

**APPRAISING THE CURRICULA OF UK NON-MEDICAL PRESCRIBING  
PROGRAMMES AND ITS ROLE IN PRODUCING HIGH-LEVEL  
INDEPENDENT PRESCRIBERS**



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## **Abstract**

In recent years, healthcare systems have sought to decrease workload pressures on doctors by expanding the authority to prescribe medications to other healthcare professionals. This authority is most advanced in the UK, where healthcare professionals including pharmacists, nurses, physiotherapists, optometrists, chiropractors, podiatrists, radiographers and dietitians can prescribe. They are referred to as non-medical prescribers (NMPs). Before NMPs can prescribe, they are required to undertake a specific short prescribing programme to obtain an independent prescribing qualification. With the increasing number of healthcare professionals able to prescribe in practice, there are various prescribing practice guidelines, but no overall consensus on the core qualities of a high-level, safe and rational prescriber, regardless of healthcare background. Additionally, there is a gap in knowledge and understanding around the teaching and educational approaches used by prescribing programmes which non-medical healthcare professionals undertake to obtain their independent prescribing qualification.

A programme of research was conducted to define the core categories of a high-level prescriber and then explore and appraise the teaching and educational approaches of UK NMP programmes and how they facilitate the development of students into high-level independent prescribers. The research began with a rapid review exploring innovative teaching approaches introduced to prescribing education worldwide in the last ten years. The review highlighted and compared the myriad of approaches used to teach prescribing, but it also highlighted the gap in literature around the training of NMPs. Study One involved a documentary analysis of national and international prescribing practice guidelines aimed at various healthcare professionals to define a universal set of core categories around high-level prescribing for prescribers of all backgrounds. Study Two used the results of Study One to inform semi-structured interviews with 16 NMP programme leads spread across the UK to obtain an understanding around the taught content, teaching approaches and overall logistical functioning of the NMP programme. Participants were also afforded the opportunity to offer their appraisals pertaining to the teaching approaches of the programme. Programme leads were recruited via email and interviews were conducted virtually using Zoom due to the constraints of the COVID-19 pandemic. Study Three involved recruiting 18 graduates of various NMP programmes spread across the UK. These were recruited through a snowball

sampling strategy with the aid of programme leads interviewed in Study Two. Graduates undertook a two-part interview, part one involved a vignette exercise, where participants were presented with prescribing case scenarios for which they would verbalise their prescribing decisions. This was an opportunity for participants to demonstrate the extent to which they displayed the qualities of high-level prescribing defined in Study One. Part Two of the interview involved a traditional semi-structured interview, where participants appraised the teaching approaches of the programme and how they helped or hindered development of their prescribing practice.

The core categories of high-level prescribing were defined as being knowledgeable, safe, communicative and contemporary. NMP programmes use a range of teaching approaches to inculcate these core qualities of prescribing into their students and utilise stringent assessment approaches to ensure prescribers qualify from the programme with these core qualities, however, despite certain differences in perspectives, both programme leads and graduates highlighted major areas where the teaching approaches and overall functioning of the NMP programme could be improved. Subsequently, these perspectives were used to inform a set of recommendations aimed at optimising the delivery of teaching on NMP programmes. Increasing innovative educational approaches such as flipped classroom, blended learning and simulation-based education will enhance the learning experiences of students on the programme and subsequently their skill and competency. Enhancing the roles of Practice Supervisors as teachers will increase the prescribing knowledge of students in their own area and fulfil the core category of being a knowledgeable prescriber. A widespread implementation of formative OSCEs would be an effective means for students to review and appraise their own prescribing practice before completing the programme. Finally, increasing continuing professional development post-qualification will ensure prescribers will be able to update and enhance their prescribing skills as they progress in their careers.

Future research aimed at comparing prescribing practices of NMPs before and after implementation of these recommended changes would be beneficial and additionally, this programme of study can serve as a starting point for countries looking to expand prescribing authority and subsequently develop a specific curriculum of study for these non-medical healthcare professionals.

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## **Abbreviations used throughout the Thesis**

ADE	Adverse Drug Effect
ADR	Adverse Drug Reaction
AHP	Allied Healthcare Professional
ALP	Adult Learning Principles
BEME	Best Evidence Medical Education
BNF	British National Formulary
CBL	Case-Based Learning
CBT	Case-Based Tutorials
CD	Controlled Drugs
CDP	Cognitive Dissonance Principles
CLP	Cognitive Learning Principles
CMP	Clinical Management Plan
CP	Constructivist Principles
DoH	Department of Health
DN	District Nurse
DRP	Drug-Related Problems
EBM	Evidence-Based Medicine
ELP	Experiential Learning Principles
FY	Foundation Year
GGP	Guide to Good Prescribing
GMC	General Medical Council
GP	General Practitioner
GSL	General Sales List
GphC	General Pharmaceutical Council
HCPC	Health and Care Professional Council
HV	Health Visitor
IDP	Instructional Design Principles
IPL	Interprofessional Learning

MAI	Medication Appropriateness Index
MCQ	Multiple Choice Questions
NMC	Nursing and Midwifery Council
NMP	Non-Medical Prescriber
NPF	Nurse Prescribers' Formulary
NPC	National Prescribing Centre
OSCE	Objective Structured Clinical Examination
PBL	Problem-Based Learning
PLP	Period of Learning in Practice
POM	Prescription-only Medicines
RIPLS	Readiness for Interprofessional Learning Score
RPS	Royal Pharmacological Society
SBME	Simulation-Based Medical Education
SDL	Self-Directed Learning
SRC	Student-Run Clinic
TBL	Team-Based Learning
WHO	World Health Organisation



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## **Author's Declaration**

I declare that the material contained in this thesis has not previously been submitted for a degree in the University of York or any other institution.

I also declare all the work in this thesis is of my own.

## Thesis Outputs

### List of Publications arising from this thesis

- **Omer UN**, Veysey M, Crampton P, Finn G. “What Makes a Model Prescriber? – A Documentary Analysis” – *The Clinical Teacher published by Association for the Study of Medical Education and John Wiley and Sons Ltd.* The Clinical Teacher 2020; 17 (Suppl. 1), 8-196
- **Omer UN**, Veysey, M., Crampton, P. and Finn, G., 2020. What makes a model prescriber? A documentary analysis. *Medical Teacher*, pp.1-10.
- **Omer, UN**, Danopoulos, E., Veysey, M., Crampton, P. and Finn, G., 2020. A Rapid Review of Prescribing Education Interventions. *Medical Science Educator*, pp.1-17.
- **Omer, UN**, Veysey M, Crampton P, Finn G. “Optimising Learning and Teaching on UK Non-Medical Prescribing Programmes” – **(under review in the Comprehensive Clinical Medicine Journal)**

### Conference contributions from this thesis

- **Omer UN**, Veysey M, Crampton P, Finn G. “The Core Categories of a High-Level Prescriber” – A Documentary Analysis”. AMEE (The Association for Medical Education in Europe) virtual conference, September 2020
- **Omer UN**, Veysey M, Crampton P, Finn G. “What Makes a Model Prescriber? – A Documentary Analysis”. University of York Postgraduate Research Conference, September 2020

# Chapter One – Introduction and Background

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This chapter is divided into two parts. Part One provides the required background information around prescribing, errors seen in prescribing practice, the emergence and impact of non-medical prescribing and how the rapid expansion of non-medical prescribing has led to the compilation of various prescribing practice guidelines. Part Two provides an insight into the advancements and innovations made over time to teaching approaches in medical education.

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## Part One

### 1.1 Background to Prescribing

Before introducing the background of non-medical prescribing in practice and education, it is important to first discuss the historical emergence of prescription drugs, provide robust definitions to certain prescribing terms and provide a short overview of prescribing law in the UK.

In the Oxford dictionary, the definition of a prescription is as follows:

*‘An instruction written by a medical practitioner that authorises a patient to be issued with a medicine or treatment’ (Oxford Dictionary, 2020)*

Patent medicines first emerged in the 1600s within the Statutes of Monopolies in England. A patent medicine is defined as a medicine made and marketed under a patent (Snowden, 2008). These patent medicines are available without prescription. Patent medicines initially began as a business and grew over a period of 300 years, where preparers of medicines used their own “recipes” and “ingredients” and sold these medicines to the public (Snowden, 2008). The end of the 17<sup>th</sup> Century saw hundreds of exotic patent drugs introduced into the market, such as ipecacuanha (an emetic) from South America and Peruvian Bark (an antimalarial). Also around this time, chemical advancements enabled discovery of raw ingredients important in the creation of novel medicines such as ferrous sulphate (Snowden, 2008). Apothecaries worked to fulfil the demand of these emerging medicines to the public.

Change began to emerge in the late 19<sup>th</sup> Century. Although this was a period of further advances in medicine, the British Medical Association stepped in to lead in the influencing of

legislation around public health matters. Evidence was growing that many patent medicines were in fact detrimental and dangerous to health (Snowden, 2008). Opiate addiction led to the 1906 amendment of the Pharmacy Act 1869, where increased legislation was introduced to control substances most likely to be abused. This was followed by the 1920 Dangerous Drugs Act, which imposed control on cannabis and medicines consisting of dihydrocodeine and by 1941, most medicines required a prescription under the Pharmacy and Medicines Act 1941 (Snowden, 2008). However, the major incident leading to prescribing as we understand it today occurred after the 1950s.

In 1954, a German pharmaceutical company known as Chemie Grunenthal developed the drug thalidomide. This new substance appeared extremely safe in animals and after encouraging results around its sedative effects on animals (Silverman, 2002), was sold over the counter worldwide. However, it was found that pregnant women who took the drug between the 34<sup>th</sup> and 50<sup>th</sup> day of pregnancy were giving birth to babies lacking certain limbs, with 40% of these babies dying before their first birthday (Lenz, 1992). As a result, thalidomide was withdrawn in 1962, although it was later found to be an effective treatment for leprosy (Silverman, 2002)

The thalidomide incident sparked an intense rethink around medication safety in the UK and led to the Medicines Act 1968. This was established to govern the manufacturing, administration and supply of medicines through a range of provisions and to date, exists as the primary legislation in the UK (Snowden, 2008). It introduced three categories of medicines. Firstly, prescription-only medicines (POMs), which are only available from a pharmacist if prescribed by a doctor. Secondly, pharmacy medicines (P), which are only available from pharmacists, but can be purchased without a prescription. Thirdly, general sales medicines (GSLs) that can be purchased from any shop without prescription. The Act stipulated that possession of a POM without a prescription to be a criminal offense (Teff, 1984).

Prescribing is the primary intervention offered by a healthcare professional to influence the health of a patient (Maxwell and Walley, 2003). These healthcare professionals include doctors, dentists, pharmacists, nurses, chiropodists, podiatrists, physiotherapists, optometrists, dietitians and radiographers. Doctors and dentists obtain prescribing authority upon registry with their professional and regulatory body (Cope et al, 2016). For many

decades, doctors and dentists were the only prescribers in healthcare. In recent years however, the legal authority to prescribe has been extended to healthcare professionals from other backgrounds (Cope et al, 2016). In certain countries, this authority to prescribe has been extended only to pharmacists and nurses (Cope et al, 2016). In the UK, along with pharmacists and nurses, Allied Healthcare Professionals (AHPs) such as chiropodists, opticians, podiatrist, physiotherapists, paramedics and radiographers have also gained eligibility to train as prescribers (Allied Health Professions Federation, 2018; Department of Health, 2007; Department of Health, 2013; NHS England, 2016). Prescribers who are not doctors or dentists are known as non-medical prescribers (NMPs). In order to obtain prescribing authority in the UK, pharmacists, nurses and AHPs must successfully undertake a part-time, non-medical prescribing short course consisting of at least 26 days, which includes taught curricula and a separate 12 days of learning in practice (Cope et al, 2016).

## **1.2 Prescribing Errors**

A prescribing error is defined as: "a clinically meaningful prescribing error occurring when there is an unintentional significant reduction in the probability of treatment being timely and effective or increase in the risk of harm when compared with generally accepted practice" (Dean et al, 2000). Prescribing is overall a very complicated task requiring the amalgamation of knowledge of medicines, diagnostic and communication skills, an in depth understanding of principles underpinning clinical pharmacology and an appreciation of risk and uncertainty (Aronson, 2006). Over time, deficiencies in prescribing education, such as a lack of practical prescribing training, a lack of linking theory to practice and the affordance of little attention towards generic prescribing skills has led to the increasing emergence of prescribing errors (Dornan et al, 2009). Errors in the prescription of medicines is currently one of the biggest dilemmas facing medicine and healthcare. Numerous studies have been conducted based upon prescribing errors and their impact on patient safety (Tully et al, 2009; Velo et al, 2009; Sayers et al, 2009). Adverse Drug Effects (ADEs) are found to be one of the main causes of injury to hospitalized patients (Bobb et al, 2004), with over half of all prescribing errors considered as potentially harmful to patients, and 7.3% of these errors leading to life-threatening consequences (Ashcroft et al, 2015).

Dornan et al conducted research to determine the causes of prescription errors. They interviewed mainly foundation year junior doctors and found that out of skill-based, rule-

based and knowledge-based mistakes, rule-based mistakes were the main cause of prescribing errors. They reported that such errors suggest a lack in the ability of medical students to correctly apply the knowledge acquired in undergraduate education. This was supported by a consensus that students felt there was a lack of modules preparing them for the transition from theory to practice and current pharmacology education was not beneficial enough with regards to prescribing. It was concluded that rule-based mistakes were most likely to go unnoticed and inflict harm towards the patient (Dornan et al, 2009).

### **1.3 Background of Non-Medical Prescribing**

#### 1.3.1 Implementation of Non-Medical Prescribing

##### 1.3.1.1 Prescribing for Community Nurses

The idea for the role of medication prescribing materialised in 1986, when Julia Cumberledge and Dr June Crown compiled a report discussing the potential benefits of expanding the authority to prescribe from merely doctors and dentists to include community nurses, albeit at a capacity initially limited to ointments and wound dressings (Community Nursing Review and Cumberledge, 1986). These community nurses included registered nurses who had obtained a health visitor (HV) or district nurse (DN) qualification. The recommendation was based on the premise that this would diminish the prescribing workload off of General Practitioners (GPs) and healthcare provision would become more efficient for patients. The publication of the Cumberledge Report led to the Department of Health (DoH) to formulate an advisory group to further investigate nurse prescribing. This led to the compilation of a further report by Dr Crown, the purpose of which was to legitimise the new practice of nurse-written prescriptions being signed by doctors (Department of Health, 1989). Additionally, the report recommended that community nurses should be cleared to prescribe a limited number of items. Legislation for this was passed in 1992 and furthermore, 1994 saw the formulation of a Nurse Prescribers' Formulary (NPF), which included wound dressings and specific medicines. The NPF was first used in a pilot in 1994, which included eight demonstration sites and 58 community nurses trained to prescribe. After the pilot was deemed a success (Crown, 2010), a further pilot took place in 1996 with 150 nurses, and upon evaluation and validation of success, April 1998 saw the announcement of a full implementation of community nurse

prescribing across the UK, and by 2005, community nurse prescribers were referred to as community practitioners (Cope et al, 2016).

The NPF for community practitioners contains a wide-range of dressings and appliances, 13 POMs, certain GSL medicines and P drugs. Given that prescribing training is included within the specialist practitioner programme for community practitioners, all newly qualified community nurses have the authority to prescribe from the NPF (Department of Health, 2006b).

#### 1.3.1.2 Prescribing for Pharmacists

In March 1999, a further Crown Report<sup>1</sup> was compiled, which suggested that '*the legal authority to prescribe should be extended beyond currently authorised prescribers*'. The report emphasised that pharmacists would be cleared to prescribe in specific circumstances and they had the ability to dispense repeat prescriptions for patients, meaning that patients were no longer required to see the GP for a repeat supply of medication (Department of Health, 2000). Furthermore, gradual changes had been implemented in the training and roles of healthcare professionals across the board. This coupled with the expanding range and formulation of drugs available and a growing need for improved healthcare access for patients led the Crown Report advocating for extending prescribing rights beyond doctors, dentists and community practitioners.

#### 1.3.1.3 Dependent and Independent Prescribing

The Crown Report further went on to define two types of prescribers that it recommended for healthcare. The first of these was the *independent* prescriber, a professional who would be responsible for assessing undiagnosed conditions in patients and devise a clinical management plan, including the prescription of a medication (Crown, 1999). The second was the *dependent* prescriber, a professional taking up continuing care of patients who have undergone prior assessment and diagnosis by an independent prescriber. The continuing care is in-line with an agreed management plan and could include prescribing. It would also permit the dependent prescriber to issue repeat prescriptions and adjust the dosage form should the patient's needs require. However, regular clinical review of continuing care must be

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<sup>1</sup> A report compiled by Dr June Crown setting out recommendations regarding prescribing practice



conducted by the independent prescriber (Crown, 1999). The dependent prescriber would later be renamed the *supplementary* prescriber.

In 2002, a consultation document was released setting out the proposed framework for implementing supplementary prescribing. This framework would legislate for POMs to be prescribed by a supplementary prescriber across the UK. This consultation document provided a new, overarching definition for supplementary prescribing as:

*“A voluntary partnership between the responsible independent prescriber and a supplementary prescriber, to implement an agreed patient-specific clinical management plan with the patient’s agreement, particularly but not only in relation to prescribing for a specific non-acute medical condition or health need affecting the patient”* (MLX, 2002).

Additionally, the document stipulated a number of conditions under which supplementary prescribing could take place. These included: the requirement of the independent prescriber being a doctor or dentist; the supplementary prescriber being a registered nurse, midwife or pharmacist; the compilation of a written clinical management plan (CMP) including the patient’s name and specific condition, range of medicines and scenarios under which the supplementary prescriber could prescribe and signed agreement over the CMP from both the independent and supplementary prescriber. Also, the CMP must include a date for review of supplementary prescribing arrangements, which should not exceed a year. Finally, access to the patient record must be shared between the independent and supplementary prescriber (MLX, 2002).

Supplementary prescribing by nurses and pharmacists was legalised on November 2002 (NHS, 2002). The first intake of pharmacist training for supplementary prescribing in England and Wales was expected by Spring 2003 (Root, 2003) Additionally, the Department of Health (DoH) elected to expand the NPF, which was renamed the Nurse Prescribers’ Extended Formulary (NPEF), which by 2005 consisted of 240 POMs, including all GSL and P drugs which GPs were normally allowed to prescribe (DoH, 2006a).

#### 1.3.1.4 Prescribing for Other Healthcare Professionals

Subsequently, 2003 saw legislative changes implemented permitting additional healthcare professionals to prescribe, including pharmacists, and AHPs such as physiotherapists,

podiatrists, chiropodists and radiographers (Crown, 1999). AHPs obtained eligibility to train as supplementary prescribers by 2005, with this eligibility also extending to optometrists by late 2005.

In May 2006, pharmacists obtained independent prescribing rights (DoH, 2006a), which enabled both pharmacists and nurse to prescribe any licensed medicines for all medical conditions within their sphere of expertise, however, this authority was further extended to unlicensed medicines by 2009 (DoH, 2010b; DoH, 2010c). 2008 saw the extension of independent prescribing rights to optometrists (CoO, 2015), and a further extension also occurred to chiropodists, physiotherapists, podiatrists and therapeutic radiographers by 2013. Recently, the authority to prescribe independently has also been extended to therapeutic radiographers in 2016 and paramedics in 2019 (Alghamdi et al, 2020).

Optometrist independent prescribers are only able to prescribe licensed drugs for conditions limited to the eye and surrounding tissue (DoH, 2011). Similarly, chiropodist and podiatrist independent prescribers are only able to prescribe licensed drugs specific to conditions related to ankles, feet and associated structures and physiotherapist independent prescribers can only prescribe licensed medicines related to conditions involving human movement and function. However, all of these AHPs are permitted to prescribe from a specified list of Controlled Drugs (CDs) (Pharmaceutical Services Negotiating Committee, 2016).

Therapeutic radiographer independent prescribers have the authority to prescribe any drug which is in their area of competence according to cancer treatment frameworks and paramedics can prescribe medicines within their scope of practice in accordance to Accident and Emergency (A&E) regulations (Allied Health Professions Federation, 2018).

## **1.4 Overall Impact of Non-Medical Prescribing**

### **1.4.1 Patient Perceptions of Non-Medical Prescribing**

UK-based studies have reported positive findings regarding the perspectives of both patients and healthcare professionals on non-medical prescribing (Cope et al, 2016; Omer et al, 2020). Courtenay et al (2011) found that patients who had attended consultations involving nurse and pharmacist prescribers expressed high levels of satisfaction with the service these prescribers provided and found that the positive relationships they established with them led

to heightened confidence in their prescribing ability and practice. Courtenay et al (2011) also report how patients mentioned having active involvement in the decision-making process when being attended to by a non-medical prescriber. This is also reported by Tinelli et al (2015), who found that nearly 70% of patients attending a consultation involving a pharmacist or nurse prescriber had been given a significant say when deciding on a treatment. Additionally, Courtenay et al (2011) further report that patients were praising of the specialist knowledge offered by nurse prescribers and their ability to utilise various methods of educating patients on their medications, including supplementary information resources such as CDs and information leaflets. Dermatology patients even expressed that nurse prescribers' service was of a "superior" nature when compared to GPs, stating that nurse prescribers afforded more time to them and that the consultations were conducted with more prose and attention (Courtenay et al, 2011).

However, despite these positive experiences from patients, studies have also reported scepticism from patients regarding safety of non-medical prescribers (Stewart et al, 2011). Patients were reported to be tentative regarding the knowledge and skills of NMPs and regarded safety to be a higher priority than convenience, believing non-medical prescribing to be safer for prescribing low-risk medicines and having more confidence in doctors when it came to diagnosis and overall patient care (Stewart et al, 2009). This perception is further supported by another study conducted by Stewart et al (2011), where it was reported that the majority of patients would choose to see a doctor over a pharmacist prescriber if presented with a choice. Courtenay et al (2011) attempted to explain this by stating that patients see NMPs as "expert specialists" and doctors as "expert generalists".

#### 1.4.2 Healthcare Professionals and Stakeholders' Perceptions of Non-Medical Prescribing

Along with patients, many doctors and stakeholders have expressed positive perspectives of non-medical prescribing (Latter et al, 2011). Stewart et al (2011) reported that doctors pointed towards a positive correlation between the emergence of pharmacist independent prescribing and improved patient care. This was due to the patients benefitting from the vast knowledge in medicines that pharmacists were able to offer when undertaking patients' medicines review and their ability to educate patients around their medications. This enabled doctors to focus more attention towards acute conditions (Latter et al, 2011). This is supported further by Watterson et al (2009), where the emergence of nurse prescribing also

led to decreased workloads for doctors, albeit that the workload for nurse prescribers also increased as a result.

However, despite this decrease in workload, Watterson et al (2009) also reported potential concerns expressed by doctors on the competency and diagnostic skills of pharmacist prescribers. Bleinkinsopp et al (2008) attempted to explain some of the negative perceptions of doctors towards NMPs by stating that doctors could feel that their role and authority in prescribing could be put under threat by other healthcare professionals. This is further supported by Weiss (2020), who stated that non-medical prescribing could potentially affect the “status quo” regarding tasks around prescribing, leading to a change in the hierarchy where currently, doctors hold the highest authority around all areas of prescribing.

#### 1.4.3 Current Research on Non-Medical Prescribing Practice

Latter et al (2011) conducted an evaluation of the practices of pharmacist and nurse prescribers, where they found that the prescribing of these two groups of prescribers were generally safe and clinically appropriate and patients to be satisfied with their experiences of non-medical prescribing, although there was a scope for improving their assessment and diagnostic skills. Another study conducted by Naughton et al (2013) utilised a Medication Appropriateness Index (MAI) tool to evaluate prescribing decisions of nurse and midwife prescribers and their clinical appropriateness, where it was found that around 95-96% of clinical decisions were appropriate and effective, and only two prescribing decisions could be classed as inappropriate. Additionally, another study by Latter et al (2012) used the MAI to evaluate clinical appropriateness of NMP prescribing decisions, and despite suggesting that NMPs should be more comprehensive in history-taking, prescribing decisions were generally safe and clinically appropriate. Moreover, Baqir et al conducted a study in 2012 around the error rate of non-medical prescribers and out of 1415 prescriptions devised by pharmacist prescribers, found an error rate of 0.3%, further supporting growing evidence around the practices of non-medical prescriber being generally safe (Baqir et al, 2015), although similar, more comprehensive studies to verify this further still are required. Additionally, some of these studies have also observed certain weaknesses in the prescribing practices of NMPs, such as recognising drug-drug interactions and recording therapy duration (Naughton et al, 2013), exacerbated the need for further studies.

## **1.5. Prescribing Practice Guidelines**

### **1.5.1. Examples of Prescribing Practice Guidelines**

Given the rapid rise of prescribers from multiple healthcare backgrounds, the process of defining prescribing competence has been a common objective of a myriad of bodies (Mucklow et al, 2012). The need for attaining this objective has further been hastened due to a rise in the reporting of prescription errors and adverse drug reactions (ADRs) (Pirmohamed et al, 2004). Dornan et al conducted research to determine the causes of prescription errors. They interviewed mainly foundation year junior doctors and found that out of skill-based, rule-based and knowledge-based mistakes, rule-based mistakes were the main cause of prescribing errors (Dornan et al, 2009). As a result, the General Medical Council (GMC) established a Safe Prescribing Working Group (Lechler et al, 2007). The working group compiled numerous recommendations, including a statement of competencies relating to prescribing for all Foundation Year (FY) doctors. This statement of competencies was incorporated into its regulatory guidance for standards for undergraduate medical education and overall practice guidelines (GMC, 2013).

In an attempt to prove that prescribing is underpinned by a common set of competencies, in 2012 the National Prescribing Centre (NPC) combined their competency frameworks for each of the non-medical prescribing backgrounds to develop a single competency framework for all prescribers (NPC, 2012; Nazar et al, 2015). This framework was updated by the Royal Pharmaceutical Society (RPS) in 2016 through collaboration with and endorsement from a wide range of professional organizations, such as the General Medical Council (GMC), the Nursing and Midwifery Council (NMC) and General Pharmaceutical Council (GPhC) (RPS, 2016).

On an international scale, the World Health Organisation (WHO) published a worldwide Guide to Good Prescribing in 1994 through a collaboration of researchers and institutions from various countries (De Vries et al, 1994). The WHO GGP presents a six-step model for the purpose of rational prescribing and due prescribing authority expansion not being conceived at the time of publication, it was intended to be a universal guide for undergraduate medical students and prescribing educators. Subsequently, the manual has been cited over 100 times

by articles from a wide range of medical backgrounds, such as endocrinology, geriatrics, internal medicine, psychiatry, primary care and pharmacology (Tichelaar et al, 2020).

## **Part Two**

### **1.6 Underpinning Pedagogy, Learning and Teaching Approaches in Medical Education**

Nazar et al (2015) built upon the research conducted by Dornan et al (2009) to delve further into the causes of prescribing errors. Their research implied that a lack of knowledge is not solely responsible for prescribing errors. They found that methods of teaching as well as the environment of prescribing also contribute towards prescribing errors. Audit Scotland questioned the adequacy of undergraduate medical education in preparing new doctors for rational and safe prescribing (Tobaiqy et al, 2007).

To understand the range of educational approaches that are potentially used in prescribing education, it is imperative to first obtain an insight into the underpinning pedagogy of medical education, the learning and teaching approaches in medical education at a general scale and the value they bring.

#### **1.6.1 Underpinning Pedagogy**

##### **1.6.1.1 Pedagogy Principles in Curriculum**

The word pedagogy is derived from two separate words: *paid* meaning “child” and *agogus* meaning “leader of”, translating into the art and science of teaching children. The origins of pedagogy can be traced back to seventh century Europe, where organised cathedral schools were introduced. These schools were the root of the model of pedagogy, which was founded upon a range of assumptions about learners, and these assumptions majorly impacted the design of the educational model (Ozuah, 2016).

Formal curriculum relates to a written educational plan which outlines the goals and objectives needing to be achieved, the topics around knowledge, skills and attitudes to be covered and the methods required for learning, teaching and evaluation (McLeod et al, 2009). An objective in health education pertains to the specifics of what the learner will know or what the learner is able to do following their undertaking of an educational activity and the level or standard to which they are able to do or know this (McLeod et al, 2009).

The learning environment describes the social, emotional and physical environment where the learning occurs. Factors influencing the learning environment include student interaction, emotional climate, meaningful learning, academic enthusiasm and intellectual maturity (McLeod et al, 2009). Pedagogy in medical education is informed through the defining of measurable and observable learning objectives, analysing the learning environment and the nature of the learner, including their cognitive, psychological and physiological characteristics (Gagne, 1985).

Pedagogy in clinical education can be viewed through two different investigative positions. Firstly, this could be pedagogies of individual subjects taught as part of the overall curriculum (e.g. pedagogies used to specifically teach pharmacology) or pedagogies of topics or themes taught across an entire health professions curriculum (e.g. pedagogies used to teach professionalism and ethical issues relating to prescribing education) (Tredinnick-Rowe, 2018).

#### 1.6.1.2 Pedagogy related to Adult Learning

Adult Learning Principles (ALPs) are informed through accounting for the age limitations of adult learners (Cross, 1981). Learning can be active or passive. Active learning involves intellectually and emotionally engaging the student in most aspects of the learning process. Passive learning is a teacher-centred learning approach with the student as the recipient of the information (McLeod, 2009).

Given their age, ALPs advocate taking advantage of the experiences of learners and afford them with flexibility around their methods of learning (Cross, 1981). It provides a safe learning environment for students given that learners are allowed to express themselves and be involved in method planning and curriculum content development (McLeod, 2009). ALP recommends learning activities to be task-oriented rather than memorisation-oriented and to be adapted for the holistic nature of backgrounds learners originate from. Also, given the variation in age of adult learners, learning is recommended to take place in a self-directed manner, where learners can conduct discoveries themselves, devise their own learning objectives and identify their needed learning resources (Cross, 1981; McLeod et al, 2009). However, ALP places emphasis on how adults are most interested in learning centred on their specific job, which can create challenges in designing educational approaches to cater for students from multiple backgrounds (Cross, 1981).

