultation	6 (6.6%)	14 (17.9%)	20 (11.8%)		1 (0.6%)	2 (1.1%)	3 (0.9%)		23 (4.5%)
Additional review	0 (0.0%)	0 (0.0%)	0 (0.0%)		7 (4.1%)	6 (3.4%)	13 (3.8%)		13 (2.5%)
Emergency	0 (0.0%)	0 (0.0%)	0 (0.0%)		0 (0.0%)	1 (0.6%)	1 (0.3%)		1 (0.2%)

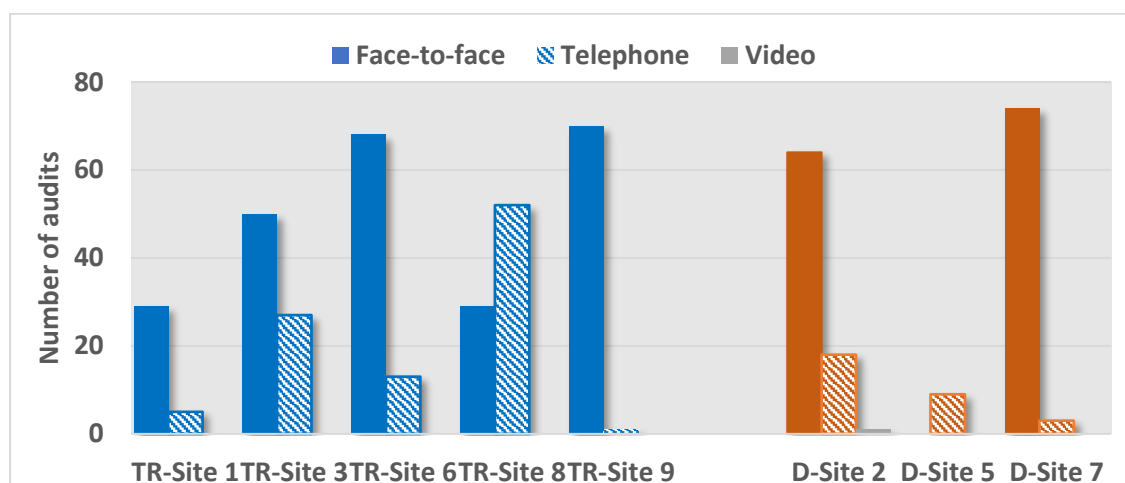
ii) **Audit patient characteristics**

	Dietitians			Therapeutic Radiographers			Total sample (n=513)
	Prescribers (n=91)	Non-prescribers (n=78)	Total (n=169)	Prescribers (n=170)	Non-prescribers (n=174)	Total (n=344)	
<b>Gender (n, %)</b>							
Female & transgender women	46 (50.5%)	44 (56.4%)	90 (53.3%)	80 (47.1%)	65 (37.4%)	145 (42.2%)	235 (45.8%)
Male & transgender men	45 (49.5%)	34 (43.6%)	79 (46.7%)	90 (52.9%)	109 (62.6%)	199 (57.8%)	278 (54.2%)
<b>Ethnicity (n, %)</b>							
White	81 (89.0%)	64 (82.1%)	145 (85.8%)	162 (95.3%)	169 (97.1%)	331 (96.2%)	476 (92.8%)
Asian or Asian British	5 (5.5%)	9 (11.5%)	14 (8.3%)	5 (2.9%)	1 (0.6%)	6 (1.7%)	20 (3.9%)
Black African, Caribbean or Black British	3 (3.3%)	4 (5.1%)	7 (4.1%)	0 (0.0%)	1 (0.6%)	1 (0.3%)	8 (1.6%)
Mixed/multiple ethnic groups	1 (1.1%)	0 (0.0%)	1 (0.6%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.2%)
Unknown	1 (1.1%)	1 (1.3%)	2 (1.2%)	2 (1.2%)	1 (1.1%)	3 (0.9%)	5 (1.0%)
Missing	-	-	-	1 (0.6%)	-	1 (0.3%)	1 (0.2%)
<b>Age (years)</b>							
Mean (SD)	51.6 (1.2)	56.4 (17.9)	53.8 (17.7)	62.3 (11.9)	67.1 (11.4)	67.2 (11.6)	62.7 (15.3)
Median (range)	53.0 (19.0-87.0)	60.5 (23.0-87.0)	55.0 (19.0-87.0)	70 (19.0-89.0)	68 (23.0-90.0)	69.0 (19.0-90.0)	66.0 (19.0-90.0)
<20	7 (7.7%)	0 (0.0%)	7 (4.1%)	1 (0.6%)	0 (0.0%)	1 (0.3%)	8 (1.6%)
20-59	53 (58.2%)	38 (48.7%)	91 (53.8%)	40 (23.5%)	39 (22.4%)	79 (23.0%)	170 (33.1%)
60-70	18 (19.8%)	25 (32.1%)	43 (25.4%)	48 (28.2%)	57 (32.8%)	105 (30.5%)	148 (28.8%)
>71	13 (14.3%)	15 (19.2%)	28 (16.6%)	80 (47.1%)	78 (44.8%)	158 (45.9%)	186 (36.3%)
Missing	-	-	-	1 (0.6%)	-	1 (0.3%)	1 (0.2%)

iii) Outcome of consultations

Dietitians			Therapeutic Radiographers			Total sample (n=513)
Prescribers (n=91)	Non-prescribers (n=78)	Total (n=169)	Prescribers (n=170)	Non-prescribers (n=174)	Total (n=344)	
<b>Further appointment/ review required (n, %)</b>						
75 (82.4%)	51 (65.4%)	126 (74.6%)	113 (66.5%)	104 (59.8%)	217 (63.1%)	343 (66.9%)
<b>No further appointment/review required/discharged (n, %)</b>						
4 (4.4%)	17 (21.8%)	21 (12.4%)	57 (33.5%)	68 (39.1%)	125 (36.3%)	146 (28.5%)
<b>Missing (version change) (n, %)</b>						
10 (11.0%)	10 (12.8%)	20 (11.8%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	20 (3.9%)
<b>Missing (n, %)</b>						
2 (2.2%)	-	-	-	2 (1.1%)	2 (0.6%)	4 (0.8%)

iv) Mode of consultation delivery at dietitian and therapeutic radiographer case sites

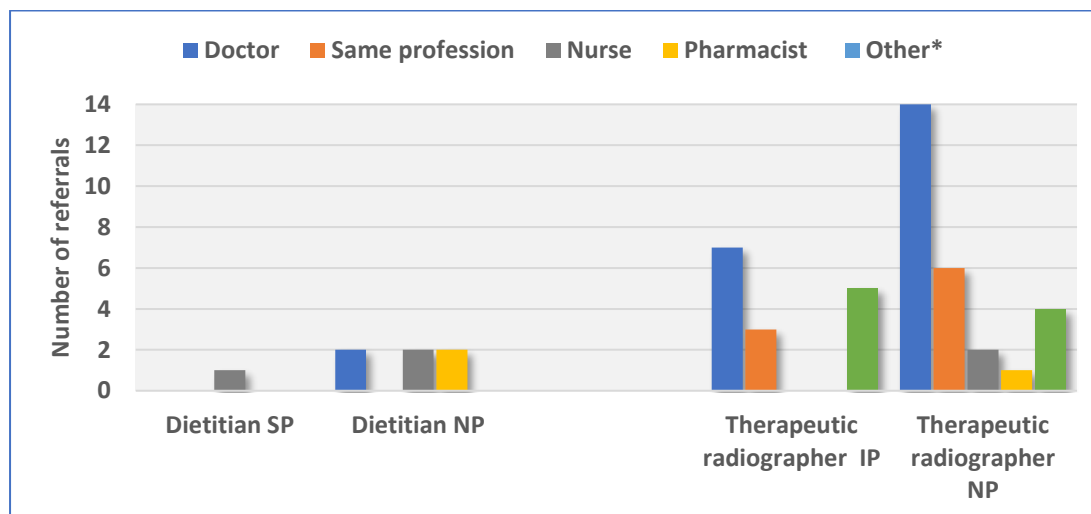


v) Consultations with colleague discussions and referrals

	Dietitians			Therapeutic Radiographers			Total sample (n=513)
	D-SPs (n=91)	D-NPs (n=78)	Total (n=169)	TR-IPs (n=170)	TR-NPs (n=174)	Total (n=344)	
<b>Consultations with colleague discussion (n, %)</b>							
Yes	40 (44.0%)	32 (41.0%)	72 (42.6%)	49 (28.8%)	61 (35.1%)	110 (32.0%)	182 (35.5%)
No	51 (56.0%)	46 (59.0%)	97 (57.4%)	121 (71.2%)	113 (64.9%)	234 (68.0%)	331 (64.5%)
<b>Consultations where referral made (n, %)</b>							
Yes	1 (1.1%)	6 (7.7%)	7 (4.1%)	11 (6.5%)	26 (14.9%)	37 (10.8%)	44 (8.6%)
No	90 (98.9%)	72 (92.3%)	162 (95.9%)	159 (93.5%)	148 (85.1%)	307 (89.2%)	469 (91.4%)

vi) Healthcare staff referrals made by dietitians and therapeutic radiographers

\*Pharmacy technician, healthcare assistant, psychologist, speech & language therapist, multidisciplinary team, dietitian (TRs only)



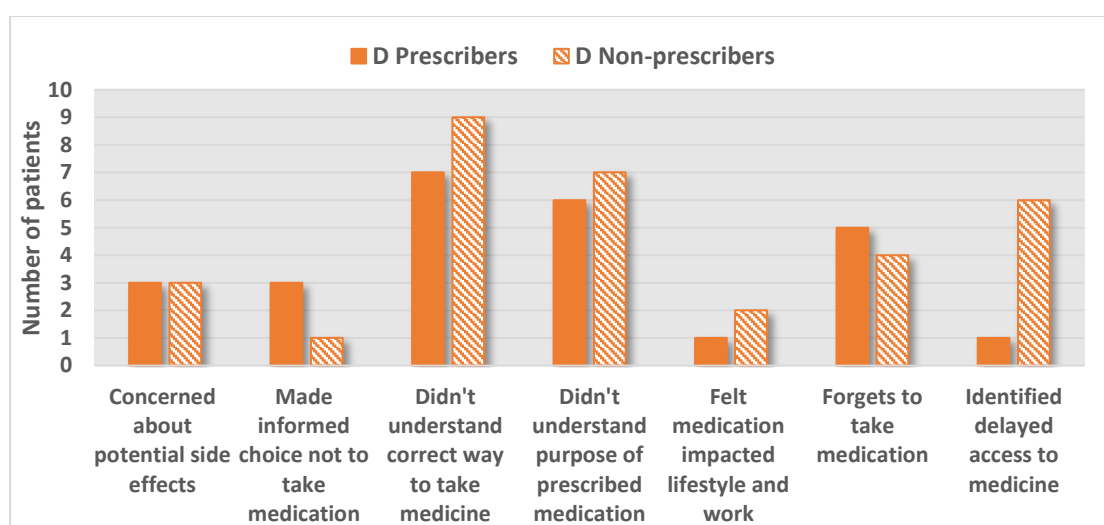
vii) Referral reasons and methods used by dietitians and therapeutic radiographers

	Dietitians			Therapeutic Radiographers			Total number of referrals (n=44)
	D-SPs (n=1)	D-NPs (n=6)	Total (n=7)	D-SPs (n=11)	D-NPs (n=26)	Total (n=37)	
<b>Reason for referral (n, % - more than 1 possible)</b>							
Prescription	0 (0.0%)	4 (66.7%)	4 (57.1%)	5 (45.5%)	15 (57.7%)	20 (54.1%)	24 (54.5%)
Information/ advice from other service	0 (0.0%)	1 (16.7%)	1 (14.3%)	6 (54.5%)	10 (38.5%)	16 (43.2%)	17 (38.6%)
Investigation	1 (100.0%)	0 (0.0%)	1 (14.3%)	2 (18.2%)	1 (3.8%)	3 (8.1%)	4 (9.1%)
Further tests	0 (0.0%)	1 (16.7)	1 (14.3%)	1 (9.1%)	1 (3.8%)	2 (5.4%)	3 (6.8%)
<b>Method of referral (n, % - more than 1 possible)</b>							
Email	0 (0.0%)	2 (33.3%)	2 (28.6%)	7 (63.6%)	17 (65.4%)	24 (64.9%)	26 (59.1%)
Face-to-face	1 (100.0%)	4 (66.7%)	5 (71.4%)	3 (27.3%)	3 (11.5%)	6 (16.2%)	11 (25.0%)
Telephone	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (9.1%)	4 (15.4%)	5 (13.5%)	5 (11.4%)
Online	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (9.1%)	1 (3.8%)	2 (5.4%)	2 (4.5%)
Letter	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (3.8%)	1 (2.7%)	1 (2.3%)

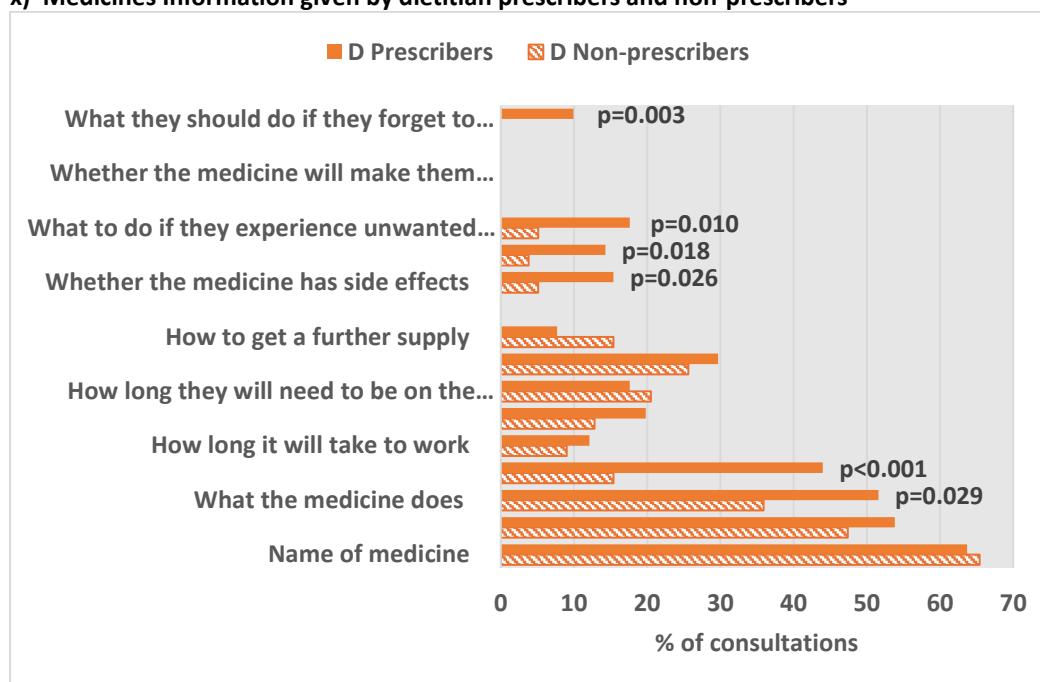
viii) Medicines related activities undertaken by dietitians