<b>Conditions where Adult Learning is Optimized</b>
When there is a need to learn
In a non-threatening environment
When individual learning style needs are met
When previous experiences of adult learners are valued
When adult learners have control over learning process
When adult learners have active cognitive and psychomotor participation in learning process
When adult learners are afforded adequate time to assimilate new information
When adult learners are provided opportunities to practice and apply their learning
When adult learners can focus upon relevant problems and practical applications of concepts
When adult learners are provided feedback in pursuit of achieving their objectives

*Table 1 - Summary of Principles of Adult Learning (Ozuah, 2016)*

### 1.6.1.3 Other Pedagogical Principles

Other than ALP, pedagogical approaches within medical education are also underpinned by: Instructional Design Principles; Experiential Learning Principles; Cognitive Learning Principles; Constructivist Principles and Cognitive Dissonance Principles.

Instructional Design Principles (IDP) state that instructions pertaining to effective learning should be effective (facilitate acquiring of required knowledge, skills and attitudes); efficient (achieve learning objectives in least amount of time); appealing (motivate and interest learners to complete learning tasks) and enduring (remain in long-term memory). These should be achieved through congruence among learning objectives, activities and assessment, with objectives highly informing learning activities and assessment and that students must physically and mentally engage with learning material. Additionally, IDP recommends students to judge their development through evaluating their achievements of instructional objectives and not compare their own progress to that of their peers (Gagne et al, 1992).

Experiential Learning Principles (ELPs) are based on learning which is specifically catered to the personal interests of the students and is most effective when external threats such as new



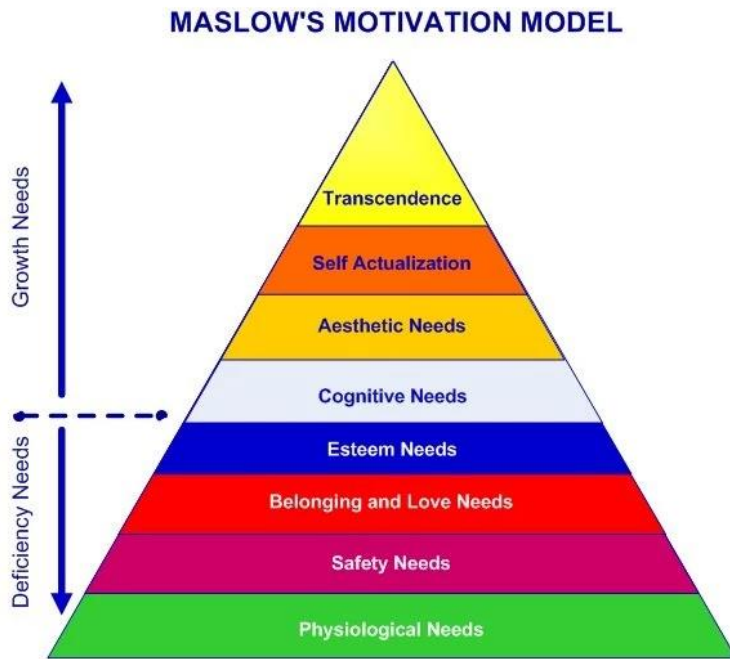
perspectives or attitudes are negated. This is best conducted through self-initiated learning (Rogers, 1969).

Cognitive Learning Principles (CLPs) advocate for learning activities which represent content in a wide-ranging manner. However, the principles state that learning should not be a mere transmission of information, but rather a construction of knowledge through case-based approaches. The principles also support interconnection of knowledge sources over compartmentalisation. Further to this, Constructivist Principles (CPs) stipulate learning to be based on learner experience and stimulate learners to fill in the gaps of knowledge through extrapolation (Spiro and Jehng, 1990). This is informed by the philosophy of Piaget and Montessori, who state that the learner should be “left alone” to explore the environment without interference (Kirch and Sadofsky, 2021).

Finally, Cognitive Dissonance Principles (CDPs) recommend learning to be centred around decision-making and problem-solving. They learn that dissonance emerges when they are put in situations where contradictions exist and that dissonance is eliminated through acquiring knowledge around beliefs, attitudes and behaviours to guide appropriate decision-making (Brehm and Cohen, 1962).

#### 1.6.1.4 Hierarchy of Needs

A large body of research was conducted by Abraham Maslow (1954) around human motivation and subsequently, he compiled a hierarchy of human needs based on both deficiency and human needs. Through this hierarchy, Maslow proposed that motivation is the result of a person’s attempt at fulfilling basic needs. This hierarchy has provided many curriculum developers with wider perspectives around the learning process and enhanced considerations when designing learning outcomes (King-Hill, 2015)



*Figure 1 - Maslow's Hierarchy of Needs (McLeod, 2007)*

Within deficiency needs, Maslow stipulated that needs must be met in a chronological order, where a lower need must be fulfilled before progressing up the pyramid to meet the next need. The deficiency needs include: Physiological needs (hunger, thirst and bodily comforts); Safety needs (avoiding danger); Belonging and Love needs (acceptance of others and affiliation with them) and Esteem needs (achieving competence and recognition) (Huitt, 2007).

Upon meeting the deficiency needs, the individual can progress to meet their growth needs. These needs include: Cognitive needs (to know, understand and explore); Aesthetic needs (achieving order and symmetry); Self-actualisation (finding self-fulfilment and realising potential) and self-transcendence (ability to aid others in finding self-fulfilment and realise their potential) (Huitt, 2007).

Although insight around deficiency needs is beyond the scope of this thesis, it is clear that the growth needs are important in the context adult learning, where the learner needs to progress from the phase of understanding knowledge to bringing order to that knowledge base and subsequently progressing to realising their own potential as learners and reaching the point of self-fulfilment.

## 1.6.2 Learning and Teaching Approaches

### 1.6.2.1 Didactic Lectures

Since the inception of medical education, traditional, didactic lectures have been the most common approach to teaching and learning. This is due to their effectiveness in imparting a high amount of factual information to a large audience whilst being of relatively low cost (Swanwick, 2010). Referring back to the concepts of underlying pedagogy, didactic lectures follow a passive form of adult learning, given that the learning approach is teacher-centred and the transfer of information takes place with the learner as the passive recipient (McLeod, 2009; Luscombe and Montgomery, 2016).

Didactic lectures are usually preferred by educators as a primary teaching approach due to factors including a significant volume of course material, time pressures and large cohorts needing to be taught (Ghorbani and Ghazvini, 2016). However, the passive nature of didactic lectures has been criticised in the literature as being less effective than active learning methods (Richardson, 2008). Additionally, limitations of didactic lectures also include their failure to address the complexity of clinical practice, which require independent clinical judgement and therapeutic problem-solving skills (Nii and Chin, 1996).

Over time, traditional, didactic lectures have evolved in both their structure and use of stimulating aids, especially given the transition to PowerPoint presentations. The use of stimulating, visual aids have helped optimise how well lectures are received by the learner. The current COVID-19 pandemic has led to a major change in the delivery of didactic lectures, which has forced educators to rapidly transition this learning approach to an entirely or partially online form of delivery (Torda et al, 2020). As a result, didactic lectures have increasingly been used alongside other educational approaches which will be discussed in further detail below.

### 1.6.2.2 Case-Based Learning

Case-based learning (CBL) or case study teaching has been long established as a pedagogical method. This method of teaching attempts to aid students link science with clinical practice (Thistlewaite et al, 2012). CBL was first adopted by Harvard Business School, which defined CBL as follows:

“when students are presented with a case, they place themselves in the role of the decision maker as they read through the situation and identify the problem they are faced with. The next step is to perform the necessary analysis – examining the causes and considering alternative courses of actions to come to a set of recommendations. To get the most out of cases, students read and reflect on the case, and then meet in learning teams before class to ‘warm up’ and discuss their findings with other classmates. In class – under the questioning and guidance of the professor – students probe underlying issues, compare different alternatives, and finally, suggest courses of action in light of the organization’s objectives” (Harvard Business School 2011).

In the context of health professions education, CBL is mostly based on patient cases. It is intended that patient cases enhance the relevance of subject matter through focusing on actual performance of healthcare professionals and student learning is associated with real life situations (Thistlewaite et al, 2012). CBL is usually worked on in groups, where discussions are based on patient background, clinical presentation, differential diagnosis and potential investigations and treatments. The cases are usually selected around a particular condition to aid student learning around that condition (McKimm and Jolie, 2010).

#### 1.6.2.3 Problem-Based Learning

Problem-based learning (PBL) is defined as a learning approach which is student-centred, takes place in small groups and the teacher facilitates the learning approach through the use of “problems” (Barrows, 1984). In the context of medical education, a patient problem acts as a “trigger” to stimulate group discussions and defining of learning objectives for students (Wood, 2003; Swanwick, 2010). As part of PBL, students undertake independent, self-directed study, after which they return into their groups to attempt to refine and make further sense of their acquired knowledge. The main purpose of PBL is to use relevant problems to enhance knowledge and understanding.

PBL is mostly regarded as a small group teaching method. This is due to the strong elements of group discussions inculcated in PBL and group learning is a key facilitator in knowledge acquisition, communication skills, learning of independent responsibility, problem-solving and team-working (Wood, 2003). Overall, a typical PBL process works as follows:

**Table of Process of Problem-Based Learning Activities**

Step 1	Identify and clarify unfamiliar terms presented in the scenario; an appointed will scribe list those that remain unexplained after discussion
Step 2	Define the problem or problems to be discussed; students may have different views on the issues, but all should be considered; the scribe will record a list of agreed problems
Step 3	“Brainstorming” session to discuss the problem(s), suggesting possible explanations on basis of prior knowledge; students draw on each other's knowledge and identify areas of incomplete knowledge; scribe records all discussion
Step 4	Review steps 2 and 3 and arrange explanations into tentative solutions; scribe organises the explanations and restructures if necessary
Step 5	Formulate learning objectives; group reaches consensus on the learning objectives; tutor ensures learning objectives are focused, achievable, comprehensive, and appropriate
Step 6	Private study (all students gather information related to each learning objective)
Step 7	Group shares results of private study (students identify their learning resources and share their results); tutor checks learning and may assess the group

*Table 2 – Process of Problem-Based Learning Activities (Wood, 2003)*

PBL has become a universally featured teaching approach globally (Swanwick, 2010). This is probably due to PBL serving the purpose of promoting learning in the context of how the knowledge will be utilised in future clinical practice (Swanwick, 2010). When comparing PBL and CBL, group work in PBL is focused towards the process of discovery by learners in an effort to stimulate independent learning, problem solving and teamwork, whereas group work in CBL is focused upon creative problem solving with prior preparation (Srinivasan et al, 2007).

#### 1.6.2.4 Peer Teaching

Peer teaching is defined as a teaching approach where a student, usually senior in level, is involved in teaching their fellow students (Ten Cate and Durning, 2007). There are numerous reasons and theories behind why peer teaching has gained in popularity throughout the medical education continuum (Ten Cate and Durning, 2007). One of the main theories involves the concept of cognitive congruence, where due to the more elaborated cognitive semantic networks of experts as compared to novices, they sometimes encounter difficulties in understanding cognitive needs of students. In contrast, it would be beneficial to have a teacher with a similar cognitive semantic network as the learner as they will find it easier to relate to the needs of the learner and aid their learning in a more efficient manner, which in

this case is a more senior medical student (Cornwall, 1979). Peer teaching is also regarded as a learning approach which is beneficial to both the student and the teacher. In accordance with the saying of French Philosopher Joseph Joubert (Whitman, 1988), Bales' Learning Pyramid demonstrates that up to 80% of information is retained through teaching others, something validated by teachers themselves stating that the practice of teaching enables them to recall information much better than mere reading or listening (Ten Cate and Durning, 2007).

#### 1.6.2.5 Team-based Learning

Team-based learning (TBL) is an active learning strategy which is centred on the learner (Koles et al, 2010). TBL works in three phases. Firstly, the preparation phase enables students to study an assignment in advance that has been determined by the faculty. Secondly, the readiness assurance phase allows learners to display their knowledge through various readiness assurance approaches and thirdly, the learner is able to apply course concepts to a breadth of problem-solving exercises, and this ability to apply course concepts is assessed by teams (Michaelsen et al, 2004). The multiple use of TBL over an academic year has been shown to develop cohesive learning groups within cohorts, allowing group members to enhance their learning through discussions within respective groups and reaching a consensus on clinical decisions. TBL activities stimulate critical thinking within students through debates within groups and motivate learners to "make a concrete decision based on analysis of a complex issue" (Koles et al, 2010; Michaelsen and Sweet, 2012). Literature has indicated that TBL leads to students attaining higher test scores and greater learner satisfaction (Sisk, 2011). Additionally, students reported that TBL enabled them to learn more content, gain a deeper level of understanding around the learning content and heightened their interest in learning the content (Swanson et al, 2019).

#### 1.6.2.6. Self-Directed learning

Self-Directed Learning (SDL) was defined by Malcolm Knowles in 1975 as:

"... a process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcome". (Knowles, 1975)

Furthermore, Knowles further described major components of SDL. These involve the educator acting as a facilitator of learning, the learners being active in identifying their learning needs and objectives, compiling their learning process and regularly evaluate it as they progress (Knowles, 1975). Murad et al (2010) expanded on this to recommend SDL to provide learners freedom in choosing their own learning resources and strategies to best complement their individual learning styles and aid achieving their overall learning objectives.

Literature has indicated that SDL is likely equally effective as traditional learning methods and is highly cost-effective (Murad et al, 2010). However, SDL appears to be most effective in settings with adult and advanced learners, particularly medical students in the latter years of the programme, students from postgraduate health professions programmes and health professionals in practice (Murad et al, 2010). This makes SDL compatible with the underpinning pedagogy of ALP.

### 1.6.3 Innovations in Teaching and Learning Approaches

The medical education landscape has seen innovations in teaching and learning approaches introduced regularly across the board. Innovations usually include new content, innovative instructional methods, new curricular structures and overall more creative approaches (Irby and Wilkerson, 2003). The 'Innovation in Learning and Teaching in Higher Education' project defined innovation in the following words:

“Doing something new in teaching and learning for nursing, midwifery and allied health, in pre- and post-registration, undergraduate or post-graduate courses. This could include recruitment, widening participation, retention and pastoral care, curricula and course development and design, applications of technology, management skills and institution structure, changes to the culture and process of innovation, or improving future employability of students.” (Dearnley et al, 2013)

The various types of innovation in medical education are discussed below.

#### 1.6.3.1 Simulation-Based Medical Education

One of the most common forms of innovation in medical education relates to simulation. Simulation attempts to develop and consolidate both knowledge and communication skills through use of techniques focusing on cognitive and affective processes (Dearnley et al, 2013;

Swanwick, 2010). Although much of simulation-based medical education (SBME) revolves around the use of technology (i.e. computer-controlled patient simulators), it is not solely dependent upon technology. Role-play activities are also a widespread tool involved in simulation (Swanwick, 2010). SBME has been described as an effective tool in mitigating the ethical dilemma around optimally honing the skills of healthcare professionals while fulfilling the obligation of ensuring patient safety and well-being in clinical practice (Ziv et al, 2003).

Tool or Approach	Description
Low-tech simulators	Models or mannequins used to practice simple physical maneuvers or procedures.
Simulated/standardized patients	Actors trained to role-play patients, for training and assessment of history taking, physicals, and communication skills.
Screen-based computer simulators	Programs to train and assess clinical knowledge and decision making, e.g., perioperative critical incident management, problem-based learning, physical diagnosis in cardiology, acute cardiac life support.
Complex task trainers	High-fidelity visual, audio, touch cues, and actual tools that are integrated with computers. Virtual reality devices and simulators that replicate a clinical setting, e.g., ultrasound, bronchoscopy, cardiology, laparoscopic surgery, arthroscopy, sigmoidoscopy, dentistry.
Realistic patient simulators	Computer-driven, full-length mannequins. Simulated anatomy and physiology that allow handling of complex and high-risk clinical situations in lifelike settings, including team training and integration of multiple simulation devices.

Table 3 - Simulation Tools and Approaches used in SBME (Ziv et al, 2003)

SBME has gained in popularity in medical education globally due its safe, learner-centred approach to learning. The greatest benefit SBME offers is that it ensures patient safety as it enables students to be prepared for patient contact, make mistakes and learn from them in a safe environment before they are exposed to real-life patients in practice (Swanwick, 2010). SBME has also been reported to aid learners develop both technical and non-technical skills.



A technical skill is an individual skill needed to accomplish a certain task such as a diagnostic or therapeutic procedure and non-technical skills involve developing qualities including teamwork, leadership, situation awareness and awareness of personal limitations (Akaike et al, 2012).

High-fidelity SBME includes computer-based systems, simulated patients, simulated environments, part task trainers and virtual reality. All of these approaches in SBME can be adapted to teach in various medical specialities including anaesthesia, intensive care medicine, paediatrics and radiology, which is a major drive in the widespread use of SBME (Al-Elq, 2010)

#### 1.6.3.2 E-Learning and Blended Learning

Also known as Web-based learning, online learning, or internet-based learning, e-learning is based on teaching and learning approach which utilise internet technologies (Rosenberg, 2001). Given the increasing challenges of delivering teaching in conventional ways, e-learning enables medical educators to improve effectiveness of education delivery, with the advantages of e-learning including increased access to pertinent information, ability to update learning content in an effective manner and ease of content distribution. E-learning allows students to control the pace and methods of learning and personalise them to meet their individual learning objectives (Ruiz et al, 2006).

E-learning is able to promote learning through various means, including text, graphics, audio, animation and video, and these can be combined to create an engaging learning experience. Both educators and learners have reported that multimedia e-learning enhances both teaching and learning (Ruiz et al, 2006). Gibbons et al (2000) state that e-learning technologies offer educators a novel paradigm based upon adult learning theory, which states that adults learn through relating new learning to past experiences. Through linking learning to specific needs and through practically applying learning, it leads to more efficient learning experiences. Using this principle, a robust e-learning experience enables learners to be more active participants and enhance engagement with the learning content (Ruiz et al, 2006). Learners who have undertaken e-learning activities have shown enhanced retention rates and a higher quality of content utilisation, leading to better achievements in knowledge and skills (Clark, 2002).

The delivery of content through e-learning could be either synchronous or asynchronous. Synchronous learning involves real-time, instructor-led e-learning where all learners simultaneously receive information and can directly communicate with other learners. Synchronous e-learning activities include teleconferences and internet chat forums. Asynchronous learning allows the learner to work within their own pace and activities include bulletin boards, weblogs and online newsgroups (Ruiz et al, 2006).

E-learning can also be used as a means of complementing traditional teaching in an approach known as blended learning. Here, a traditional, didactic lecture can be complemented with virtual labs and additionally, educators can supply learners with information and materials through online virtual learning environments (VLEs) such as Blackboard (Phungsuk et al, 2017). A systematic review by Vallee et al (2020) showed that many studies reported blended learning to consistently demonstrate enhanced knowledge outcomes when compared to traditional learning in health education.

#### 1.6.3.4 Competency-Based Education

Competency-Based Education (CBE) in relation to medical education is an approach to curriculum design which firstly, defines a public understanding of a standard of what a professional looks like. Secondly, it defines a framework needed to deliver education in accordance to that standard. Thirdly, it expects explicit and definitive objectives and assessment criteria to be developed by medical educators. It then places accountability on professional education organisations for how graduates perform in clinical practice and uses the public standard as a tool for ensuring accountability. CBE follows a behaviourist philosophical underpinning and places focus upon outcomes and abilities (Kirch and Sadofsky, 2021).

### **1.7. Training of Non-Medical Prescribers**

In order to gain entry onto a non-medical prescribing programme, a healthcare professional is required to have a minimum period of post-registration experience (Cope et al, 2016). For nurses, the applicant is required to have been registered with the Nursing and Midwifery Council (NMC) for a minimum of one year prior to entry onto the programme (NMC, 2018). For pharmacists, the applicant is required to have been registered with the General Pharmaceutical Council (GPhC) for a minimum of two years prior to entry onto the

programme and a minimum of two years of patient-orientated experience in a UK hospital or primary or community care setting (GPhC). Finally, AHPs must be registered with the Health and Care Professions Council (HCPC) in one of the relevant allied health professions, with at least three years of relevant post-qualification experience in their chosen clinical area (HCPC, 2012).

The programme consists of a minimum of 26 days of in-class taught content and is supplemented with 12 days of practical experience referred to as the Period of Learning in Practice (PLP). The PLP must take place under the supervision of a medical practitioner who was initially referred to as a Designated Medical Practitioner (DMP), but is now known as a Practice Assessor (PA). After a change in policy, the PA can be any healthcare professional who can prescribe instead of only having to be a doctor, as long as they have a minimum of three years' clinical experience in the field of practice relevant to the prescribing student (Cope et al, 2016).

For all non-medical prescribing programmes, the generic learning outcomes informed by the learning outcomes of the GPhC, NMC and HCPC are set out in Table Three, which also maps the learning outcomes against Bloom's Taxonomy (Krathwohl, 2002):

Generic Learning Outcomes of GPhC, NMC and HCPC for successful independent prescribers	Learning Outcomes' places on Bloom's Taxonomy
1. With reference to pathophysiology and the use of common diagnostic aids the student will critically evaluate their assessment and consultation skills and their ability to take an accurate history and perform a comprehensive problem-focused age-appropriate clinical/physical examination	<b>Apply</b> – Carrying out a procedure in a given situation
2. Critically reflect on and apply clinical assessment skills to inform a working diagnosis and the formulation of a treatment plan, prescribing where appropriate and carrying out a checking process to ensure patient safety.	<b>Analyze</b> – Breaking material into its constituent parts and detecting how the parts relate to one another to an overall structure
3. Critically analyze the ability to review working/differential diagnosis, monitor response to therapy, modify treatment, or seek guidance/ refer the patient as appropriate.	<b>Analyze</b> – Breaking material into its constituent parts and detecting how the parts relate to one another to an overall structure
4. Make robust prescribing decisions based on the interpretation and analysis of information on efficacy, safety and cost.	<b>Create</b> – Putting elements together to form a novel, coherent whole
5. Demonstrate critical awareness of the legal and professional framework for accountability and responsibility in relation to independent and supplementary prescribing.	<b>Evaluate</b> – Make judgements based on criteria and standards
6. Demonstrate critical awareness of the legal and professional implications of prescribing unlicensed medicines	<b>Analyze</b> – Breaking material into its constituent parts and detecting how the parts relate to one another to an overall structure
7. Justify prescribing decisions in the light of best available evidence and decision support.	<b>Evaluate</b> – Make judgements based on criteria and standards
8. Critically reflect on and respond to influences on prescribing decisions at individual, local and national levels.	<b>Evaluate</b> – Make judgements based on criteria and standards
9. Demonstrate detailed knowledge and understanding of pharmacological principles and their application to prescribing practice	<b>Remember</b> – Retrieving relevant knowledge from long-term memory
10. Demonstrate a critical awareness of the role and responsibilities of the independent prescriber and others involved in prescribing and medicines management and work collaboratively with them.	<b>Apply</b> – Carrying out a procedure in a given situation
11. Develop robust relationships and communication channels with other prescribers and members of the healthcare team through the maintenance of accurate, effective and timely records and ensuring colleagues are appropriately informed.	<b>Apply</b> – Carrying out a procedure in a given situation

12. Develop, document and justify a clinical management plan (CMP) within the context of a prescribing partnership	<b>Evaluate</b> – Make judgements based on criteria and standards
13. Actively participate in CPD and maintain a record of CPD activity, critically reflect on continuing professional development for prescribing practice at individual and professional levels.	<b>Apply</b> – Carrying out a procedure in a given situation <b>AND</b> <b>Analyze</b> – Breaking material into its constituent parts and detecting how the parts relate to one another to an overall structure
14. Work within clinical governance frameworks and critically evaluate prescribing practice through audit and personal development.	<b>Evaluate</b> – Make judgements based on criteria and standards
15. Critically reflect on and apply the principles of concordance and adherence in managing patients' needs for medicines.	<b>Evaluate</b> – Make judgements based on criteria and standards
16. Demonstrate detailed knowledge and understanding of the public health issues related to medicines use.	<b>Understand</b> – Determining the meaning of instructional messages, including oral, written and graphic communication
17. Critically evaluate the needs of patients across the life-span when assessing, examining and taking prescribing decisions	<b>Evaluate</b> – Make judgements based on criteria and standards

Table 4 – Learning Outcomes for Independent Prescribers (GPhC 2019, NMC, 2015; HCPC, 2012)

### 1.7. Differences in Educational Needs between Medical and Non-Medical Prescribers

Further to the EQUIP study conducted by Dornan et al (2009), Brinkman et al (2018) delved into the educational needs of medical students to facilitate their development into safe and rational prescribers. They highlighted that undergraduate education and training in clinical pharmacology and therapeutics (CPT) was inadequate and criticised the continued use of traditional methods such as lectures to teach CPT to medical students. They recommended that to improve general prescribing competency, medical students needed training within clinical practice at the earliest stage of medical training as possible, and preferably, under supervision of senior clinicians (Brinkman et al, 2018). This is further supported by Tichelaar et al (2015), who state that to improve the rational prescribing skills of medical students, an enrichment of the learning context was required, which involved active involvement in the therapeutic decision-making process in clinical practice with real patients.

This contrasts with the educational needs of NMPs. As discussed earlier in the chapter, all healthcare professionals, regardless of professional background, are required to bring patient-oriented experience from clinical practice before enrolment on the programme. Additionally, the literature which discusses the NMP programme at a basic level clearly

indicates that 12 days are delegated to PLP on the programme (Cope et al, 2016), which would provide NMP students with the exposure to real patients that medical students lack (Brinkman et al, 2018). Brinkman et al (2018) also highlighted the need for CPT in medical programmes to be taught separately from broader course designs. This would differ for NMP students, given that the NMP programme would be dedicated entirely to prescribing education.

In preparing teaching and learning activities on NMP programmes, the National Prescribing Centre (2005) acknowledged that NMP students are not at beginner level and bring their own unique experiences onto the programme pertaining to clinical practice. In contrast to the majority of undergraduate medical students, who enrol onto medical programmes following completion of A-Levels, NMP students have both completed undergraduate education and have experience working in clinical practice, so they will have their own set patterns of learning. As a result, the NPC (2005) recommends that NMP students learn in a way that: encourages self-direction; takes into account their past experiences in clinical practice; allows them to apply their learning in a practical way; takes into account their individual learning needs and stimulates their mentor (DMP or PA) to take a facilitative approach to teaching over a didactic one. Moreover, NMP programmes are advised to establish a learning environment which is conducive (NPC, 2005).

### **1.8. Gap in Research and Literature**

Although more prescribing practice guidelines have emerged along with the expansion of prescribing authority to other healthcare professionals, research has highlighted a gap in the literature regarding the definitive, holistic qualities of a good prescriber (Chapman, 2006; Tichelaar et al, 2016; Woit, 2020). Referring to this saturation of guidelines and evidence on proper patient treatment, Chapman points towards a confusion in what actual prescribing practice should be by analogising it with a quote from Dougal Jefferies: “Until someone can clear the waters for me, I think I’ll just continue to muddle along” (Chapman, 2006). Further to this, Tichelaar et al (2016) highlight that no generally applicable guideline exists to aid prescribers in setting treatment goals, avoiding prescribing errors, managing treatment costs and following up with patients, despite doctors and other healthcare professionals having to conduct these vital tasks on a daily basis (Tichelaar et al, 2016). Additionally, Woit et al (2020) conducted a scoping review of the literature pertaining to physician and pharmacist

competence and confidence to further the understanding the prescribing practices of both sets of prescribers. One of their findings also pointed towards a lack of consensus regarding prescribing competence and confidence, particularly for prescribers from a non-medical background (Woit et al, 2020).

Despite the expansion of prescribing authority towards non-medical healthcare professionals, the rapid literature review in Chapter Two highlighted a lack of understanding around how these healthcare professionals are trained and educated to qualify as independent prescribers. Given the pertinence and inevitable further extension of prescribing authority, it is imperative to gain an understanding around the educational approaches that are used to facilitate the development of NMPs as high-level, safe and rational prescribers.

### **1.9. Research Questions**

- 1) What are the core qualities of high-level prescribing practice for all prescribers in practice?
- 2) What are the teaching and educational approaches used by UK Non-Medical Prescribing Programmes to facilitate the development of these core qualities of high-level prescribing?
- 3) What are the strengths and weaknesses of these teaching and educational approaches and how can they be enhanced or improved to optimise non-medical prescribing education?

### **1.10. Research Aims**

- Define the core qualities of a high-level prescriber through a Documentary Analysis of national and international prescribing practice documents.
- Explore the teaching and educational approaches of UK NMP programmes through semi-structured interviews with programme leads.
- Identify the extent to which prescribers demonstrate the core qualities of high-level prescribing through a vignette exercise with NMP programme graduates.
- Appraise the strengths and weaknesses of the teaching and educational approaches of NMP programmes through follow-up semi-structured interviews with NMP programme graduates.

- Compile a set of recommendations of how the teaching and educational approaches of NMP programmes can be enhanced or improved to optimise learning of students on the programme.

### **1.11. Layout of Thesis**

- Chapter Two will serve as a rapid systematic review of the current literature around innovative approaches to prescribing education and seek to identify the gap in knowledge which currently exists.
- Chapter Four will outline the methodological approaches used throughout the programme of research, such as research paradigms, data collection and data analysis approaches.
- Chapter Five will involve the documentary analysis of national and international prescribing practice guidelines to build and define a consensus of high-level prescribing in practice for prescribers of all backgrounds.
- Chapter Six will include the semi-structured interviews with UK NMP programme leads to obtain an understanding of the logistical function of the programme, the taught content, the educational approaches used by the programme to facilitate development of high-level prescribing and recommendations programme leads would consider to improve the programme
- Chapter Seven will include the vignette exercise with programme graduates, allowing them to demonstrate the extent to which they display the core qualities of high-level prescribing as stipulated in Chapter Five. Additionally, follow-up semi-structured interviews will allow programme graduates to critically appraise the teaching and educational approaches of the NMP programmes they undertook and recommend improvements to the programme.
- Chapter Eight will provide an overall discussion of all of the findings of the individual studies compiling this doctoral thesis. These findings, including those of the literature review, will be used to construct a set of recommendations for NMP programmes to optimise learning and development of their students. Limitations of the research will be presented and this will be followed with final conclusions.



## Chapter Two – Literature Review: Investigating the Range, Effectiveness and Perspectives on Prescribing Education Interventions

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The objective of this chapter is to provide an update from the literature around the types of educational interventions being used to improve prescribing education across the world in all educational contexts and identify the current gap in knowledge that exists. **This Chapter has been published in the Medical Science Educator journal as:**

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### 2.1. Introduction

Previously, a systematic review was conducted by Kamarudin et al examining previous work on educational interventions designed to enhance the prescribing competency of both medical and non-medical prescribers (Kamarudin et al, 2013). Despite reporting a wide range of educational interventions in prescribing education, one of their principle findings was the lack of studies seeking to evaluate educational approaches in non-medical prescribing programmes. Given the rapid expansion of prescribing authority since this review, there is a need to evaluate any recent studies which seek to investigate educational interventions in non-medical prescribing programmes. Additionally, Kamarudin et al, as well as other systematic reviews on prescribing education interventions have only investigated the quantitatively measured effectiveness of interventions and omitted reviewing studies which qualitatively investigate the views and perspectives of students on the various interventions.

Given that previous literature reviews have omitted qualitative studies on prescribing education interventions, coupled with the advancement of the nature of educational interventions across the medical education continuum and the time elapsed since a previous review in this area, our aim was to perform a rapid systematic review to provide an update on the scope, nature and effectiveness of educational interventions aimed at developing the prescribing skills and competencies of medical and non-medical prescribers and investigate

the views and perspectives of the students regarding different prescribing educational interventions.

## **2.2 Methods**

### **2.2.1 Design**

Given that previous literature reviews evaluating prescribing education interventions had been conducted, the aim was to investigate whether and to what extent the nature of these educational interventions had evolved in the last ten years, therefore, a rapid review was deemed most appropriate. A rapid review is defined as a form of evidence synthesis that provides more timely information for decision-making as compared to a traditional systematic review. In addition, rapid reviews have been the preferred form of evidence synthesis for reviews aiming to serve as an update on previous reviews (Tricco et al, 2017). In addition, due to the heterogeneity of the studies and the inclusion of both qualitative and quantitative studies, the data was synthesised using a narrative approach (Popay et al, 2006).

### **2.2.2 Search Strategy**

The focus was towards identifying studies where an educational intervention was implemented in a curriculum to improve the prescribing skills of medical and/or non-medical prescribing students. Papers were screened from nine different databases, including MEDLINE, EMBASE, PsychINFO, Scopus, Academic Search Premier, CINAHL Complete, Cochrane Library, NIH PubMed and Google Scholar. The search terms entered into these data bases were as follows: (Prescribing OR Prescription\* OR Prescriber\*) AND (Education OR Curriculum OR Training) AND (Intervention\* OR Innovation\* OR Approach\*) AND (View\* OR Perspective\* OR Result\*) AND (Medical Student\* OR Undergraduate OR Postgraduate OR Non-Medical Prescriber\*).

A search strategy was developed with the aid of a librarian from the University of York Library (Appendix 1)

### **2.2.3 Study Selection**

Papers were included if they were published in English, were full-text journal papers and evaluated an implemented educational intervention related to prescribing. Both qualitative and quantitative studies of any design taking place in medical schools and/or non-medical

prescribing programmes were included, whether the intervention was evaluated through assessments or through qualitative student perspectives. However, they had to have taken place between the years 2009-2019. Papers were excluded if the educational intervention was not related to prescribing, were systematic reviews, meeting reports, letters, opinion pieces or studies involving qualified healthcare professionals. The screening process took place in compliance with the PRISMA guidelines (Moher et al, 2009).

The titles and abstracts of the papers were reviewed to assess relevance of studies. Both me and another researcher I recruited to aid with the data extraction process held discussions regarding which papers should be included for full-text screening and an agreement was reached in a timely manner. Me and the other researcher also conducted full-text screening and agreed upon 95% of the papers and selected them for data extraction.

#### **2.2.4 Data Extraction and Quality Appraisal**

Initially, a small number of papers underwent dual data extraction by me and the other researcher as recommended by Waffenschmidt et al (2019) on study design, location, study aims, type and success of educational intervention, level of innovation and specific areas of prescribing targeted by intervention. Quality of each study was assessed using the Best Evidence Medical Education (BEME) scale (BEME, 2003). As we both agreed on the data extracted, data extraction of the remaining papers was conducted by myself only.

### **2.3 Results**

#### **2.3.1 Number of Studies**

Overall, a total of 1,137 papers were screened across all nine databases. Following the removal of duplicates, 696 papers remained, of which 634 were excluded for reasons including having no relevance to prescribing, studies not including medical and/or non-medical prescribing students as study cohorts or studies being conducted before 2009. After consultation between me and the other researcher, it was agreed that 58 papers should be included for full-text screening. Following the process of full-text screening, 22 papers were included for the review. The full breakdown of the study inclusion process is included in Appendix One.

### **2.3.2 Study Characteristics**

Of the 22 studies selected for the review, eight were randomised or non-randomised controlled trials, six were before-and-after studies, five mixed-methods studies, two qualitative studies and one survey study.

### **2.3.3 Types of Educational Interventions**

#### **2.3.3.1 Teaching and Mentoring from Healthcare Professionals other than Faculty Members**

Four case-based educational interventions were aided by teaching and mentoring from qualified healthcare professionals other than faculty lecturers (Newby et al, 2019; Gibson et al, 2014; Bowskill et al, 2014; Tittle et al, 2014). Two studies followed a group learning format using case-based scenarios (Newby et al, 2019; Gibson et al, 2014), one study used experiential learning through observations of real-life prescribing situations (Tittle et al, 2014) and one study implemented a mentoring scheme between learner and expert (Bowskill et al, 2014)

Newby et al (2019) conducted an eight-week intervention which involved tutorials and mentoring run by clinical pharmacists. The tutorials were based on case scenarios commonly encountered by junior doctors and the students were required to either prescribe a medication for the condition described in the case scenario or calculate an appropriate dosage. As the effectiveness of the intervention was evaluated through mixed methods, students were required to complete a prescribing confidence questionnaire, undertake a prescribing exercise before and after the entire intervention and complete a short questionnaire on their opinions of the eight-week programme. A small number of students were also asked to take part in focus groups discussing the benefits and drawbacks of the programme. The results of the prescribing confidence questionnaire demonstrated that the programme had significantly enhanced the prescribing confidence of the students. The prescribing exercise showed that from baseline, the number of students whose prescribing was rated as 'appropriate' increased from baseline and that by the end of the programme, no student's prescribing could be rated as 'inappropriate and potentially harmful'. The results of the questionnaire on perceptions of the prescribing programme showed that all students agreed or strongly agreed with statements pertaining to the programme improving awareness of good prescribing practice in prescription-writing, increasing confidence in

prescription-writing and enabling them to undertake basic prescribing required of doctors in intern year. This was reinforced by the small number of students taking part in the focus groups (Newby et al, 2019).

Gibson et al (2014) conducted a year-long study involving 60-minute junior doctor-led prescribing tutorials based on ten acute clinical prescribing scenarios. Each tutorial involved small group learning and featured discussions on a single clinical vignette and reaching a consensus on the clinical management of the patient. Feedback was provided to the group collectively with reference to the 'Ten Principles of Good Prescribing' compiled by the British Pharmacological Society (RPS). Effectiveness of the tutorials were evaluated through an end-of-session questionnaire administered to the students, where they were asked about prior experiences and attitudes towards prescribing, their experiences of the tutorial itself and how they felt it would impact their future prescribing practice. Every student rated the tutorials as 'good' at a minimum, with the vast majority (75%) rated them as 'excellent'. The results of the questionnaires also reported that the tutorials greatly enhanced their prescribing confidence, knowledge and skills and in addition, they reported great satisfaction with junior doctors acting as prescribing tutors, with 95% of students indicating them to be the best group of staff to deliver these tutorials. This was supported by the student examination performance, where those who attended the tutorials performing better in the prescribing components of the exams than their peers who didn't attend (Gibson et al, 2014).

Bowskill et al (2014) implemented a mentoring scheme for non-medical prescribing (NMP) students from the University of Nottingham, where they were allocated an alumni from previous years of the NMP programme to act as their prescribing mentor. Mentors who'd agreed to take on the role attended briefing sessions on how they would provide support to the student on effectively integrating their prescribing skills into their area of clinical expertise. The effectiveness of the mentoring scheme was evaluated through both a survey where students and mentors provided feedback on their perceptions of the scheme and semi-structured interviews further exploring student and mentor experience in-depth. According to the results of the survey, while students agreed that the scheme was useful for contextualising prescribing to their own area of expertise, many did not access their mentors frequently feeling that sufficient support from tutors and colleagues was already available. On the other hand, most mentors agreed the scheme was useful and that they were able to

provide students with moral support and aid them in contextualising prescribing into their area of expertise. They also expressed a sense of satisfaction in sharing their own experiences to help the students. In the semi-structured interviews, students praised the mentoring scheme as an avenue to seek moral support in coping with the programme demand and academic support on certain course components. However, the interviews demonstrated that these were the primary reasons why students would access their mentors rather than discussing integration of prescribing theory into their clinical practice. Interviews with mentors revealed that mentors were able to help students gain a better understanding of the demands of the prescribing programme and advise them on studying and assessment. But the mentors also agreed with the student perception that due to the hardships of completing the course, much of the mentoring was focused towards advising the student on how to successfully complete the course and subsequently, difficulties arose in trying to help students focus on contextualising prescribing knowledge and skill into their area of clinical practice (Bowskill et al, 2014).

Tittle et al (2014) sought to investigate the perceptions final-year medical students would have on a hospital pharmacist-taught prescribing course. Whilst these students were undertaking clinical placements in teaching hospitals, they would attend 2-hour weekly teaching sessions conducted by pharmacists, where teaching methods such as small group tutorials and ward rounds shadowing pharmacists would be implemented. These teaching methods would address topics including prescribing for acute medical emergencies, taking patient drug histories, discharge prescriptions and therapeutic drug monitoring. Views and perceptions of the 4-week teaching module were recorded through focus group interviews, where students found that their prescribing confidence had been enhanced by the course despite certain limitations. They found pharmacists to be all-round effective teachers in terms of both theory and practice and were approachable and the small group teaching sessions were praised as being stimulating and enjoyable. Overall, students found the course's emphasis on enhancing their practical prescribing skills to improve their prescribing confidence (Tittle et al, 2014).

The studies used different methods to evaluate the outcomes of their studies. Newby et al., (2019) employed mixed methods to evaluate the benefits of these sessions, where students undertook a prescribing exercise and a prescribing confidence questionnaire before and after

the implementation of the intervention alongside focus groups where selected students discussed the benefits and potential drawbacks of the tutorials. Post-intervention scores were significantly higher, and both the focus groups and questionnaires data indicated that the tutorials had improved prescribing confidence in students. Gibson et al., (2014) also used end-of-session questionnaires but observed student examination performance as indicators of success. Results of the questionnaires showed that most students rated the tutorials as 'excellent', greatly enhancing their prescribing confidence, knowledge and skills with the role of the junior doctor as the teacher being well received. Both Tittle et al., (2014) and Bowskill et al., (2014) evaluated outcomes qualitatively through focus groups, semi-structured interviews and surveys. Tittle et al's., (2014) focus group results demonstrated positive perceptions for the intervention, the role of the clinical pharmacist as the teacher and the positive effect of the intervention on their prescribing confidence were recorded. However, Bowskill et al., (2014) found that although students praised the scheme for helping contextualisation of prescribing into their specific area of practice, they felt that adequate support was already provided from colleagues and tutors.

### **2.3.3.2 Interventions designed using and featuring the WHO Guide to Good Prescribing**

Six case-based interventions were aided by exposing students to treatment-setting standards from the World Health Organisation (WHO) Guide to Good Prescribing (GGP) to varying degrees (Raghu et al, 2017; Keijsers et al, 2015; Thenrajan et al, 2016; Kamat et al, 2012; Krishnaiah et al, 2013; Tichelaar et al, 2016). Two studies used a combination of didactic lectures and subsequent prescription-writing for specific paper case scenarios [29,32]; two studies implemented an individualised instruction approach where students were provided with the WHO GGP to use individually for creating treatment plans [Krishnaiah et al, 2013; Tichelaar et al, 2016), one study used an experiential approach where students learned through observing real-life patients (Thenrajan et al, 2016) and one study implemented the WHO GGP across an entire curriculum and in a variety of teaching formats (Keijsers et al, 2015).

Keijsers et al (2015) incorporated the WHO-Six-Step into the Utrecht Medical School curriculum. All modules relating to pharmacology and pharmacotherapy were modelled according to the learning goals of the WHO GGP and the guide was heavily featured during whole group lectures, small-group tutorials and practical sessions. Students were required to

use the WHO GGP to prepare patient cases in their third-year clerkship and their E-learning programme was overhauled according to the WHO GGP. The impact of this curricular intervention was examined through a formative standardised assessment testing basic pharmacological knowledge (testing factual knowledge), applied pharmacological knowledge (solving clinical scenarios) and pharmacotherapy skills. The assessment consisted of MCQs with one open question on writing a prescription. MCQs were marked as right or wrong with one point awarded for a right answer. The written prescription was marked according to categories such as including patient name, doctor's name, drug, dose and number. In addition, students were also asked to complete a short questionnaire evaluating the pharmacology and pharmacotherapy education. Students sitting these tests included students on the verge of beginning their fourth year and sixth year of study respectively. The test was also sat by student control groups who were not exposed to the modified curriculum. The results demonstrated that both fourth and sixth year students receiving the WHO GGP intervention significantly outscored their control group peers. This was more prominent in the 6<sup>th</sup> year students. The intervention clearly showed that it improved students' knowledge of basic and applied pharmacology. Results from the student evaluation questionnaires showed that those who received the WHO GGP intervention gained a greater appreciation of their education and expressed greater confidence in clinical practice (Keijsers et al, 2015).

Raghu et al (2017) recruited 117 second-year medical students and asked them to compile prescriptions for three case scenarios. After collecting all these prescriptions, the students were provided with rational prescribing sessions and as groups, students discussed their written prescriptions with group facilitators, gaining awareness of their errors and correcting errors in sample prescriptions. The students were then provided with a further three clinical scenarios to write prescriptions for. The written prescriptions were assessed against the standards of the WHO GGP and feedback was given to students accordingly. It was found that prescriptions written by students after the intervention consisted of much less errors than those prescriptions compiled before the intervention. Errors which were remedied included the omission of the prescriber's name, not including the Rx symbol, not including patient name, errors in the drug dose and duration and incomprehensible handwriting (Raghu et al, 2017).



Tichelaar et al (2016) devised second year undergraduate medical students into three separate groups, whom after attending a pharmacotherapy training programme, were either given instructions on setting treatment goals from the WHO GGP, the 'SMART' criteria of goal setting or no further instructions (control group). The students then had to set treatment goals for four different patient cases, including choosing the right medications and the measures they would implement for treatment monitoring. After scoring the treatment plans devised by the three patient groups through the Delphi procedure, it was found that students provided with the 'SMART' criteria of goal setting obtained significantly higher scores than the WHO GGP and control group. Similarly, Krishnaiah et al (2012), students were provided with the WHO GGP to aid them in formulating a treatment plan for hypothetical cases, which resulted in their treatment plan scores being higher in comparison to the scores they obtained before using the WHO GGP. Kamat et al (2012) themed prior lectures and case-based tutorials (CBT) involving treatment of varying conditions such as diabetes mellitus, peptic ulcers and constipation on the 6-steps of the WHO GGP. This educational intervention involved a control group who received traditional teaching and a pre-test before the intervention, followed by a post-test a month after the end of the study. Overall, the students undertaking CBT attempted more questions and scored higher marks than their peers who had received traditional teaching.

Thenrajan et al (2016) performed a pilot study using a smaller sample size of two groups of 25 (one control group). Both groups were exposed to the WHO GGP guidelines of selecting the preferred drug following a clinical diagnosis. They then received five clinical scenarios on common patient conditions. The test group underwent patient-based teaching, where they encountered real patients suffering from the same conditions they saw in the five clinical scenarios from earlier. The students interacted with these patients for ten minutes each. The control group received prescription writing training on the five clinical conditions they encountered. Following a period of two days self-study for both groups, the students were then required to write prescriptions in the standard format for the same five clinical scenarios, which were then assessed and scored. Out of a maximum score of 14, the test group averaged 12.04 and the control group averaged 9.6. Open-ended feedback from the test group students indicated that patient-based teaching enhanced motivation, increased prescribing responsibility and empathy (Thenrajan et al, 2016).

Outcomes by most studies were assessed through scoring the treatment plans and prescriptions written by students following the intervention. Both Raghu et al., and Krishnaiah et al., (Raghu et al, 2017; Krishnaiah et al, 2013) found student treatment plans to score higher post-intervention and compared to control groups. However, Tichelaar et al., (2016) found the treatment plans of students using the 'SMART' criteria to score higher than those who used the WHO GGP. Keisjers et al., (2015) examined the impact of their curricular intervention through a formative standardised assessment testing basic pharmacological knowledge (testing factual knowledge), applied pharmacological knowledge (solving clinical scenarios), pharmacotherapy skills as well as prescription-writing. The results demonstrated that both fourth and sixth-year students receiving the WHO GGP intervention significantly outscored their control group peers.

### **2.3.3.3 Self-Directed and Online Learning**

Three studies involved interventions which included a component of self-directed or online learning (Al Khaja and Sequiera, 2013; Hauser et al, 2017; Sikkens et al, 2018). Two studies incorporated their self-directed components of the intervention alongside PBL-based tutorials involving case-based scenarios (Hauser et al, 2017; Sikkens et al, 2018) and one study implemented an entirely individualised e-learning prescribing module (Sikkens et al, 2018).

Al Khaja and Sequiera (2013) investigated the impact of an optional 2-hour interactive prescribing skills session at the end of each pre-clerkship unit phase, where 5-6 clinical scenarios were discussed. Following these sessions, students were required to complete and submit assignments for feedback within a week of attending the prescribing session. As a result, the number of students who met the pass mark of at least 60% in the end-unit objective structural practical examination (OSPE) for assessing prescribing skill was much higher among those who attended the two-hour session and completed the assignments than non-attendees. The educational intervention investigated by Hauser et al (2017) required the students, together with a tutor to develop a model conversation guide based on providing a prescription. To aid in developing this, students were provided with case scenarios as prompts. Firstly, students attended a 45 min PBL session based on a non-adherent patient. By the end of this session, students were required to define their learning goals to remedy the situation with the non-adherent patient. The students were then sent away for two days to conduct research upon their learning goals, after which they returned for a second PBL

session to discuss their research findings. This PBL session was followed by the workshop where the students came together with their tutors to develop their prescribing conversations. The intervention was evaluated through the students being asked to fill in portfolios during the course, where they reflected upon their own strengths and weaknesses and their attitudes pertaining to medication adherence and physician-patient communication. In addition, the overall elective was concluded with a short-written test and informal feedback session. The feedback reported high levels of satisfaction of students with the elective and their portfolios demonstrated that the elective had enhanced student awareness of appropriate prescribing communication works (Hauser et al, 2017).

One study investigating a case-based educational intervention was both devised using the WHO GGP and required the student to undertake learning in their own time. Sikkens et al (2018) designed a randomised controlled intervention where a group of fourth year medical students were provided access to a six-week e-learning module with eight clinical cases based on the WHO GGP. The impact of the intervention was assessed through knowledge test comprising of multiple-choice questions (MCQs) and an OSCE simulating prescribing behaviour in practice. These assessments demonstrated that students exposed to the e-learning group performed significantly better and pass rates were much higher compared to the control group. Survey results also showed that students rated the e-learning module to have enhanced their prescribing confidence in antimicrobial therapy (Sikkens et al, 2018).

The outcomes of these studies were assessed through observation of usual course assessment, where the scores of participants were higher as compared to those who hadn't been recruited for the study (Al Khaja and Sequiera, 2013), student reflections in the programme portfolio, where students expressed a high level of satisfaction with the intervention (Hauser et al, 2017) and through MCQ knowledge tests and OSCE simulations, where it was found that students exposed to the e-learning group performed significantly better and pass rates were much higher compared to the control group. Survey results also showed that students rated the e-learning module to have enhanced their prescribing confidence in antimicrobial therapy (Sikkens et al, 2018).

#### **2.3.3.4 Simulation and Role-Play**

Three studies implemented an educational intervention centred around learning through role play and Simulation-Based Medical Education (SBME) (Cooke et al, 2017; Paterson et al, 2015; Tayem et al, 2016). Two studies implemented a mixed disciplinary small-group approach to their role-play method of teaching (Cooke et al, 2017; Paterson et al, 2015) and one study used a large-group experimental observation approach (Tayem et al, 2016)

Cooke et al (2017) designed an intervention where Medical and Pharmacy students were devised into small mixed-disciplinary groups and were required to consult with a simulated patient. The students were provided with the British National Formulary (BNF), medical chart relevant to the 'patient'. The patient would describe their clinical presentations and the consultation would be led by the medical student, while the pharmacy student would actively observe. After the initial assessment, the students would devise a working diagnosis, collectively write a mock prescription with detailed management plan including both pharmacological and non-pharmacological aspects and then explain this to the 'patient'. Following this, the small groups were given a debriefing by faculty staff and simulated patients. The impact of this simulated learning experience was investigated through focus group interviews with participants, who communicated positive perceptions of the experience. They found that the experience enabled them to apply theory knowledge into 'practice' in a safe environment, gain a realistic insight into the issues that could manifest in practice, better understand the role and importance of other healthcare professionals in the common goal of ensuring the patient obtains the right prescription drug, understand the significance of accurate prescription writing and realise the importance of patient-centred care. It also helped them reduce their built-in prejudices of other healthcare professionals and instead foster empathy for them (Cooke et al, 2017).

Like Cooke et al (2017), Paterson et al (2015) investigated the impact of a simulated educational approach on the prescribing of students from other healthcare backgrounds as well as medical students. An expert advisory panel designed an inter-professional masterclass consisting of three cases commonly seen in practice: one on sepsis, one community-based and one polypharmacy case. Two cases required history-taking from simulated patients and the polypharmacy case was paper-based. Each case had to be worked on collaboratively by

one medical student, one pharmacist prescribing student and one nurse prescribing student with one member of the expert advisory panel acting as the facilitator. Upon completion of each scenario, the prescribing decisions were compared to the model answers and feedback was provided accordingly. The impact of the interprofessional simulation exercise was evaluated through a pre- and post-readiness for inter-professional learning score (RIPLS) and self-efficacy score. Focus groups with the participants were also conducted to gain insights into the intervention. The RIPLS scores post-masterclass showed significant increase from pre-masterclasses as well as self-efficacy scores. Focus group discussions indicated that students positively received the masterclasses, praised the concept of working in small groups and gained a greater awareness and appreciation of the roles of other professionals in prescribing (Paterson et al, 2015).

Tayem et al (2016) designed an intervention where students were given role-play demonstrations using a student volunteer on patient communication with regards to drug treatment. The faculty member acted as the physician and the volunteer student acted as the patient. The role-play exercise was followed by feedback from the instructor on explaining the disease, aim of therapy and instructions of drug use to the patient. All students had opportunity to act as volunteers in these demonstrations. All participants were asked to complete a questionnaire recording their perceptions of the role-play experience and around three groups of students of eight were invited to express their opinions of the role-play demonstration in focus group interviews. In addition, student scores in OSPE stations on prescription communication were assessed. The questionnaire results indicated that students found the role-play demonstrations instructive, that it helped enhance their ability to communicate drug therapy information effectively to patients, increase prescription-writing confidence and that they would like to be given further opportunities to undertake role-playing exercises in other facets of their medical education. Students participating in focus groups reported that the educational intervention helped develop interaction skills with patients and that the exercise would be most effective within small groups. Moreover, OSPE scores of those attending these role-play sessions were higher than non-attendees (Tayem et al, 2016).

Study outcomes were assessed through both qualitative and quantitative approach. Cooke et al's (2017) focus group participants expressed positive perceptions of the intervention in

focus groups, stating the ability to apply theory into practice in a safe environment along with understanding the role of other healthcare professionals in prescribing. Paterson et al's (2015) focus group discussions indicated that students positively received the masterclasses, praised the concept of working in small groups and gained a greater awareness and appreciation of the roles of other professionals in prescribing. They also used a pre- and post-readiness for inter-professional learning score (RIPLS) and self-efficacy score to evaluate the impact of the interprofessional simulation exercise. Tayem et al., (2016) used recorded questionnaires, where students found the role-play demonstrations instructive, helping to enhance their ability to communicate drug therapy information effectively to patients, increase prescription-writing confidence and that they would like to be given further opportunities to undertake role-playing exercises in other facets of their medical education. Additionally, students attending focus groups reported that the educational intervention helped develop interaction skills with patients and that the exercise would be most effective within small groups. Moreover, OSCE scores of those attending these role-play sessions were higher than non-attendees

#### **2.3.3.5 Peer-Based and Inter-Professional Learning**

Two studies implemented educational interventions where either students from multiple stages of the medical programme were recruited for team-based learning or students from different degree programmes were brought together to partake in an inter-professional based learning experience (Dekker et al, 2015; Achike et al, 2014). One study implemented a small-group experiential learning approach under supervision (Dekker et al, 2015) and one study used a blended approach of didactic lectures and case-based small-group learning (Achike et al, 2014).

Dekker et al (2015) recruited first-, third- and fifth-year medical students to take part in a pilot intervention involving student-run clinics (SRCs), which are clinics completely organised and run by medical students. Here, the students were given joint responsibility for outpatient consultations and were required to collaborate with other health professionals including nurses. Each student team consisted of a first-, third- and fifth-year medical student and they had to prepare their consultation a week in advance. The plan consisted of taking a patient history, physical examination and a treatment plan based on the guidance of the WHO GGP. The consultation plan had to be approved by the supervisor beforehand. During the

consultation, the third- and fifth-year students performed the main components of the consultation such as taking of patient history and explaining diagnosis and treatment. The first-year student played a supporting role through asking additional questions and compiling a medical record. The intervention was longitudinal as an eventual follow-up consultation also occurred with the objective of treatment monitoring. Following each consultation, patients completed an evaluation questionnaire and the students were required to provide a summary of the consultation and write a letter to the referring doctor. Finally, feedback was provided by the supervisor on the consultation, which was supplemented by the patient evaluation questionnaire. Feasibility of the educational intervention was evaluated if the patients were happy with the care, if supervisors expressed whether the intervention was feasible based on safety, quality of care and perceived value to medical curriculum and if students expressed whether the intervention was feasible based on organisation quality and supervision and value to medical curriculum.

Patients were overall very satisfied with professional behaviours of students, supervisors expressed satisfaction for the intervention, holding the opinion that the SRC was safe, provided high level of care and was beneficial to the students. They also expressed an interest to supervise SRCs again in future. Students found the experience to be of great value, especially given they had the opportunity to prescribe as a team, but most importantly, it enhanced their awareness of having responsibility and independence (Dekker et al, 2015).

Like Dekker et al, Achike et al (2014) also conducted a pilot study. However, this intervention brought together both second-year medical and fourth-year nursing students for an interprofessional learning (IPL) class. A month prior to the IPL class, medical students sat a didactic class on rational drug choice and prescription writing based on the model recommended by the WHO GGP. The students were required to complete a homework exercise before the two-hour IPL class. Within the IPL class, 10 groups of around eight-to-ten medical students and two-to-three nursing students were formed. The class consisted of a brief didactic lecture followed by a small group discussion on a clinical scenario and group presentation. The session ended with a question/answer session and feedback questionnaires administered to students before they left the class. The questionnaire asked the students questions on the adequacy of the class, including delivery of content and value of the class itself to their prescribing education. The results of the questionnaires showed positive overall

student perceptions of the class. Most students agreed that the objectives of the class were met, that the class was useful and well presented. In the open-ended questions, the overwhelming majority of students found that in terms of the aspect they liked most about the class was the chance of interacting with students from other professions and learning more about the process of rational drug choice (Achike et al, 2014).

Outcomes were measured by Dekker et al., (2015) through evaluation questionnaires by students, supervisors and patients, from which feedback was positive all-round, with the consensus that the SRC was safe, provided high level of care and was beneficial to the students (Dekker et al, 2015). Likewise, Achike et al (2014) administered feedback questionnaires to students before they left the class, which showed overall positive perceptions of the class, with students complementing interactions with students of other professions and learning more about the process of rational drug choice.

Two studies implemented peer-based learning between students of the same cohort (Zgheib et al, 2011; Wilcock and Strivens, 2015). Both studies implemented small-group teaching, however, one of these also incorporated large-group discussions at the end of the session (Zgheib et al, 2011) and the other implemented specific tutorials on a single topic (Wilcock and Strivens, 2015).