	Dietitians			p value
	Prescribers (n=91)	Non-prescribers (n=78)	Total (n=169)	
<b>Consultations with medication regimen assessment (n, %)</b>				
No	19 (20.9%)	16 (20.5%)	35 (20.7%)	
Yes	72 (79.1%)	62 (79.5%)	134 (79.3%)	p=0.953
<b>Consultations with actions considered necessary (n, %)</b>				
No	37 (51.4%)	24 (38.7%)	61 (45.5%)	
Yes	35 (48.6%)	38 (61.3%)	73 (54.5%)	p=0.142

ix) Reasons for patient non-compliance with prescribed medicines



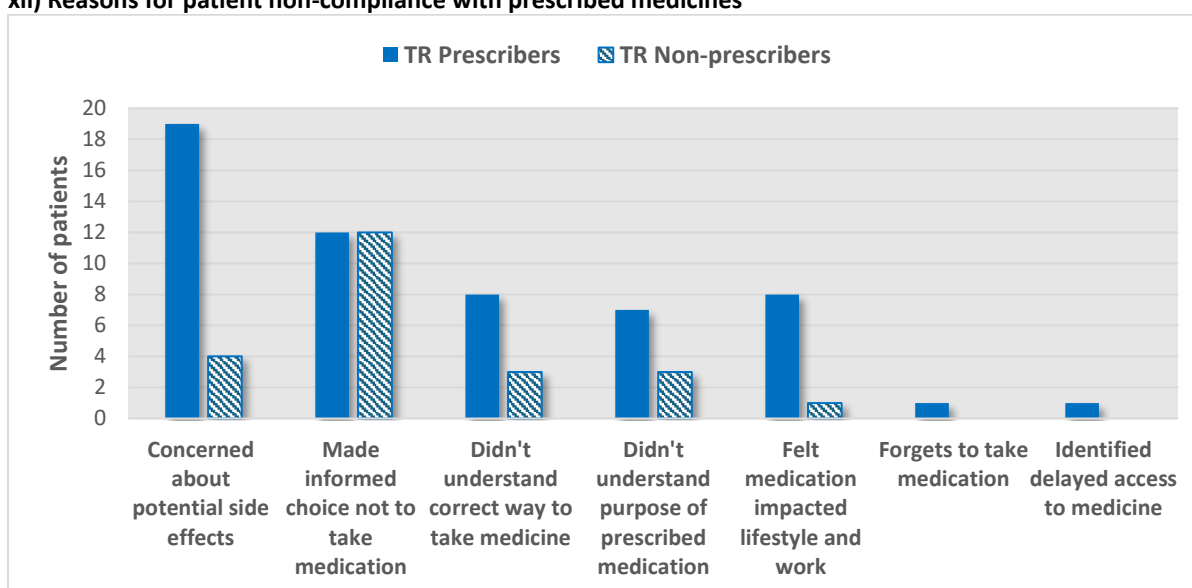
x) Medicines Information given by dietitian prescribers and non-prescribers



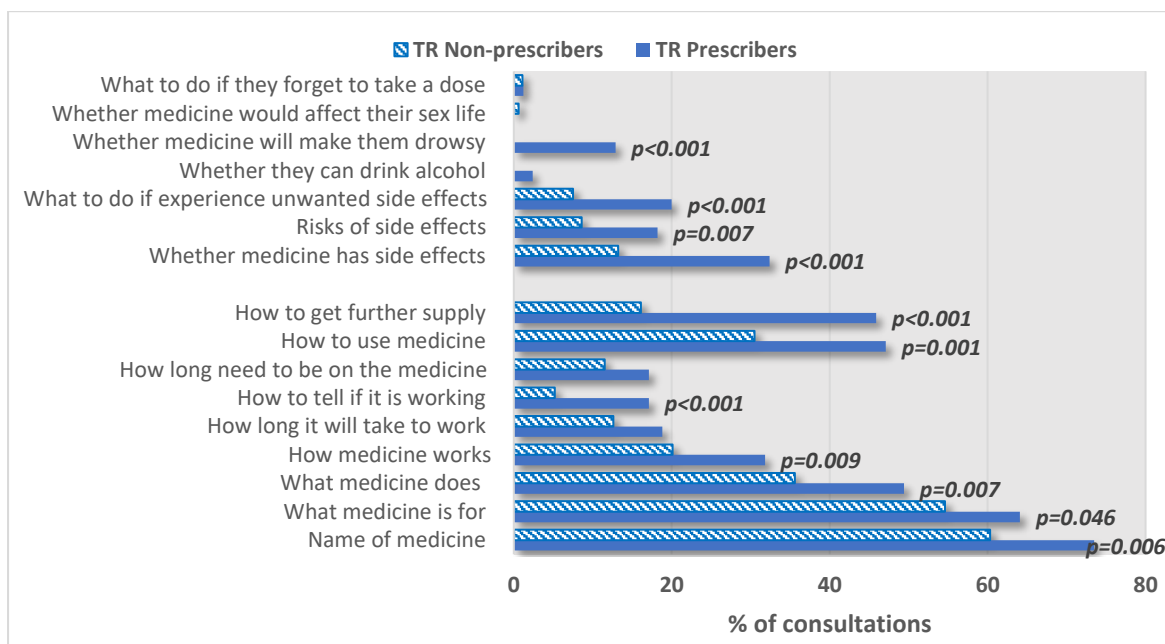
xi) Medicines related activities undertaken by therapeutic radiographers

	Therapeutic Radiographers			p value
	Prescribers (n=170)	Non-prescribers (n=174)	Total (n=344)	
<b>Consultations with medication regimen assessment (n, %)</b>				
No	22 (12.9%)	54 (31.0%)	76 (22.1%)	
Yes	148 (87.1%)	120 (69.0%)	268 (77.9%)	<0.001
<b>Consultations with actions considered necessary (n, %)</b>				
No	72 (48.6%)	88 (73.3%)	160 (46.5%)	
Yes	76 (51.4%)	32 (26.7%)	108 (31.4%)	<0.001

xii) Reasons for patient non-compliance with prescribed medicines



xiii) Medicines Information given by therapeutic radiographer prescribers and non-prescribers



xiv) Case site 3 consultation characteristics and outcomes during and after NMP training

	Case site 3 – Trainee			p value
	During NMP Training n=40	After NMP training as TR-IP n=37	Total n=77	
<b>Service location, n (%)</b>				
NHS hospital outpatient	170 (100.0%)	174 (100.0%)	344 (100.0%)	NA
<b>Consultation type, n (%)</b>				
Face-to-face	13 (32.5%)	37 (100.0%)	50 (64.9%)	
Telephone	27 (67.5%)	0 (0.0%)	27 (35.1%)	<0.001
<b>Type of consultation, n (%)</b>				
Review	40 (100.0%)	36 (97.3%)	76 (98.7%)	
Additional review	0 (0.0%)	1 (2.7%)	1 (1.3%)	0.295
<b>Patient gender, n (%)</b>				
Female	14 (35.0%)	20 (54.1%)	34 (44.2%)	
Male	26 (65.0%)	17 (45.9%)	43 (55.8%)	0.093
<b>Patient age</b>				
Mean, SD	62.3 (11.8)	62.9 (13.5)	62.6 (12.6)	
Median, range	62.5 (23.0-80.0)	63.0 (19.0-80.0)	63.0 (19.0-80.0)	0.751
<b>Consultation outcome, n (%)</b>				
Further appointment	31 (77.5%)	30 (81.1%)	61 (79.2%)	
No further appt	9 (22.5%)	7 (18.9%)	16 (20.8%)	0.699
<b>Discussion with colleagues, n (%)</b>				
Yes	14 (35.0%)	7 (18.9%)	21 (27.3%)	
No	26 (65.0%)	30 (81.1%)	56 (72.7%)	0.113
<b>Referral to colleague/service, n (%)</b>				
Yes	2 (5.0%)	2 (5.4%)	4 (5.2%)	
No	38 (95.0%)	35 (94.6%)	73 (94.8%)	0.936

xv) Clinical caseload of case site 3 therapeutic radiographer during and after NMP training

Conditions (n, %)	Therapeutic Radiographer		
	During NMP training	After NMP training as TR-IP	Total
	n=40	n=37	n=77
Gastro-oesophageal	11 (27.5%)	9 (24.3%)	20 (26.0%)
Colon & rectum	11 (27.5%)	8 (21.6%)	19 (24.7%)
Head & neck	7 (17.5%)	11 (29.7%)	18 (23.4%)
Sarcoma	6 (15.0%)	6 (16.2%)	12 (15.6%)
Lymphoma	3 (2.1%)	1 (1.9%)	4 (5.2%)
Skin	1 (2.5%)	2 (5.4%)	3 (3.9%)
Female breast	1 (0.5%)	0 (0.0%)	1 (1.3%)

xvi) Medicines related activities undertaken during and after NMP training

	Case site 3 – Trainee			p value
	During NMP Training n=40	After NMP training as TR-IP n=37	Total n=77	
<b>Consultation with medication regimen assessment (n, %)</b>				
No	6 (15.0%)	2 (5.4%)	8 (10.4%)	
Yes	34 (85.0%)	35 (94.6%)	69 (89.6%)	0.158
<b>Consultations with actions considered necessary (n, %)</b>				
No	26 (76.5%)	13 (37.1%)	39 (56.5%)	
Yes	8 (23.5%)	22 (62.9%)	30 (43.5%)	0.002
<b>Consultations with MMA undertaken (n, %)</b>				
No	33 (82.5%)	16 (43.2%)	49 (63.6%)	
Yes	7 (17.5%)	21 (56.8%)	28 (36.4%)	<0.001
<b>Consultations with medication adherence assessment (n, %)</b>				
No	14 (35.0%)	4 (10.8%)	18 (23.4%)	
Yes	26 (65.0%)	33 (89.2%)	59 (76.6%)	0.012
<b>Consultations with information given about medicines (n, %)</b>				
No	13 (32.5%)	16 (43.3%)	29 (37.7%)	
Yes	27 (67.5%)	20 (54.0%)	47 (61.0%)	
Missing	-	1 (2.7%)	1 (1.3%)	0.284



Semi-Structured Interviews

xvii) Themes from qualitative analysis of case-site staff interviews

Topic	Theme	Data codes and sub themes	Indicative quotation
1. Views on the impact of TR-IP or D-SP	1a. Improving access to medicines and service efficiency	Patient access to medicines	<i>"In terms of our palliative patients, where they need anti-sickness prior to their radiotherapy - we have the occasional time where, "Oh, this patient, we think they're going to need anti-sickness, they're on the bed in half an hour, can you do anything?" "Yes, I can. I get it sorted straight away." And so that is a huge benefit to our service, in being able to make sure that medicines are available to that patient as soon as possible." CS8-TR-IP</i> <i>"So...if I've gone and assessed that a patient (is) dehydrated, I can write up a bag of fluid, I can go and take it to the Nurse, I can say "Can we get this fluid up ASAP." Whereas maybe in the past, we would have to go and find a doctor - and the doctors that I work with trust us implicitly, they have done for many, many years – go and sign the prescription. So, I would say potentially faster access to medicines; from a patient perspective they get their medicines faster". CS2-D-SP</i>
		Streamlining care and service efficiency	<i>"If a patient presented in front of me needs intervention, I can't do it, so I take the full case history. Then I need to find somebody to relay all of that information again to, so double work for me, and our prescribers would be required to see the patient to justify... all the criteria for prescribing medication. So, the patient would have two interventions, so longer patient time, two members of staff involved". CS1-TR-NP1</i> <i>As a service it takes the pressure off senior doctors and junior doctors. So, I only see it as an advantage. CS2 Consultant</i> <i>"We keep our caseload separate. [] We are very much almost like 50/50, divide the ward between the two dieticians and then keep that group of patients for the length of their stay. So, I don't really feel it impacts on my day-to-day working." CS2-D-NP1</i> <i>"Because we are a specialist unit, I think it [D-SP] works well for inpatients. I know there can be issues when outpatients go home because some of the medications that we use quite routinely are used in quite high doses and I think often when they get back in the community, their GPs, quite rightly, want to review the medications that they are on and often, not often, but some will change the amounts prescribed, reduce the amounts prescribed or suggest, "Oh you don't need that any longer," which can have an impact on the patient's wellbeing and health and hydration." [CS2-D-NP1]</i>
		Service flexibility and choice	<i>"It's made it more accessible that patients could be treated out of hours. The department is open from 8 till 6:30. We would try and keep the more complicated patients within the 9 to 5 working hours, but that's not so much of an issue now. So if a patient wants to carry on working, if their family member is working and drives them to treatment it means that they can have an out-of-hours appointment which fits their quality of life better". CS6-TR-IP1</i>

			<p><i>"When the prescribing radiographers aren't here, it certainly takes longer to get medication to the patient because we don't have doctors just here....(It's) not particularly easy, especially not on a Friday afternoon. I might not have a reply from a consultant that day. In some cases they might have to (wait over the weekend)." CS1-TM1</i></p>
	1b. Quality and safety of care, medicines management and advice	Mobilising knowledge and skills	<p><i>"We are one of the only professions that goes into oncology from the outset. So we have a skillset from the outset, good communication skills, empathy with a scientific background and getting that mix to prescribing ticks all of those boxes, it's like the scientific knowledge of why things work, and the empathy to listen to the patient... And we're the people that have seen the patients all day every day for weeks." CS6-TR-IP</i></p> <p><i>"As part of the qualification, we did a lot of work on clinical examination and reasoning, and that sort of thing. And that all feeds into the work that I do. And I wouldn't say, at any stretch, that I'm an expert at clinical examination, but I certainly know an awful lot more than I did before I did the prescribing course. Which again, gives me a little bit more confidence in being able to manage things. But also allows me to recognise when actually, it got to the point where I'm like, actually, I do need to get a doctor now." CS8-TR-IP</i></p> <p><i>"We did a Cardiology week and I was like "Nothing to do with me, what do I care about Cardiology?" But oh, my goodness, the amount of our patients that are on cardiac meds... and of course I was aware of it but just honing in on it and really thinking about it in a lot more detail was really helpful. The same with the Respiratory. Of course, as healthcare professionals we look at all the things going on with a patient, but from a medication perspective and looking at all the different side effects of all the different medications, yes, that was just fascinating. So, I found it all really helpful". CS2-D-SP</i></p>
		Team knowledge about medicine	<p><i>"I might go to (TR-IP) and say, "Can you prescribe co-codamol?" but she asks, "What other things does the patient take?" or, "Does the patient take, say, morphine?" And you say, "Yes,". "No, you can't have those together." So you learn little things like that stick with you." CS3-TM3</i></p> <p><i>"We've also pulled medicines management up. We're not taught drugs in our degree. So our review team and our non-medical prescribers...they've written a medicines management package...and all of the staff now get training and they complete a competency to be able to sign off and give out controlled drugs." CS9-TM1</i></p>
		Continuity of care	<p><i>"...patients really, really appreciate that single point of care.... for their point of contact during their acute side effects period and a week or two after, it's really important that they have that named radiographer who's looking after their care. They also mention things like at the beginning they were very, very anxious and their review radiographer, the independent prescribers, often mean the difference between them getting through treatment and not. So, they hold them quite high up in their wellbeing". CS1-TR-NP2</i></p>
		Holistic patient-centred care	<p><i>"I think they probably get a better experience from a radiographer, they often consider that we give them more time in the consultations, we explain things better, we consider aspects like swallowing is going to be an issue, shall we prescribe this as a liquid rather than a tablet." CS6-TR-IP</i></p>
		Treatment safety and specificity	<p><i>"Previously, because they (TRs) weren't able to prescribe, although they would often be making a lot of decisions and assessments, we (the doctors) would have to be there to then use that information to prescribe. Which I actually feel is never a good way to prescribe. I think it's probably more prone to error than having a really good nonmedical prescriber who actually can see the patient, assess them and take through that whole process." CS9-TM3</i></p>