Zgheib et al (2011) aimed to apply the concepts of Team-Based Learning (TBL) in the teaching of Clinical Pharmacology. TBL is described as a teaching approach which enables learners to undertake team working whilst simultaneously maintaining individual accountability (Michaelsen and Sweet, 2008). Six clinical pharmacology sessions were delivered twice monthly over a period of three months. Each session lasted 90 minutes. The first session was a didactic introductory lecture where the goals and objectives of the course were listed and the standards on rational prescribing, selecting personal drugs and providing sufficient information to patients based on the WHO GGP were reviewed. The session also included explaining the TBL format to students. The five TBL sessions included activities such as compiling of group prescriptions and group formularies, small group work on MCQs eventually being joined into whole-class discussion on answers, group work on clinical scenarios and their appropriate prescribing decisions. The compiled group prescriptions, formularies and answers to case scenarios were collected at the end of each session for grading. Formularies were scored based on rationality of specific drug selection from



therapeutic class, prescriptions were scored based on format, handwriting, dosage and use of generic name with additional points awarded if instructions and warnings were emphasised. Also, at the end of the final TBL session, students were asked to complete a peer evaluation form and a course evaluation form including Likert scaled questions, listing strengths and weaknesses of course and suggesting additional topics. Student performance in the formulary exercises improved over the sessions as well as the scores for the prescribing exercises, with almost all students attaining perfect scores by the end of the intervention. Students expressed satisfaction with the format of the programme and helped them improve in their group interaction skills. However, the peer evaluation method didn't work as robustly as the authors expected as students were unwilling to evaluate their group members (Zgheib et al, 2011).

Wilcock and Strivens (2015) conducted a study where a certain segment of the overall prescribing education intervention involved teaching between peers. After being provided with a pre-test, fourth-year medical students were split into six groups of around six-to-ten students whom received one 40 minute tutorial every two weeks on the medications aspirin, tiotropium and simvastatin. The tutorial included discussing facts about each drug to improve knowledge, questions of drug effectiveness in specific clinical scenarios, discussions on evidence-based medicine (EBM) and ethical principles surrounding the decision to prescribe and the different possible prescribing judgements that could be made. During the six weeks of these tutorials, one student in each group was asked to voluntarily provide their own tutorial to their peers on a fourth medication of their choice while following the same tutorial format. Following an eight-week gap, students were administered with a post-test. Overall, students struggled with discussions on the ethics of prescribing and although enjoyed delivering tutorials to their peers, did not appear to display sustained improvements in their critical thinking (Wilcock and Strivens, 2015).

#### **2.3.3.6 Other Studies**

Two studies did not fit under any specific theme as their objectives were of a more general nature (James et al, 2016; Celebi et al, 2009).

One study investigated whether case-based teaching was more effective in small group or large group settings. James et al (2016) initially divided a cohort of second year medical

students into small groups of 13 to 15 students where clinical case scenarios related to the respiratory system and their management and prescription were discussed. Following this session, students were required to anonymously complete questionnaires regarding their perceptions of the small-group approach. Later in the year, a large group prescription-writing session was conducted for the entire cohort which involved the management and prescribing decisions around clinical scenarios in cardiovascular areas. Like the small-group session, the large-group session was also followed by the students completing a questionnaire about perceptions on the large-group approach. A limited number of students were also selected to partake in a focus group discussion to openly express their views and perspectives on both the small-group and large-group approaches. The results of the questionnaires reported that students regarded the small-group teaching approach to be more instructive in the learning of prescribing in every area, including analysing clinical scenarios, applying prescribing theory to practice and accurate prescription-writing. This was echoed by the students who took part in the focus group discussions who expressed strong preference for the small group approach (James et al, 2016).

Celebi et al (2009) conducted a study investigating whether a module on drug-related problems (DRPs) could help reduce the number of prescribing errors. Group One underwent the week-long prescription training course followed by a week-long skills laboratory training period, whilst group two acted as the late intervention group by undergoing the week-long skills laboratory training before the prescription training course. Both groups underwent assessments before the training, a week later and at the end of the training programme. The training module included a 90-minute seminar on adverse drug reactions (ADRs), prescribing errors and special needs patients. Another 90 minutes were dedicated to practical training based on a virtual case of congestive heart failure. The next three days involved the students practicing prescriptions for real life patients every morning and discussing the real-life patient cases with lecturers in afternoon sessions, affording particular attentions to avoiding prescribing errors. At the end of the week, students were required to sit an examination with cases similar to assessment cases but with different diseases. The results of the assessments demonstrated a significant decrease in prescription errors. These results were more prominent in the early intervention group (Celebi et al, 2009).

## 2.4 Discussion

In the last ten years, 22 studies were found to meet the inclusion criteria of educational interventions aimed at improving the prescribing skills and competencies of medical and non-medical prescribing students. These showed that a considerable amount of studies continue to be conducted on the best educational approaches to improving prescribing skills, however, as reported by previous systematic reviews (Kamarudin et al, 2013; Ostini et al, 2009; Brennan et al, 2013), generalisability and validity continue to be limited due to the diversity and heterogeneity of the reported studies

The most recent review on this topic was conducted by Kamarudin et al (2013) which reported that many interventions were designed based on the concepts of the WHO GGP. This review also found that prescribing education interventions continue to be designed using the main concepts of the WHO GGP, demonstrating that despite its publication being back in 1994, the guideline continues to be the leading model for safe and rational prescribing to this day. This assertion is aided by the positive results yielded by interventions designed around the WHO GGP, both in assessment and student perception (Raghu et al, 2017; Keijsers et al, 2015; Thenrajan et al, 2016; Kamat et al, 2012; Krishnaiah et al, 2013; Tichelaar et al, 2016).

Despite there being a range of different educational interventions to improve the teaching of prescribing, most of these interventions feature the heavy use of clinical case scenarios. Brauer et al (2009) report that clinical case scenarios are vital to problem-based learning in healthcare and to the development of clinical practice guidelines. This also applies to the WHO GGP, which consists of a plethora of case scenarios of various clinical areas such as diabetes, cancers, gastrointestinal, respiratory and cardiovascular disorders. Hence the designing of effective prescribing educational interventions requires the inclusion of robust clinical scenarios as they can be applied to improving multiple aspects of prescribing competencies such as prescription-writing, prescribing communication and recognising of ADRs. In addition, apart from one study, all studies reported a high level of success regarding their interventions, whether through students attaining higher scores in traditional assessments, scored treatment plans and OSCEs in comparison to control groups or through students expressing positive views of the educational intervention.

Another theme to emerge was the use of small-group teaching. Many of the interventions required multiple small groups of students to be created to deliver the teaching, with one study specifically evaluating the difference in effectiveness between small and large-group teaching. Along with demonstrating high scores in assessments, small-group teaching was particularly perceived positively in qualitative interviews with students. Small-group learning approaches originate from constructivist principles, where students can define their own objectives with minimal interference from facilitators (Kirch and Sadofsky, 2021), a concept discussed in Chapter One. NMP programmes consist of far less student numbers per cohort as compared to medical school programmes, however, studies introducing educational interventions to NMP programmes remain very low, as this review could only locate two studies involving NMP programmes, one introducing a mentoring scheme to NMP students and the other involving an IPL intervention with medical students. Given that certain areas of the literature indicate a very low prescribing error rate of NMPs (Baqir et al, 2015), the specific benefits of small-group teaching in the context of prescribing skill requires further investigation.

However, despite identifying a range of different educational interventions aimed at improving prescribing education, our aim was to investigate how innovative these interventions were, and the level of innovation appears to be low. In a literature review, Dearnley et al (2013) categorised innovation in medical education to include simulation; digital teaching aids; online/e-learning teaching and assessment; social media and virtual learning environments. Only three studies implemented a degree of innovation, where simulated and real-life patients and role-play were used. Here, although one of the studies failed to provide an insight into the content of the simulated consultations, when students were provided with the opportunity to use their prescribing skills on either simulated or real-life patients, their responses were overwhelmingly positive. Some of the studies mentioned the use of self-directed learning aided through an online e-learning system, however, it was unclear what content was included in these e-learning systems. None of the studies implemented the use of social media or innovative uses of virtual learning environments such as virtual reality with virtual patients. Most studies implemented interventions which for the most part, were based on case scenarios on paper, inter-professional education where

students from different backgrounds were merely brought together, teaching delivered from other healthcare professionals.

Although with the exception of one study, all interventions were reported to be successful in improving the prescribing skill and competency of students and were perceived positively, questions on their long-term effects upon prescribing practice of students beyond graduation and into their full-time clinical careers still remain as these studies failed to implement a longitudinal follow-up of whether their benefits on the prescribing practice of these students are sustained over a long period of time, as this would be a more reliable indicator of whether an educational intervention has achieved its desired outcome. Moreover, studies which only assessed the benefits of an intervention through merely the views and perspectives of the students undertaking them would be greatly enhanced if they utilised assessments and evaluated whether the scores of these assessments supported the positive viewpoints of the students.

Given that most studies only assess the short-term impact of educational interventions on prescribing practice, educators should also assess whether the positive impact of these interventions are sustained over a longer period as prescribers advance in their careers. Also, the WHO GGP continues to be a model from which prescribing educators design their teaching approaches. This could partly be due to it providing a comprehensive prescribing guidance on many areas of expertise using clinical case scenarios, something established as being core to problem-based learning. Given the lack of educational interventions being evaluated in NMP programmes, it would be prudent to design an intervention around the WHO GGP and evaluate its effectiveness in an NMP setting due to the existence of a variety of clinical areas of expertise in NMP programme cohorts.

This review did include certain limitations. As we limited the inclusion criteria to include studies involving students only, studies involving junior doctors could have implemented more innovative interventions which if reported here, could have been useful for prescribing curriculum of medical schools and NMP programmes to gain knowledge of and implement in their own programmes of study. Likewise, the search strategy also excluded non-English language papers, where there could have been more innovative interventions implemented in such studies. In addition, given that the papers we identified reported positive outcomes

and perspectives as a result of the interventions, there is also the possibility of positive publication bias.

Overall, this review was able to retrieve a broad range of studies investigating various prescribing education interventions.

## **2.5 Conclusion**

Although a wide range of educational interventions to improve prescribing skills and competencies have been developed, despite their high success rate in the short-term in both assessment and student perception, there still exists a lack of innovation in these interventions. Given that we are seeing other areas of medical education adapting their teaching approaches to be more innovative with the recent rise in, prescribing curricula also needs to adapt and evaluate the scope of implementing educational approaches which utilise innovations such as virtual reality and explore areas where students can commit errors in a safe environment and learn from these to better their prescribing skills in preparation for real-life clinical practice.

## Chapter Three – Methodology

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The objective of this chapter is to introduce the qualitative approaches utilised throughout the programme of research.

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### 3.1 Introduction

Before undertaking a significant programme of research, it is prudent to discuss how research is conducted and justify the logistics underpinning the research approach. This research approach includes the research design and the meticulous processes needed to record, interpret and analyse data and answer the research question presented (Creswell and Poth, 2016). When determining which research methods are to be adopted for the study, the researcher must take into account the subject of study and the underpinning philosophical assumptions that both they hold as the researcher and those that govern the possible research approaches. Subsequently, in the process of describing methodology, the researcher must both address the concepts around the underlying philosophical assumptions pertaining to the potential research approaches along with the specific approaches of data collection and analysis (Creswell and Poth, 2016).

### 3.2. Ontology, Epistemology and Philosophical Underpinnings of Research

#### 3.2.1. Ontological Stance of Research

A major categorisation in qualitative research relates itself with ontology, defined as the 'nature of reality' (Ritchie, 2020) and the 'study of being' (Scotland, 2012). The overarching ontological positions include realism and relativism. Realism is based on a distinction between the way the world is and of people's beliefs or understanding of that external reality (Ritchie et al, 2020). Relativism is based upon the philosophy that reality is constructed within the human mind and that reality is 'relative' depending on the experiences of individuals (Moon and Blackman, 2014). Based on the need for addressing the gap in knowledge around the universal qualities of high-level prescribing, the educational approaches used by NMP programmes to facilitate development of high-level prescribers and appraising these educational approaches, it was imperative to explore the beliefs and understandings of

different people and stakeholders relating to educational approaches and cultivating high-level prescribing. Therefore, this doctoral study took a relativist ontological stance.

### 3.2.2 Epistemological Stance of Research and Paradigms

Epistemology is based on the nature and forms of knowledge (Cohen et al, 2007). Epistemology is concerned with the creation, acquisition and communication of knowledge, and furthermore, Guba and Lincoln (1994) define the epistemological question as being “*what is the nature of the relationship between the would-be knower?*”. Guided by ontology and epistemology are paradigms. A paradigm or worldview is “*a basic set of beliefs that guide action*”. Any given paradigm could vary with the set of beliefs they bring with them to the research setting, but additionally, researchers can use multiple paradigms that are compatible with one another within their research (Creswell, 2003). There are four major paradigms used to inform research, including: postpositivism, constructivism, advocacy/participatory and pragmatism (Creswell, 2003).

Postpositivism is the engaging with research through a scientific approach. The approach includes the principles of being logical, cause-and-effect oriented, based on empirical data collection and deterministic based on *a priori* theory (Creswell and Poth, 2016). Postpositivist researchers will tend to approach inquiry through a lens of logically-related steps, believe in multiple perspectives from participants rather than a single reality and adopt rigorous methods of data collection and analysis (Denzin and Lincoln, 2005).

Constructivism is a worldview where individuals develop subjective meanings of their experiences. Due to the varied nature of these meanings, researchers seek complexity of views rather than narrow meanings into fewer ideas. This leads the researcher to base the research on the participants’ views of the situation. Hence, the subjective meanings they are seeking usually form through interaction through others, which lends to the term Social Constructivism. Researchers inductively generate a theory or pattern of meaning, rather than beginning with a theory as seen in postpositivism. The questions asked by constructivist researchers are broad, enabling participants to construct meaning behind situations. These meanings are constructed through open discussions and dialogue. Constructivist researchers attempt to keep questions as open-ended as possible to obtain as much understanding of the participants’ lived reality as possible. They also recognise that their own background shapes



their interpretation, and subsequently “position themselves” in the research to acknowledge how the interpretation flows from their own personal, cultural and historical experiences. Overall, the researcher seeks to make sense of the meaning others have about the world. It is widely seen that the constructivist worldview usually manifests in phenomenological studies (Creswell and Poth, 2016).

Advocacy/Participatory is based on the principle that research must contain an action agenda for reform which has the potential of bringing meaningful change, especially to the lives of participants and the institutions which they are a part of. The researcher seeks to act as a voice for these participants and help free people from the constraints of irrational and unjust structures which limit self-development and self-determination. This worldview is practical and collaborative as the inquiry is answered through cooperation “with” others (Kemmis and Wilkinson, 1998). As a result, advocacy/participatory inquirers collaborate with research participants through possibly using their help with designing questions, collecting data, analysing it and compiling the final research report. The research report consists of an agenda for reform and the paradigm is usually seen in ethnographic studies (Creswell and Poth, 2016).

The fourth paradigm is Pragmatism. This is where researchers focus on the overall outcome of the research, including the actions and consequences of the inquiry. The important aspect of the research is the problem being studied and questions asked pertaining to the problem. Pragmatism provides researchers complete freedom over the methods, techniques and procedures of research they best see fit for the purpose, as pragmatism is not committed to any specific philosophy or reality (Cherryholmes, 1992; Murphy, 1990). Researchers using this worldview will use multiple methods of data collection to comprehensively answer the research question and they will focus on the practical implications of the research (Creswell and Poth, 2016).

### 3.2.3. Epistemological and Methodological Stance of my Research

Upon consideration of various potential approaches, it was decided that an entirely qualitative approach would be utilised. When reviewing the objectives of the doctoral study, compiling a consensus of universal high-level prescribing practice, addressing the knowledge gap around the educational approaches of NMP programmes and subsequently appraising these approaches could only be achieved appropriately through a qualitative approach. This

was also influenced by my position as a non-clinical researcher who held no preconceived ideas around prescribing education given that I had no prior experience of undertaking any form of prescribing education or practicing prescribing in clinical practice to any degree.

The purpose of conducting qualitative research is to understand a given phenomenon in a context-specific setting (Creswell and Poth, 2016). Qualitative research enables the researcher to bring in their own worldviews or sets of beliefs into the research project.

Next, I considered which ontological and epistemological stance my research would take. As discussed earlier in the chapter, the aim of obtaining various sources of data to help inform a universal consensus of high-level prescribing practice and appraisals of educational approaches on NMP programmes would mean analysing multiple viewpoints and realities of data sources, and subsequently, this would lead to taking a relativist ontological stance. Further to this, a relativist ontological stance fits most appropriately with the constructivist paradigm and how it requires researchers to obtain broad perspectives. As a result, I used a constructivist paradigm to conduct my research. Analysing prescribing practice documents to attain a consensus of high-level prescribing practice, interviewing both programme leads and graduates of non-medical prescribing programmes to gain an understanding of the educational approaches and obtaining their appraisals of these educational approaches could best be conducted through an entirely qualitative design. A quantitative approach would be unsuitable to answer the research questions. Firstly, it would be difficult to build a consensus of high-level prescribing practice through quantitative means and furthermore, it would be difficult to obtain a comprehensive body of knowledge of the educational approaches of NMP programmes through any quantitative approaches. The only way in which quantitative approaches would be relevant in this doctoral study would be through surveys, however, specific information relating to educational approaches and perspectives around these could only be obtained through qualitative interviews.

Additionally, the constructivist paradigm was most compatible with the aims of the doctoral study as a whole, which uses multiple approaches including documentary analysis, the vignette exercise and semi-structured interviews in seeking to answer the research questions and address the gap in knowledge. Studies using constructivist paradigms have been known to use multiple approaches to attain research objectives (Brown and Duenas, 2020).

### 3.3 Types of Research Designs

There are various techniques used for data collection in qualitative research. One of these is ethnography or observational field studies. Observational studies in ethnography are defined as studies where: *“the objective is to elucidate cause-and-effect relationships [... in which it] is not feasible to use controlled experimentation, in the sense of being able to impose the procedures or treatments whose effects it is desired to discover, or to assign subjects at random to different procedures”* (Cochran, 1965). This approach enables researchers to directly observe a given phenomena in its natural setting and are usually conducted in studies involving the exploration of aspects of professional practice or leisure activities (Barbour, 2014). However, conducting observational studies in this project was deemed unsuitable, as gaining an understanding of educational approaches in non-medical prescribing programmes would be too time consuming and would not be a suitable means of obtaining appraisals of educational approaches from programme leads and graduates.

Another technique in qualitative research is the use of focus groups. Focus groups are: *“a group of individuals selected and assembled by researchers to discuss and comment on, from personal experience, the topic that is the subject of the research”* (Powell et al, 1996). Focus groups involve participants interacting with one another within the group when discussing the topics provided by the researcher (Morgan, 1997). Despite the advantages of focus groups, they were deemed unsuitable for this project. Firstly, this was due to logistical difficulties in assembling various programme leads and graduates across the country to partake in focus groups at a mutually convenient time. Secondly, it has been reported that researchers have less control over production of data in focus groups than in one-to-one interviews (Morgan, 1988). Additionally, focus groups have been known to cause a shift in the balance of power from the researcher to the participants (Wilkinson, 1998), which could compromise the validity of the study, given the potential shift in power could allow biases of the participants to emerge within the data. Also, more vocal members could begin to control the focus group session, which would be a hindrance for the nature of this study given the necessity to obtain as many comprehensive perspectives as possible to address the gap in knowledge. Hence, data collection through semi-structured interviews was deemed as a more reliable approach in obtaining an understanding and appraisal of educational approaches in non-medical prescribing programmes.

### 3.3.1 Documentary Analysis

Study One consisted of a documentary analysis of national and international prescribing guidelines to create a consensus of the core categories which make a good prescriber. Documentary analysis is a method of qualitative research where a researcher interprets and reviews documents to elicit meaning specific to a particular topic. The analysing of documents involves coding data into concepts and themes in a similar way to how analysis of common qualitative data sources such as interview or focus group transcripts occur (Bowen, 2009). In contrast to a literature review, a documentary analysis is a method of qualitative research where a researcher interprets the contents of a document through the incorporation of codes and themes, similar to how interview and focus group transcripts are analysed (Bowen, 2009). In the context of Study One, a prescribing guideline was defined as a document providing general guidance for prescribing practice, regardless of professional background

In documentary analysis, the types of documents which are typically analysed are usually: Public records, including curriculum syllabi, student handbooks and mission statements; Personal documents, including e-mails, blogs, personal journal pieces and newspapers; Physical evidence, such as artefacts, posters and training materials (O'Leary, 2014). Documentary analysis is often utilized by researchers as a means of strengthening and supporting research, sometimes as a complementary segment to a wider study which helps in contextualizing the overall research within a specific field (Bowen, 2009).

Most documentary analyses use content analysis in their study, in which a pre-defined coding criterion is used to analyse the data, where the presence of specific words are sought through quantification of recurring words and themes (Bowen, 2009; O'Leary, 2014). However, in the context of this study, allowing codes and themes to be identified from the data itself was deemed to be more effective in answering the question of what makes a high-level prescriber. This was to allow each prescribing guideline to have an equivalent contribution towards providing relevant data and to avoid any single guideline acting as a standard for other guidelines. Additionally, the study intended to provide each prescribing guideline with an equivalent contribution towards providing relevant data. If content analysis were to have been used in this study, a pre-defined coding framework would have to be derived from an existing prescribing guideline document, it would imply that the document selected to act as the coding framework is of higher significance than the rest of the documents and hence, it

would not be possible to enable each guideline document selected for the study to provide equivalent contribution to the study.

### 3.3.2 Semi-structured interviews

Semi-structured interviews are designed to stimulate subjective responses from participants relevant to a particular phenomenon they have experienced (McIntosh and Morse, 2015). The interview uses a detailed interview guide or protocol, which is usually informed by sources of objective knowledge in the field, such as article, studies or practice guidelines if the research question is based on healthcare (McIntosh and Morse, 2015). These sources of objective knowledge provide a framework for the development of interview question stems. Interview question stems are usually open-ended, where participants can respond freely, and the researcher has opportunities to probe their responses. The flexibility afforded to participants by these open-ended questions defines the *semi-structured* aspect of this research approach. When compared to other interview methods, semi-structured interviews provide a good degree of relevancy to the topic while remaining responsive to the participant (Bartholomew, Henderson and Marcia, 2000).

### 3.3.3. Qualitative Vignettes as a Data Collection Tool

Vignettes are hypothetical scenarios, short stories or description of events (Schoenberg and Ravidal, 2000). Vignettes have been used in qualitative research as a stimulus to generate a discussion or viewpoint from participants. They are mostly presented in written form and are compiled to replicate realistic situations. The vignette exercise is employed by research in recognition that values, decisions and judgements occur within context rather than in isolation (Jackson et al, 2015). Vignettes allow for the examination of actions within a specific context to assist in the research of sensitive subjects. Subsequently, vignettes have been used within various field, including social work, education, medical treatments and nursing (Jackson et al, 2015). The work of Thompson (1997) demonstrated a precedent for combining the use of semi-structured interviews with vignette exercises. They can be employed to enhance existing data or even generate data not recorded by other research methods used within the study (Barter and Renold, 1999).

In the context of this study, to further understand and appraise the educational approaches of non-medical prescribing programmes, it was decided that graduates of these programmes

would undertake a vignette exercise prior to the semi-structured interview. This would allow participants to provide a demonstration of their prescribing practice for hypothetical scenarios relevant to their area of practice. Firstly, this would highlight areas of their prescribing practice which is adhering to the recommendations presented in the documentary analysis. Secondly, it would provide added depth to the semi-structured interviews, where participants could reflect upon their performance in the vignette exercise and stimulate discussion over how the educational approaches of the programme have helped develop areas of their prescribing practice.

#### 3.3.4. Qualitative Data Analysis – Grounded Theory

To derive the consensus of what a model prescriber looks like, data had to be allowed to be identified from the guidelines themselves without the use of pre-defined categories as seen in orthodox content analysis, phenomenology and some of the primary approaches of thematic analysis. As a result, data analysis was conducted in Study One using a constructivist grounded theory approach. Grounded theory is an approach to data collection and analysis which enables concepts to be identified from the data without the need of a pre-defined coding framework and data collection and analysis can occur simultaneously according to the development of the core theory (Strauss and Corbin, 1990). Constructivist grounded theory was developed by Kathy Charmaz, who based this analysis approach on the concept that due to social reality being constructed, the researcher is also a part of that reality, and as a result, the researcher must be mindful of their reflexivity and preconceptions when analysing data to ensure maximum accuracy. According to Charmaz, the use of the term constructivist in her grounded theory approach is important in *“acknowledging subjectivity and the researcher’s involvement in the construction and interpretation of data”*. (Charmaz, 2006)

Data analysis was guided by the constant comparative method (Glaser and Strauss, 1967), which follows an inductive approach designed to identify patterns and theoretical properties within the data. Identified codes and categories were constantly checked and re-checked and various segments of data were compared to one another for recurring concepts. This process was continued until theoretical saturation of all codes and categories were reached. This concluded the initial coding phase and led to the next phase, focused coding. Charmaz has described focused coding as the stage where: *“decisions about which initial codes make the most analytical sense to categorise your data incisively and completely”*. At this point, initial

codes were re-read, refined and ultimately clustered into axial codes, where initial codes were further scrutinised to discover which axial codes they fit into (Charmaz, 2006). For example, initial codes highlighting the need for the prescriber to have an accurate knowledge of the conditions they prescribe for, being as well-informed as possible, having access to all information needed for the prescription and prescribing within their own area of expertise along with other initial codes were refined and clustered into an axial code of the prescriber having a comprehensive understanding of the diseases and conditions which they will be prescribing for in practice.

The overall process of a grounded theory study is underpinned by constant memo-writing at each stage of coding (Charmaz, 2006). In the context of this study, it enabled the expansion of ideas around the specific codes and categories and aided the creation of substantive categories and the final process of theoretical sorting and subsequent write-up of results.

### 3.3.5. Qualitative Data Analysis – Thematic Analysis

Thematic analysis does not describe a singular method, but rather serves as an umbrella term for various different approaches used for identifying, analysing, and interpreting patterns of ‘themes’ within qualitative data (Clarke and Braun, 2014). These approaches include: inductive thematic analysis, where code development is guided by content within the data; deductive thematic analysis, where code development is guided by existing ideas; semantic thematic analysis, where code development reflects explicit content of the data and latent thematic analysis, where code development reports on assumptions underpinning the data (Braun and Clarke, 2006). Further to this, TA has also been used in a hybrid inductive and deductive approach, where a priori template of codes have been used to generate themes, whilst at the same time, themes have also been allowed to emerge directly from the data (Fereday and Muir-Cochrane, 2006).

TA serves as a systematic and accessible method of generating themes and codes from qualitative data. The major advantage afforded by TA pertains to flexibility. Researchers can apply TA across a wide range of theoretical frameworks and research paradigms discussed above. Similarly, TA can be applied to various types of research questions, sampling sizes, data collection methods and approaches to data generation. It is an ideal data analysis method for identifying patterns both within and across data relevant to participants’ lived experience,

views and perspectives and behaviours in practice. Also, TA is useful within a 'critical framework', where the researcher can interrogate patterns within social or personal meaning around a topic and ask questions around the implications of these (Clarke and Braun, 2014).

The flexible nature of TA also extends to sample sizes, where it has been used to analyse datasets as small as 1-2 participants (Cedervall and Aberg, 2010) and as large as 60 or more participants (Mooney-Somers et al, 2008). These samples have been both homogenous and heterogenous. Data can be analysed from both widely used data collection methods such as interviews and focus groups and less widely used methods including qualitative surveys, vignette exercises and story completion (Clarke and Braun, 2014).

Given the dense nature of the data generated from the interview segment of this programme of study, data analysis was conducted through thematic analysis. Thematic analysis was chosen over grounded theory as the interview protocol was based on the results of the documentary analysis of Study One and that interview questions had to remain the same with each participant, which is incompatible with the requirements of a grounded theory analysis, where each interview is guided by the results of the previous participants' responses. Also, thematic analysis was deemed more appropriate for these interviews than phenomenology due to the flexibility thematic analysis affords to the researcher around analysing multiple aspects including lived experiences of participants, practical information pertaining to the area of subject and suggestions for improvement, whereas phenomenology mainly looks at the lived experiences and stories of the participants. Due to the requirements of the research questions and the wide-range of data required to answer these research questions, we adopted the hybrid inductive and deductive approach of TA, where the results of the documentary analysis were used as a coding manual to code data relevant to teaching approaches around the categories of a good prescriber, whilst allowing themes related to the experiences of programme leads and graduates of teaching and learning on the programme to emerge from the data.

The six steps of thematic analysis are as follows:

- 1) Familiarisation with the data – The purpose of this step is for the researcher to become as familiar with the data as possible. If the researcher has collected the data themselves, then they will already have a level of prior familiarity, but the optimal way



of familiarisation is through active and repeated reading of the data set to ensure a deep understanding of the breadth and depth of the data and establishing curiosity to the meanings within. It is recommended for the researcher to begin compiling notes for the coding phase. (Braun and Clarke, 2006)

- 2) Generation of initial codes – After a period of full familiarisation with the data and generating an initial list of ideas around the data, the researcher produces initial codes. This is conducted through the researcher working through the dataset systematically to identify repeated patterns and generate as many themes from them as possible (Braun and Clarke, 2006)
- 3) Searching for themes – The researcher progresses to a stage where they group similar patterns and themes into potential categories that can form principal themes and subthemes. Some themes in this phase can be discarded and others kept under a ‘miscellaneous’ category which could be useful in a latter stage of the analysis (Braun and Clarke, 2006)
- 4) Reviewing themes – Upon identification of provisional themes, the next step involves the refinement of these themes. In this phase, some themes may turn out to not have enough data to support their status as standalone themes and other sets of themes may merge to create one theme. Data within themes must cohere together meaningfully, while clear and identifiable distinctions should exist between separate themes (Braun and Clarke, 2006).
- 5) Defining and naming of themes – Once a satisfactory thematic map of the data has been compiled, the researcher finally refines and defines the themes and determines what aspect each theme captures, organising them into a coherent and internally consistent account (Braun and Clarke, 2006).
- 6) Write up of report – This final stage amalgamates the themes, their supporting statements and how they fit into the narrative of the data and the topic of study in context to the available literature. The researcher must ensure that the analysis provides a concise, coherent, logical, non-repetitive and interesting account of the story the data tells, both within and across themes. The write-up must demonstrate that each theme has sufficient evidence within the data (Braun and Clarke, 2006).