			<p><i>"It's (TR-IP) reduced an impact of things going wrong because I tend to check medications they are on, interactions, whereas sometimes the clinicians are not necessarily quite so thorough, I would say." CS6-TR-IP</i></p> <p><i>"Being able to educate patients, having a bit better knowledge of what the drugs are. We had to have some knowledge working under a PGD, but not as much knowledge as we now have, and we explain things probably more than we would have done previously because we know that that's part of what a prescribing role is about the side effects, which we would never have... we would have just been, like, "You need these tablets, there you go." Rather than actually counselling the patient on what it was." CS7-D-SP2</i></p>
		Enhanced treatment options	<p><i>"(PGDs) are very structured. There's no deviation from that structure. For example, Fybogel, if you are treating a patient's breast and they have loose bowels, because of chemotherapy, you could not give Fybogel, because it's for radiotherapy patients. If the patient had rectal bleeding, you could not give an ointment". CS9-TR-IP2</i></p>
	1c. Personal and professional benefits	Job satisfaction and role development	<p><i>"I've been in this role quite a long time, I needed something to move me forward, you just feel a bit stagnated ...It's introduced a variety that I didn't have before and every clinic is different. I learn something every week pretty much. Different patients find different things work for them and that's good to know to bear in mind for future patients that I can recommend and discuss". CS3-TR-IP</i></p> <p><i>"I just think it's much more enjoyable and it makes you feel more responsible, and protective almost, towards your group of patients. I try and communicate with the patients as if they are a member of my own family." CS1-TR-IP</i></p> <p><i>"I think as well in terms of for clinical progression or job satisfaction and retaining people within their roles, because that's the big thing in the NHS is keeping people and within that you want to be able to learn new skills and become more accomplished at your role, so I see added benefit from those areas." CS2-D-NP2</i></p>
		Professional reputation	<p><i>"And I think it's also highlighted the job role because Therapeutic Radiographers are really unknown still; unless you've had an experience of cancer treatment or radiotherapy, most people don't still know what a Therapeutic Radiographer is, so I think it's great that it's highlighted to Government officials and policy makers that actually we are an important profession". CS6-TR-IP2</i></p>
2. Innovation & implementation issues	2a. Factors influencing uptake and implementation of IP	Leadership and managerial support	<p><i>"My immediate manager wasn't very supportive. I couldn't even photocopy articles to read in the department. She didn't want me to take the allocated study leave. I had to fight for it with the manager higher up. But I literally didn't have a life for seven months, I worked every night and every weekend to get through the course, and that's why now we've got [name] doing the course and I will bend over backwards to allow the time she needs to visit other departments, to go to different places, to experience different things, which I had to fight for it all the way, it was horrible." CS1-TR-IP</i></p> <p><i>"I think if the overall ethos is already embedded, then for someone coming in, it's, kind of, you know, much easier to show that this is the way it works, and it does work well. and I think these younger consultants are very open to anything that's better for everyone, the patient and for the team. You're always going to get some discord sometimes, one consultant who's harder to communicate with maybe." CS7-D-SP2</i></p>
		Support from MDT	<p><i>"I think the main barrier always is cultural. I think there's been some resistance amongst the consultant body, mainly. But I think we have had now several years of experience of seeing how successful and how reliable the review</i></p>

			<p><i>radiographer team has been. And I think that's ultimately how people...I didn't really need winning over but I think seeing them reviewing the patients, knowing that actually there aren't any problems."</i> CS9-TM3</p>
		Workforce development and motivation	<p><i>"It increases career progression and potentially retention of staff, and recruitment. But in a previous role, not having any prescribers, it meant that we didn't have that enhanced scope of practice, we were never improving our knowledge and our patient care in that aspect because we were constantly going to the doctors to help. And although that is absolutely the right thing to do when you don't have the skill and knowledge, there was no scope for that to enhance."</i> CS8-TM2</p> <p><i>"There's a shortage of people... So the PGDip course at one of our local universities should have recruited 15 students this year. They recruited two. So we're already 13 down in two years' time....And then I think the other barrier is releasing staff. It's a national staff shortage. We have a shortage. You've got so many radiographers. If we want to put radiographers into pre-treatment and into patient review, then you're going to have to take them off a LINAC or you're going to have to take them off pre-treatment, but actually I can't afford to do that..."</i> CS9-TM1</p> <p><i>"You get nothing for it, which is wrong really, because if it was, like, it's a cherry, okay, you do that, then you're going to get an upgrade, then you'd be more likely to do it, wouldn't you? Because it is extra responsibility you're taking."</i> CS7-D-SP2</p>
		Supplementary prescribing, controlled and unlicensed drugs	<p><i>"It is also quite annoying seeing that we assess and see the patients. We know they want it [controlled drug], and we are having to ask the nurse to prescribe it or the doctor who haven't seen the patients. And the nurse has done exactly the same course as the radiographer, but they can prescribe it."</i> CS3-TR-IP</p> <p><i>"My main issues is unlicensed drugs, because there's something that we use for our thorax patients that's an unlicensed drug. So I'm not allowed to prescribe that one, but actually, I would say I need that prescribed at least once a week. So I have to just keep leaving a prescription on a doctor's desk, with a little note saying please."</i> CS8-TR-IP</p> <p><i>"Keeping a track of it is another thing as well, so we have to make sure that every time we prescribe, we make sure that there is a valid CMP so we have to check all the time, so it's something that takes time and you have to remember to do that every time you do it. This is something if you're an independent prescriber you don't need to do."</i> CS7-D-SP1</p> <p><i>"I think the thing that I found difficult is that there isn't much guidance on supplementary prescribing. Because it's such an old way of prescribing and most other professions are independent prescribers now, it's almost left to the individual practitioner to decide how they're going to implement the CMP. And that's why I think lots of Dieticians have contacted me and have said "How are you doing this?"</i>CS2-D-SP</p>
		Governance and support	<p><i>"Our Trust prescribing policy clearly says that we have to work within our scope of practice, and each prescriber has their own personal formulary, and we're not supposed to prescribe outside of that. And as with any non-medical prescriber, we should always be sticking to our remit within our area of speciality. I'm not going to suddenly start prescribing stuff for gout, or diabetes, or anything like that."</i> CS8-TR-IP</p> <p><i>"I keep a log of every prescription that I do, just on a spreadsheet, just write down when it was, and what I prescribed, and whether it was on an outpatient prescription, or an FP10, or whether it was taken from our stock. So, I look at</i></p>

			<p>that, and as part of my yearly audit, that I need to submit to the Trust, I'll pick out a handful of those ones that I've prescribed that perhaps would be slightly more unusual, and do a reflection on why I chose that particular medication, why I chose that dose, that sort of thing." CS8-TR-IP</p> <p>"We can prescribe as outpatient but we can't have – it's a Trust thing, I think – we cannot have the dual thing of prescribing for inpatients as well. So I think that's the only problem we have, so we can either do one or the other." CS7-D-SP1</p>
		Patient awareness of prescribing	<p>"I think from a patient care point of view, patients don't really mind who they see, who they get it done by, they just want it done quickly and they want to be able to say the problem, ask for what they want, get a suggestion and get their drugs quickly, and I think that's what it's done." CS6-TM3</p>
	2b. Concerns and unexpected consequences	Workload pressure	<p>"I think the main disadvantages of prescribing is the massive feeling and burden of responsibility. Knowing that you are responsible for making that decision and that's the disadvantage to adding anything to my P formulary. I now am responsible for giving people opiates, and this is why I have not put oxycodone on my P formulary because I get disturbed so much that I'm not ready. People coming to you saying, 'can you write a prescription for this?' They're treatment radiographers, they're not familiar with the legislation around nonmedical prescribing. And I always explain, I say 'look, legally I should not prescribe something for a patient that I haven't seen. Legally I'm not covered.' That's my mortgage, that's my career." CS9-TR-IP</p>
		Reduced medical input and deskilling	<p>"I guess the only potential disadvantage is that it does reduce the need for the consultants to actually see their patients. Which – they're very busy, and I think it gives them more time to do whatever they're doing. But I know if I was having cancer treatment, I'd want to see my consultant, maybe more often than they get to.... They're like, "this person called me, and then a different person called me for this follow-up; I don't actually know who my consultant ultimately is.. I've never had a face-to-face." CS8-TR-NP</p> <p>"The way we manage the patients, is we do it per dialysis shift. So, if the patient then changes his/her time, then they come under a different dietitian. So therefore, it could be that one of my patients then moves to the non-prescriber, then they don't get the same service as they were when they were under me. Or it could be vice versa." CS7-D-SP2</p>
	2c. Service innovation, future development and sustainability	Strategy and new developments	<p>"Patients are on some of these drugs or with these side effects for 5 or 10 years after. That's how significant radiation is, and how significant side effects are. So the whole concept of the late effects clinic is new from Macmillan. They've said they want to set up so many clinics and [name] has gone from being a treatment Band 7 to starting up that clinic." CS3-TM3</p> <p>"We would like to grow it further. So we have one ACP who sits over the review team and the reason we have that ACP is to look at deteriorating patients, those patients who become acutely ill in the department. So it's managing those patients who wouldn't have that support otherwise." CS9-TM1</p> <p>"Nationally, there's a clinical oncologist shortage, so we decided how can we help. We went down two routes - advanced clinical practitioners and...the reviews, because who knows anything more about side effects of radiotherapy than a radiographer who's treated the patient for the last 20 treatments? So a business case was put</p>

			<p><i>in...based on actually how many Programmed Activities<sup>2</sup> we would save for our consultants, what we would free up our consultants to do. We based (it) on our review team taking on 30% of our overall reviews. Currently, they're on 48.5%. So we're aiming to get up to 60%. [ ] So we knew that we needed non-medical prescribers. So the way the business case is set up ..they all came in on trainee posts. So we had two staff members who already had their non-medical prescribing - the rest of the team came in on a training post and we used Annex 21 under Agenda for Change<sup>3</sup>, so we paid them while they were training....What we did is we staggered the team, so we had some on 7s and we also recruited to a band 6 position, who doesn't have non-medical prescribing....just so that we had a route for succession planning..."CS9-TM1</i></p> <p><i>"Nationally, there's a clinical oncologist shortage, so we decided how can we help. We went down two routes - advanced clinical practitioners and...the reviews, because who knows anything more about side effects of radiotherapy than a radiographer who's treated the patient for the last 20 treatments? So a business case was put in...based on actually how many Programmed Activities<sup>4</sup> we would save for our consultants, what we would free up our consultants to do." CS9-manager</i></p>
		Sustainability	<p><i>"It's (NMP) in their job description, it's desirable at interview and then afterwards it's essential that they will have it. If they don't have it already, they will have it in the first year to 18 months. ...we had some (review TRs) on 7s and we also recruited to a band 6 position, who doesn't have non-medical prescribing, and the reason we did that was just so that we had a route for succession planning....That has its positives and its negatives. Positives from a succession planning because now she's in a position that she's ready to apply and do her medical prescribing in the future, and then apply for band 7 roles." CS9-TM1</i></p> <p><i>"Having had discussions about the way my service is going with the managers, I'm not convinced if I was to leave, that I would be replaced. And so my service would end up being possibly shrunk, or led by a Band 6. But I think from a prescribing perspective, the consultant prescribers would have to take on the lion's share of everything that I do, and I'd say I do more prescribing than they do, currently". CS8-TR-IP</i></p>
3. Views on IP training programme &	3a. NMP training programmes	Preparation for NMP training	<p><i>"There was disparity in that I studied with one university -it's accredited by the right bodies and one of my colleagues was studying with a different university, as a different type of prescriber and that colleague got a day a week. To do everything. And I was like, hold on, I'm a single mum and I go home and look after my children. I don't</i></p>

<sup>1</sup>Programmed Activities – 4 hour blocks of time, in which Consultants’ contractual duties are performed. There are four categories of contractual work: Direct Clinical Care, Supporting Professional Activities (teaching, governance etc), Additional Responsibilities and External Duties. In this example, related to Direct Clinical Care.

<sup>3</sup>Annex 21 of Agenda for Change enables NHS Trusts to pay employees as trainees, whilst undertaking a period of training to develop knowledge and skills. A percentage of full salary determined as a percentage of the pay for qualified staff on that band is paid.

<sup>4</sup>Programmed Activities – 4 hour blocks of time, in which Consultants’ contractual duties are performed. There are four categories of contractual work: Direct Clinical Care, Supporting Professional Activities (teaching, governance etc), Additional Responsibilities and External Duties. In this example, related to Direct Clinical Care.

transition period			<p>work full-time and I'm getting a day. And I didn't really notice it until another colleague who went on my nonmedical prescribing course six months later said, 'oh it's really not fair. Why are we getting so little?'. CS8-TR-IP</p> <p>"Whilst I was doing the course, I had one of the consultant oncologists that was my DMP, and I regularly caught up with her to discuss different things. She was absolutely amazing. And I think because we're a reasonably small department, we're on first-name terms with our oncology pharmacist, with some of the nurses on the ward, and with the doctors. And they were always really, really amenable to me just going, "Can I just pick your brains about this?" So yes, I think I did have a lot of support whilst doing the course". CS8-TR-IP</p>
		Course content and support	<p>"It was brutal... for six months, you had to put your life on hold, and you just ate, slept and breathed prescribing. And you had to give so much of yourself, to just learning everything that needed to be learnt, trying to memorise everything... Yes, it was relentless." CS8-TR-IP</p> <p>"Because I think all of my colleagues have all done the course...all very much like, "No, you are meant to have it," and we all helped and covered each other and stuff like that to do it. And it's the same for the person who has just started the course. They are like, "No, no, book your study days now..." So she booked them in at the very beginning, so we know that she's not going to be in. So that's fine." CS6-TR-IP</p>
	3b. Transition support	Developing confidence and competence	<p>"You don't want a newly qualified non-medical prescriber in any profession feeling pressurised to make prescribing decisions just because they've got that 'I'm a prescriber', and there's the potential for abuse, the potential for "Oh, you can prescribe, can you just do this?" No, absolutely not, but that's where experienced prescribers and the non-medical prescribing group here at the Trust needs to provide the support so that new non-medical prescribers don't feel that pressure and abuse....We've got a really strong non-medical prescribing Lead here in [name], and quite a strong and supportive group – we've got lots of non-medical prescribers here, and it's a well-beaten track here." CS3-TM2</p> <p>"I qualified but then it took four months to actually issue my first prescription. That's just because I was obviously the first Dietician in my hospital, so they were like "What is this? What is it? Never heard of you." There were a lot of hoops to jump through". CS2-D-SP</p> <p>"What we don't want is... because the pharmacists ...if they know you're a prescriber, and they go, "Oh, yeah, I just need such and such for this patient, they're going home now, can you do it for me because you're a prescriber?" ... Because they can be put in difficult situations where they're asked to do something outside their competency or their comfort zone even." CS7-D-SP2</p>

## Patient Questionnaire

### xviii) Characteristics of dietitian and therapeutic radiographer consultations

	Dietitian (n, %)	Therapeutic Radiographer (n, %)	Total n=number of responses	% of total sample
<b>First consultation with service</b>			<b>n=180</b>	
Yes	15 (30.6%)	84 (64.1%)	99	55.0%
No	34 (69.4%)	47 (35.9%)	81	45.0%
<b>Consultation location (Can indicate &gt; 1)</b>			<b>n=180</b>	
Hospital outpatient	13 (26.5%)	96 (73.3%)	109	60.6%
Hospital ward	36 (73.5%)	5 (3.8%)	41	22.8%
Telephone/video call	3 (6.1%)	36 (27.5%)	39	21.7%
Community clinic/GP practice	0 (0.0%)	2 (1.6%)	2	1.2%
<b>Consultation waiting time</b>			<b>n=180</b>	
Advance booking	8 (16.3%)	89 (67.9%)	97	53.9%
Seen same day	20 (40.8%)	20 (15.3%)	40	22.2%
Waited 1-6 days	11 (22.4%)	6 (4.6%)	17	9.4%
Waited ≥ 7 days	3 (6.1%)	12 (9.2%)	15	8.3%
Unknown	7 (14.3%)	4 (3.1%)	11	6.1%
<b>Information received about medicines</b>			<b>n=172</b>	
Yes	42 (85.7%)	83 (63.4%)	125	69.4%
No	7 (14.3%)	48 (36.6%)	55	30.6%



xix) CSQ scores for patients attending dietitian and therapeutic radiographer consultations

	Dietitian				Therapeutic Radiographer			
	Prescriber	Non-prescriber	Total	P*	Prescriber	Non-prescriber	Total	P*
<b>Quality of Care</b>								
n	24	22	46		54	68	122	
Mean (SD)	89.2 (11.0)	86.9 (13.5)	88.1 (12.2)	0.53	90.7 (10.9)	89.5 (11.0)	90.0 (10.9)	0.53
Median (IQR)	95.3 (79.7-96.9)	93.8 (75.0-96.9)	93.8 (75.0-96.9)		93.8 (84.4-100)	93.8 (78.1-100)	93.8 (81.3-100)	
<b>Access to Care</b>								
n	13	10	23		25	30	55	
Mean (SD)	69.2 (15.1)	76.0 (20.7)	72.2 (17.6)	0.37	82.2 (14.9)	78.5 (13.9)	80.2 (14.4)	0.35
Median (IQR)	65.0 (55.0-75.0)	70.0 (60.0-100)	65.0 (55.0-85.0)		80.0 (70.0-100)	75.0 (70.0-90.0)	75.0 (70.0-95.0)	
<b>Timeliness of Care</b>								
n	15	16	31		54	66	120	
Mean (SD)	80.8 (18.2)	75.0 (24.2)	77.8 (21.3)	0.46	88.2 (16.5)	83.8 (16.9)	85.7 (16.8)	0.40
Median (IQR)	75.0 (75.0-100)	75.0 (50.0-100)	75.0 (50.0-100)		100 (75.0-100)	81.3 (75.0-100)	87.5 (75.0-100)	
<b>Total</b>								
n	11	9	20		25	30	55	
Mean (SD)	77.4 (9.5)	78.9 (50.6)	78.1 (12.3)	0.79	83.8 (12.3)	80.0 (10.9)	81.7 (11.6)	0.23
Median (IQR)	77.9 (67.6-86.8)	73.5 (67.6-91.2)	76.5 (67.6-88.2)		86.8 (76.5-89.7)	80.1 (72.1-89.7)	82.4 (73.5-89.7)	

xx) G-MISS scores for patients attending dietitian and therapeutic radiographer consultations

	Dietitian				Therapeutic Radiographer			
	Prescriber	Non-prescriber	Total	P*	Prescriber	Non-prescriber	Total	P*
<b>Relief</b>								
n	18	13	31		34	51	85	
Mean (SD)	80.6 (12.3)	75.7 (13.8)	78.5 (13.0)	0.31	85.5 (12.7)	80.9 (13.8)	82.7 (13.5)	0.12
Median (IQR)	79.7 (71.9-87.5)	78.1 (65.6-87.5)	78.1 (68.8-87.5)		87.5 (75.0-100)	78.1 (75.0-93.8)	81.3 (75.0-93.8)	
<b>Communication</b>								
n	22	18	40		50	71	121	
Mean (SD)	88.8 (10.6)	87.0 (13.1)	88.0 (11.6)	0.63	90.3 (11.9)	89.0 (12.1)	89.6 (12.0)	0.56
Median (IQR)	91.7 (83.3-100)	91.7 (75.0-100)	91.7 (79.2-100)		93.8 (87.5-100)	91.7 (79.2-100)	91.7 (79.2-100)	
<b>Compliance</b>								
n	24	21	45		52	72	124	
Mean (SD)	73.4 (22.5)	72.0 (61.9)	72.8 (22.2)	0.83	85.1 (17.9)	80.6 (16.8)	82.5 (17.3)	0.15
Median (IQR)	75.0 (50.0-100)	75.0 (50.0-87.5)	75.0 (50.0-100)		87.5 (75.0-100)	75.0 (75.0-100)	87.5 (75.0-100)	
<b>Total</b>								
n	16	12	28		33	50	83	
Mean (SD)	82.3 (11.2)	78.8 (11.1)	80.8 (11.1)	0.41	87.2 (11.9)	82.9 (12.0)	84.3 (12.1)	0.12
Median (IQR)	82.8 (75.8-90.6)	75.8 (69.5-90.6)	80.5 (71.1-90.6)		89.1 (76.6-100)	82.0 (75.0-95.3)	85.9 (75.0-95.3)	

P\*= t-tests

xxi) Respondent attitudes to dietitian and therapeutic radiographer prescribing

	Dietitian				Therapeutic Radiographer				Total
	Prescriber	Non-prescriber	Total	p*	Prescriber	Non-prescriber	Total	p*	n=125
<b>How likely are you to take the medicine prescribed by the therapeutic radiographer/dietitian?</b>									
n*	24	18	42		40	43	83		125
Mean (SD)	6.75 (1.03)	6.89 (0.32)	6.81 (0.80)		6.93 (0.47)	6.63 (0.85)	6.77 (0.70)		6.78 (0.74)
Median (IQR)	7.0 (7.0-7.0)	7.0 (7.0-7.0)	7.0 (7.0-7.0)	0.80	7.0 (7.0-7.0)	7.0 (7.0-7.0)	7.0 (7.0-7.0)	0.012	7.0 (7.0-7.0)
<b>How comfortable are you about therapeutic radiographers/dietitians prescribing?</b>									
n	25	24	49		57	74	131		180
Mean (SD)	6.48 (1.12)	6.63 (0.77)	6.55 (0.96)		6.75 (0.66)	6.49 (0.93)	6.60 (0.83)		6.59 (0.86)
Median (IQR)	7.0 (6.0-7.0)	7.0 (6.5-7.0)	7.0 (6.0-7.0)	0.78	7.0 (7.0-7.0)	7.0 (6.0-7.0)	8.0 (6.5-8.0)	0.043	7.0 (6.25-7.0)
<b>How confident are you in the therapeutic radiographer's/dietitian's ability to prescribe the most appropriate medicine?</b>									
n	25	24	49		57	74	131		180
Mean (SD)	6.56 (1.12)	6.38 (1.38)	6.47 (1.24)		6.68 (0.74)	6.47 (0.91)	6.56 (0.84)		6.54 (0.97)
Median (IQR)	7.0 (7.0-7.0)	7.0 (6.0-7.0)	7.0 (7.0-7.0)	0.49	7.0 (7.0-7.0)	7.0 (6.0-7.0)	17 (14.5-17.0)	0.161	7.0 (6.0-7.0)

*n\*=question restricted to n=125 respondents receiving information about medicines, p\*=Mann-Whitney U test*

xxii) SIMS scores for patients receiving information about medicines

	Dietitian				Therapeutic Radiographer				Total
	Prescriber (n=24)	Non-prescriber (n=18)	Total (n=42)	p *	Prescriber (n=40)	Non-prescriber (n=43)	Total (n=83)	p *	n=125
<b>Action &amp; Usage</b>									
n	24	18	42		40	41	81		125
Mean (SD)	8.54 (0.72)	8.67 (0.97)	8.60 (0.83)		8.63 (0.98)	7.78 (2.03)	8.20 (1.65)		8.26 (1.60)
Median (IQR)	9.0 (8.0-9.0)	9.0 (9.0-9.0)	9.0 (8.0-9.0)	0.25	9.0 (9.0-9.0)	9.0 (7.0-9.0)	9 (8.0-9.0)	0.030	9.0 (8.0-9.0)
<b>Potential Problems</b>									
n	24	18	42		40	40	80		125
Mean (SD)	6.29 (2.79)	7.17 (1.89)	6.67 (2.46)		7.15 (1.46)	6.60 (2.39)	6.88 (1.99)		6.70 (2.24)
Median (IQR)	8.0 (6.0-8.0)	8.0 (8.0-8.0)	8.0 (6.0-8.0)	0.21	8.0 (7.0-8.0)	8.0 (6.0-8.0)	8.0 (6.5-8.0)	0.78	8.0 (6.0-8.0)
<b>Total score</b>									
n					40	40	80		125
Mean (SD)					15.8 (2.04)	14.4 (3.90)	15.06 (3.18)		14.96 (3.31)
Median (IQR)					17.0 (15.0-17.0)	17.0 (12.5-17.0)	17.0 (14.5-17.0)	0.19	17.0 (14.0-17.0)

\*Wilcoxon rank sum tests

## **Observations**

### ***Overview of dietitian consultations***

Dietitian consultations (5-6 per day) were conducted in haemodialysis unit bedspaces, with most patients seen bi-monthly/monthly. Separate morning, afternoon and evening haemodialysis sessions were held seven days a week with patients receiving a minimum of 3 sessions/week. Each dietitian held a separate caseload with no cross cover beyond informal clinical discussion between the D-SP and D-NP. Consultations were electronically pre-booked through blanket referral and/or on request of MDT members or patients. Patients were not informed of consultation times/dates in advance.

Consultations were broadly conducted according to the following procedures: confirmation of patient identity and consent, initial review of biochemistry, drug and observation charts, review of physical and general health well-being, discussion of nutritional intake and medicines adherence and provision of treatment and advice. Local protocols were followed for some medicines (e.g., in the management of phosphate binders and activated vitamin D in chronic kidney disease stage 5D).

### ***Overview of D-SP and D-NP patient access to medicines***

Standard practice was for the D-SP to make immediate alterations/adjustments to prescribed medicines on drug charts and where necessary generate electronic prescriptions for patient collection of drugs/products at the subsequent dialysis session. Notification of adjustments and/or recommendations for repeat prescribing were routinely made via templated letter to the patient's general practitioner (GP).

The D-NP was not permitted to generate GP recommendation/notification letters independently, and liaised with a D-SP weekly/monthly to discuss medicines management decisions beyond the scope of protocols. D-SPs and/or consultants subsequently authorised GP letters, with the D-NP subsequently more reliant overall on GPs for initiating, amending and/or prescribing medicines.

Patients reported problems accessing a GP and delays in getting prescriptions from GPs for medicine during consultation observations, indicating additional trips to collect medication from community pharmacies were required.

### ***Overview of therapeutic radiography review consultations***

Following radiotherapy referral, on-site scheduling teams booked patients into a pre-planned number of radiotherapy sessions, in addition to a set number of TR face to face or telephone reviews. The number was determined by fractions; patients receiving 5 fractions generally received one end of treatment review (e.g., breast cancer), 15 fractions received first and final week reviews, with complex cancers (e.g., head & neck, thorax, gynaecology) and those receiving 20 fractions (e.g., prostate) seen weekly. Review consultations were allocated in 30-45 minute time blocks, although follow up actions (prescribing, referral) could extend the length of consultation time to 60 minutes or more. Review TRs conducted 5-8 consultations daily, which if face-to-face, were usually scheduled to coincide with the patient's radiotherapy session. For example, a patient would receive a same day face to face review just before or after receiving radiotherapy in order to minimise time spent in the department. Telephone consultations were coordinated to patient availability outside hospital attendance with one

site (CS 7) sending patients preliminary SMS texts to confirm call times and provide alternative face to face review options if preferred.

TR-IP/TR-NP consultations were conducted in designated treatment rooms and followed local protocols. Procedures included confirmation of patient identity and consent, review of current radiotherapy treatment and monitoring of tolerance, treatment-related toxicity and general physical/mental health well-being review in addition to provision of treatment and advice.

#### ***TR-IP consultations and patient access to medicines***

In addition to pre-booked appointments TR-IPs provided ad hoc reviews at request of TR treatment/review non-prescribers and/or patients. At CS 9 these ad-hoc triage duties were pre-assigned to a specific TR-IP while at CS 6 they were performed by any available TR-IP.

TR-IPs used electronic prescribing and/or paper (CS 8) prescriptions depending largely on the route by which medicines would be dispensed. All observed case sites held departmental stocks of topical applications and drugs commonly used for side effects that were dispensed via (usually paper) prescription or under PGD. Electronic prescribing was predominantly used for pharmacy dispensed medications, either in hospital, or to a pharmacy of patients' choice. Limited supplies of medicines prescribed from departmental stocks were given to patients immediately, while main hospital pharmacies took 24-36 hours to dispense drugs during week days. Patient collection of prescribed medicines at satellite pharmacies based in radiotherapy/oncology centres (CS 6, CS 9) were observed to involve a 5-7 minute walk and 10-40 minute wait. An ambulatory prescription chart was used if a patient needed a STAT dose of opiates or anti-emetics to facilitate/enable radiotherapy treatment (e.g., Oramorph, Ondansetron). TR-IPs referred to doctors or in some cases clinical nurse specialists (CS 6, CS 9) for controlled drugs with CS 6 and CS 9 using SP.

PGDs for the administration/supply of common drugs (e.g., topical applications, soluble paracetamol, anti-emetics, enemas, laxatives, oral care products, loperamide) were accessible to Trust trained TR-IPs at case-sites 6, 8 and 9. Access to drugs via PGDs were restricted to single drugs/products (CS 3) or a wider range of specific drugs (CS 6, CS 8, CS9). Issue required two staff members trained in dispensing.

#### ***TR-NP consultations and patient access to medicines***

Non-prescribing TR colleagues (review and treatment) were observed to refer to TR-IPs to access prescriptions or address patient medicines optimisation needs beyond their scope of practice. Treatment radiographers often worked in teams of 3 or 4, with one assigned administrative duties including making necessary TR-IP referrals/contacts. Where no TR-IPs were accessible, doctors including consultants and ward/clinic based registrars were contacted. These were not always on-site and required location in other departments/organisations, with access generally more difficult towards the end of the week and in evenings. Doctors contacted via email, phone or (usually by leaving the unit) face-to-face either provided a prescription based on the information provided by non-prescribers, or attended the department/arranged a patient review before prescribing. Doctor generated prescriptions were predominantly electronic and sent directly to main hospital or satellite pharmacies with collection of medicines by patients/relatives/pharmacy delivery, or via a direct dispensing of stock prescription items from radiotherapy departmental cupboards (requiring two TR staff trained in dispensing).

The level of TR-NP MMA involvement varied according to case-site departmental set competencies and training arrangements. Subject to training eligibility (usually AfC band 7 band above), PGDs were not available to non-prescribers at CS8. Case site 8 also mandated that TR-NPs (treatment and review) could not give direct patient recommendations/advice for over the counter medicines and could only give advice about prescribed medicines as stipulated in prescription instructions.

## Case record review

### xxiv) Dietitian case record assessments

Dietitian case record assessments (n=10) by 2 assessors (total n=20)								
A. Source Documents	Yes		No		Unsure		Disagree	
	Count	%	Count	%	Count	%	Count	%
A1. Information of presenting/ current condition/complaint	20	100%	0	0%	0	0%	0	0%
A2. Past medical history	19	95.0%	1	5.0%	0	0%	1	5.0%
A3. Current medications	1	5.0%	19	95.0%	0	0%	1	5.0%
A4. Allergies	17	85.0%	3	15.0%	0	0%	3	15.0%
A5. Rationale for prescribing/ medicines management decision	16	80.0%	4	20.0%	0	0%	4	20.0%
A6. Prescription records for any changes or new drugs issued during consultation	20	100.0%	0	0%	0	0%	0	0%
A7. Prescription records for discharge plan recommendation	12	60.0%	0	0%	8	40.0%	8	40.0%
A8. Other give details (any other information provided, e.g., GP letter)	NA	NA	NA	NA	NA	NA	NA	NA
A9a. General quality of available records, (1=poor, 10=excellent)	Total records (n=10): mean 7.05, SD 1.09, median 7.0, range 5-9. D-SPs: Mean 7.5, SD 0.97, median 7, range 6-9. D-NPs: Mean 6.6, SD 1.07, median 6, range 5-8.							
A9b. Number of records with quality scoring discrepancies > 2 points, requiring adjudication	n=3							
B. Patient Information and background	Full		Some		None		Disagree	
	Count	%	Count	%	Count	%	Count	%
B1. Age, gender, date, reason for consultation	5	25.0%	15	75.0%	0	0%	3	15.0%
B2. Current medications	19	95.0%	1	5.0%	0	0%	1	5.0%
C. Appropriateness of prescribing/ medicines management decision(s)	Yes		No		Unsure		Disagree	
	Count	%	Count	%	Count	%	Count	%
C1. Enough information provided to make an assessment regarding the appropriateness of the decision(s)	14	70.0%	6	30.0%	0	0%	2	10.0%
C2. Based on the available information, was an appropriate decision(s) made?	14	70.0%	6	30.0%	0	0%	2	10.0%
D. Medication Errors	Yes		No		Unsure		Disagree	
	Count	%	Count	%	Count	%	Count	%
D1. Did the document(s) contain enough information for any medication errors occurring during the prescribing/medicines management stages to be assessed?	19	95.0%	1	5.0%	0	0%	1	5.0%



D2. Based on the available information, did the patient experience any prescribing/ medicines management decision related medication errors?	1	5.0%	18	90.0%	1	5.0%	1	5.0%
<b>D3. Error details (n=1 error)</b>	<b>Yes</b>		<b>No</b>		<b>Unsure</b>		<b>Disagree</b>	
	<b>Count</b>	<b>%</b>	<b>Count</b>	<b>%</b>	<b>Count</b>	<b>%</b>	<b>Count</b>	<b>%</b>
<b>Error description</b>	<i>Dose of Evacal D3 written as 400u rather than 400iu on GP letter</i>							
a. Incorrect/missing drug dose	0	0%	0	0%	NA	NA	NA	NA
b. Incorrect/missing units	2	100.0%	0	0%	NA	NA	NA	NA
c. Incorrect/missing frequency	0	0%	0	0%	NA	NA	NA	NA
d. Drug/product name incorrect	0	0%	0	0%	NA	NA	NA	NA
e. Unclear, incomplete/illegible prescription	0	0%	0	0%	NA	NA	NA	NA
f. Medicines not written as prescribed	0	0%	0	0%	NA	NA	NA	NA
g. Selection of drug	0	0%	0	0%	NA	NA	NA	NA
h. Selection of dose	0	0%	0	0%	NA	NA	NA	NA
i. Selection of formulation	0	0%	0	0%	NA	NA	NA	NA
j. Incorrect/missing units	0	0%	0	0%	NA	NA	NA	NA
k. Incorrect/missing frequency	0	0%	0	0%	NA	NA	NA	NA
l. Drug/product name incorrect	0	0%	0	0%	NA	NA	NA	NA