It is essential to clarify that the six steps set out above are not hierarchical, but an iterative and interactive process, where the researcher sifts back and forth between stages throughout the progression of the analysis. For example, a researcher may go back from reviewing themes in Step Four to searching for more themes in Step Three (Braun and Clarke, 2006).

The coding and analysis process can be undertaken either manually or through using computer packages, such as NVivo. Given the time-consuming and labour-intensive nature of manual processes, we used the computer package NVivo 12 to conduct the entire process of thematic analysis. This enabled all data transcripts to be organised and managed in a convenient manner, facilitated interrogation of data through rapid retrieval of data required to answer relevant questions and allowed transparency in the process, where codes and memos could be attributed to a particular researcher (Bazeley and Jackson, 2013).

#### 3.3.5.1 Thematic Saturation

A major consideration when embarking upon qualitative research is determining the point of data saturation. Thematic saturation is achieved when the research reaches a point where further data analysis fails to reveal any new themes. Theoretical saturation is the point where additional data is unable to further develop the qualitative theory derived from the data (Lowe et al, 2018). The use of saturation in qualitative research is instrumental in answering the question of “Are the observations sufficient to justify the claims and conclusions?” and thus guide the researcher to either complete or continue their sampling (Lowe et al, 2018).

A study conducted by Ando et al (2018) sought to define the number of interviews required in studies utilising thematic analysis to achieve thematic saturation. They found that 12 interviews were sufficient in providing all the themes from the research data and further interviews were useful for modifying the acquired codes. Ando et al’s findings (2018) are supported by Braun and Clarke (2006), who state that studies using thematic analysis generally include between 12-18 participants. This informed my strategy for achieving thematic saturation, where both Study Two and Three aimed to recruit between 12 and 18 participants. After analysing the first 12 interviews, the aim was to assess whether new codes or categories were being identified from the previous three interviews. If no new codes and categories were emerging, the remaining interview transcripts would be analysed for the purpose of strengthening or modifying the codes and ensuring data saturation. If new codes

and categories were emerging, analysis of the remaining transcripts would continue and recruitment of further participants would commence.

In the case of Study Two, no new codes and categories were being formed on the NVivo 12 software after 12 interviews, so the remaining four transcripts were analysed to ensure saturation, and in the case of Study three, no new codes and categories were being formed on the NVivo 12 software after 13 interviews, so the remaining five transcripts were analysed to ensure saturation.

### **3.4 Sampling Strategy**

The concept of sampling in qualitative research comes under two broad categories, random and non-probability sampling (Marshall, 1996). However, random sampling is best utilised to provide generalisability of the results to the population and due to small sample sizes in qualitative research, are generally inappropriate to be applied to qualitative research due to the focus of qualitative research being on understanding complex issues pertaining to human behaviour (Marshall, 1996). This is why qualitative research mainly uses non-probability sampling strategies. Three broad strategies to non-probability sampling exist within qualitative research: Theoretical Sampling; Purposive Sampling and Convenience Sampling (Marshall, 1996).

Theoretical sampling is defined by samples are added to the study in a theory and data-driven manner. The emerging theory in the data informs the researcher regarding the best source of data which can be used to add to the theory (Marshall, 1996). This sampling strategy is usually employed in grounded theory studies and was used to obtain documents to construct the theory in the Documentary Analysis of Study One.

Purposive Sampling is the most common sampling technique (Marshall, 1996). Here, a small number of participants are identified and selected to partake in the study given their higher likelihood to provide data most likely to answer the research questions. The major advantage of this sampling strategy is that participants selected are able to provide in-depth insights about the topic of interest (Marshall, 1996). This was the sampling strategy deemed most suitable for Study Two, where programme leads were specifically selected as they could provide in-depth information and perspectives around the logistics and educational approaches of NMP programmes. It was also simple to identify these participants through

internet searches. However, the main disadvantage would be that the sampling strategy may not take into consideration other stakeholders who could have provided further insights into the programme.

Convenience Sampling is the simplest way of sampling, where participants are selected due to ease of accessibility (Marshall, 1996). A derivative of Convenience Sampling is known as Snowball Sampling, where samples are identified through previous participants of the study (Handcock and Gile, 2011). Snowball Sampling was utilised in Study Three, where programme leads who participated in Study Two were asked to identify and actively help in recruiting graduates from their NMP programmes.

### **3.5 Validity and Reliability**

Validity and reliability are vital aspects of qualitative research (Brink, 1993). Both of these aspects must be afforded meticulous attention, as the researcher's subjectivity could potentially cloud data interpretation, so ensuring both validity and reliability are established enables fellow researchers to acknowledge credibility of findings (Brink, 1993).

Validity deals with the accuracy and truthfulness of findings within research and for a study to be classed as valid, it must clearly demonstrate what actually exists (Le Comple and Goetz, 1982). Reliability deals with the stability, consistency and repeatability of the findings and the ability of research methods to consistently produce the same results if they were to repeat the research study (Brink, 1993).

Numerous threats exist to validity and reliability (Brink, 1993). One of these is researcher bias, where researchers could tend to interpret findings through their own values and choose to selectively record certain data at the expense of other, relevant data (Brink, 1993). In light of this, validity was established through selecting both programme leads and programme graduates of NMP programmes in institutions spread across the UK. This enabled overlaps in data obtained from both research cohorts to be explicitly recorded. Reliability was established through regular meetings and discussions with the supervisory team throughout the data collection and analysis processes, where emergent codes and themes were discussed rigorously and agreed between myself and the supervisory team. This process of establishing reliability is in line with the recommendations of Le Comple and Goetz (1982) for researchers working primarily alone in the data collection and analysis process.

Another risk to validity and reliability is the nature of participants, whose responses could introduce bias into the data. For example, they may provide positive responses either to please the researcher or due to fear of reprisal (Brink, 1993). In this case, validity was established through issuing participants with research information sheets before the interview, outlining specifics of the study, what the study aims to achieve and reassurances around anonymity of participants and their responses. The use of an audio recorder enhanced reliability of the study as it ensured interview transcripts were precisely the words of the participant.

### **3.6 Reflexivity**

Reflexivity refers to the researcher acknowledging the outside influence they bring into the research process (Kuper et al, 2008). This includes how the researcher looks into the data through the lens of their own profession or even their gender or ethnic background. In accordance to this, the researcher must acknowledge the lens through which they look at the data and how it shapes their understanding.

As this doctoral study explored and appraised the educational approaches of NMP programmes, the professional background of the researcher undertaking the study would be of significance, given that the perspectives of a nurse prescriber would likely differ to that of a pharmacist prescriber or a AHP. However, I am purely a medical education researcher with no healthcare professional background, so the potential for understanding the data from the view of any specific group of prescriber was eliminated in the case of this doctoral study.

I have no prior involvement of teaching any healthcare professional group and this was the first research activity I had undertaken regarding health professions education, hence I had no pre-conceived ideas of the most effective or innovative educational approaches for prescribing education. This meant that analysing the perspectives and appraisals of both sets of participants could be conducted through a fresh perspective. Additionally, it meant that I could conduct the Documentary Analysis of Study One through a fresh perspective given that I would not have any biases in favour or against any prescribing guideline document, regardless of whether the document was compiled for medical or non-medical prescribers.

## Chapter Four: Documentary Analysis - Compiling a consensus of the core categories for good prescribing practice

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This Chapter is a Documentary Analysis of various national and international prescribing practice guidelines aimed at multiple prescribing backgrounds. It provides four core categories which prescribers must excel at, regardless of background and serves as a guide for prescribing education to the standard of prescriber it should produce. **This Chapter has been published in the Medical Teacher journal as:**

**Omer UN**, Veysey, M., Crampton, P. and Finn, G., 2020. What makes a model prescriber? A documentary analysis. *Medical Teacher*, pp.1-10.

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### 4.1 Rationalising the Study

The RPS Framework was compiled with the purpose of providing a common set of competencies for universal prescribing practice, however, the framework was compiled between the years 2012-2015 and since then, many of the guidelines used to inform the framework have undergone further updating. In addition, there is no mention of the use of any guidelines specific to general practice in informing the Framework, which would be a valuable addition due to prescribing being a major component of primary care services (Wilcock, 2020). Given the breadth of prescribers in practice worldwide today and the subsequent existence of various general prescribing practice guidelines, building an up-to-date consensus of the qualities of a model prescriber is critical.

To date, there has been a lack of studies attempting to inform good prescribing practice and generate this consensus (Tichelaar et al, 2016). Clinical guideline documents exist to improve the quality of patient care. They are proven to enhance the quality of clinical and treatment decisions made by clinicians, update their clinical practice habits and alert them to ineffective and potentially harmful practices (Woolf et al, 1999). This makes prescribing guideline documents the appropriate sources of data from which to derive the consensus of the qualities of a model prescriber. Therefore, the aim of this study was to identify UK and internationally based documents pertaining to guidance on general prescribing practice and analyse them to create a consensus of those core qualities which should be observed in a model prescriber and developed by prescribing education curricula.

## 4.2. Methods

### 4.2.1 Data Collection

As discussed in the methodology section, this study utilized a Documentary Analysis. Utilising a similar approach as Rich (2019) in collating competency frameworks for documentary analysis in an area of medical education, prescribing guidelines were retrieved through internet searches on Google, Google Scholar, PubMed and Web of Science. The search was conducted in the month of July 2019. As this study intended to include prescribing guideline documents compiled for both medical and non-medical prescribers, guidelines were included from countries listed by Cope et al (2016) that have incorporated any degree of non-medical prescribing within their healthcare system. However, due to the nuances of other languages and the technical competencies of translating, we excluded non-English language countries. Guidelines created for prescribers of all countries were also included, provided they were compiled in English. Terms entered into search engines included: “good prescribing” AND “prescribing practice” AND “prescribing guidelines”. As the study aimed to include guidelines from various countries, names of countries were also added to the search terms i.e “prescribing guidelines UK” or “prescribing practice Canada”.

For the core qualities of a theoretical ‘model’ to apply to all prescribing backgrounds, documents were included if they provided general guidance on their interpretation of ‘good prescribing practice’ and if the guidelines could be applied to all groups of medications. However, no restrictions were put in place regarding the year of guideline publication.

### 4.2.2. Data Analysis

Each guideline document was entered into the NVivo 12 (NVivo 12, 2018) software and reviewed through in-depth reading of each line, sentence and paragraph. Here, data were extracted and analysed by following the theoretical sampling process, where coding and analysis took place simultaneously and further code formation was guided by the emerging theory of what makes a model prescriber (Strauss and Corbin, 1990). Initial coding took place based on the guidance of Charmaz (2006), where sentences and phrases were coded if they were describing any activity pertaining to conducting or improving prescribing practice. Line-by-line coding ensured the remaining of openness towards the data in order to identify statements, instructions and specific guidance relating to prescribing. This was conducted

with a high level of detail and precision in order to distinguish words and lines of text which mentioned activity specific to the action of prescribing from those which were pertaining to instructions about the uses of the specific documents and overviews of sections and chapters.

Overall, 83 initial codes were clustered into ten axial codes. Upon completion of this process, these ten axial codes were further re-read, refined and clustered to create substantive categories. For example, the axial codes themed around the prescriber's understanding of diseases in their area of expertise was combined with the axial code of the prescriber having an adequate understanding of the overall properties and mechanisms of actions of the medications they prescribe in practice to create a substantive category pertaining to the prescriber demonstrating accurate and precise knowledge of both diseases and drugs they prescribe in practice. This category was further strengthened by clustering in the axial code of the prescriber being able to apply this knowledge to the individual patient. Finally, following creation of the substantive categories, all the concepts included in each of the categories were theoretically sorted.

I alone conducted all of the data collection and analysis. However, the initial coding list, the subsequent axial coding list and all further steps in the coding process were compiled and conducted through extensive discussion and consultation with my entire supervisory team.



### 4.3. Results

<b>UK-Based Prescribing Guidelines</b>		
<b>Name of Guideline Document</b>	<b>Organization</b>	<b>Date of Publication</b>
Ten Principles of Good Prescribing	British Pharmacological Society (BPS)	2012
Good Practice in Prescribing and Managing Medicines and Devices	General Medical Council (GMC)	2013 (latest edition)
The Quality of GP Prescribing	The King's Fund	2011
A Guide to Good Prescribing Practice for Prescribing Pharmacists in NHS Scotland	NHS Education for Scotland	2012
Guidelines for Good Prescribing in Primary Care	Lancashire Medicines Management Group	2016 (latest edition)
A Competency Framework for all Prescribers	Royal Pharmacological Society (RPS)	2016 (latest edition)
Selecting the Right Drug	InnovAit (Part of Royal College of GPs)	2013
Standards of Proficiency for Nurse and Midwife Prescribers	Nursing and Midwifery Council (NMC)	2006
Guidance on Prescribing	National Institute for Healthcare Excellence (NICE)	2012
<b>International-Based Prescribing Guidelines</b>		
Prescribing Drugs of Dependence in General Practice, Clinical Governance Framework, Benzodiazepines and opioids	Royal Australian College of GPs (RACGP)	2015
Statement on Good Prescribing Practice	Medical Council of New Zealand (MCNZ)	2016
Basic Principles of Prescribing	World Health Organisation (WHO)	2009
WHO Guide to Good Prescribing	World Health Organisation (WHO)	1994

Table 4 - List of documents analysed

Out of the 16 documents selected for the study, 13 were adequate to reach theoretical data saturation, where codes and concepts demonstrated constant overlap and no new concepts were emerging from the data. Nine documents were published in the UK, one was published in Australia, one was published in New Zealand and two were published through international collaboration. Despite the existence of small variations in perspectives within certain documents, this study reports the results in relation to commonalities in perspectives relating to prescribing practice.

Overall, data analysis of the guideline documents led to the finding of many fundamental qualities required in a high-level prescriber. These subsequently led to the formation of four core categories, where the model prescriber demonstrates excellence in practice:

- Knowledge, particularly in relation to disease conditions encountered and the drugs required to treat them;
- Safety, mainly of the patient, of self and following the protocols which ensure safety;
- Communication with both the patient and other healthcare professionals;
- Contemporary to ensure the constant improvement of prescribing practice.

### **4.3.1. The Knowledgeable Prescriber**

#### **4.3.1.1 Knowledge and Understanding of Conditions and Diseases**

For all conditions encountered in their area of practice, the model prescriber should have a comprehensive breadth of knowledge. This includes the pathophysiology and progression of the disease condition (RPS, 2016; De Vries et al, 1994). Knowledge of the pathophysiology and prognosis of disease will enable the prescriber to effectively deduce the likely site of action of the drug and subsequently, select the most appropriate drug to achieve the therapeutic objective (De Vries et al, 1994). Without knowledge of disease pathophysiology, the prescriber would merely be treating the patient's symptoms, which is only appropriate in a minority of cases (i.e palliative care) (Duerden et al, 2011). Furthermore, accurate knowledge of disease pathophysiology and prognosis provides the prescriber with an insight into the

likely duration of the prescribed treatment regimen (De Vries et al, 1994; Nursing and Midwifery Council, 2006).

#### 4.3.1.2 Knowledge and Understanding of Drugs, their Properties and Mechanisms of Action

The model prescriber should have a comprehensive understanding of the fundamental principles regarding all prescription drugs. This includes pharmacodynamics, pharmacokinetics, pharmacotherapeutics and the ADME (Absorption, Distribution, Metabolism and Excretion) process (NMC, 2006). The prescriber acknowledges that access to all information regarding the drugs they prescribe in practice is imperative, including possible side-effects, ADRs (Adverse Drug Reactions) and interactions (NMC 2006; Duerden et al, 2011). The prescriber will keep in view the individual patient's therapeutic window (patient's sensitivity to the drug's action) and plasma concentration-time-curve (patient body exposure to drug after administration). Certain factors (age, pregnancy) will create variations in the patients' pharmacodynamics or pharmacokinetics and subsequently, the prescriber recognises that these effect changes to the therapeutic window and plasma concentration-time-curve. The prescriber is well-informed about the factors potentially effecting these changes and understands the objective of always maintaining the plasma level of the drug within the therapeutic window. This should substantially influence the prescriber's thinking when selecting the most appropriate drug for the patient (De Vries et al, 1994)

The prescriber will address possible gaps in their knowledge in a timely and effective manner (De Vries et al, 1994). They will realise that in this context, rather than looking at drugs at an individual level, it is more beneficial to see them as groups of drugs (De Vries et al, 1994). It is easier to remember drugs as a group due to their similarities in pharmacodynamics and molecular structures. This will aid the prescriber in creating their own personal formulary. The prescriber's ability to create an individual personal formulary would help to demonstrate the breadth of their knowledge of particular drugs and will help to show their competency in keeping up-to-date with the latest evidence-based research (Avery and Gookey et al, 2013). Creating individual personal formularies has taught the prescriber to handle pharmacological concepts and data and the ability to distinguish between core pharmacological features of drugs (De Vries et al, 1994).

To establish an accurate diagnosis, the model prescriber can take a full patient history which involves a thorough medical history of the patient (NHS Scotland, 2014; RPS, 2016; General Medical Council, 2013; Royal Australian College of General Practitioners 2017; NMC, 2006;). The prescriber will use their comprehensive knowledge of drug properties to recognise the nature of previous ADRs which may have occurred in the patient and the properties of other drugs they may be taking, hence the possible interactions with the drug which could be prescribed (Davey, 2013; GMC, 2013; NMC, 2006; RPS, 2016; RACGP, 2017; Aronson, 2012).

Other than drugs, the prescriber will be knowledgeable on the vast array of non-pharmacological treatments (British National Formulary – National Institute for Health and Care Excellence, 2008; De Vries et al, 1994; Medical Council of New Zealand, 2016; NMC, 2006; RACGP, 2017; RPS, 2016; World Health Organisation; 2009). These include complementary medicinal products such as homeopathy, herbal remedies and vitamins (NMC, 2006). The prescriber will also know of certain foods with the characteristics of drugs. These are classed as borderline substances (Davey, 2013).

#### 4.3.1.3 Application of Knowledge and Understanding of Diseases and Drugs to Prescribe the most Optimal Treatment for Individual Patient

The model prescriber can combine a knowledge of disease with a knowledge of drugs to devise the most appropriate prescription for treating or preventing disease in the individual patient. The WHO Guide to Good Prescribing highlights the verification of drug suitability for an individual patient as 'the most important step' in the process of rational prescribing (Davey, 2013; De Vries et al, 1994; Duerden et al, 2011; RPS, 2016).

The most pertinent question the prescriber will ask themselves in practice is whether the prescription of a drug is needed at all. They prescribe only when a genuine need for clinical treatment arises (NHS Scotland, 2014; GMC, 2013; NMC, 2006; MCNZ, 2016). In many cases, the prescriber will recognise that a non-pharmacological treatment would be the appropriate first-line therapy (i.e. exercise for obese person) (De Vries et al, 1994; RACGP, 2017).

When the need for a pharmacological treatment is established, the prescriber will be aware of the range of individual patients they are likely to encounter in practice, particularly high-

risk patients. High-risk patients are those who are particularly vulnerable to significant harm and should be closely monitored and reviewed for continued appropriateness of treatment (Dreischulte and Guthrie, 2012). These patients include children, the elderly, pregnant women and those who are ambivalent about medication-taking (BNF NICE, 2008; Davey, 2013; De Vries et al, 1994; Duerden, 2011; NMC, 2006; RPS, 2016). Patients with multimorbidities and long-term impairments of certain organs are also considered by the prescriber as high-risk patients. They recognise that for some patients with multimorbidities, the burden of drugs is already excessive and adding to that list of drugs may lead to inappropriate polypharmacy (De Vries et al, 1994) and for acute illness patients, they take more stringent considerations such as alternate methods of administration (Duerden et al, 2011; De Vries et al, 1994). Furthermore, the prescriber will also take into account patient lifestyle when prescribing (i.e wary of prescribing sleep-inducing medications for patient who drives taxis for a living).

Once the prescriber has understood the conditions surrounding the individual patient, they will apply their knowledge of drugs to prescribe the patient with the optimal medication (NHS Scotland, 2014; GMC, 2013; RPS, 2016). They can compile inventories of possible treatments. It is possible that their inventory could include a wide-range of medicines, including unlicensed medicines. In such a scenario, the prescriber will be able to utilise their knowledge-base to fully justify that their use of the unlicensed medicine will adequately serve the patient's needs (NHS Scotland, 2014; GMC, 2013). When adding to their inventory, the prescriber will also take into account potential interactions the drugs could have with complementary medicines the patient is taking. This is especially important when dealing with high-risk patients, where pharmacodynamics and pharmacokinetics are impaired (De Vries et al, 1994). When prescribing for patients with mental disorders, they may add medicines with potential for misuse. They should be able to justify the reasons why the drug is necessary for the individual case (Davey, 2013).

#### 4.3.1.4 Knowledge of Cost-effective Prescribing

The model prescriber will also be knowledgeable regarding other factors when coming to the final prescription. One of these is being cost-effective when prescribing. The prescriber will acknowledge that for almost any clinical scenario, they are required to minimise cost. As a

result, the prescriber should be aware of generic prescribing, where the use of the non-proprietary title enables for the dispensing of any suitable drug for a particular patient rather than a specific brand of drug. Thus, when the prescriber is able to prescribe generically, they will be able to do so having developed their knowledge of numerous drugs within the same drug class. Cheaper alternatives to the appropriate drug can be prescribed (Avery et al, 2013; Davey, 2013; De Vries et al,1994; NMC, 2006; ).

The prescriber will be aware of considering the cost of overall treatment rather than the cost per unit of drug. They will also realise there may come situations where cost may be the only deciding factor between prescribing two appropriate treatments. Also, they will acknowledge scenarios where they choose to either treat a small number of patients with an expensive drug or a large number of patients with a satisfactory, but cheaper drug (De Vries et al, 1994).

#### **4.3.2 The Safe Prescriber**

##### **4.3.2.1 Ability to Prescribe the Patient with the Correct Amount of Medication According to their Need**

The model prescriber can accurately calculate the required dosage of medication (NMC, 2006; Davey, 2013; De Vries et al, 1994; WHO, 2009). They will afford attention towards the most basic of considerations, for example, avoiding decimal points as much as possible and using the correct units (RPS, 2016; Davey, 2013). When calculating dosages, the prescriber should always take into account possible factors such as patient weight and renal function and know how to effectively use dosage calculation tools wherever required (Davey, 2013; De Vries et al, 1994; MCNZ, 2016; NMC, 2006; RPS, 2016 ). They realise that maintaining relationship between dosage and frequency of administration is vital, as changing either of these without good justification can cause fluctuations in the curve and window and as a result, compromise patient safety (De Vries et al, 1994).

To provide the patient with the correct amount of prescription, the model prescriber will make themselves as well-informed as possible about the patient (BNF NICE, 2008; Davey, 2013; GMC, 2013). This includes drugs of dependence recognising when the patient is exhibiting 'drug-seeking' behaviour due to possible tolerance of certain dosages. In such circumstances, the prescriber will conduct further investigations along with a full assessment

of the patient to help calculate the correct dosage as providing a larger dosage could compromise patient safety (RACGP, 2017; MCNZ, 2016). For patients with co-morbidities, the prescriber will take into account other medications the patient is taking and in view of potential contraindications, realize that the average dosage for patients with no co-morbidities could be dangerous for this high-risk patient group (De Vries et al, 1994). For high-risk patients generally, the basic principle is that the minimum effective dosage should be prescribed based on the dosage amount required to affect target symptoms without causing ADRs (WHO, 2009).

When unsure of anything, the prescriber should refer to guidance provided by drug formularies such as the BNF (British National Formulary) on supplying and administering medicines (GMC, 2013; Davey, 2013; NICE, 2008). Along with avoiding under and overprescribing, the prescriber guards against drug wastage through following local anti-wastage procedures like promoting information campaigns raising public awareness about the costs of medicines to the NHS, particularly in situations where a patient exhibits clear signs of medication non-adherence (Duerden et al, 2011).

#### 4.3.2.2 Ability to Write Clear, Accurate Prescriptions

The model prescriber would have robustly developed their skills in prescription-writing to ensure all of their prescriptions are accurate, legal and legible. They will acknowledge that errors in the prescription writing process greatly enhance the chances of administration and dispensation errors. The prescriber should regularly refer to appropriate prescription-writing guidelines and templates and ensure their own prescriptions are in line with these (GMC, 2013; Davey, 2013; RACGP, 2017; NMC, 2006). Also, the prescriber would consider basic factors when writing prescriptions, such as legible handwriting and patient preference for dosage to be written as number of tablets rather than 'mg'. (De Vries et al, 1994; Davey, 2013).

#### 4.3.2.3 Regular Monitoring Effectiveness of Prescribed Medications

In achieving the therapeutic objective of a medication, the model prescriber will understand the importance of regularly reviewing a prescribed treatment (Avery et al, 2013; Davey, 2013;

De Vries et al, 1994; Duerden et al, 2011; GMC, 2013; RPS, 2016; WHO, 2009). It allows them to evaluate how effectively the treatment is working, detect potential ADRs and decide whether other medicines are required for the patient or if the current treatment needs reducing or stopping. This is especially vital for high risk patients or if medicines have common/serious side effects and susceptible to abuse. Regular review also enables the prescriber to confirm if medication adherence is present and if the treatment is achieving the desired objective (BNF NICE, 2008; GMC, 2013; Davey, 2013). The prescriber should also be aware of the concept of passive monitoring, where they explain to the patient about tracking their own progress in the treatment process, whether they feel the prescribed treatment is working or if they are experiencing side-effects (De Vries et al, 1994).

If the treatment is not showing signs of success, the prescriber will recognise the possible factors behind treatment failure and strives to remedy the situation. This includes evaluating the original diagnosis, checking whether medication adherence was established and if the monitoring process was correct. If they detect deficiencies in any of these processes, they will work to amend them and if necessary, repeat the entire process and switch medication or dosage (De Vries et al, 1994).

The prescriber should recognise that providing patients with medicines for longer than needed could be dangerous for their health and should only be provided as long as the treatment is needed, effective and not causing serious side-effects. Thus, they should realise when the point to deprescribe a medication is reached. However, they should also recognise that all drugs cannot be discontinued immediately due to potential harm to patient health and need to be 'tailed off' gradually through continuous decrease in dosage (NICE, 2008; De Vries et al, 1994) For patients requiring lifelong treatment, the prescriber ensures that secure procedures are in place for repeat prescriptions, which include reviewing at regular intervals such as annually or bi-annually and suitable arrangements for monitoring the patient are in place (Davey, 2013; GMC, 2013; NHS Scotland, 2014).

#### 4.3.2.4 Awareness of Types of Prescribing Errors

The model prescriber will understand that prescribing errors are one of the gravest threats to patient health in medical practice (NHS Scotland, 2014; GMC, 2013; Davey, 2013; RACGP,



2017; RPS, 2016; Avery et al, 2013; NMC, 2006; MCNZ, 2016; Aronson, 2012; De Vries et al, 1994). As a result, they will be well-informed about the type, nature and causes of prescribing errors which can occur in practice, including under- or overdose, omitted transcription and poor handwriting. The prescriber is also aware of the causes of prescribing errors such as lapses in concentration and inadequate checking of prescriptions (Velo and Minuz, 2009). The prescriber will be able to recognise potential errors and work to prevent them from occurring before they harm the patient. The prescriber should also be able to detect potential errors in colleagues' prescribing practice and intervene before the error can be committed. (Davey, 2013; GMC, 2013).

#### 4.3.2.5 Compliance with Guidelines and Regulations

The model prescriber will be aware of and strive to comply with various relevant guidelines and protocols which guide them towards good prescribing practice. They will recognise that although numerous, the guidelines teach the same principles of safe prescribing and offer insight into the actions the prescriber should take in the emergence of various scenarios encountered in practice ( i.e. 'fringe' situations such as prescribing for people who cannot consent or where individual medicines have their own specific protocol). Certain guidelines inform the prescriber about their legal obligations in practice and emphasise the importance of the prescriber being able to convincingly rationalise their clinical decisions should they encounter a scenario where they must operate outside guidelines and protocols (RPS, 2016; NHS Scotland, 2014; GMC, 2013; Davey, 2013; RACGP, 2017; Avery et al, 2013; NMC, 2006; MCNZ, 2016; Aronson, 2012; De Vries et al, 1994).

The prescriber's practice will be underpinned by ensuring the safety of the patient and the prescriber scrutinizes all decisions they make by assessing its level of safety. They should make it their duty to inform the patient of all matters pertaining to safety (i.e. keeping medicines out of the reach of children) and in the event of any safety incidents (i.e. missing prescription pads), they should be able to report it to the appropriate organisation, including the pharmacy supplying the medications and if needed, even the police (GMC, 2013). The prescriber should be cautious regarding administrative safety, take responsibility for prescription forms, keeping them safe and never leaving them unattended, setting up appropriate security

measures, such as destroying forms no longer needed but keeping appropriate records intact (RPS, 2016; GMC, 2013; NHS Scotland, 2014; MCNZ, 2016).

#### 4.3.2.6 Maintaining Accountability

Although patient safety is seen as the top priority in prescribing practice, the model prescriber will also be mindful of their own safety in practice. To achieve this, the prescriber should always maintain professionalism, where they understand that they're professionally accountable for their decisions. If a patient refuses to act upon their advice, the prescriber should fully inform the patient of the potential implications of refusing the treatment (RACGP, 2017). Whatever occurs in the consultation, the prescriber must always strive to maintain patient confidentiality (RPS, 2016; NHS Scotland, 2014; GMC, 2013; Davey, 2013; RACGP, 2017; Avery et al, 2013; NMC, 2006; MCNZ, 2016; Aronson, 2012; De Vries et al, 1994).