**xxv) Therapeutic radiographer case record assessments**

Therapeutic Radiographer case record assessments (n=22) by 2 assessors (total n=44)								
A. Source Documents	Yes		No		Unsure		Disagree	
	Count	%	Count	%	Count	%	Count	%
A1. Information of presenting/current condition/complaint	44	100%	0	0%	0	0%	0	0%
A2. Past medical history	43	97.7%	1	2.3%	0	0%	1	2.3%
A3. Current medications	39	88.6%	5	11.4%	0	0%	1	2.3%
A4. Allergies	31	70.5%	12	27.3%	1	2.3%	6	13.7%
A5. Rationale for prescribing/medicines management decision	36	81.8%	3	6.8%	5	11.4%	4	9.1%
A6. Prescription records for any changes or new drugs issued during consultation	33	75.0%	4	9.1%	7	15.9%	4	9.1%
A7. Prescription records for discharge plan recommendation	27	61.4%	4	9.1%	13	29.5%	6	13.7%
A8. Other give details (any other information provided, e.g., GP letter)	NA	NA	NA	NA	NA	NA	NA	NA
A9a. General quality of available records, (1=poor, 10=excellent)	Total sample (n=22): mean 6.81, SD 1.99, median 7.0, range 1-10. TR-IPs: mean 7.21, SD 2.33, median 8.0, range 1-10. TR-NPs: mean 6.12, SD 0.89, median 6.0, range 5-8.							
A9b. Number of records with quality scoring discrepancies > 2 points, requiring adjudication	n=2							
B. Patient Information and background	Full		Some		None		Disagree	
	Count	%	Count	%	Count	%	Count	%
B1. Age, gender, date, reason for consultation	33	75.0%	10	22.7%	1	2.3%	8	18.2%
B2. Current medications	43	97.7%	0	0%	1	2.3%	1	2.3%
C. Appropriateness of prescribing/medicines management decision(s)	Yes		No		Unsure		Disagree	
	Count	%	Count	%	Count	%	Count	%
C1. Enough information provided to make an assessment regarding the appropriateness of the decision(s)	39	84.1%	5	11.4%	0	0%	4	9.1%
C2. Based on the available information, was an appropriate decision(s) made?	37	89.3%	1	2.3%	6	13.7%	7	15.9%
D. Medication Errors	Yes		No		Unsure		Disagree	
	Count	%	Count	%	Count	%	Count	%
D1. Did the document(s) contain enough information for any medication errors occurring during the prescribing/medicines management stages to be assessed?	31	70.5%	13	29.5%	NA	NA	13	29.5%
D2. Based on the available information, did the patient experience any prescribing/medicines management decision related medication errors?*	0	0%	30	70.5%	13	29.5%	11	25.0%

\*n=1 response missing



## Appendix 7: Economic Evaluation: Data collection tools and additional tables and figures

### Data Collection Tools

#### 7.1 Health Economics Questionnaires

##### Table and figures

- i) Summary of the characteristics of 20 NMP training programmes\* in the UK in 2021
- ii) Non-medical prescribing training courses and associated costs
- iii) Training costs per prescriber and per patient contact
- iv) Patient contacts and referrals, mean (range)
- v) Time spent on prescribing-related activities
- vi) Effectiveness estimates used in economic analysis
- vii) Summary of effectiveness outcomes (non-adjusted)
- viii) EQ-5D-5L responses for patients managed by dietitians and therapeutic radiographers
- ix) Patient waiting time to obtain a prescription (day) for the two professions
- x) List of model parameters used in the study
- xi) Results of the cost-effectiveness analyses of non-medical prescribing by dietitians and therapeutic radiographers
- xii) Cost-effectiveness plane (A) and cost-effectiveness acceptability curve (B) for prescriber dietitians vs non-prescriber dietitians based on 5,000 Monte Carlo simulations of total costs and QALY (adjusted using the mixed effects model)
- xiii) Cost-effectiveness plane (A) and cost-effectiveness acceptability curve (B) for prescriber dietitians vs non-prescriber dietitians based on 5,000 Monte Carlo simulations of total costs and QALY (adjusted using the mixed effects model)
- xiv) Deterministic sensitivity analyses of supplementary prescribing by dietitians
- xv) Cost-effectiveness plane for prescriber dietitians vs non-prescriber dietitians based on 5,000 Monte Carlo simulations of total costs and patient overall satisfaction with consultation
- xvi) Cost-effectiveness plane for prescriber dietitians vs non-prescriber dietitians based on 5,000 Monte Carlo simulations of total costs and patient overall experience of the consultation
- xvii) Cost-effectiveness plane (A) and cost-effectiveness acceptability curve (B) for prescriber therapeutic radiographers vs non-prescribers based on 5,000 Monte Carlo simulations of total costs and QALY (adjusted using the mixed effects model)
- xviii) Cost-effectiveness plan for prescriber therapeutic Radiographers vs non-prescriber therapeutic radiographers based on 5,000 Monte Carlo simulations of total costs and patient overall satisfaction with consultation
- xix) Cost-effectiveness plane for prescriber therapeutic Radiographers vs non-prescriber therapeutic radiographers based on 5,000 Monte Carlo simulations of total costs and patient overall experience of the consultation
- xx) Deterministic sensitivity analyses of independent prescribing by therapeutic radiographers
- xxi) List of training courses included in health economics analysis. Data on courses were collected in January-March 2021
- xxii) Unit costs used in the analysis

## 7.1: Health Economics questionnaire



14.D-SP  
Questionnaire Versi



15.TR-IP  
questionnaire Versi

### *D-SP- TR-IP Questionnaires*



16.NP-Trainee  
Dietitian Questionn:



17.NP-Trainee TR  
Questionnaire 1802:

### *Non-prescribing- Trainee Dietitian and Therapeutic Radiographer Questionnaires*

## Tables and Figures

### i) Summary of the characteristics of 20 NMP training programmes\* in the UK in 2021

Item	Mean (range)
Duration (week)	6 (3–13)
Number of training sessions (day)	30 (10–48)
Class/study time (hours)	7.5 (7–8)
Fee (£)	1,800 (1,220–3,240)
Course credits	40 (20–60)
Annual intake	2 (2–4)
Average number of attendees per intake	60 (40–80)

\*All data were collected from the websites of sample courses approved by the Health and Care Professions Council for dietitians and therapeutic radiographers. A few course organisers were contacted to obtain information on the annual intake and the average number of attendees per intake.

### ii) Non-medical prescribing training courses and associated costs

	Dietitians		Therapeutic radiographers	
	Mean	Range	Mean	Range
<b>Training programme</b>				
Course fee (£)	£1,801	£1,200–£3,500	£1,951	£1,070–£4,000
Course duration (month)	7	3–13	8	3–13
Employer-paid additional study time (day)	6	1–11	7	2–14
Pay band (£)	£48,456	£44,606–£52,305	£48,456	£44,606–£52,305
Cost of employer-paid additional study time (£)	£797	£133–£1,400	£951	£266–£1,859
Taught days in the training programme (day)	26	N/A	26	N/A
Days of supervised learning completed for the programme (day)	12	12–13	12	12–13
Cost of the time off work to complete the course – staff backfill (excluding personal study times) (£)	£2,522*	N/A	£2,522*	N/A
<b>Out-of-pocket expenses (OOPs, paid by trainees)</b>				
Travel expenses (£)	£132	£10–£400	£209	£36–£600
Textbooks and study materials (£)	£105	£10–£400	£62	£20–£150
Other OOP expenses (£)	£193	£30–£400	£45	£25–£60
Personal study time (day)	29	7–60	27	4–60
Personal study time (£)	£3,791	£929–£7,965	£3,584	£531–£7,965

\* Based on the required time to complete the course. The cost associated with time off work to complete the NMP course was estimated using the number of 'taught' and 'supervised' days. As a requirement, each trainee had to complete 26 taught days and 12 supervised days. The costs of supervised days are already included in the NMP training programme fee. The numbers of the days were the same for both professions. N/A: Not Applicable; OOP: Out-of-pocket.

iii) **Training costs per prescriber and per patient contact**

	Dietitians		Therapeutic radiographers	
	Mean	Range	Mean	Range
<b>Including OOP expenses</b>				
Average training cost per prescriber	£9,341	£4,834–£16,654	£9,324	£4,470–£17,223
Average training cost per patient contact	£21	£20–£23	£10	£10–£16
Average training per patient contact required to manage prescriptions	£34	£32–£37	£16	£15–£26
<b>Excluding OOP expenses</b>				
Average training cost per prescriber	£5,120	£3,855–£7,489	£5,425	£3,858–£8,447
Average training cost per patient contact	£12	£10–£16	£6	£5–£14
Average training cost per patient contact required to manage prescriptions	£19	£17–£26	£9	£7–£22

Note: \* for detailed costs, please see (ii).

iv) **Patient contacts and referrals, mean (range)**

	Dietitians		Therapeutic radiographers	
	Prescribers	Non-prescribers	Prescribers	Non-prescribers
All patient contacts per week	9 (5–15)	9 (5–15)	19 (6–38)	19 (6–38)
% of patient contacts required to manage prescriptions	63% (50%–75%)	N/A	63% (41%–90%)	N/A
Number of patient contacts required to manage prescriptions per week	6 (3–9)	N/A	12 (4–24)	N/A
% of referrals for prescribing	2% (0%–2%)	30% (5%–60%)	7% (1%–10%)	23% (9%–37%)
Total number of patient contacts per year	442 (240–720)	442 (240–720)	909 (272–1800)	909 (272–1800)
Number of patient contacts required to manage prescription per year	276 (150–450)	N/A	575 (172–1139)	N/A
Number of referrals for prescribing per year	30 (5–77)	131 (72–209)	60 (18–119)	213 (64–421)

N/A: Not Applicable; \* the figures rounded up to the nearest whole number as the figures show the number of patient contacts.

v) Time spent on prescribing-related activities

Activity	Dietitians		Therapeutic radiographers	
	Mean	Range	Mean	Range
Communicating with patients	23%	20%–25%	43%	25%–70%
Reviewing medication	28%	25%–30%	33%	5%–85%
Consulting with colleagues	55%	10%–100%	13%	10%–20%
Writing notes	10%	N/A	28%	15%–45%

N/A: Not Applicable (due to a lack of data on the range)

vi) Effectiveness estimates used in economic analysis

Assessment	Prescribers		Non-prescribers		Difference in mean	95% CI
	Mean	SD	Mean	SD		
<b>Dietitians</b>						
QALY	0.7403	0.0223	0.7525	0.0269	-0.0122	-0.0817, 0.0551
Patient's overall satisfaction with consultation	77.32	7.38	76.38	7.63	0.95	-3.37, 5.26
Patient's overall experience of the consultation	65.2	7.39	63.33	5.65	1.87	-1.93, 5.66
<b>Therapeutic radiographers</b>						
QALY	0.7299	0.0250	0.7359	0.0291	-0.0060	-0.0816, 0.0686
Patient's overall satisfaction with consultation	79.57	0.96	79.35	0.66	0.22	-0.0556, 0.5002
Patient's overall experience of the consultation	65.69	0.97	66.24	1.09	-0.55	-0.9140, -0.1867

Effectiveness outcomes were adjusted for covariates using a mixed-effects model (see Methods)



vii) Summary of effectiveness outcomes (non-adjusted)

Assessment	Prescribers		Non-prescribers		Difference in mean	95% CI
	Mean	SD	Mean	SD		
<b>Dietitians</b>						
QALY	0.6267	0.3068	0.6414	0.2961	0.0147	-0.1587–0.1881
Patient's overall satisfaction with consultation*	77	7	76	8	1	-3–5
Patient's overall experience of the consultation*	65	7	63	3	2	-2–6
<b>Therapeutic radiographers</b>						
QALY	0.8337	0.1297	0.8430	0.1574	0.0092	-0.0416–0.0601
Patient's overall satisfaction with consultation*	79	8	80	7	1	-2–2
Patient's overall experience of the consultation*	66	7	66	5	0	-2–2

\* patients' satisfaction and experience outcomes scores were estimated based on a 100 scale.

viii). EQ-5D-5L responses for patients managed by dietitians and therapeutic radiographers

Dimensions	Dietitians		Therapeutic radiographers	
	Prescriber group (n=25) N (%)	Non-prescriber group (n=24) N (%)	Prescriber group (n=57) N (%)	Non-prescriber group (n=74) N (%)
<b>Mobility</b>				
No problems	5 (20%)	7 (29%)	48 (84%)	65 (88%)
Slight	6 (24%)	6 (25%)	7 (12%)	7 (10%)
Moderate	7 (28%)	4 (17%)	1 (2%)	1 (1%)
Severe	4 (16%)	4 (17%)	1 (2%)	1 (1%)
Extreme	3 (12%)	3 (13%)	0 (0%)	0 (0%)
<b>Self-care</b>				
No problems	16 (64%)	15 (63%)	51 (89%)	66 (89%)
Slight	2 (8%)	3 (13%)	4 (7%)	6 (8%)
Moderate	6 (24%)	4 (17%)	1 (2%)	2 (3%)
Severe	0 (0%)	1 (4%)	1 (2%)	0 (0%)
Extreme	1 (4%)	1 (4%)	0 (0%)	0 (0%)
<b>Usual activities</b>				
No problems	5 (20%)	5 (21%)	22 (38.5%)	44 (60%)
Slight	6 (24%)	6 (25%)	21 (37%)	11 (15%)
Moderate	8 (32%)	8 (33%)	11 (19%)	17 (23%)
Severe	4 (16%)	3 (13%)	1 (2%)	1 (1%)
Extreme	2 (8%)	2 (8%)	2 (3.5%)	1 (1%)
<b>Pain/Discomfort</b>				
No pain	7 (28%)	7 (29%)	16 (28%)	26 (35%)
Slight	7 (28%)	6 (25%)	23 (40%)	32 (43%)
Moderate	7 (28%)	5 (21%)	14 (25%)	9 (12%)
Severe	3 (12%)	5 (21%)	4 (7%)	5 (7%)
Extreme	1 (4%)	1 (4%)	0 (0%)	2 (3%)
<b>Anxiety/Depression</b>				
No problems	12 (48%)	15 (63%)	32 (56%)	46 (62%)
Slight	7 (28%)	3 (13%)	17 (30%)	22 (30%)
Moderate	2 (8%)	3 (13%)	7 (12%)	6 (8%)
Severe	1 (4%)	2 (8%)	1 (2%)	0 (0%)
Extreme	3 (12%)	1 (4%)	0 (0%)	0 (0%)

ix) Patient waiting time to obtain a prescription (day) for the two professions

	Prescribers		Non-prescribers	
	N*	Mean (SD)	N	Mean (SD)
Waiting time for patients managed by dietitians	5	1.67 (0.6)	3	3.7 (2.3)
Waiting time for patients managed by therapeutic radiographers	12	1 (N/A)	3	1 (N/A)