The prescriber will recognise the importance of legal requirements in prescribing and keeping accurate, legible and contemporaneous records to their safety in practice. The prescriber will add to these records following each consultation to track the progress of a certain treatment and its effect upon the patient. In these records, the prescriber will include patient information, the initial prescription made with justification, relevant clinical findings as a result of medical history and ongoing treatment, advice provided to patient, decisions made and agreed between themselves and patient, information provided to the patient and who is compiling the records. The records should be detailed enough for another practitioner or prescriber to be well informed about the patient case should they have to assume patient care (RPS, 2016; NHS Scotland, 2014, GMC, 2013; RACGP, 2017; NMC, 2006; MCNZ, 2016).

### 4.3.3 Good Communication

#### 4.3.3.1 Building Rapport and Trust with Patient

The model prescriber will make every effort to ensure they have robust communication with the patient based on a foundation of rapport and trust. This is highly significant towards achievement of the therapeutic objective. The prescriber should work in partnership with the patient and their carers throughout the entirety of the prescribing decision-making process and ensures all consultations occur in a private and 'non-threatening environment'. They will

acknowledge that a failure to do this could have negative implications towards medication adherence ((Avery et al, 2013; Davey, 2013; De Vries et al, 1994; GMC, 2013; NHS Scotland, 2014; RPS, 2016)

In consultation with the patient, the prescriber will endeavor to keep the patient as well-informed as possible throughout all stages of the treatment. They should inform them about the benefits and risks of a medicine, possible side-effects, when and how to take the medicine, likely duration of prescribed treatment and arrangements regarding follow-up and review (Avery et al, 2013; BNF NICE, 2008; Davey, 2013; De Vries et al, 1994; Duerden et al, 2011; GMC, 2013; MCNZ, 2016; NHS Scotland, 2014; NMC, 2006; RACGP, 2017; RPS, 2016; WHO, 2009). However, the prescriber should ensure the patient has understood the information given to them and encourages them to ask questions. If the patient requires further information, the prescriber will refer them to other information resources such as information leaflets according to their condition as they are useful in supplementing patient-prescriber interaction (GMC, 2013; Aronson, 2013; Duerden et al, 2011; RPS, 2016). The prescriber should ensure the patient knows that all components of their discussion and resulting decisions are being recorded to ensure their safety and avoid potential errors (NHS, 2014; Davey et al, 2013; GMC, 2006).

The prescriber would highlight obtaining patient consent and maintaining confidentiality to be the bedrock of good communication between them and the patient (MCNZ, 2016; NHS Scotland, 2014; RACGP, 2017). The obtaining of consent in an appropriate way reflects healthy and successful communication between patient and prescriber, especially when consent is obtained throughout multiple stages of the treatment (such as monitoring and follow-up). The prescriber should also recognise consent to be a reflection of patient autonomy, where patient has received adequate information enabling them to make an informed decision of whether to accept the medication being prescribed to them (RACGP, 2017). The prescriber can also obtain consent in various patient circumstances, including where the patient's first language is different to that of the country where prescription is administered and where patient lacks the capacity to consent (GMC, 2006).

At each stage of the consultation, the prescriber will endeavor to communicate with the patient through openness, trust and dialogue. They should respect the patient's feelings and

viewpoints and make efforts to understand their perspectives, encouraging them to express their feelings and themselves acting as a sympathetic listener. They treat the patient as a partner towards reaching the therapeutic objective and take their suggestions seriously. However, if they believe a certain medication to be in the best interest of the patient, they will attempt to convince them through valid arguments. When a patient is either refusing or demanding to take a certain treatment, the prescriber will recognise that it could be a negotiation tactic from the patient rather than a final stance and as a result, realises that an improvement in communication may be warranted (Duerden, 2011; De Vries et al, 1994).

#### 4.3.3.2 Effective Co-ordination with Colleagues and Other Healthcare Professionals

The model prescriber should understand that prescribing never occurs in isolation and also make this clear to the patient. Effective communication with colleagues and other healthcare professionals is an indispensable component of good prescribing practice (Davey, 2013; GMC, 2013; MCNZ, 2016; NHS Scotland, 2014; NMC, 2006; RPS, 2016). This includes acknowledging the roles of other members of the prescribing team such as pharmacists, who advise patients about their medications and carry out medicine reviews and supplementary prescribers with whom they must share access to the clinical patient record (Davey, 2013; De Vries et al, 1994; GMC, 2013).

The prescriber will recognise scenarios where they must transfer patient care. For this, high-skilled correspondence is needed between themselves and other healthcare professionals, including transferring information pertaining to patient condition, current and previous medicine use and ADRs experienced (if relevant). They should realise that this makes keeping accurate records even more important in prescribing practice (Davey, 2013; RACGP, 2017).

The prescriber will also acknowledge the benefits of being part of a multidisciplinary team (MDT) (RACGP, 2017). It provides them with the opportunity to create relationships with other prescribers and healthcare professionals based on understanding, trust and respect for one another. They can gain deeper insights into the roles of one another through open discussions, discuss the strengths and weaknesses of their individual prescribing practice and critically appraise one another's prescribing habits. These can take place during formal and

informal professional support sessions (Duerden et al, 2011; GMC, 2013; RACGP, 2017; RPS, 2016;).

#### **4.3.4 The Contemporary Prescriber**

##### **4.3.4.1 Ability to Further Develop themselves to Enhance Prescribing Practice (Continuing Professional Development)**

For the purposes and requirements of Continuing Professional Development (CPD), the model prescriber will always be motivated towards seeking to enhance their knowledge and skills to improve their prescribing practice. They must acknowledge that all knowledge pertaining to disease pathophysiology and drug action has been established through research-based evidence. Research is constantly evolving so the prescriber realises that it is in their best interest to conduct all prescribing-based activity using reliable and up-to-date research-based evidence (Aronson, 2012; Avery et al, 2013; Davey, 2013; De Vries et al, 1994; Duerden et al, 2011; GMC, 2013; MCNZ, 2016; NHS Scotland, 2014; NMC, 2006; RACGP, 2017; RPS, 2016). As a result, the prescriber will be aware of a plethora of information resources. These include drug compendia, formularies, bulletins and journals. They will gain reliable and accurate information from these regarding drugs and management of clinical conditions and as a result, gain familiarity in relation to a wider range of clinical scenarios. In addition, the prescriber should also register for electronic email updates from national and international organisations informing them of latest research relating to their field, further enhancing their knowledge-base (GMC, 2013; Davey, 2013; Aronson, 2012; Duerden et al, 2011; De Vries et al, 1994). The prescriber should also be aware of non-literature-based information resources, such as conversation with other healthcare professionals and opinion leaders (Aronson, 2012; Davey, 2013; De Vries et al, 1994; Duerden et al, 2011; GMC, 2013; RPS, 2016). They will gain feedback regarding current prescribing practice and a different perspective regarding treating the conditions they currently treat. They should also attend educational outreach visits and visit drug information centres to gain valuable feedback on prescribing performance.

The prescriber won't merely collate information resources but will also be able to critically appraise the information resources mentioned above to ensure good quality (Aronson et al, 2013; Davey, 2013; De Vries et al, 1994; NMC, 2006; RPS, 2016). They will acknowledge that

a poor quality and unreliable information resource could be detrimental to their prescribing practice (RPS, 2016; NMC, 2006). To help develop their critical thinking skills, one of the steps the prescriber would take is to attend sessions such as critical appraisal skills workshops and learn how to distinguish between good quality and poor-quality medical journals. In addition, they could also learn to be wary of commercial information sources regarding drugs and assessing these sources for quality of references they use. Moreover, the prescriber will also evaluate through conversations with opinion leaders and mentorship schemes with more experienced prescribing practitioners whether they are being advised based on critically-appraised research evidence or based on pharmaceutical industry influence (De Vries et al, 1994).

The prescriber will acknowledge that the consultation doesn't always occur face-to-face physically and subsequently, will make themselves familiar of circumstances where telephone or online mediums could be used (NHS Scotland, 2014). They should closely follow protocols pertaining to these mediums, such as ensuring that the patient isn't in need of physical examination (MCNZ, 2016). The prescriber will also learn how to use electronic, online or other systems which could lead to an improvement in the prescribing process (Davey, 2013; De Vries et al, 1994; GMC, 2013; MCNZ; 2016; NHS Scotland, 2014; NMC, 2006; RPS, 2016). They will realise decision support prescribing systems are becoming more common in practice. These will provide the prescriber with local formulary choices and advice pertaining to latest cost-saving, safety and effectiveness issues relating to medicines. The prescriber should effectively be able to work with such systems (Davey, 2013; De Vries et al, 1994; Duerden et al, 2011; RPS, 2016).

They will know that to develop their prescribing practice, regular reflection is required. They will acknowledge they are solely responsible for their learning and continuing professional development (CPD). To achieve this, the prescriber must involve themselves in activities such as clinical auditing, peer-review and continuing medical education. This enables the improvement of their prescribing skills, knowledge and expertise (MCNZ, 2016).

## 4.4. Discussion

All prescribing guideline documents, whether UK-based or international, guide the prescriber towards the same core prescribing qualities, being knowledgeable, safe, communicative and contemporary in their practice. The most comprehensive information towards the practice of a model prescriber were provided by guidelines compiled for doctors practicing in primary care (Davey, 2013; Duerden et al, 2011). Although prescribers from a wide range of professional backgrounds exist in practice today, given that prescribing in primary care is holistic in nature (Avery et al, 2013). As a result, the guidance provided in documents specific to primary care demonstrated applicability to prescribers of all backgrounds and experience and subsequently, they provide value that could inform curricula aimed at training prescribers from a non-medical background.

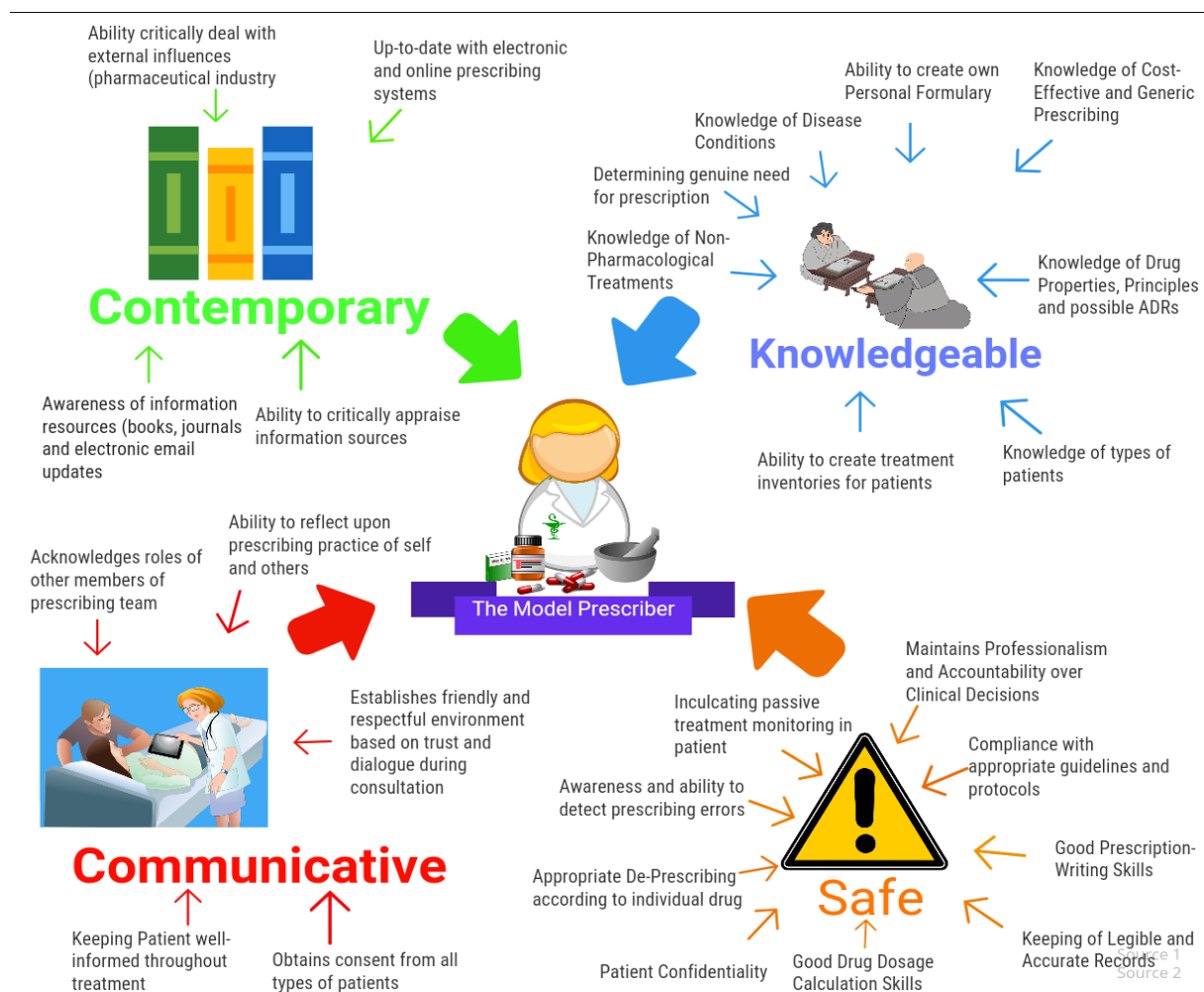


Figure 2 – Core Qualities of a Model Prescriber

Guideline documents originating from Australia and New Zealand were able to expand upon certain concepts mentioned in the UK documents, for example, recognising 'drug-seeking' behavior in patients and how obtaining consent from the patient in prescribing a medicine, although a legal requirement, highlights healthy patient-prescriber communication (MCNZ, 2016; RACGP, 2017). Furthermore, the WHO Guide to Good Prescribing is a guideline document produced through a collaboration of researchers across Europe, making it a potential prescribing guideline for prescribers worldwide (De Vries et al, 1994). It also furthers concepts seen in other UK guideline documents through providing comprehensive guidance on various issues pertaining to prescribing using clinical scenarios. The effectiveness of the WHO Guide to Good Prescribing on improving the prescribing practices of medical students and junior doctors has already been widely researched and proven since its compilation in 1994 (Ross and Loke, 2009; Kamarudin et al, 2013; Scordo, 2014). Although the WHO Guide to Good Prescribing was published at a time when the concept of independent prescribing by pharmacists, nurses and AHPs had not been developed, the guidelines compiled in this document demonstrate applications in a wide-range of clinical areas such as cardiovascular, haematological, gastrointestinal, and respiratory conditions and diabetes. The principles of prescribing practice for all of these areas are similar (De Vries et al, 1994), hence the guidance provided by the WHO Guide to Good Prescribing is valuable in informing prescribing education curricula for prescribers of all areas of expertise and why it was a vital addition to our analysis.

Although the lack of a consensus on good prescribing practice is highlighted in the literature (Chapman, 2006; Tichelaar et al, 2016), the areas where prescribing errors occur are well-defined (Dornan et al, 2009). Many of the prescribing errors which occur in practice are related to errors around the categories included in knowledge and safety, such as lack of scientific and clinical knowledge-base; inaccurate dosage calculations, poor prescription-writing and poor monitoring of prescribed treatment (Aronson, 2006; Dornan et al, 2009). Moreover, some studies found safety to be the issue regarding why most patients preferred to see a doctor for a prescription rather than an NMP (Stewart et al, 2011). In addition, errors in communication such as heavy reliance on pharmacists to identify errors and miscommunication with patients have also been recorded (Dornan et al, 2009; Ryan et al,



2014; Woit et al, 2020). These are three of the four core categories derived from our documentary analysis and the concepts relating to each category align robustly with the type of errors seen (Dornan et al, 2009; Ryan et al, 2014; Woit et al, 2020). For example, the prescriber being well-informed on drug interactions and the ADME process will lead to the reduction of knowledge-based errors reported in literature including the lack of knowledge of drug interactions and routes of administration (Dornan et al, 2009; Ryan et al, 2014; Woit et al, 2020).

The fourth category of being a contemporary prescriber is where the least amount of errors reported (Dornan et al, 2009; Ryan et al, 2014). However, despite the formation of four separate categories in this analysis, certain concepts demonstrate strong interdependence. For example, the prescriber's gaining of more knowledge pertaining to disease and drugs will lead to be more contemporary as prescribers and constant development and updating of skills such as calculating dosages and writing accurate and legible prescriptions will enable them to become safer prescribers.

To date, UK NMP programmes base their curricula on the RPS Framework for all Prescribers (RPS, 2016). Although the results of our documentary analysis overlapped with many of the recommendations of this framework (i.e safe prescribing, professional prescribing, monitoring and prescribing as part of a team), certain concepts in our results are missing in the RPS Framework, such as the nature of 'de-prescribing' being immediate or gradual according to the individual drug, the need of the prescriber compiling their own personal formulary and viewing drugs as groups based on molecular and pharmacodynamical similarities rather than as individuals. In addition, other documents used in the analysis are able to expand upon concepts introduced by the RPS Framework, for example, the RPS Framework states that prescribers should be knowledgeable of the pathophysiology of conditions they will be prescribing for and the WHO Guide to Good Prescribing further rationalizes this by stating that pathophysiological knowledge of diseases will enable the prescriber to deduce likely site of drug action and aid in selecting the most appropriate drug. As a result, NMP programmes can look at the areas where this study has expanded upon concepts introduced by the RPS Framework and as a result, gain a deeper understanding as to how and to what extent their programmes are implementing these prescribing

competencies within their curriculum. We hope, therefore, NMP programmes can use the results of this paper as an additional tool alongside the RPS Framework for informing and evaluating their curriculum.

The study was not without certain limitations. The aim was to include documents from a range of English-speaking countries mentioned by Cope et al (2016). However, despite multiple searches according to our search strategy outlined in the 'Methods' section, we only retrieved a small number of relevant documents from countries other than the UK and as a result, nine out of 13 documents were UK-based. In addition, although the importance of the WHO Guide to Good Prescribing has been realised both in this study and indeed to prescribing education at large (De Vries et al, 1994), the guideline was published twenty-five years ago and questions regarding its continued effectiveness today could potentially be raised. The study also intended to include documents around dental prescribing, but unexpectedly, no appropriate documents could be found.

Given that this study has derived these categories from guidelines of multiple professional prescribing backgrounds and countries of origin, the results can be used internationally by institutions offering medical programmes for curriculum evaluation. In addition, institutions of countries which have already begun implementing independent non-medical prescribing within their healthcare systems can use this study to conduct gap analyses of programmes designed to train and produce non-medical prescribers. On the other hand, institutions of countries which have future plans to introduce independent non-medical prescribing into their healthcare systems can, according to the degree it would be permitted by their national frameworks and protocols, design new prescribing programmes and curricula around the categories compiled from this study, especially given that the categories of our results have been informed in part by the WHO Guide to Good Prescribing, a guideline document designed for prescribers worldwide. Moreover, the results of this study can be used by researchers to investigate to what extent a deviation from these core categories in prescribing practice can lead to prescribing errors and to what severity.

## **4.5. Conclusions**

Regardless of whether the prescriber is a doctor, pharmacist, nurse or AHP by background, as mentioned by the RPS Framework, the qualities of a model prescriber are universal. No matter the area of expertise or whether the prescriber covers all areas of prescribing, if they strive to be a model prescriber, they must demonstrate excellence in all four categories of prescribing. The scope of their knowledge base may differ according to the area of expertise, however, the same principles pertaining to safety, communication and staying contemporary should apply for all levels of prescribers in all locations. This can be verified if multiple countries attempt to use this study and investigate its applicability to their own prescribing curricula. Additionally, future work on publishing dental prescribing practice guidelines must be conducted, given that our study was unable to locate any relevant guidelines related to dental prescribing.

## **Chapter Five: Educating Non-Medical Prescribers in the UK – Perspectives of Programme Leads**

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This Chapter presents the results of the semi-structured interviews with programme leads of NMP programmes. This includes the programme overview, taught content, assessment approaches, appraisals of the programme and perspectives on how the programme can be enhanced for future cohorts.

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### **5.1 Introduction**

For many years, the authority to prescribe medications has been exclusively with doctors and dentists, but since the start of the century, there has been a worldwide expansion of this authority to other healthcare professionals (Cope et al, 2016). In the United States, it has been extended to pharmacists and nurses, however, the extent to which this authority is expanded varies according to the rules of the US state (SSNHS, 2015). Countries including Australia, New Zealand and Canada have also extended prescribing authority to pharmacists and nurses to a limited level, but these countries have imposed legal restrictions upon the type of medications nurses are able to prescribe and currently, pharmacist prescribing is not permitted in European countries (Cope et al, 2016). Only Ireland, the Netherlands and the UK have granted nurse prescribers the right to prescribe any medicine within their specialty (Maier, 2019).

Globally, the UK is the only country which has currently granted extensive prescribing authority to various healthcare professionals. These include pharmacists, nurses and many other healthcare professionals such as chiropodists, opticians, podiatrist, physiotherapists, paramedics and radiographers. Prescribers other than pharmacists and nurses are known as Allied Healthcare Professionals (AHPs) and together, prescribers who are pharmacists, nurses or AHPs are referred to as non-medical prescribers (NMPs) (Omer et al, 2020).

To gain the authority to prescribe in the UK, a prospective NMP is required to undertake a non-medical prescribing programme. To enrol onto a non-medical prescribing programme, a

healthcare professional is required to have a minimum period of post-registration experience (Cope et al, 2016). These requirements are outlined in Table One.

The programme consists of a minimum of 26 days of in-class taught content and is supplemented with 12 days of practical experience referred to as the Period of Learning in Practice (PLP). The PLP must take place under the supervision of a medical practitioner who was initially referred to as a Designated Medical Practitioner (DMP) but is now known as a Practice Assessor (PA). After a change in policy, the PA can be any healthcare professional who can prescribe instead of only having to be a doctor, providing they have a minimum of three years' clinical experience in the field of practice relevant to the prescribing student (Cope et al, 2016; NMC, 2018; HCPC, 2012).

One of the major reasons for the introduction of non-medical prescribing was to provide patients with quicker access to medications and decrease the heavy workload from medical prescribers (Watterson et al, 2009), a contributing factor towards one of the biggest dilemmas within medicine and healthcare, prescription errors and the dangers they bring to patient safety (Velo and Minuz, 2009). Although NMP programmes have been running since 2004, there is still a lack of information regarding the educational approaches adopted by these programmes. This was highlighted in recent systematic reviews conducted by Kamarudin et al (2013) and Omer and Danopoulos et al (2020). These reviews investigated the educational and assessment approaches used within prescribing curricula, which included traditional, didactic lectures, cross-mentoring between healthcare professionals, self-directed and online learning, peer-based and interprofessional learning, small group learning and simulation and role-play. Assessment approaches mainly included written prescribing examinations and Objective Structured Clinical Examinations (OSCEs). However, both reviews indicated that upon literature searches, there were only limited studies relating to NMP programmes and the vast majority were based upon prescribing education approaches in medical schools. Given that there is a growing consensus of NMPs being safe and effective in clinical practice (Latter et al, 2012; Baqir et al, 2015), it is imperative to gain a comprehensive insight into the content taught within NMP programmes and the educational tools and methods used to teach this content.

Therefore, the aim of this study was to explore the objectives of the NMP programme, the content taught, the educational approaches utilised to educate NMPs and how the programme prepared them for prescribing practice.

## **5.2 Methods**

### **5.2.1 Study Design**

This study utilised a qualitative research design due to the focus on obtaining information, perceptions and appraisals of NMP programme leads on the educational approaches of NMP programmes across the UK.

### **5.2.2 Participants and Settings**

This study utilised a purposive sampling strategy. Across the UK, 71 NMP programmes were identified which were either pharmacist-specific, nurse and AHP specific or accepted all three groups of healthcare professionals onto the programme. The programme leads of each NMP programme were identified through visiting the university website pertaining to the programmes.

An invitation to participate in the research study was sent out to each programme lead through email. Programme leads who did not respond within 14 days were sent a reminder email, after which they were excluded upon a lack of response following another 14-day period. Overall, 16 programme leads responded and agreed to participate in the study. These were spread geographically across the UK, with representation of NMP programmes from the South of England, the Midlands, the North of England, Scotland and Northern Ireland. The first two participants served as pilot interviewees, however, the robustness of both interviews enabled them to be included in the overall data set.

### **5.2.3 Ethical requirements**

Ethical approval was granted by the HYMS Ethics Committee under their file number 1924. Prior to the interview, all participants were sent a research information sheet and an informed consent form which they were required to sign to document their agreement to participate and send back to the research team.

#### 5.2.4 Data Collection

Data collection took place from March to May 2020. Semi-structured in-depth interviews were conducted through the online Zoom platform due to the constraints of the COVID-19 pandemic. The interviews provided the participants to openly provide comprehensive information around the content taught on the programme, the educational approaches used to teach the content. Additionally, the interviews allowed participants to freely reflect upon and appraise the educational approaches of the programme and provide their thoughts upon how the programme could be modified and enhanced for future cohorts. All interviews were recorded through using an audio recorder with the consent of the participant.

The interviews were conducted using guiding questions (Appendix 10) and the list of questions had been informed using the Documentary Analysis conducted in Chapter Four on the core categories of a model prescriber, a separate study conducted as part of this research project.

All interviews varied from lasting 30-70 minutes and were transcribed verbatim by the researcher. I examined all of the transcripts through line-by-line checking for congruence between recordings and transcripts.

#### 5.2.5 Data Analysis

The interview transcripts were analysed through a hybrid inductive and deductive thematic analysis approach as recommended by Fereday and Muir-Cochrane (2006), as explained in Chapter Four of the thesis. This approach allowed for coding pertaining to taught content and educational approaches to be conducted deductively, mapped to the Documentary Analysis, whilst on the other hand, codes pertaining to the appraisals of programme leads and their perspectives on how the programme could be modified to be identified inductively from the data itself. This approach was deemed more suitable given the flexibility afforded by thematic analysis in contrast to Grounded Theory and Phenomenology.

Interview transcripts were read and coded both openly and in-depth by me alone. Transcripts were independently coded line-by-line by the researcher and once the coding process was complete, I held in-depth discussions with the supervisory team on the categories of the codes and how they could be clustered into appropriate themes. No new categories were

identified after 12 interviews, with the final four transcripts serving to ensure data saturation (Clarke and Braun, 2014). Final themes were agreed by me and the supervisory team. Memos compiled during the reading and open coding phase of data analysis were preserved to help inform the discussion section of the study.

## **5.3. Results**

### **5.3.1 Introduction to the Programme**

#### 5.3.1.1 Basic Overview

As stated in the literature, all programmes still operate in the same overarching manner, although minor changes have been implemented since the inception of the programmes:

*“Right yes, so the 26 days taught days, it doesn't have to be 26 taught days, it is the equivalent of 26 taught days, and then 12 days in practice which equates to 78 hours or 90 hours in clinical practice, but now the DMP has actually now changed, so the DMP, depending on which validating body will either be now known as a practice educator, a practice assessor with a practice supervisor or a DDP, so that's changed recently as well, certainly the standards for nursing and midwifery have changed, like I say, 2018 and the standards before were 2006. The other aspect as well, which has undergone significant changes, are some of the entry requirements”.* (P2 Interview)

#### 5.3.1.2 Gaining Entry onto NMP Programme

Despite the length and overall layout of the programme being uniform across all prescribing programmes, some programmes differed in the criteria which qualified a prospective non-medical prescriber to gain entry onto the programme. Many programme directors indicated that a good level of pre-requisite knowledge and skills, with one programme director implying these knowledge and skills to be wide ranging:

*“We do, now there's an expectation increasingly that students who come into non-medical prescribing courses have a level of holistic assessment skills, using like systematic approaches and tools, and what we found is that there's a huge variation and range in what those pre-existing skills are, we actually ask them before they come in at the point of application and*



*their manager has to sign off that they do have skills in that area that are integral to their own role. (P11 Interview).*

Some programme directors have, however, been more specific in the types of knowledge and skills they expect their students to bring before enrolling onto the programme:

*“So, as part of the application process, nursing and midwifery students have to demonstrate that they have the physical assessment and diagnostic skills already, that’s either portending a proper module, or that it’s been confirmed by their manager...so the nurses have already got that, the pharmacists have to do it as part of their programme...”. (P13 Interview).*

Programme directors have also highlighted a distinction in the entry requirements of different healthcare professionals. One participant talked specifically about the requirements for pharmacist prescribers:

*“...it’s a requirement from the module that they are working in an area of specialist practice, where they are regularly assessed or diagnose the patients and they’ve been doing that for at least a year, and the GPhC say that it’s at least 2 years for a pharmacist, so they come into it knowing the consultation theory they’ve gone beyond consultation theory to the point where they apply it and can understand it, so that’s a baseline they need to come in with”. (P12 Interview).*

One participant put more emphasis on the type of individuals they are looking for to enrol on the programme and the way in which they communicate:

*“I guess one of the things is that that the students all need to be in the right role and the right kind of person, so you’d hope, and certainly we’ve not had any issues with communication around students not being successful, but I guess if you weren’t a good communicator, it would be very difficult for you to get into a role to become a prescriber, you know, the healthcare board are very much in charge in who gets on the programme, so it’s very unlikely that you wouldn’t...”. (P10 Interview).*

One of the participants implied that their programme evaluates the knowledge and skills a student brings onto the programme to understand the areas where the students display limitations and areas where the programme can specifically help them in their prescribing practice:

*“...if the nurse is working in gynae and obs, they are quite well-versed in what they do, they just need a little support in terms of their pharmacology, in terms of clinical skills, they’re almost there, but the only difference I think is to ensure that they understand and recognise the responsibility that comes with independent prescribing...”*. (P14 Interview).

Additionally, the participant mentions that their programme conducts a “learning needs analysis” to further elicit areas of strengths and weaknesses of the students before formally starting the programme:

*“What we do is we do a learning needs assessment on our induction day to get our understanding of what do they want to achieve from the programme, what are their weaknesses, what are their strengths, how do they want to approach this. So this information goes to their respective personal tutors, so during the first tutor meeting, we focus on areas where they are weak in”*. (P14 Interview)

#### 5.3.1.3 Managing Requirements of Regulatory Bodies

Given the various healthcare professionals represented in NMP programmes, each background has a regulatory body, making these regulatory bodies key stakeholders in regard to how the programme is delivered, as highlighted below:

*“...so we have quite close relationships with the prescribing leads in each health board and meet with them quite regularly, basically because they drive the need for non-medical prescribing, so we kind of have to involve in accordance with what their needs are as a service, so we work very closely with them”*. (P11 Interview).

As NMP programmes work very closely with these regulatory bodies, they strive to base their teaching content and learning outcomes based on the requirements stipulated by these regulatory bodies to gain their accreditation and subsequent reaccreditation:

*“...because we run a multidisciplinary programme, for pharmacists, they follow RPS, which is GPhC guidelines, and what we do is we match the GPhC learning outcomes with the RPS Framework, so that they are aware of both. The same thing we do for nursing and for physiotherapists for HCPC as well, that for whatever their professional learning outcomes are, we match them against our RPS learning outcomes, so that they are aware of both, and then we use all three different learning outcomes, for the nurses, their portfolio needs to focus on*

*the nursing-specific learning outcomes, the NMC learning outcomes, for the podiatrists, physiotherapists and all other healthcare professionals, it goes with HCPC learning outcomes”*. (P14 Interview).

Due to this, one of the participants mentioned that having to design their learning objectives according to the requirements of multiple regulatory bodies was at times a challenging prospect:

*“...individually it’s hard enough. But trying to meet the requirements of all three of them, as you are aware, going through looking at different guidelines, they all have slightly different takes on things and a different emphasis. So, meeting the challenges of each one and yet still maintaining something that’s generic can be applied to everybody really is a challenge”* (P12 Interview).

### **5.3.2 The Roles of Prescribing Educators on the Programme**

#### **5.3.2.1 Wide-ranging role and experience of Programme Director**

Across the majority of NMP programmes, the Programme Director (PD) serves as the principal education provider with a myriad of responsibilities. Along with teaching the content on the programme, PDs have mentioned being responsible for curriculum planning and development, liaising with regulatory bodies for accreditation, quality control, programme timetabling and admissions onto the programme itself:

*“I’m involved in the teaching and the timetabling of the programme, so I deliver some of the sessions, but I’m probably more now involved in the actual programme leadership of it than the actual face-to-face teaching, so curriculum development, curriculum delivery, timetabling, quality control and evaluation, and admissions.”* (P11 Interview).

*“So I oversee the whole module and the programme, but I’m also involved in running the delivery on another programme, so I design a lot of the teaching, we use our online learning platform canvas, I design all of that, co-ordinate all the teaching that we do, oversee the whole process, marking, moderation and all the usual things that go with a module lead. I’m a direct liaison with... so it’s NMC students, HCPC and also the GPhC, so liaising with those organisations to make sure that everyone’s happy”*. (P12 Interview)

Some PDs related their responsibilities on the programme to their specific professional background:

*“So, I’m responsible for the therapeutics side of it, so I’m a clinical pharmacologist and I’m involved with trying to instil the principles of safe prescribing through the filter of therapeutics and what is needed to know to make safe prescribing decisions in a generic way, which is quite difficult with the diverse groups that we get, it can be challenging, but it’s good”.* (P15 Interview)

*“I’ve done work as a first responder for East Midlands Ambulance Service, and I also have had a local and national role at the Rugby Football Union, doing pitch side trauma management around the community rugby setting, so I’m a pharmacist by background, that’s been my sort of route into that”.* (P9 Interview).

Some PDs brought a range of holistic experience onto the programme through working and practicing prescribing in many different settings, both in clinical and non-clinical settings:

*“I was a chief pharmacist for so many years, I did practice in most settings, I’m also a qualified prescriber myself, I’ve practiced in prisons, in hospitals, in GP surgeries, so I do have quite a lot of experience”.* (P3 Interview)

*“...and I was hired to teach long-term conditions, because my background obviously included lots of diabetes, ongoing management, heart disease, respiratory etc”.* (P7 Interview).

Although most PDs were prescribers by background, this was not a mandatory requirement to take on the PD role for the course, illustrated by some examples of prescribing courses where the PD was successful in the role despite not being a prescriber themselves:

*“So, I’ve been course director for prescribing for nurses on my programme since 2003, I’m not a prescriber myself, but I was asked to take on this programme”.* (P6 Interview)

*“My role is that I took over the programme in about 2016, I’m not a non-medical prescriber myself, but a lot of my clinical work has been through”.* (P9 Interview).

### 5.3.2.2 Multiple Educators on a Programme

All NMP programmes employed a multidisciplinary approach to teaching on the programme with educators coming from different professional backgrounds. This was to ensure the programme could adequately deliver teaching to students from all areas of expertise:

*“OK, we’re very fortunate that we have a multidisciplinary teaching team, so we have a clinical pharmacist on our teaching team who works part time in clinical practice and part-time with us in education, and she delivers all of the pharmacological content of the course. We also have a few clinicians who are consultants and AMPs that come in and teach specific areas of expertise, so we have a pharmacologist who comes and teaches prescribing in mental health for example, we have like care of the older adults clinicians that come in...”*. (P11 Interview)

*“I think that’s one of the strengths of the way that we deliver our programme, so within our programme team, there’s seven of us, so we have neonatal midwife specialists, we have a community district nurse. We have a wound specialist, my background is acute renal, there’s an acute ITU person, there’s a professor of mental health and a paediatric advanced practitioner, so we’ve got all the specialities, which is why we feel we can really take on all of these students”*. (P10 Interview).

One participant highlighted how one of their roles as the PD was ensuring the effective and robust working between these multiple educators on the programme:

*“The administrative responsibility for the programme is within the School of Pharmacy, but we do have a nursing lead who is from the School of Nursing and a physiotherapist who is from the School of Sports Sciences, so we all work together, and my responsibility is to make sure that the pharmacy lead and the nursing lead and the physiotherapy lead, they are all working together”*. (P14 Interview).

### 5.3.2.3 External Educators

Along with PDs and the multidisciplinary team responsible for the delivery of teaching on the NMP programme, use is also made of external speakers and educators who come and deliver specific teaching sessions around their area of specialism:

*“Researcher: OK, so you sometimes get external speakers to give these lectures?”*

*Participant: Yeah, so at the moment, we have a specialist midwife who is on the programme with us and one of her areas of specialism is around homeopathic and herbal medications with the pregnant lady". (P1 Interview)*

*"We've actually got someone coming in this afternoon from NHS digital, so they'll talk about the use of packed data. We also have a consultant microbiologist coming from one of the hospital trusts to talk about antibiotic stewardship as well. So we look at it from a number of different angles, and again, even down to is a prescription even needed as well". (P1 Interview)*

*"I know, we set our eyes in another big area, so I think again, we have wonderful experts who are fantastic, supportive and a consultant psychiatrist who speaks and experts in substance abuse". (P7 Interview)*

One participant explains the advantages of bringing external speakers and educators on the programme, highlighting how their programme organise an event near the end of the programme where external healthcare professionals from varying backgrounds are invited to "showcase" their roles and expertise in clinical practice to enable prescribing students to further their learning and gain a deeper insight into how their prescribing practice should be from healthcare professionals practicing in their specific area of specialism:

*"...we also have what we call a showcase, so the last day in class, we invite people from practice to come in and evidence some of the decisions that they've done as a prescriber, we've had a whole variety of things from children's hospice, nurse consultants to pain team to the lead for prescribing from a local health trust who does a session around audit having done a literature review about audit processes, so we kind of cover a whole load of things. It's about developing their knowledge of how people use this role, just very much focused on an interdisciplinary approach". (P10 Interview)*

Overall, one participant rationalised the importance of the individual educator and the way in which they are able to deliver teaching to the students:

*"I'd say that the most valuable thing is the session run by somebody that actually really knows what they're talking about, which sounds a bit obvious, but actually because I work in a university of undergraduates and postgraduates, postgraduates aren't overall the easiest*

*bunch, in terms of that they've been there to a certain extent and got the t-shirt to it to a certain extent". (P5 Interview)*

The participant implies the expertise of the prescribing educator is of even more importance in an NMP programme setting due to it being a postgraduate course with students working in clinical practice, some for a number of years.

### **5.3.3 Taught Content**

This section will present the type of content which is taught in NMP programmes and the teaching approaches which are generally used. These will be mapped according to the core categories of a high-level prescriber as illustrated in Chapter Four.

#### **5.3.3.1 Knowledge**

5.3.3.1.1 Pharmacology, Pharmacokinetics, Pharmacodynamics and Administration, Distribution, Metabolism and Excretion (ADME)

Across most NMP programmes, given the breadth of healthcare professionals who enrol to become independent prescribers, the teaching of knowledge concepts around prescribing are kept generic as illustrated by these participants below:

*"Yeah, so well, I very much make the point in the introductory session that this is a generic course and that every session is delivered in a general sense, so there's nothing that hones in on a particular specialty, so it's very broad". (P4 Interview)*

*"So we do need to teach a generic approach to pharmacology, and that's what we try to aim for... and I think there's the blurring of lines between generic pharmacology and when do you get into the specialist knowledge". (P12 Interview)*

As outlined in Chapter Four, a high-level prescriber is required to have a comprehensive understanding of the fundamental principles around the principles of pharmacology, pharmacokinetics, pharmacodynamics and ADME of the drugs they prescribe in clinical practice. NMP programmes aim to teach these principles to students around as many drug groups as possible and for treating a range of conditions:

*"We've got certain teaching sessions, it's probably two or three sessions specifically describing and teaching about pharmacokinetics and pharmacodynamics". (P16 Interview)*

*“We then get them to look at the pharmacology, so pharmacokinetics, pharmacodynamics and we will look at that, but then we will also look at specifics around that, so it might be prescribing in certain groups, such as pregnancy, so we would term it as prescribing across the lifespan, so that might be with children and in the elderly, so looking at things like impaired renal function, hepatic function, all that sort of things as well”*. (P1 Interview)

*“...so pathophysiology, we teach pharmacology applied to prescribing. So, we take a systems approach to our pharmacology, which would involve everything from secondary messengers to the liver to liver metabolism to renal excretion to the ADME process and pharmacodynamics. That would need to be applied to a student's underpinning area of clinical practice and by that then their pathophysiology of the diseases that they're encountering”*. (P2 Interview)

Although a robust level of prior knowledge on pharmacological concepts are expected from students of a pharmacy background, the majority of students enrolling onto NMP programmes are nurses, midwives and AHPs, therefore, the programme assumes that students from these healthcare backgrounds will not have an adequate level of pharmacological knowledge so they aim to teach them this knowledge from base:

*“I love teaching pharmacology, so I teach them all basic pharmacology from the ground-up. I don't make any assumptions about their prior pharmacology expertise”*. (P3 Interview)

There is also an acknowledgement that learning of pharmacological concepts is challenging overall for students:

*“The students find the pharmacology stuff the hardest, so they may have had some pharmacology knowledge but they find it very overwhelming”*. (P10 Interview)

*“I do think as I say, the pharmacology stuff is hard, the students find it very difficult, but they know that they need to know it and I think there's not many ways that you can really teach that apart from in a lecture theatre with recorded lecture for them to relisten to, because we've got classes of sixty, so it would be quite difficult”*. (P10 Interview)

*“I think the pharmacology is really good, but I think most of the comments that we get about the pharmacology that it's too complex, but I think you've got to provide it at that level, and*



*then they can take from it what they need to, you can't sort of do the easy bit of pharmacology, you've got to do it properly, but they're the ones that we would do". (P13 Interview)*

In terms of teaching approaches around pharmacological concepts, NMP programmes use more traditional methods such as didactic lectures to teach these, but they also supplement these traditional lectures with learning approaches such as online self-directed learning, group discussions and case-study learning:

*"...so they have quite a lot of face-to-face lectures, almost a whole day on pharmacokinetics, face-to-face teaching, almost a whole day on pharmacodynamics face-to-face, and then they have some online learning to do as well". (P5 Interview)*

*"Yeah, this is normally taught in class in a traditional setting, we set a day with our students, bearing in mind it's sort of half online and half in classroom, and we spend a day doing the principles of pharmacotherapeutics and setting out the boundary really, which for some is relatively new material". (P15 Interview)*

*"We use a composite of face-to-face and distance learning, a lot of group work, case studies, we base it very much on the interactions with the lecturer". (P6 Interview)*

*"So we do need to teach a generic approach to pharmacology, and that's what we try to aim for, so we have a mixed approach to that, which includes lectures, online self-directed learning through canvas using scenarios". (P12 Interview)*

One participant explained that the teaching of pharmacological principles on the programme are merely a foundation which students must use to further develop and enhance their knowledge individually during their time completing their mandatory hours in clinical practice:

*"What our pharmacologist does is cover all the basic principles of pharmacokinetics and dynamics, but it's really then down to the student whether 90 hours of practice learning for them to develop the knowledge that they need to put evidence in their written work and they're examined around the specialist knowledge that they need". (P10 Interview)*

#### 5.3.3.1.2 Creating a Personal Formulary

Chapter Four discussed the ability of a prescriber to create their own personal formulary highlights the breadth of their knowledge of drugs and allows them to demonstrate the competency of updating their knowledge in the latest evidence-based research. Some NMP programmes base much of their early teaching around the basics of creating a small personal formulary:

*“So first off, they build a personal formulary of five drugs, so obviously, it will expand in future, and they thoroughly learn those five drugs, they have to do a related prescription, all the pharmacology behind it, all the clinical decision-making within this log”. (P5 Interview)*

The participant here implies that students building a small, initial personal formulary allows them to focus on these limited number of drugs and it allows them to study these drugs in depth. This is further supported by other participants below:

*“...right from the beginning, in every week, I say that go away, look for this, look for some drugs that were actually receptors and you’re going to be prescribing, get to know how these drugs work, look up some of their characteristics, dig deeper, and we have six days of self-directed learning, which is mainly in the second trimester, the focus is spending time learning more about the medications that they will prescribe”. (P12 Interview)*

*“...finally there’s prescribing in evidence-based medicine, and then we do follow NICE guidelines, in fact, the students are asked to develop their own personal formulary, within that formulary, they’ll pick their drugs, their dosage forms, the strengths and the prescribing as per NICE guidelines”. (P14 Interview)*

Furthermore, other participants explain how students creating their own personal formulary stimulates them to consider why they are choosing certain drugs and is effective practice for them to justify their prescribing decisions in practice:

*“...we do encourage the students to think about it, but sometimes we encourage them to articulate that onto paper, but also to put a narrative alongside that to say how they got to that decision, “this is my chosen formulary, this is how I have come to that by looking at this and looking at the certain elements”, so whether that’s having discussions with other non-medical prescribers, the DMP, looking at their specialist area, but also being mindful that, that*

*formulary might not necessarily be the fixed one forever, looking very much at how much I start to then develop in a safe and competent way". (P1 Interview)*

*"With their formulary, I get them to choose up to 12 drugs that they know they are going to prescribe and write a full drug monograph, and then I say to them at the end: "Now off you go, you've got an L-plate on your back... in your pocket that you know and love and you know, familiar with, you've written essays about them, but now, if you want to add any drugs to your personal formulary, I expect you to write a drug monograph to get to know the nitty gritty of the pharmacology of that drug, you know, ADRs, its interactions, how does it go through the liver, how does it go through the kidney, what impact will age have, you know". (P3 Interview)*

#### 5.3.3.1.3 Drug Prescription as a Last Resort, Deprescribing and Non-Pharmacological Treatments

In Chapter Four, it is discussed that a high-level prescriber only prescribes a medication when a genuine need for it arises and they must scrutinise whether a drug prescription is needed for a given patient scenario. This is a concept which is strongly underpinned throughout NMP programmes:

*"We do emphasise that quite a lot, that it's actually about actually making a prescribing decision, rather than necessarily prescribing something, so a prescribing decision can be not to prescribe". (P5 Interview)*

*"...we do reiterate that the decision not to prescribe is often the preferable decision and that prescribing should not be the first port of call". (P11 Interview)*

Some programme leads stated that in the clinical decision-making process, a prescriber is taught to evaluate whether the patient is suffering from a medical condition or from an issue which wouldn't need a medication:

*"Well certainly, the holistic assessment, and looking in that session at the fact that... so, ICE, ideas, consent and expectations, really looking at what somebody has come for, whether this is actually a social issue, whether it's a psychological issue, all of that kind of broad approach is what we are asking them to consider". (P7 Interview)*

NMP programmes also highlight how prescribers need to be wary of situations where they could be pressured into issuing a prescription and how they need to carefully negotiate such pressures:

*“...we all know that sometimes clinicians almost get bullied sometimes into writing a prescriptions, so we do have those sorts of conversations and we have a session focusing on health promotion, and that's also a learning outcome within the case studies that they have to write. So in other words, you know ways of avoiding medication therapy in the future”. (P4 Interview)*

*“...we look at the pressure to prescribe”. (P1 Interview)*

One participant stated how their programme is, in fact, based on the concept of avoiding drug prescribing as far as possible:

*“We talk about the fact that it is a prescribing course, but actually what we're talking about is don't prescribe where you can't, a prescribing exercise, a prescribing diet in etc, social prescribing... they actually put in a session about social prescribing and we have sessions on deprescribing, medicines management, reviews, those types of things, so actually, the emphasis is not on prescribing, it's on not prescribing, if that makes sense”. (P8 Interview)*

This is further supported by participants laying much emphasis upon prescribers being clear upon the importance of deprescribing:

*“I would say that the focus sometimes within our programme is probably less on the non-pharmacological, but actually more about deprescribing. We spend a lot of time on polypharmacy and a lot of time on deprescribing, which I think is probably more prevalent and adjust with what is going on within our local areas”. (P10 Interview)*

*“Well I mean, that's right from the very beginning and what my opening line is that this really should be a deprescribing module”. (P12 Interview)*

Along with determining a genuine need for prescribing of a medication and knowing where to deprescribe, NMP programmes are also mindful of the importance of high-level prescribers requiring knowledge on a vast array of non-pharmacological treatments

*“With our new programme that we are developing, we will be looking at social prescribing, so we’ve got someone in to talk to the group around social prescribing and again, non-pharmacological interventions. We also look at homeopathic and herbal medication as well, so looking at something slightly outside of what would be seen as normal pharmaceuticals”.* (P1 Interview)

*“We also expect them to demonstrate that they’ve taken wider prescribing expertise and duty of care into account in their clinical decision-making, so that would be your non-pharmacological approaches, so it’s not just about the drug, but it’s about what else you did to ensure that you were treating non-pharmacologically and that they’re aware of the understanding of that, so it is embedded in our course content”.* (P11 Interview)

Some NMP programmes require their students to reflect in-depth around the types of non-pharmacological treatments they should consider for certain situations:

*“In the last part of our course, the students are supposed to write a reflection, and when they write this reflection based on their clinical experience with their DMPs, one of the competencies is their ability to use non-pharmacological treatment options and to make a fair decision, even if that is to not prescribe. So we do teach them this both in our case-based learning sessions, the importance of non-pharmacological treatments options, especially for long-term disease conditions, importance of sustaining and integrating pharmacological with non-pharmacological treatments, because a lot of people who are on long-term medications but not adhere to their treatment or to their prescription medicines, so we do teach to look at patient more holistically”.* (P14 Interview)

Again, like deprescribing, it is taught to students that the decision to provide a medication or consider a non-pharmacological treatment should be based on the background and the lifestyle of the patient:

*“So, does the patient even see the disease as being a disease or is it just the consequences of lifestyle choice or ageing. So, if you take a patient who has had six kids and they’ve got stress in context, is that a medical condition, or is that just the fact that they’ve had kids. Do we need to medicalise that?”.* (P9 Interview)

#### 5.3.3.1.4 Cost-effective Prescribing

Generic and subsequent cost-effective prescribing is afforded much attention across prescribing practice guidelines and as a result, NMP programmes find it incumbent to teach their students concepts around cost-effective prescribing, however, it is implied that it is taught to the extent required by guidelines:

*"...we do bang on... well it's probably because it's one of my little irritancys really, but we do talk about cost-effectiveness, because that is part of the competency framework. So really, anything within that wheel is included, but we very much talk about... and the supply chain and all of those sorts of things and really try to encourage patients to buy anything that is accessible over the counter rather than demanding a prescription. So yeah, we very much do have a conversation on that". (P4 Interview)*

*"NICE has a big section on cost-effectiveness as well, so in terms of rational prescribing, we ask students to think about cost of the medicine as well, because people who usually come from hospital backgrounds, they are quite aware of the term cost-effectiveness, and they don't consider cost first of all, rather than before thinking of anything else, but the students who come from community pharmacist backgrounds, they usually struggle to understand the concept, but ultimately they get there". (P14 Interview)*

In some programmes, rather than concepts around cost-effective prescribing being actively taught, it is merely discussed in class and later, students are asked to think about cost-effectiveness as a consideration when completing their portfolios around justifying prescribing decisions:

*"Yeah, we also... part of the assignment, it's kind of meeting competencies through the writing of portfolios, and within the portfolios, the students are encouraged to take cost-effectiveness as a part of consideration, and we definitely discuss it. We talk about prescribing generic names, we talk about different kinds of options and cost. Also for individuals, so you have to consider the cost for individuals if the person is able to pay for prescription". (P16 Interview)*

*"I think that you'll find most courses will cover that, and again that's about deprescribing, that's about looking at guidelines, that's why we follow guidelines, and if you want to differ outside those guidelines, what your case needs to be for doing that, because guidelines are*

*there because they've chosen the most cost-effective drug in that area. So we would then say OK, well if you're not going to use that drug, why are you not going to use that?"*. (P8 Interview)

One programme emphasises that cost-effective prescribing is important for healthcare bodies such as the NHS:

*"That's another good question, I think the main sort of angle we take from that in terms of... yes things need to be cost-effective. There's nothing more inefficient than prescribing things that don't get taken, because we haven't properly assessed and properly collaborated with the patient first, so included in the course, there's a lot of stuff around service user involvement, so we have service user session and service user input in programme meetings and why the course was originally defined"*. (P5 Interview)

### 5.3.3.2 Prescribing Safety

#### 5.3.3.2.1 Drug Calculations

In Chapter Four, it was discussed how a high-level prescriber must be able to accurately calculate drug dosages. Many participants highlighted how drug dosage calculations are an integral part of the taught content on the programme:

*"For the pharmaceutical calculations to... we do have one-to-one sessions, all the study days in module one will have a pharmaceutical calculations day at the end"*. (P14 Interview)

*"What we do with that is we teach, we have a lead lecture, and then a self-directed work booklet on dose calculation and numerical ability"*. (P2 Interview)

*"So, as I mentioned earlier, the drug calculation, well we have teaching, and a lot of the students are actually doing a lot of practice of calculations throughout the module"*. (P16 Interview)

Although many programmes teach numeracy skills on their programme, there is an overall expectation that students enrol onto the programme with a satisfactory level of numeracy skills, particularly by regulatory bodies:

*"NHS trusts will stipulate that students, before they come onto the programme, will have undertaken some numeracy as well, so a lot of trusts do that"*. (P1 Interview)

*“Well, all students coming on the programme should be deemed numerate by their supporting organisations”*. (P2 Interview)

Despite the expectation of some level of competency in numerical skills, some participants mentioned the availability of drug calculation tutors on the programme for those students who felt they lacked confidence in their numerical skills:

*“The calculations sits on its own really separate entity, so they do the calculations session, it's not mandatory, some of them come in and they're fine with numeracy, no problem, but we do have a calculations tutor, a numeracy teacher in our team”*. (P4 Interview)

*“...one-to-one sessions can be arranged with the personal tutors”*. (P14 Interview)

#### 5.3.3.2.2 Prescription-writing

A high-level prescriber must attain robust prescription-writing skills, ensuring accuracy and legibility in their written prescriptions (Omer et al, 2020). Teaching of prescription-writing is an area where a range of learning approaches can be seen throughout NMP programmes. Many programmes approach teaching prescription-writing as a part of the legal requirements of prescribing:

*“OK so, we teach prescription-writing, we teach the legal requirements for prescribing, we teach legal requirements of writing a prescription”*. (P2 Interview)

*“...so they obviously do in-house sessions on the legalities of prescribing, which includes what legally goes and what type of prescription for controlled drugs, regular drugs for children and the different requirements for the various types of prescriptions that we write, and they do the legalities and then they do the practical sessions on prescription-writing as well, with FP10s, with hospital forms, with e-prescribing as well, we try to give them samples that they do any class exercise with that”*. (P15 Interview)

*“We do a whole session on prescription-writing, we repeat it again with a controlled drug session, because obviously that's different, and what we hammer home is it's a safe and legal prescription, not just a legal prescription”*. (P8 Interview)

Some participants provided an overview of what occurs in sessions where prescription-writing is taught:



*“OK, so breaking that up, in accurate prescription-writing, they have to provide five prescriptions with their prescribing log that are absolutely spot, no mistakes, otherwise it would be an automatic refer, obviously prior to doing that, they have one of our associate lecturers, who is a pharmacist and spends an awful amount of time looking at prescriptions that they're, obviously not writing, they're not prescribing as such, but they do a lot of prescription-writing practice to check that's just so”. (P5 Interview)*

*“We also have particular sessions on prescription-writing, so we have one for the acute sector and one for the primary care sector, so we have medicines reconciliation session that's delivered, talks about prescription writing in the hospital and then we also have a community one that talks about the 10 points of safe prescribing”. (P11 Interview)*

*“There's other sources I get them to read around a little bit. Then we go into the session, we do some basic: “these are the guidelines”, and then I just set them a series of case-studies for them to consider writing a correct prescription for. We tend to do it in twos, bounce off each other, and then a whole class discussion on “what did you get?”. (P3 Interview)*

Participants have also indicated that prescription-writing skills are further developed and honed during their time in clinical practice:

*“Yes, so they'll be critiquing prescribing that they've seen, reflecting on that during their 90 hours in practice that tends to be where we cover that”. (P9 Interview)*

Relating to prescription-writing, students are encouraged to look at templates from specific guidelines to ensure that their written prescriptions are in-line with these templates. NMP programmes instruct their students to use the British National Formulary at the main point of reference:

*“So the ways that those are taught, we do have a prescription-writing workshop, and again that's a whole day session, and it's a combination of pre-session reading, it's really the BNF to be honest with you, the best guidance is actually at the front of the BNF, tells you exactly how to write a prescription”. (P3 Interview)*

*“Yeah, it's always evolving isn't it? And yeah, of course so is the prescription-writing guide at the front of the BNF anyway, so we tend to use that as a resource for our students”. (P4 Interview)*

Many participants highlighted that written prescriptions are one of the major features of the student portfolio worked on by the students throughout the programme:

*“Yes, this would be in the portfolios, but we also do a formative process and they need to kind of... now we do them online, so obviously we ask them to upload it, normally kind of in the classroom we sometimes just ask them to send it to us and we just give them feedback on that. Each of them will have to have a written prescription and in one of the portfolio, they have to have a management plan, prescribing management plan, which is fundamental to prescribing, so will have both elements, so writing prescriptions, and also working with a management plan”. (P16 Interview)*

*“Now prescription-writing, as part of the portfolio, they actually have to submit four handwritten prescriptions according to the BNF guidelines, and those are counter-signed by their practice assessor, it’s just an exercise, it doesn’t ensure anything really, and of course rarely will people handwrite these days, usually it’s all going to be through online systems”. (P7 Interview)*

*“Yes, so prescription-writing, yes, a lot of prescriptions have to be handed in as part of their portfolio and a range of prescriptions as well, so at least one FP10 and some electronics, depending on what they use in their clinical area, and they get lots of support with that”. (P5 Interview)*

*“And the things that they write in that workshop, they use as evidence for their portfolio, they scan them into their portfolio as well, so it all goes off as evidence”. (P3 Interview)*

#### 5.3.3.2.3 Monitoring Effectiveness of Treatment

In Chapter Four, it was illustrated how one of the most vital areas of prescribing is being able to monitor and review a prescribed treatment. Overall, NMP programmes afford a high degree of attention towards teaching prescribers the importance of treatment monitoring:

*“Yeah, so that monitoring. That comes... monitoring and safety netting. Safety netting is a big part of what we teach, again, based on our experiences of pharmacy practice”. (P9 Interview)*

*“Researcher: So, also because it's about monitoring treatment as a big part of safety, so how are they taught to keep track of a certain treatment? Because you have passive monitoring*

*and active monitoring, so one is about telling the patient how to keep track of their own treatment*

*Participant: So some of that is safety netting, so they're obviously taught that within the consultation, and some of that will be assessed within their practice area as well, so some of that is more the generic principles that we would teach them about that, and some of that is around the communication, so that when we explain about the use of leaflets and maybe about the recall as well from certain patients and we get them to bring in examples they gain from practice and talk about maybe what good practice is and what maybe not good practice is as well". (P1 Interview)*

The participant above implies that the level at which a prescriber must learn treatment monitoring can depend upon their area of practice. This is something supported further by other participants:

*"It's quite difficult for some of them, because of the type of roles that they do, if they work in A&E for example, they're not going to be able to monitor the patient". (P13 Interview)*

*"Yeah, so I guess that's within the course, but I guess that's probably more heavily emphasised within the person's role, so if you see somebody in A&E, you might be in a very different position than someone who works in a osteoporosis clinic who is monitoring somebody over a long period of time. So, some of those key principles within the RPS competencies will be varied depending on the role that person is doing, and that's really down to the person in practice to help them develop their knowledge, and they're the ones who sign to say that they meet that RPS competency". (P10 Interview)*

However, one participant highlighted that even if a prescriber's area of practice doesn't require them to be regularly monitoring and reviewing treatments, they still need to attain this skill to a high level, albeit to pass one of their assessments:

*"...in their case study where they've identified a particular patient and they go through that journey of prescribing with them, that is one of the things that they're taught and is reiterate that you must consider follow-up and review, even if you are only seeing them in an A&E department and you're never likely to see them again, you still have to signpost them and safety net and ensure that the correct information is given". (P11 Interview)*

Another participant also mentioned that the importance of teaching drug monitoring is enhanced given that most prescribing is conducted for long-term conditions, making the awareness of adverse drug reactions even more pertinent:

*“Majority of the prescribing occurs for long-term conditions, monitoring is key... together with evidence-based medicine, we do teach them about adverse drug reactions reporting... and what is their role as independent prescribers and ensuring safe and effective prescribing”*. (P14 Interview)

A participant explained how treatment monitoring on their programme is taught through likening a patient’s journey through the clinical process to an “algorithm”:

*“...they have to produce a prescribing algorithm for patients within their scope of practice... so the algorithm is like a patient journey through their clinic, and they would have to put in there, so is there any monitoring that needs to be done as part of the initial diagnosis, so if we take hypertension again, you know, you would do things like looking at the albumin creatine ratio and endoscopy, ECG and liver function, all of those things would be done. So that comes into their algorithm, they actually have to express how that’s going to be monitored”*. (P9 Interview)

#### 5.3.3.2.4 Awareness of Prescribing Errors

Along with learning to prescribe safely and effectively, it is incumbent that prescribers have knowledge of the types of errors which can occur in practice. Awareness of possible prescribing errors is an area of discussion throughout NMP programmes:

*“Well, we talk about like the reporting errors, I guess we talk about the double-checking, we’re talking about... there is this double layer of checking, the one person’s prescribing while someone else is administrating and it has to be checked”*. (P16 Interview)

Some of these discussions are based around the Swiss Cheese Model. This is the concept of likening organisational defences against errors to slices of cheese, with holes in the slices representing weaknesses in the system (Reason, 2000). This concept enables the facilitating of discussions around how and why certain prescribing errors can occur:

*“When we’re looking at prescribing errors as well, we do have a session on prescribing errors, medication errors and so we look at things such as the Swiss Cheese Model, we look at things*

*around why do errors occur, we look at the iceberg as well and reported errors and we also get them to bring in their own examples from practice, and often you'll get them, because it's quite a safe environment, they also bring in things that have happened perhaps and then they can talk about them as well". (P1 Interview)*

*"We also have sessions on safety and where things can go wrong and... one of the models talked about is the Swiss Cheese Model, where things can all line up together, I think part of it as well is... the risk is mediated to a much better extent I think with non-medical prescribing compared to say prescribing in doctors, in that, we are very clear that they should only be prescribing within their scope of practice". (P5 Interview)*

The statement above implies that due to NMP prescribing being specific to the prescribers' area of practice, it is easier to recognise prescribing errors due to the limited scope of medications prescribed as compared to General Practice.