Note: \* Sample size for this effectiveness outcome; N/A: Not Applicable

x) List of model parameters used in the study

Parameter	Value		Reference
	Prescriber	Non-prescriber	
<b>Dietitians</b>			
<i>Probability of using their prescribing rights</i>			
base case	0.64	N/A	Data from the study sample
lower limit	0.34	N/A	Assumption ( $\pm 30\%$ from the base case)
upper limit	0.94	N/A	Assumption ( $\pm 30\%$ from the base case)
<i>Probability of referring patients for prescribing to other prescribers</i>			
base case	0.02	0.30	Data from the study sample (HE questionnaires)
lower limit	0.00	0.05	Data from the study sample (HE questionnaires and audits)
upper limit	0.32	0.60	Assumption (+30% from the base case) for the prescribers and data from the study sample for the non-prescribers
<i>Probability of prescribing not being required</i>			
base case	0.34	0.70	Data from the study sample
lower limit	0.04	0.40	Assumption ( $\pm 30\%$ from the base case)
upper limit	0.64	1.00	Assumption ( $\pm 30\%$ from the base case)
<b>QALY</b>			
base case	0.74	0.75	Data from the study sample
lower limit	0.70	0.71	Data from the study sample
upper limit	0.78	0.82	Data from the study sample
<b>Therapeutic radiographers</b>			
<i>Probability of using their prescribing rights</i>			
base case	0.87	N/A	Data from the study sample
lower limit	0.57	N/A	Assumption ( $\pm 30\%$ from the base case)
upper limit	1.00	N/A	Assumption ( $\pm 30\%$ from the base case)
<i>Probability of referring patients to other prescribers</i>			
base case	0.07	0.23	Data from the study sample (HE questionnaires)
lower limit	0.01	0.09	Data from the study sample (HE questionnaires and audits)
upper limit	0.10	0.37	Data from the study sample (HE questionnaires and audits)
<i>Probability of prescribing not being required</i>			
base case	0.06	0.77	Data from the study sample
lower limit	0.06	0.47	Assumption ( $\pm 30\%$ from the base case)

upper limit	0.36	1.00	Assumption ( $\pm 30\%$ from the base case)
<b>QALY</b>			
base case	0.73	0.74	Data from the study sample
lower limit	0.68	0.69	Data from the study sample
upper limit	0.78	0.82	Data from the study sample

N/A: Not Applicable

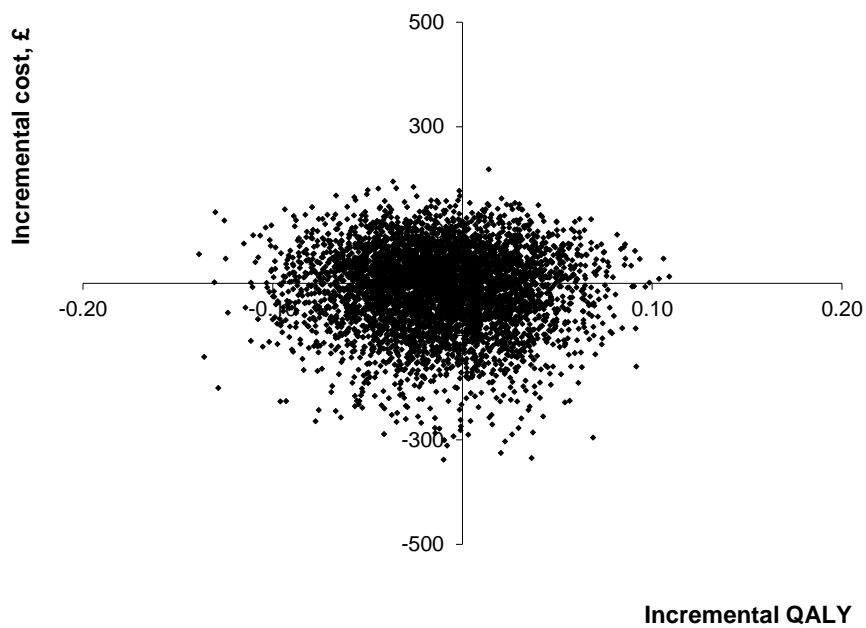
xi) **Results of the cost-effectiveness analyses of non-medical prescribing by dietitians and therapeutic radiographers**

Outcome	Total cost, £ mean (SD)	Total effect, mean (SD)	Difference in cost, £ mean (95% CI)	Difference in effect, mean (95% CI)
<b>Patients managed by dietitians</b>				
<b>QALY</b>				
Prescribers	169 (34)	0.74 (0.02)	-10 (-179, 120)	-0.0122 (-0.0824, 0.0566)
Non-prescribers	179 (69)	0.75 (0.03)		
<b>Patient's overall satisfaction with consultation</b>				
Prescribers	169 (34)	77.32	-10 (-179, 120)	0.95 (-3.38, 5.26)
Non-prescribers	179 (69)	76.38		
<b>Patient's overall experience of the consultation</b>				
Prescribers	169 (34)	65.20	-10 (-179, 120)	1.87 (-1.93, 6.66)
Non-prescribers	179 (69)	63.33		
<b>Patients managed by therapeutic radiographers</b>				
<b>QALY</b>				
Prescribers	134 (61)	0.73 (0.03)	5 (-194, 183)	-0.0060 (-0.0816, 0.0686)
Non-prescribers	129 (71)	0.74 (0.03)		
<b>Patient's overall satisfaction with consultation</b>				
Prescribers	134 (61)	79.57	5 (-194, 183)	0.22 (-0.0586, 0.5002)
Non-prescribers	129 (71)	79.35		
<b>Patient's overall experience of the consultation</b>				
Prescribers	134 (61)	65.69	5 (-194, 183)	-0.55 (-0.9140, -0.1867)
Non-prescribers	129 (71)	66.24		

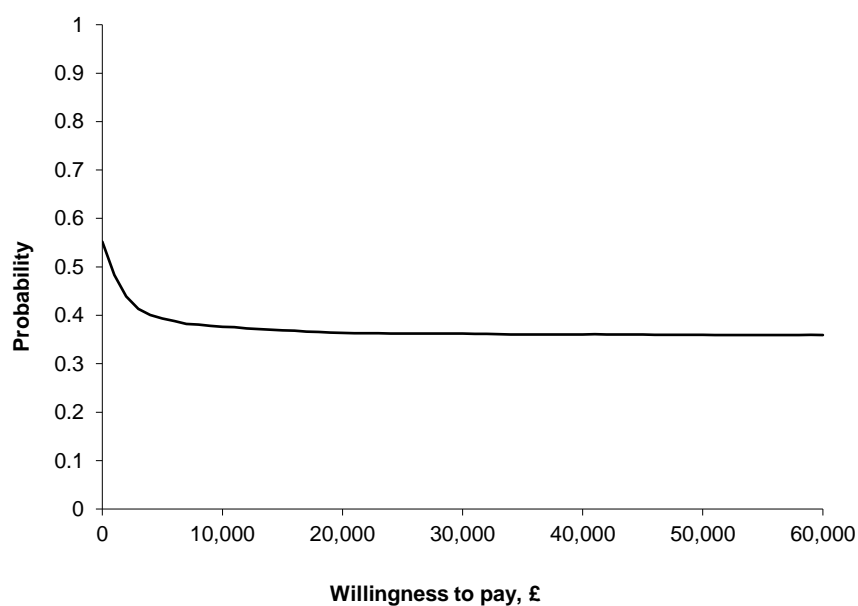
Costs were rounded to the nearest

*XII ) Cost-effectiveness plane (A) and cost-effectiveness acceptability curve (B) for prescriber dietitians vs non-prescriber dietitians based on 5,000 Monte Carlo simulations of total costs and QALY (adjusted using the mixed effects model)*

**(A)**

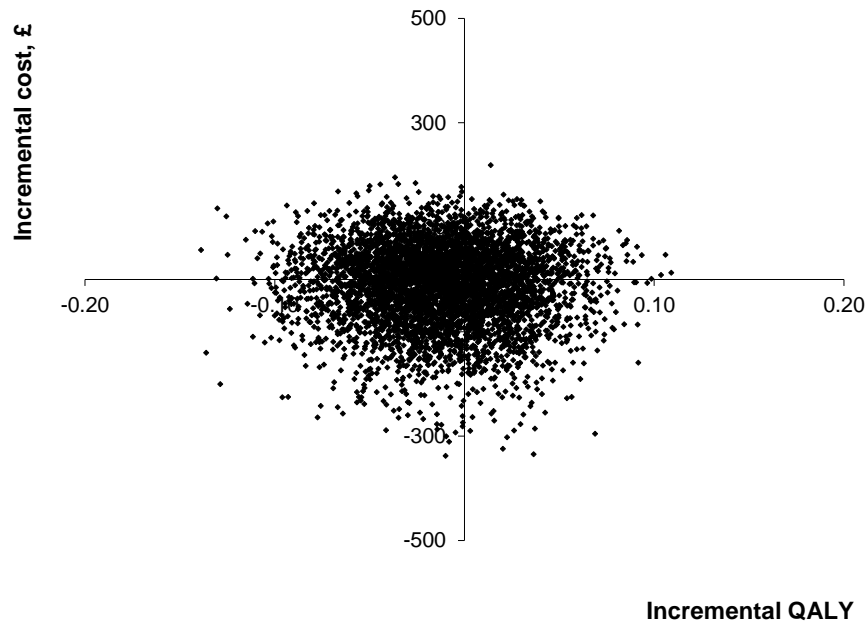


**(B)**

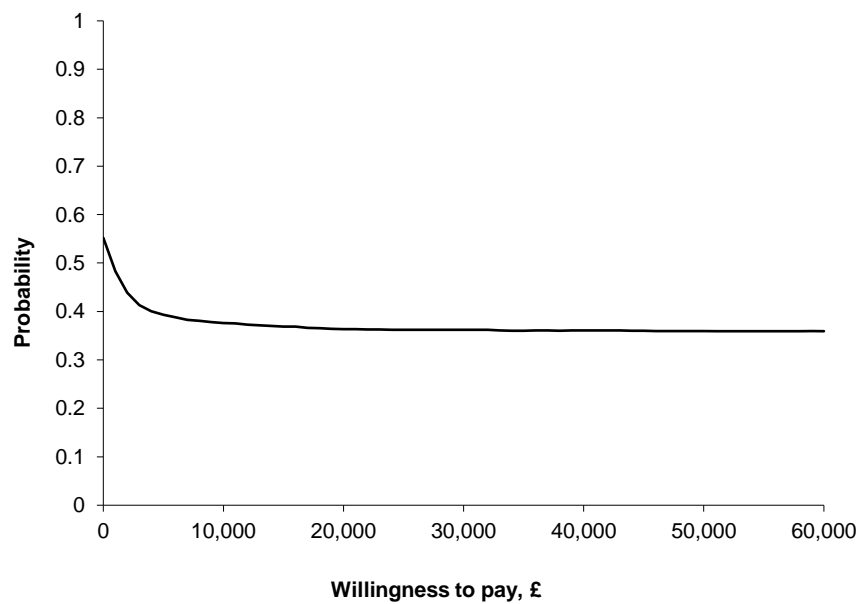


XIII) Cost-effectiveness plane (A) and cost-effectiveness acceptability curve (B) for prescriber dietitians vs non-prescriber dietitians based on 5,000 Monte Carlo simulations of total costs and QALY (adjusted using the mixed effects model)

(A)



(B)

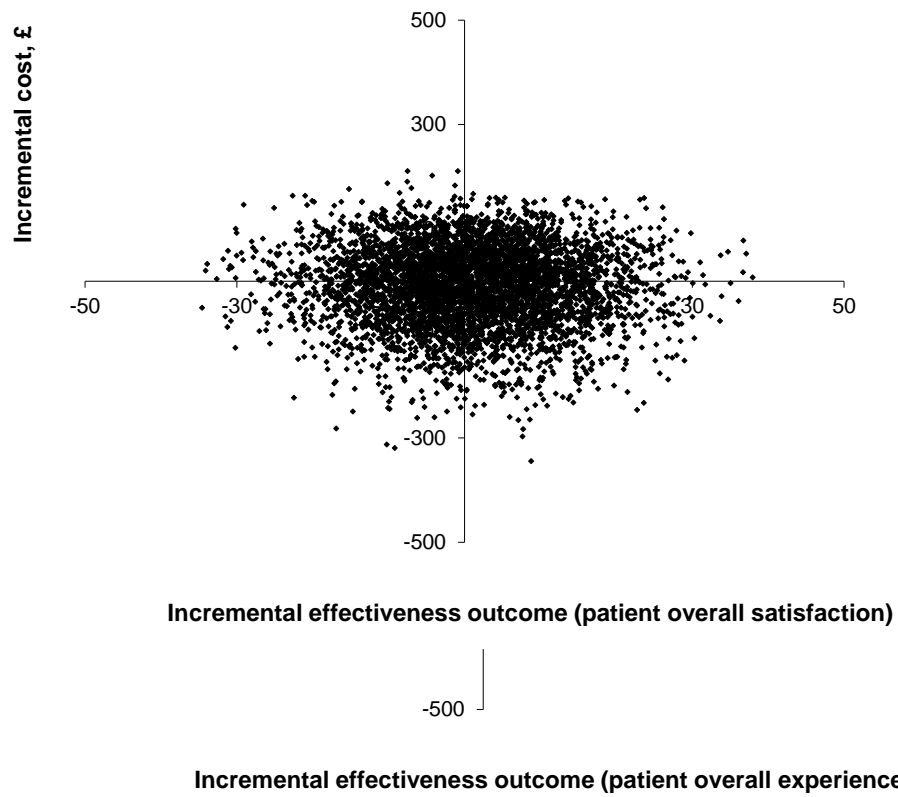


**xiv) Deterministic sensitivity analyses of supplementary prescribing by dietitians**

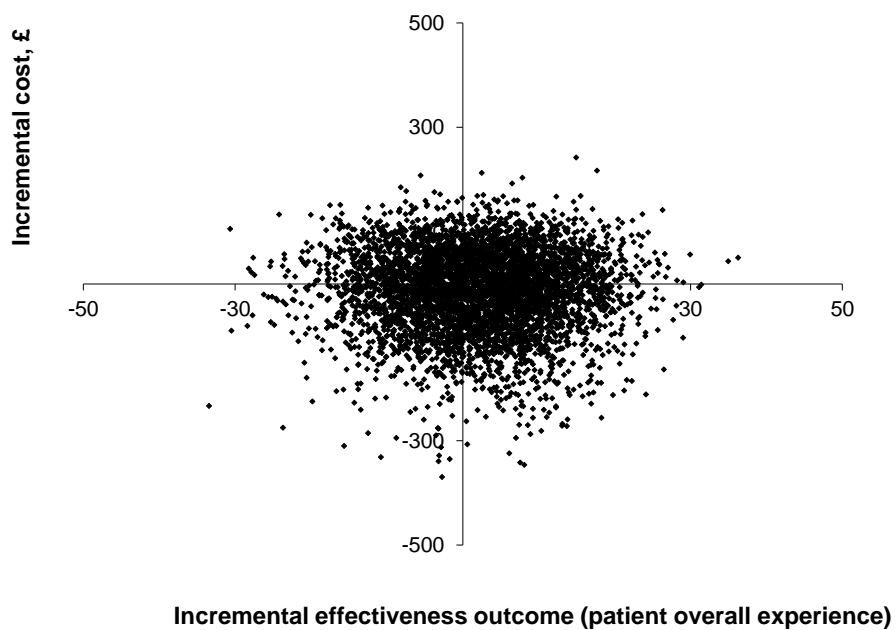
		Difference in cost, £ (95%CI)	Difference in QALY (95%CI)	ICER point estimate, £ (95%CI)
<b>Base case</b>		-10 (-179–120)	-0.0122 (-0.0824–0.0566)	816 (-25,289–23,788)
<b>Parameter</b>				
<b>Prescriber</b>	<b>Non-prescriber</b>			
<b>QALY</b>				
base case: 0.74	base case: 0.75	-10 (-179–120)	-0.0122 (-0.0824–0.0566)	816 (-25,289–23,788)
lower limit: 0.70	lower limit: 0.71	-10 (-179–120)	-0.0100 (-0.0787–0.0577)	993 (-25,486–25,450)
upper limit: 0.78	upper limit: 0.82	-10 (-179–120)	-0.0400 (-0.1080–0.0290)	248 (-17,446–14,445)
<b>Probability of using prescribing rights</b>				
base case: 0.64	N/A	-10 (-179–120)	-0.0122 (-0.0824–0.0566)	816 (-25,289–23,788)
lower limit: 0.34	N/A	-20 (-184–112)	-0.0122 (-0.0824–0.0566)	1,643 (-20,988–24,892)
upper limit: 0.94	N/A	1 (-166–138)	-0.0122 (-0.0824–0.0566)	-82 (-29,177–26,208)
<b>Probability of prescribing not being required</b>				
base case: 0.34	base case: 0.70	-10 (-179–120)	-0.0122 (-0.0824–0.0566)	816 (-25,289–23,788)
lower limit: 0.04	lower limit: 0.40	-72 (-261–73)	-0.0122 (-0.0824–0.0566)	11,996 (-40,066–37,090)
upper limit: 0.64	upper limit: 1.00	-34 (-268–137)	-0.0122 (-0.0824–0.0566)	5,665 (-39,420–37,056)
<b>Probability of referring patients to other prescribers</b>				
base case: 0.02	base case: 0.30	-10 (-179–120)	-0.0122 (-0.0824–0.0566)	816 (-25,289–23,788)
lower limit: 0.00	lower limit: 0.05	34 (-57–120)	-0.0122 (-0.0824–0.0566)	-2,793 (-21,115–19,512)
upper limit: 0.32	upper limit: 0.60	-10 (-309–248)	-0.0122 (-0.0824–0.0566)	821 (-50,616–43,994)
<b>Cost of non-medical prescribing, excluding OOP expenses per patient contact</b>				
base case: £12	N/A	-19 (-190–114)	-0.0122 (-0.0824–0.0566)	1,590 (-27,372, 25,794)
lower limit: £10	N/A	-21 (-195–110)	-0.0122 (-0.0824–0.0566)	1,755 (-24,821–29,635)
upper limit: £16	N/A	-15 (-182–119)	-0.0122 (-0.0824–0.0566)	1,262 (-26,333–29,607)
<b>Cost of non-medical prescribing, including OOP expenses per patient contact</b>				
base case: £21	N/A	-10 (-179–120)	-0.0122 (-0.0824–0.0566)	816 (-25,289–23,788)
lower limit: £20	N/A	-11 (-183–115)	-0.0122 (-0.0824–0.0566)	933 (-28,251–24,793)
upper limit: £23	N/A	-8 (-176–124)	-0.0122 (-0.0824–0.0566)	687 (-28,889–24,668)
<b>Cost of referral for prescribing per patient contact</b>				
base case: £188	base case: £188	-10 (-179–120)	-0.0122 (-0.0824–0.0566)	816 (-25,289–23,788)
lower limit: £76	lower limit: £76	14 (-223–161)	-0.0122 (-0.0824–0.0566)	1,150 (-33,798–35,502)
upper limit: £364	upper limit: £364	-95 (-300–70)	-0.0122 (-0.0824–0.0566)	7,803 (3,591–6,421)
<b>Cost of consultation (and prescribing-related activities) per patient contact</b>				
base case: £157	base case: £123	-10 (-179–120)	-0.0122 (-0.0824–0.0566)	816 (-25,289–23,788)
lower limit: £125	lower limit: £98	-24 (-231–127)	-0.0122 (-0.0824–0.0566)	1,971 (-28,894–31,417)
upper limit: £190	upper limit: £149	-33 (-227–119)	-0.0122 (-0.0824–0.0566)	2,711 (-32,360–31,977)

\*Cost per QALY lost. QALY, Quality-adjusted life years; ICER, Incremental cost-effectiveness ratio; prescribing; NMP, non-medical prescribing; OOP, Out-of-pocket.

XV) Cost-effectiveness plane for prescriber dietitians vs non-prescriber dietitians based on 5,000 Monte Carlo simulations of total costs and patient overall satisfaction with consultation

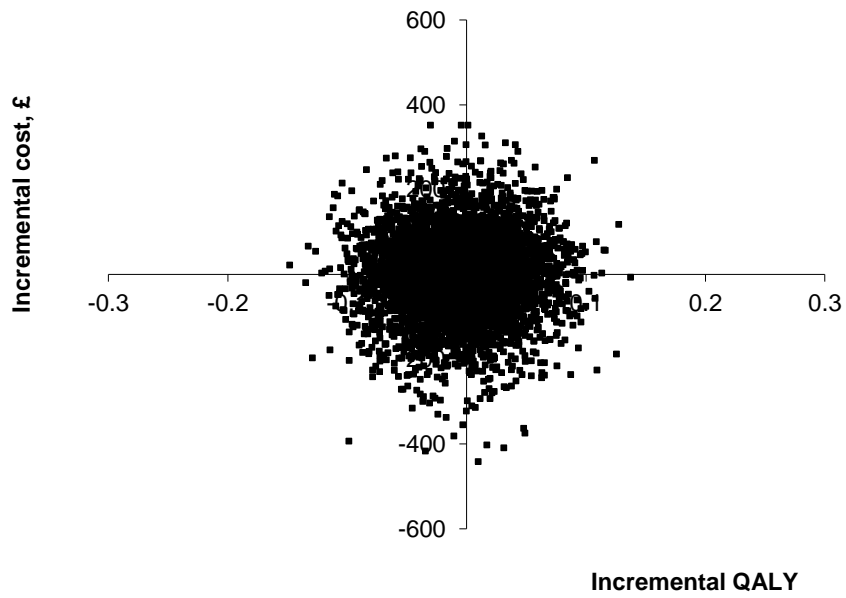


xvi) Cost-effectiveness plane for prescriber dietitians vs non-prescriber dietitians based on 5,000 Monte Carlo simulations of total costs and patient overall experience of the consultation

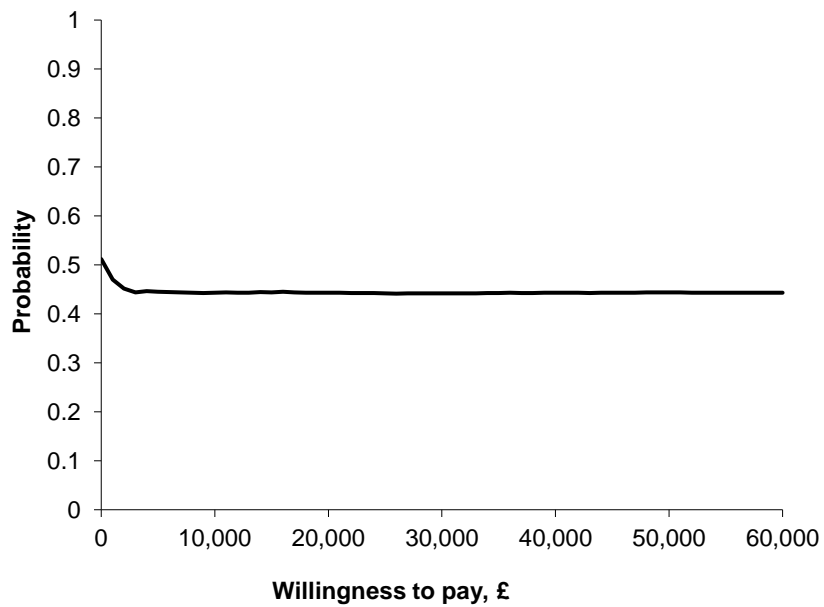


xvii) Cost-effectiveness plane (A) and cost-effectiveness acceptability curve (B) for prescriber therapeutic radiographers vs non-prescribers based on 5,000 Monte Carlo simulations of total costs and QALY (adjusted using the mixed effects model)

(A)

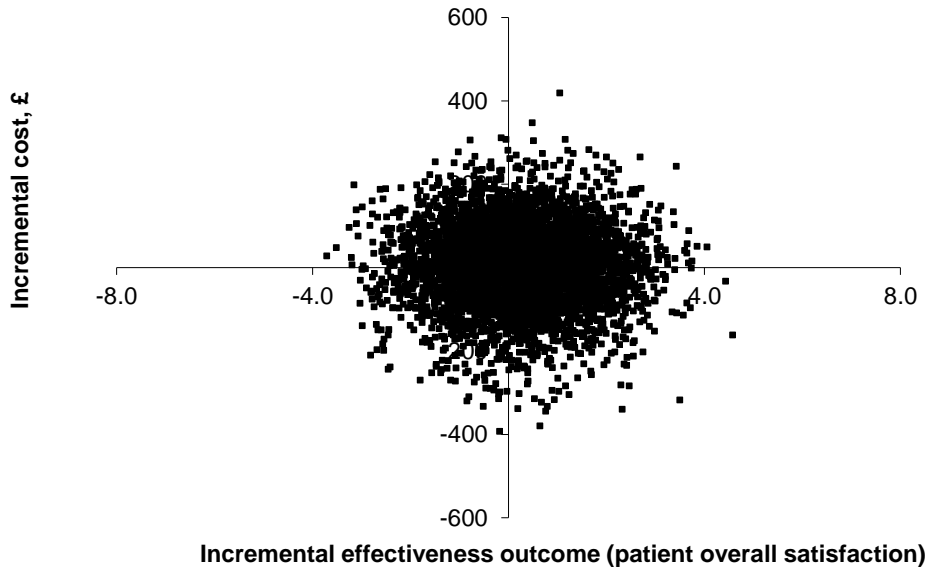


(B)

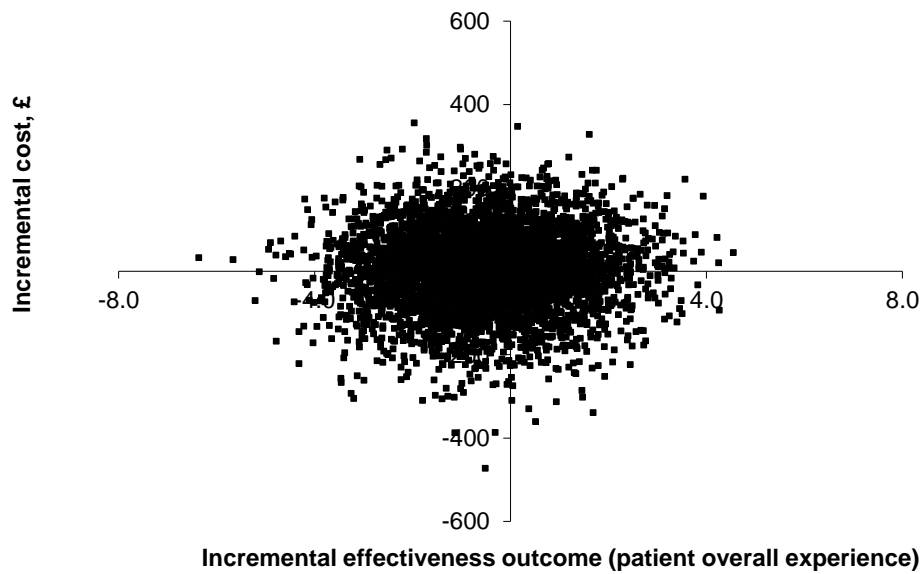




xviii) Cost-effectiveness plane for prescriber therapeutic Radiographers vs non-prescriber therapeutic radiographers based on 5,000 Monte Carlo simulations of total costs and patient overall satisfaction with consultation



xix) Cost-effectiveness plane for prescriber therapeutic Radiographers vs non-prescriber therapeutic radiographers based on 5,000 Monte Carlo simulations of total costs and patient overall experience of the consultation



xx) Deterministic sensitivity analyses of independent prescribing by therapeutic radiographers

		Difference in cost, £ (95%CI)	Difference in QALY (95%CI)	ICER point estimate, £ (95%CI)
<b>Base case</b>		5 (-194-183)	-0.0060 (-0.0816-0.0686)	-824 (-37,645-24,032)
<b>Parameter</b>				
<b>Prescriber</b>	<b>Non-prescriber</b>			
<b>QALY</b>				
base case: 0.73	base case: 0.74	5 (-194-183)	-0.0060 (-0.0816, 0.0686)	-824 (-37,645-24,032)
lower limit: 0.68	lower limit: 0.69	5 (-194-183)	-0.0100 (-0.0866, 0.0661)	-494 (-28,950-23,313)
upper limit: 0.78	upper limit: 0.82	5 (-194-183)	-0.0400 (-0.1178, 0.0371)	-124 (-18,064-17,804)
<b>Probability of using prescribing rights</b>				
base case: 0.87	N/A	5 (-194-183)	-0.0060 (-0.0816, 0.0686)	-824 (-37,645-24,032)
lower limit: 0.57	N/A	-4 (-204-167)	-0.0060 (-0.0816, 0.0686)	596 (-32,474-24,538)
upper limit: 1.00	N/A	-3 (-192-163)	-0.0060 (-0.0816, 0.0686)	525 (-30,775-25,650)
<b>Probability of prescribing not being required</b>				
base case: 0.06	base case: 0.77	5 (-194-183)	-0.0060 (-0.0816, 0.0686)	-824 (-37,645-24,032)
lower limit: 0.06	lower limit: 0.47	32 (-145-206)	-0.0060 (-0.0816, 0.0686)	-5,347 (-26,514-27,906)
upper limit: 0.36	upper limit: 1.00	15 (-213-231)	-0.0060 (-0.0816, 0.0686)	-2,499 (-34,980-35,429)
<b>Probability of referring patients to other prescribers</b>				
base case: 0.07	base case: 0.23	5 (-194-183)	-0.0060 (-0.0816, 0.0686)	-824 (-37,645-24,032)
lower limit: 0.01	lower limit: 0.09	21 (-127-168)	-0.0060 (-0.0816, 0.0686)	-3,499 (-20,499-21,765)
upper limit: 0.10	upper limit: 0.37	-13 (-127-168)	-0.0060 (-0.0816, 0.0686)	2,166 (-38,176-34,147)
<b>Cost of non-medical prescribing, excluding OOP expenses per patient contact</b>				
base case: £6	N/A	2 (-194-187)	-0.0060 (-0.0816, 0.0686)	-308 (-30,366-32,210)
lower limit: £5	N/A	1 (-198-184)	-0.0060 (-0.0816, 0.0686)	-142(-30,986-30,498)
upper limit: £14	N/A	10 (-189-197)	-0.0060 (-0.0816, 0.0686)	-1,641 (-27,2313-34,675)
<b>Cost of non-medical prescribing, including OOP expenses per patient contact</b>				
base case: £10	N/A	5 (-194-183)	-0.0060 (-0.0816, 0.0686)	-824 (-37,645-24,032)
lower limit: £10	N/A	5 (-194-183)	-0.0060 (-0.0816, 0.0686)	-824 (-37,645-24,032)
upper limit: £16	N/A	12 (183-193)	-0.0060 (-0.0816, 0.0686)	-1,975 (-29,524-34,404)
<b>Cost of referral for prescribing per patient contact</b>				
base case: £179	base case: £179	5 (-194-183)	-0.0060 (-0.0816, 0.0686)	-824 (-37,645-24,032)
lower limit: £76	lower limit: £76	23 (-190-183)	-0.0060 (-0.0816, 0.0686)	-3,832 (-33,467-29,009)
upper limit: £364	upper limit: £364	-23 (-226-155)	-0.0060 (-0.0816, 0.0686)	3,832 (-24,980-29,418)
<b>Cost of consultation (and prescribing-related activities) per patient contact</b>				
base case: £116	base case: £87	5 (-194-183)	-0.0060 (-0.0816, 0.0686)	-824 (-37,645-24,032)
lower limit: £69	lower limit: £52	1 (-218-204)	-0.0060 (-0.0816, 0.0686)	-5,347 (-26,514-27,906)
upper limit: £168	upper limit: £127	15 (-213-231)	-0.0060 (-0.0816, 0.0686)	-2,499 (-34,980-35,429)

\*Cost per QALY lost. QALY, Quality-adjusted life years; ICER, Incremental cost-effectiveness ratio; prescribing; NMP, non-medical prescribing; OOP, Out-of-pocket.

**xxi) List of training courses included in health economics analysis. Data on courses were collected in January-March 2021**

	<b>Name of course</b>	<b>Dietitians, TRs, or both</b>	<b>Provider</b>	<b>Course duration (months)</b>	<b>Source</b>
1	Independent/Supplementary Prescribing (PG Cert)	Both	University of Kent	10	<a href="https://www.kent.ac.uk/courses/postgraduate/740/independent-supplementary-prescribing">https://www.kent.ac.uk/courses/postgraduate/740/independent-supplementary-prescribing</a>
2	Independent and Supplementary Prescribing	Both	Liverpool John Moores University	6.5	<a href="https://www.ljmu.ac.uk/study/cpd/stand-alone-cpd-courses/non-medical-prescribing">https://www.ljmu.ac.uk/study/cpd/stand-alone-cpd-courses/non-medical-prescribing</a>
3	Continuing Professional Development (CPD)/Short courses (Practice Certificate in Independent and Supplementary Prescribing – L6)	Both	Coventry University	3.25	<a href="https://www.coventry.ac.uk/course-structure/health-and-life-sciences/cpd/practice-certificate-in-independent-and-supplementary-prescribing-level-6/">https://www.coventry.ac.uk/course-structure/health-and-life-sciences/cpd/practice-certificate-in-independent-and-supplementary-prescribing-level-6/</a>
4	Non-Medical Prescribing (Independent and/or Supplementary Prescribing)	Both	University of West England Bristol in partnership with the University of Bath	7	<a href="https://courses.uwe.ac.uk/Z5100077/non-medical-prescribing-independent-and-or-supplementary-prescribing">https://courses.uwe.ac.uk/Z5100077/non-medical-prescribing-independent-and-or-supplementary-prescribing</a>
5	Non-medical prescribing CPD award	Both	University of the Highlands and Islands	5	<a href="https://www.uhi.ac.uk/en/courses/cpd-award-non-medical-prescribing/#tabanchor">https://www.uhi.ac.uk/en/courses/cpd-award-non-medical-prescribing/#tabanchor</a>
6	Independent/Supplementary Prescribing (V300) L7	Both	De Montfort University, Leicester	7	<a href="https://www.dmu.ac.uk/study/courses/postgraduate-courses/independent-supplementary-prescribing-v300/independent-supplementary-prescribing-v300-level-7.aspx">https://www.dmu.ac.uk/study/courses/postgraduate-courses/independent-supplementary-prescribing-v300/independent-supplementary-prescribing-v300-level-7.aspx</a>
7	Postgraduate certificate in non-medical prescribing (PG Cert NMP)	Both	The Open University	13	<a href="http://www.open.ac.uk/postgraduate/qualifications/k33">http://www.open.ac.uk/postgraduate/qualifications/k33</a>
8	Non-Medical Prescribing	Both	Anglia Ruskin University	6	<a href="https://aru.ac.uk/study/professional-and-short-courses/v300-non-medical-prescribing">https://aru.ac.uk/study/professional-and-short-courses/v300-non-medical-prescribing</a>
9	Non-Medical Prescribing (V300) - Level 7	Both	Sheffield Hallam University	2.5	<a href="https://www.shu.ac.uk/study-here/options/health-and-social-care/short-courses-and-modules/nonmedical-prescribing-v300-level-7">https://www.shu.ac.uk/study-here/options/health-and-social-care/short-courses-and-modules/nonmedical-prescribing-v300-level-7</a>
10	Non-Medical Prescribing (V300) - Level 6	Both	Northumbria University	5.5	<a href="https://www.northumbria.ac.uk/study-at-northumbria/continuing-professional-development-short-courses-specialist-training/non-medical-prescribing-v300-level-6-ac0636-ac0637/">https://www.northumbria.ac.uk/study-at-northumbria/continuing-professional-development-short-courses-specialist-training/non-medical-prescribing-v300-level-6-ac0636-ac0637/</a>
11	Advanced Certificate Non-Medical Prescribing	Both	University of Central Lancashire	6	<a href="https://www.uclan.ac.uk/cpd/courses/non-medical-prescribing-advcert">https://www.uclan.ac.uk/cpd/courses/non-medical-prescribing-advcert</a>
12	Advancing Non-medical Prescribing	Both	Teesside University	4.5	<a href="https://www.tees.ac.uk/parttime_courses/nursing_health/ucppd_advancing_non-medical_prescribing.cfm">https://www.tees.ac.uk/parttime_courses/nursing_health/ucppd_advancing_non-medical_prescribing.cfm</a>
13	Non-Medical Prescribing Programme	Both	University of Northampton	6	<a href="https://www.northampton.ac.uk/courses/nonmedical-prescribing-programmes/">https://www.northampton.ac.uk/courses/nonmedical-prescribing-programmes/</a>

14	Non-medical Prescribing (V300)	Both	Manchester Metropolitan University	6	<a href="https://www.mmu.ac.uk/hpsc/cpd/course/non-medical-prescribing-v300/">https://www.mmu.ac.uk/hpsc/cpd/course/non-medical-prescribing-v300/</a>
15	Non-Medical Prescribing (V300)	Both	Edge Hill University	6.5	<a href="https://www.edgehill.ac.uk/health/cpd-modules/non-medical-prescribing-v300-2/">https://www.edgehill.ac.uk/health/cpd-modules/non-medical-prescribing-v300-2/</a>
16	Non-Medical Prescribing	Both	University of Chester	6	<a href="https://www1.chester.ac.uk/study/postgraduate/non-medical-prescribing-chester">https://www1.chester.ac.uk/study/postgraduate/non-medical-prescribing-chester</a>
17	Independent/Supplementary Prescribing (V300)	Both	University of Surrey	6	<a href="https://www.surrey.ac.uk/cpd-and-short-courses/independentsupplementary-prescribing-v300-level-7">https://www.surrey.ac.uk/cpd-and-short-courses/independentsupplementary-prescribing-v300-level-7</a>
18	Independent Prescribing	Both	University of Brighton	6	<a href="https://www.brighton.ac.uk/studying-here/find-a-course/cpe-in-health-sciences/undergraduate/modules/independent-prescribing-for-nurses-midwives-allied-health-professionals.aspx">https://www.brighton.ac.uk/studying-here/find-a-course/cpe-in-health-sciences/undergraduate/modules/independent-prescribing-for-nurses-midwives-allied-health-professionals.aspx</a>
19	Non-medical prescribing	Both	Bucks New University	7.5	<a href="https://bucks.ac.uk/courses/short-course/non-medical-prescribing-formerly-independent-and-supplementary-nurse-prescribing">https://bucks.ac.uk/courses/short-course/non-medical-prescribing-formerly-independent-and-supplementary-nurse-prescribing</a>
20	Independent And Supplementary Prescribing For Healthcare Professionals	Both	Edinburg Napier University	6.5	<a href="https://www.napier.ac.uk/about-us/our-schools/the-school-of-health-and-social-care/courses/independent-and-supplementary-prescribing">https://www.napier.ac.uk/about-us/our-schools/the-school-of-health-and-social-care/courses/independent-and-supplementary-prescribing</a>

## Appendix 8 Case Site Overview

## Dietitians

### Case Site 2 – Pilot dietitian comparison

Service Information	Case Site 2– pilot dietitian comparison	
	Dietitian – Prescriber	Dietitian – Non-Prescriber
Job title and role	Lead Intestinal Rehabilitation Dietitian	Advanced Specialist Intestinal Rehabilitation Dietitian
Specialty/cancer sites	Gasto-intestinal, severe intestinal failure	
Description of service provided and setting	Specialist acute hospital providing medical/surgical in-patient/out-patient services.	
Team structure/size, NMPS in team (other than TR-IP)	Small team, split across sites and rotating.	
Service scheduling/access/referral	In-patient, out-patient services for adults and adolescents transitioning to adult services, parenteral nutrition, IV fluids/micronutrients, intestinal rehabilitation.	
Patient access to medicines	In-patient medicines accessed through standard hospital procedures, daily TPN prescriptions. GP asked to continue prescriptions. No departmental PGD use.	No departmental PGD use. GP asked to commence/amend prescription and continue.
Contextual information	Catchment population 1.0 million, above national average unemployment, deprivation index, ethnic diversity	

### Case Site 5 – Dietitian comparison

Service Information	Case Site 5 – dietitian comparison	
	Dietitian – Prescriber	Dietitian – Non-Prescriber
Job title and role	Lead Clinical Dietitian	Community Diabetes Dietitian
Specialty/cancer sites	Diabetes.	
Description of service provided and setting	NHS community trust, providing outpatient services.	
Team structure/size, NMPS in team (other than TR-IP)	Multi-disciplinary outpatient specialist diabetes team, with n=1 dietitian prescriber, nurse prescribers/doctors.	
Service scheduling/access/referral	Patients (adults only) referred to service via GP. D-SP split managerial/clinical role providing one daily clinic per week. D-SP provided 2-3 clinics/week by telephone.	
Patient access to medicines	SP, but seldom prescribed due to presence of IPs within MDT. GP asked to continue prescription. No departmental PGD use.	No departmental PGD use. GP asked to commence/amend prescription and continue.
Contextual information	Catchment population 1.1 million, above national average deprivation index, national average ethnic diversity.	

### Case Site 7: Dietitian comparison

Service Information	Case Site 7 – dietitian comparison	
	Dietitian – Prescriber	Dietitian – Non-Prescriber
Job title and role	Specialist Dietitian	Specialist Dietitian
Specialty/cancer sites	Renal services.	
Description of service provided and setting	Major acute specialist hospital, providing in-patient/out-patient dietetic care to patients with acute or chronic renal disease comprising parenteral/enteral/oral nutrition support & therapeutic dietary advice. Extended role in managing renal bone disease in dialysis patients.	
Team structure/size, NMPS in team (other than TR-IP)	Small team, n=2 prescribers, work within a wider multi-professional team.	
Service scheduling/access/referral	Patients (adults only) pre-allocated according to dialysis shift. Each dietitian has allocated dialysis shifts which are covered by prescriber/non-prescriber. Multi-disciplinary referrals. Patient initiated consultations possible.	
Patient access to medicines	SP. In-patient medicines accessed through standard hospital procedure for outpatient prescribing of 28 day initial supply. GP asked to continue prescription. No departmental PGD use.	No departmental PGD use. Authorised/trained to adjust phosphate binders under Trust protocol. GP asked to commence/amend prescription and continue.
Contextual information	Catchment population 3.0 million, above national average deprivation index, national average ethnic diversity.	

## Therapeutic Radiographers

### Case Site 1 –Pilot therapeutic radiographer comparison

Service Information	Case Site 1– pilot therapeutic radiographer comparison	
	Therapeutic Radiographer Prescriber	Therapeutic Radiographer Non-Prescriber
Job title and role	Review Radiographer	Review/Treatment Radiographer
Specialty/cancer sites	All cancer sites	Urology, breast
Description of service provided and setting	Major acute hospital medium sized radiotherapy department, including chemotherapy, brachytherapy, isotope treatments, and palliative care.	
Team structure/size, NMPS in team (other than TR-IP)	Small sized, TR-led review team, provided by TR independent led clinics. Work within a wider multi-professional team.	
Service scheduling/access/referral	Patients receive a minimum of 2 reviews. Patients receive week 1 and week 4 reviews during short course radiotherapy; week 1, 4, 5, 6, and 7 reviews during long course radiotherapy (urology).	
Patient access to medicines	IP. Not trained to supply/administer using PGD.	Not trained to supply/administer using PGD.
Contextual information	Catchment population 2.2 million, above national average for ethnic diversity.	

### Case site 3 – Therapeutic radiographer trainee case-site

Service Information	Case Site 3 – therapeutic radiographer trainee case-site	
	Therapeutic Radiographer Prescriber	Therapeutic Radiographer Non-Prescriber
Job title and role	Review Radiographer	Review Radiographer
Specialty/cancer sites	Gastro-intestinal, sarcoma, head & neck	Gastro-intestinal, skin and sarcoma, head and neck
Description of service provided and setting	Major acute hospital medium sized radiotherapy department, including chemotherapy, brachytherapy, isotope treatments, and palliative care.	
Team structure/size, NMPS in team (other than TR-IP)	Small sized, TR-led review team, provided by TR independent led clinics. Work within a wider multi-professional team.	
Service scheduling/access/referral	Patients (adults only) not pre-allocated to prescriber/non-prescriber. Short course skin cancer: one end of treatment review. Head and neck, GI and sarcoma: weekly reviews.	
Patient access to medicines	Prescriber: IP, PGD (Co-codamol only).	PGD (Co-codamol only).
Contextual information	Catchment population 2.2 million, above national average for ethnic diversity.	



### Case-site 6 – Therapeutic radiographer comparison

Service Information	Case Site 6 - therapeutic radiographer comparison	
	Therapeutic Radiographer Prescriber	Therapeutic Radiographer Non-Prescriber
Job title and role	Advanced Practitioner Therapeutic Radiographer	Review/Treatment Radiographer
Specialty/cancer sites	Head & neck	All sites (excluding head & neck)
Description of service provided and setting	Tertiary cancer centre. Large radiotherapy department. Onsite satellite pharmacy.	
Team structure/size, NMPS in team (other than TR-IP)	Large sized, multidisciplinary review team. Work within a wider multi-professional team	
Service scheduling/access/referral	Patients (adults only) pre-allocated to prescriber/non-prescriber. Ad-hoc review possible at patient/radiographer request. Site based review protocol: Breast - 1 end of treatment review, Prostate 20-37 fractions - mid and end of treatment review, Complex (e.g., head & neck, thoracic, GI, gynaecology, concurrent chemotherapy) weekly review.	
Patient access to medicines	IP and SP (controlled drugs). PGD (e.g., topical applications, soluble paracetamol, anti-emetics, enemas, laxatives, oral care products, loperamide).	PGD (e.g., topical applications, soluble paracetamol, anti-emetics, enemas, laxatives, oral care products, loperamide).
Contextual information	Catchment population 2.5 million, above national average for ethnic diversity.	

### Case-site 8 – Therapeutic radiographer comparison

Service Information	Case Site 8 - therapeutic radiographer comparison	
	Therapeutic Radiographer Prescriber	Therapeutic Radiographer Non-Prescriber
Job title and role	Macmillan Specialist Radiographer	Review/Treatment Radiographer (rotational)
Specialty/cancer sites	All Cancer sites – specialising in Gynaecological, thoracic, LGI	All cancer sites
Description of service provided and setting	Acute hospital small sized radiotherapy department, including chemotherapy and palliative care. Main hospital pharmacy.	
Team structure/size, NMPS in team (other than TR-IP)	Small sized TR-led review team, provided by TR led clinics, n=1 prescriber. Work within a wider multi-professional team.	
Service scheduling/access/referral	Patients (adults only) not pre-allocated to prescriber/non-prescriber. Patient-initiated appointments possible. Fraction based review protocol: 5 fractions - 1 final week review, 15-20 fractions - 1 <sup>st</sup> and final week review, complex (e.g., head & neck, thoracic, gynaecology) weekly review.	
Patient access to medicines	IP. PGD (Scheriport, ondansetron, tamsulosin). Access to small in-house stock (including anti-emetics, analgesia, steroids, loperamide)	Not trained to supply/administer using PGD. Not permitted to provide recommendation/advice for OTC medicines.
Contextual information	Catchment population 544,000, above national average > 65 year old population.	

### Case-site 9 – therapeutic radiographer comparison

Service Information	Case Site 9 - therapeutic radiographer comparison	
	Therapeutic Radiographer Prescriber	Therapeutic Radiographer Non-Prescriber
<b>Job title and role</b>	Advanced Review Therapeutic Radiographer	Review Radiographer
<b>Specialty/cancer sites</b>	All cancer sites	All cancer sites (excluding chemo-radiotherapy, stereotactic)
<b>Description of service provided and setting</b>	Major acute hospital, large sized radiotherapy department, including chemotherapy, stereotactic radiotherapy, isotope treatments, and palliative care. Onsite satellite pharmacy.	
<b>Team structure/size, NMPS in team (other than TR-IP)</b>	Large multi-disciplinary review team, n=5 prescribers. Work within a wider multi-professional team.	
<b>Service scheduling/access/referral</b>	Patients (adults only) not pre-allocated to prescriber/non-prescriber. Patient-initiated appointments possible. Fraction based review protocol: 5 fractions - 1 final week review, 15-20 fractions - 1 <sup>st</sup> and final week review, complex (e.g., head & neck, thoracic, gynaecology) weekly review.	
<b>Patient access to medicines</b>	IP and SP (controlled drugs). PGD (e.g., topical applications, soluble paracetamol, anti-emetics, enemas, laxatives, oral care products, loperamide).	PGD (n=5 medications).
<b>Contextual information</b>	Catchment population 1.8 million, above national average deprivation index and ethnic diversity .	