#### 5.3.3.2.5 Compliance with Guidelines and Regulations

To prescribe at the highest level, a prescriber must adhere to relevant guidelines and protocols within their practice. Regarding NMP programmes, the main guidelines they use and instruct students to follow are the RPS Framework for all prescribers and NICE guidelines along with local formularies:

*"Well obviously SIGN and NICE guidelines, so national guidance for a particular condition for particular drugs or for a particular treatment aspects, they're encouraged to be familiar with them, I have already mentioned local formularies and protocols and treatment pathways, almost all areas will have them. Obviously, the RPS Framework is the main one and that it does underpin all of their competencies". (P11 Interview)*

Additionally, prescribers are asked to follow the guidelines issued by the governing bodies of their own professional backgrounds:

*"Well, their own governing body guidelines, the HCPC and the NMC both have their own standards of prescribing, so we use those initially at the beginning of the course and direct both groups of registrants to those". (P4 Interview)*

*"Again, because we run a multidisciplinary programme, for pharmacists, they follow RPS, which is GPhC guidelines, and what we do is we match the GPhC learning outcomes with the*

*RPS Framework, so that they are aware of both. The same thing we do for nursing and for physiotherapists for HCPC as well, that for whatever their professional learning outcomes are, we match them against our RPS learning outcomes, so that they are aware of both, and then we use all three different learning outcomes, for the nurses, their portfolio needs to focus on the nursing-specific learning outcomes, the NMC learning outcomes, for the podiatrists, physiotherapists and all other healthcare professionals, it goes with HCPC learning outcomes".* (P14 Interview)

As mentioned above, given the all-encompassing nature of the RPS Competency Framework, guidelines from the background-specific organisations are being mapped to the RPS Framework when NMP programmes compile their learning outcomes. Additionally, some programmes are also asking students to look at GMC guidelines given that it covers a wide range of prescribing backgrounds:

*"Certainly, we make sure that they understand the GMC guidelines as well, because we think it's important they understand what other professions' guidance on medicines is".* (P11 Interview)

Although NMP programmes guide students on which guidelines they should be using, they are also instructed to apply them to their specific area of practice and be selective on which guidelines are best suited to their scope:

*"We always refer them to clinical guidelines for specific conditions, so if they work in this area, they know what to look for and they know how to kind of find the information, because again, I always... the part of teaching is, they need to be up-to-date for the rest of their prescribing career, they need to be aware how to find the guidelines, and they need to be able to use this clinical guidelines for their prescribing in the future".* (P16 Interview)

*"...for example if you're working in paediatrics and neonatal, there's a lot of off-label prescribing, so just being aware of that and how to make as safe, evidence-based decisions as possible and then you talk about things like NICE Guidance and formularies and in their case studies. It really encourages them to be critical thinkers. So what we want is practitioners on our course that are actually at such a level that they're not completely flummoxed by that, that they can take a step back and look at all these sources of different information and make a safe decision".* (P5 Interview)

However, NMP programmes do acknowledge that there may be scenarios where prescribers must work outside of the guidelines and they instruct students that should the need arise, they must be prepared to fully justify their rationale behind working in contrary to guidelines recommendations:

*“...and they also are versed on justifying the rationale for their decision-making if they go off formulary or if they go off local protocol and how they would justify that when it’s OK to do that and what the procedures are, so they’re kind of taught about all of that”*. (P11 Interview)

#### 5.3.3.2.6 Professionalism and Accountability

The teaching of concepts of professionalism and accountability are heavily featured throughout most programmes, with specific session dedicated to discussing relevant issues around these concepts:

*“Yeah, well we have a whole session that covers professional and legal frameworks supporting prescribing, so a lot of those types of things would be covered in that, so that’s when we look at sort of ethics, when we look at prescribing legislation and that kind of thing. We also add governance and wider governance structures to support safe prescribing”*. (P11 Interview)

One participant mentioned that although there is an expectation that students already have knowledge of ethical and professional procedures, sessions on professionalism and accountability are still required to refresh their knowledge of these concepts:

*“...they are already registered on a professional regulatory body, but we still do incorporate that within the course, so we do actually deliver a particular session on professionalism and accountability, where we talk about those very things, we talk about upholding your code of conduct, ethics, maintaining confidentiality, the importance of documentation and keeping it up-to-date, but also sort of things like the duty of candour and how to admit that you’ve made a mistake and how to apologise if you’ve made a mistake, just all that type of thing as well”*. (P11 Interview)

On the other hand, there was one example of a programme which did not teach specific sessions on professionalism as it believed that their programme was in the right to assume students enrolling upon the programme came with prior knowledge of concepts around professionalism:

*“So we don't deliver specific sessions on those topics, because they're already ingrained in these professionals, and I don't think it's wrong to assume that to be the case”*. (P4 Interview)

The importance of teaching professionalism and accountability is emphasised further by another participant who stated that they may not have experienced situations where they would need to show certain types of professionalism in their specific practice:

*“Because the students come from different backgrounds, so even they have been taught these things, they may not have experienced that in their practice. But again, as I have mentioned earlier, we have role-plays, we have ethics, consent, breaking bad news, discussing cases in front of family members, we have all those role plays, assimilated role plays that happen”*. (P14 Interview)

One of the major features of professionalism is around consent and capacity. Participants made it clear that this is an area which is covered in sessions around professionalism:

*“Yeah, we actually got a lecture on consent and capacity, and so within that, we might look at people such as ... Competency and Fraser Guidelines, we look at that, we look at in terms of context of mental health as well, we look at how you might develop that relationship with the parent and the child and the issues around consent and capacity. We also have them bringing examples in from practice, so that's quite interesting. We also get them to look at legal and ethical as well within that as well, and very much again about the frameworks”*. (P1 Interview)

One programme took a more novel approach to teaching consent and confidentiality through a “speed-dating” discussion session between students and service users involved in informing module content:

*“The other thing I suppose I haven't mentioned is service users, and we have a reasonably successful, well-evaluated workshop with them, where we do a kind of speed-dating arrangement, obviously, a lot of them by definition, some of them are older and more frail, so we don't want to exhaust them, but we get the students to go around and listen to their stories and how it feels to be prescribed for, and issues of consent and confidentiality are part of their proforma that they use to have those discussions”*. (P7 Interview)



Prescribing students are required to upload work relating to professionalism to their portfolios throughout the programme:

*“Yeah, so they are all acting professionally as they're all registered healthcare professionals, but they do as part of their portfolio, one of the little short pieces that they have to do... and is a pass or fail element because... they have to say they'll keep everything anonymous and confidential” . (P5 Interview)*

*“We do expect that they know it, that they come with that level of knowledge, but again, it's assessed in the portfolio, they have to talk about accountability, professional accountability, what it means to them... liability and all those things, it's also about consent, and that consent is... how you get consent and how important it is as part of the process of professionalism and accountability, so they are assessed on that” . (P13 Interview)*

Another major component of professionalism pertains to record-keeping, an area afforded great attention by NMP programmes:

*“I think to be honest, the level of healthcare professionals that we have, they're very... with the concept that if it's not written down, it didn't happen from a legal perspective, I mean we do reiterate briefly that obviously, they need to keep very thorough notes, and particularly in terms of sign posting and safety netting.” (P5 Interview)*

*“So what we kind of try to teach them is that, although you're an independent prescriber, it's never in isolation that the patient will see many people and it's your duty to ensure that every person that should be using for the importance of good documentation and we ask them to double-check sources when they're doing their assessment using multiple sources, so yeah, they're taught that as well” . (P11 Interview)*

It was highlighted that one of the major reasons for good record-keeping was to ensure effective multidisciplinary working:

*“Yes. And also, we talk about how you... part of working as a team, so we do a session on teamwork as well about how you work together, how you communicate, and one of the outcomes is talking about different roles, and I like them to talk about if they work in secondary care, how do you make sure they communicate properly to primary care and vice*

*versa, so that when you are prescribing, all places have got new medicines or you change them etc, how they do that kind of record-keeping if you like". (P13 Interview)*

*"That again is part of the portfolio about them keeping records and also working with multidisciplinary teams, we talk about communication being a very important part and accurate records is a part of it, so this is part of their reflective portfolio where they're expected to demonstrate how they manage communication and follow up and link it with referrals". (P16 Interview)*

*"So, we go with this notion of anything you write should be in sufficient detail that another clinician can pick up that care without asking questions". (P9 Interview)*

Along with the orthodox method of delivering a lecture on record-keeping, one programme took a role-play approach to the teaching of effective record-keeping:

*"There is a specific case study that is on record-keeping. Again, we do in a role-play as well that one of the prescribing error has happened because of inaccurate record-keeping of inaccurate patient history record-keeping, so we do emphasise that, there is only one case study that we do, plus there is a lecture that covers the importance of record-keeping, plus one of the learning outcomes in the RPS Framework is working in a team and ensuring the transfer of care". (P14 Interview)*

Record-keeping is also a vital skill for students to demonstrate in their assessments, and the consequences of not demonstrating adequate record-keeping can include failing the assessment:

*"...so it would be expected that when they write their case-study, they might well use the consultation model framework as part of that, so one of the steps within that consultation model would be housekeeping, note-keeping, so that would be the case study, it would also be when they do their history-taking viva, the actual consultation closure, we consider to be one of the most important sections, and there are certain things in there which if they don't mention in terms of making sure that they safety net their patients and write up detailed notes about what the management plan should be, that would be a fail if they didn't do that". (P5 Interview)*

#### 5.3.3.2.7 Overall Perception of NMP Prescribing Safety

Given that prescribing safety is comprehensively covered by NMP programmes in accordance with the recommendations from Chapter Four, some participants pointed towards studies reporting positive findings around the safety of NMPs as compared to junior doctors:

*“It’s the exact opposite isn’t it? I mean I just couldn’t believe it, I just thought... I don’t know... well I knew where they worked, I won’t say, but seen it in practice, the amount of times you see a very stressed junior doctor... when you do look at the studies, the biggest amount of errors are from junior doctors aren’t they?”* (P13 Interview)

*“So, from my perspective, I know from experience and actually we keep in touch with a lot of our students, they sometimes come back and do sessions for us in future, and colleagues as well sometimes, so I know that they get on with it and it all works out OK and in fact, we know from the data that NMPs have been very good for errors in prescribing and that there haven’t been problems with it”.* (P15 Interview)

#### 5.3.3.3 Communication Skills

##### 5.3.3.3.1 Communication with Patients

A major component of high-level prescribing is having effective communication with both patients and other healthcare professionals. The teaching of good communication skills is an area which is afforded a lot of focus by some NMP programmes through a myriad of approaches:

*“Oh, that is absolutely a cornerstone of the prescribing in practice module, because it appears in practically all competencies about communication, and they would cover that”.* (P6 Interview)

*“There’s a lot of focus on that, I think particularly our lectures around consultation models and theories around people’s health beliefs and that initial stage where you’re communicating with your patient and you’re building rapport that you’re asking them open-ended questions to start off with getting them to tell their story in their own words, so and summarising that to them and so that they fully understand that you’ve listened and you fully understand what they’ve said, so throughout the whole consultation process, you’re making decisions together.*

*So I think that's quite a strong element of the course running right the way throughout.”. (P5 Interview)*

*“I have already mentioned, we do a lot about consultation and critiquing of a consultation and that sort of thing, so we spend a bit of time on that”. (P10 Interview)*

*“Yeah, I think we do have some sessions where we review consultation theory and we go over it from that perspective of prescribing. So we do go over that and we cover it in several different ways, early on, we have a session on consultation, we use it as a way of “look, how are you going to approach your clinical learning? So, what do you already know, how do you approach this patient? “How are you going to think about changing your communication, your interaction, your assessment of a patient? How are you going to look at... what areas do you need to develop over your 72 or 90 hours of clinical practice?”. (P12 Interview)*

One of the more popular teaching approaches for developing communication skills with patients is the use of role-plays:

*“Apart from... if they are asked specifically about the teaching styles, so we do use a variety of teaching styles, so for clinical skills teaching, we use role-plays, which are trained by the medical school, so we use the same role plays. Our communication units, they have role plays as well, then we use for the communication sessions, we do use role plays again”. (P14 Interview)*

*“I’ve been doing some research on another programme about breaking down the consultation cycle and clinical reasoning, so we teach them around that, so we teach them about stages of the consultation, what you’re trying to achieve at each stage of that consultation, how to go about it in terms of communication, and then... as we say, every single profession that they come in, we do some element of role play”. (P9 Interview)*

A sign of good communication with patients is of the prescriber establishing patient concordance and adherence to the prescribed treatment. This is something widely acknowledged by the participants:

*“The university has simply done quite a few studies on adherence, so yeah, I was writing for undergraduates, writing a programme of learning the other day and getting them to look at this particular paper, where they came up with, I think it was only 30% of metformin*

*prescriptions were taken correctly. It was some horrendous number, I mean, it was a couple of years old, but you'd think of something as common as metformin, and think "oh my something not going right here". (P7 Interview)*

*"So again, it's about if you do not get shared decision-making, then you're not going to get concordance and you've wasted your time and theirs, because they're going to go away and not take it. Sometimes, the ones who have never worked in the community or mental health, places like that don't get it, because obviously, in hospital it is kind of a little bit more... patients in hospital tend to adhere better, because there's a different dynamic. But in the community, if you're working in the community, you know damn well if you walk out the door and you haven't got shared care, they're just not going to bother to do what you want them to do". (P8 Interview)*

NMP programmes ensure to dedicate specific sessions to patient concordance and medication adherence:

*"We have a specific session on concordance and adherence that we teach them and we differentiate between the terms compliance, adherence and concordance, we put it in the context of the evolving healthcare environment where service users now are more aware of their needs and it's more of a partnership approach rather than an authoritative telling somebody what to do approach". (P11 Interview)*

*"So those are on the reading list, the compulsory reading list for the students, so before they come to the session on, we call it the concordance session, and we talk about the difference between compliance and concordance, compliance being do as your told, I'm the expert, you're the patient, you do as I say, concordance being a patient partnership, where different options are discussed with equity, the patient and the prescriber make the choice together, the patient therefore has 'buy-in' into the process, and it's more like therefore, as the research suggests you adhere to treatment, because they've actually had some involvement in the choices that are being made". (P3 Interview)*

Some participants highlighted that within the teaching sessions around medication adherence, the concept of polypharmacy had to be discussed given the different patient populations prescribers are likely to experience in practice:

*“Yes, but we also talk about that, when we are discussing things like polypharmacy and tackling in particular, vulnerable groups or different patient populations, so again, I’d say what’s quite interesting about prescribing and especially with the RPS competencies is, if things really are interlinked, so we have a short session specifically on adherence and where it’s come from, but then you can’t get away from that when you’re talking about other things to do with consultation or whether you’re talking about polypharmacy”.* (P10 Interview)

Along with specific communication-based sessions within the programme, there is also an expectation that students will develop their communication skills whilst completing their mandatory hours within clinical practice, and this is facilitated by the designated medical practitioner (DMP) or Practice Assessor (PA), who will determine whether their communication skills are adequate:

*“We do a lot about consultation and critiquing of a consultation and that sort of thing, but again, it comes down to the DPP, and the academic assessor in practice, could the DPP not getting a good vibe about the communication and they’re not feeling it, then they won’t sign them off, it’s a real professional responsibility there, so I guess the student, by being allowed to apply, is most likely OK in communication and again it’s in the competencies, so if they don’t meet the competencies, then they won’t get signed off by the DPP or the academic assessor”.* (P10 Interview)

#### 5.3.3.3.2 Communication and co-ordination with colleagues and other prescribers

Good prescribing practice is also underpinned through effective communication skills with other healthcare professionals and prescribing colleagues. One of the strongest universal features of NMP programmes is that to ensure prescribers develop robust communication skills with their peers, they establish a rich learning environment with a wide range of healthcare professionals learning alongside one another:

*“So we have a very varied group in the NMP cohort, definitely. And of course you’ve got all the allied professionals now and we have physios, my current cohort has been suspended at the moment, but I’ve got podiatrists in this one, so that’s quite nice, radiographers and actually, we’ve got our first few paramedics this time, so yeah, very diverse”.* (P4 Interview)

*“Yeah, absolutely, very much agree with that, it's amazing really the diversity of people you get on the course, you know, from neonatal nurses to substance misuse nurses, physios in ITU, nurses that are working in general practice, I mean, so in a collaborative group, they get a huge amount out of group work and that sort of thing”.* (P5 Interview)

*“OK, so we recognise that we've got a very diverse group of students, most of them are very specialised in a particular area. Even if they work in A&E or a GP practice, they're specialised generalists or generalised specialists... they work in a relatively narrow spectrum”.* (P12 Interview)

*“We do find that in the room, we will find people who are very, very different in their levels of experience and that makes quite a rich learning environment”.* (P1 Interview)

Through establishing this rich learning environment, prescribers from different healthcare backgrounds can collaborate and discuss cases seen within their specialism and gain further insights from the experiences of others, usually through giving presentations to the rest of the class:

*“We get them to do group work and things like that, where they can take some of the generic prescribing issues and put it into their own prescribing context”.* (P11 Interview)

*“We have exercises that we get them to do, so we get them to actually present a case, a case discussion of a patient, and we get them... the patient that they've done the case study essay on, we get a little presentation about them for the class, and the class can question then "Why did you prescribe that drug", and "So what was that patient's original diagnosis?" and as you say, when you've got podiatrists asking about their feet, what about their exercise levels and the pharmacists saying: "Well I don't think those drugs were right”.* (P3 Interview)

*“So we get them to do the formative assessment, where they do a case presentation to the class. Everybody has to do this, and some people have never stood up in front of a group of other people and presented before and they're terrified of doing it. But it's a very good communication skill to have, so we make them do this, and actually, that day is such fun because you get to see people's perspective, the whole class can join in, it's a peer-marked assessment as well”.* (P3 Interview)

*“Oh, absolutely yeah. And that's what's so lovely actually the A&P presentations that they do, because they divide up into small groups and they just learn so much from each other and you very seldom get a room with forty very experienced and varied clinicians together, you know, all sharing their knowledge, so it's quite a privilege really to be involved in that I think”. (P4 Interview)*

To optimise the learning of communication with other healthcare professionals, some participants mentioned how in their programme, they mix small student groups to include at least one student from a different professional background:

*“I think historically maybe all clinicians were guilty of sitting in their silos and not sharing knowledge”. (P11 Interview)*

*“We make sure that there's a pharmacist, there's a nurse, there is a physiotherapist or there's a podiatrist, we have to make sure that these groups are different and multidisciplinary, so that they can learn from each other. All the clinical skills teaching is taught in groups, in their personal tutor groups, again, it will give them the opportunity to learn from each other, which is they learn from each other, so we will ask them to master one of the clinical skills and teach to their peers... so we do quite a lot of things to make sure that they understand and learn from each other and hopefully that will help them work in a team”. (P14 Interview)*

*“I think we find something very special about bringing people together, mixing them up, this year is the first year we have had paramedic practitioners, advanced paramedics in the team in the module, and there are nine, which is quite a big number out of 37, and as with quite often in different professional silos, there's been a kind of “let's all sit together” going on, and I kind of realised that on week one”. (P7 Interview)*

*“What I was looking at was professional identity, because you watch a group at the beginning of a course, and they will sit in their groups, so you can almost tell who the pharmacists are, who the physios are. I am very good at this and you then can even almost break down who your mental health nurses are etc, and they will gradually gravitate towards each other, it's bizarre to watch, so despite our best efforts sometimes, they will actually gravitate into professional groups, because they speak the same language. So, we spend a lot of time breaking them up and making them sit somewhere else and work with somebody else”. (P8 Interview)*



Alongside focusing on students learning from one another's prescribing practices, there were also examples of some programmes conducting sessions geared towards specific interprofessional team working:

*"We also have a session on interprofessional working and working as a team, so we do have that session as well". (P4 Interview)*

*"And also, we talk about how you... part of working as a team, so we do a session on teamwork as well about how you work together, how you communicate, and one of the outcomes is talking about different roles, and I like them to talk about if they work in secondary care, how do you make sure they communicate properly to primary care and vice versa, so that when you are prescribing, all places have got new medicines or you change them etc, how they do that kind of record-keeping if you like". (P13 Interview)*

### 5.3.3.4 Continuing Professional Development

#### 5.3.3.4.1 Updating Knowledge and Skill in Practice

In keeping in-line with Continuing Professional Development (CPD), a high-level prescriber is always striving to enhance their knowledge and skills to improve their prescribing practice. NMP programmes across the board acknowledge the importance of this and inform the students of ways in which they can update their prescribing knowledge and skills:

*"Once you register as a prescriber, there's a session where we very much talk about the importance of staying updated, whether that be through an organised conference or just through your own individual reading, I know a lot of settings, hospitals in particular which have their own prescribing page on their intranet and they have their own bulletins come out, keep it up-to-date with medicines management bulletins, you know if you work for CCGs, so we talk about different methods and ways of staying updated, what resources are out there, taking note of the NICE bulletins that come out". (P4 Interview)*

*"...we do highlight things like newsletters like the medicines regulatory emails that they can sign up to get updates and we do part of their case study". (P5 Interview)*

One participant stated that they emphasise the importance of updating knowledge and skills through telling students that they will likely be undertaking assessment and supervisory roles

in future around prescribing, and subsequently, they must be up-to-date in their prescribing to be safe and effective in their supervisory roles:

*“The very last session I say right OK, so in your... become prescribers, in 3 years’ time, you’re going to be practice assessor and supervisors and you’re going to be training people to do what you’re doing now, so what you need to be doing is keeping them up-to-date with everything, so that you will be able to be a safe and effective teacher, and that scares them a bit, because they probably don’t think about that, and I think it’s pretty useful because that’s when we set the scene for when we go through what we need to be doing on a daily basis and on an annual basis and then maintain that knowledge... and then I throw it to them that what do you need to be doing for you to be able to become a teacher?” (P12 Interview)*

One participant likened knowledge at any time to a “snapshot in time” which is constantly changing, meaning that prescribers must effectively track this change, and the programme the participant teaches on requires students to create an iterative therapeutic framework which they should regularly update:

*“Yeah, and this is why we teach in the way that we teach, their therapeutic framework becomes an iterative document that we actually encourage them to build upon and update on a regular basis, because one of the thing that we tell them about is that knowledge is only correct at a snapshot in time, it’s like if you have a clock that is stopped, it tells the correct time twice a day, but it’s the same with knowledge, knowledge develops, knowledge changes, and they’ve got to keep abreast of those changes in knowledge, so we get them to develop this therapeutic framework which can be used in one of two ways, one of them is, as they want to expand their scope of practice, then they can actually use this as an way of learning and demonstrating learning and demonstrating competence as they expand, but also they can use it to update their knowledge”. (P9 Interview)*

One participant also mentioned of external events such as prescribing conferences and seminars which they urge students to attend beyond graduation:

*“Within Scotland, again we are in a really unique position, we’ve got the NHS Education for Scotland as a national group, they run a prescribing conference every year, so there is national work around engaging with prescribers, which obviously includes pharmacists,”. (P10 Interview)*

Overall, there was a consensus among participants that regarding prescribers keeping up-to-date in their practice, the programme was there in a supporting and advisory role and that it was ultimately the responsibility of the students themselves to update their knowledge and skills beyond graduation:

*“We teach them that they should never be prescribing anything that they don’t feel competent to do or is out of their scope, however, we also teach them that where there are ongoing deficits that their role, that we would expect them to be able to fill, that it’s their responsibility to try and find a way to address those gaps and things”. (P11 Interview)*

*“We advise the students that, for example, if they are taking on a new drug, once they’re qualified, keeping your knowledge up-to-date and so on, we advise them to carry on using exactly the same format as they did whenever they were a student”. (P6 Interview)*

#### 5.3.3.4.2 Critical Thinking

Along with identifying and using information resources to update their prescribing knowledge, prescribers must also have the ability to critically appraise information resources. One participant regarded critical appraisal as a Master’s Level skill:

*“I insist I only teach postgraduate students, because that level of critical thinking is a Master’s level skill, and when you’re writing the curriculum, you have to use language that ensures that people are critically assessing, and not just learning, explaining, they’re actually synthesising the information critically”. (P3 Interview)*

As a result, critical appraisal is an area discussed by most NMP programmes:

*“We also do sessions on critiquing and reviewing literature because obviously you know, just to help form that evidence base and you know, do we prescribe this, do we prescribe that and we encourage students to review the evidence you know, if there’s uncertainty there. So that’s a part of the skill base that we try and install”. (P4 Interview)*

Additionally, one participant spoke about how they direct their students to appropriate textbooks teaching readers about critically appraising pieces of evidence:

*“So we do a couple of critical thinking sessions with them, and we send them away to do some exercises, there’s some excellent literature out there as well. My favourite textbook is a*

*textbook called critical thinking. That's on their essential reading list. There's some great material out there. Another programme did a critical thinking course, it teaches you how to critically assess a piece of evidence that you just see on the news, how do I know this is not just sensationalism, taking it through the aspects of critically analysing whether it is... piece of evidence". (P3 Interview)*

On the other hand, one participant stated that their programme doesn't actively teach critical appraisal within their programme, rather they outsource it as an area of further support students can attain from other departments within the university:

*"We don't actually run those sessions, we're very clear when they come to university that we are not the ones who will teach them how to critically analyse things, but we point them in the direction of the amount of support they can get on our programme, there is a huge amount of support for them to actually refresh their skills, and some of them have never done critical writing, but they're the ones that we wouldn't probably have on Level 7, we would have them on Level 6". (P13 Interview)*

One participant implied that critical thinking is a skill that is not merely for appraising information resources, rather it is a skill which is also required throughout the prescribing process:

*"...we will also be asking them to critique the patient's journey, and in doing that, when they will be critiquing it, they will be critiquing it against the evidence-base they have designed themselves to underpin their own prescribing practice. So, in way, it's a process of "Here's your scope of practice, you explore the evidence base that underpins your scope of practice, then you apply that evidence base to critique the care of patients, who are managed within your scope of practice". Does their condition need to be reviewed, does their therapy need to be reviewed in light of the fact that they might have lost weight, and they might have started to change their lifestyle". (P9 Interview)*

#### 5.3.3.4.3 Dealing with External Pressures

An important aspect of CPD for a prescriber is the ability to adequately deal with external influences to prescribing practice. The most significant source of external pressure is from the pharmaceutical industry. Most participants shared the view that NMPs were vulnerable to

the influences of the pharmaceutical industry and as a result, taught them to avoid drug representatives and events organised by the pharmaceutical industry:

*"It is a bit of an insidious influence with drug reps and the pharmaceutical industry". (P15 Interview)*

*"They are not allowed to accept any favours in terms of lunches or anything like that, we strongly advise them not to engage at all with any... obviously they need to consult the literature or information, but with regards in the instance of the pharmaceutical industry, they're completely discouraged from having anything to do with them". (P6 Interview)*

*"Funnily enough, non-medical prescribers are targeted by drug companies as quite innocent babes in the wood, and therefore, we'll target them because we can get them, we can influence them, so again teach them beware. We teach them how to recognise bias in glossy brochures for example, how to see graphs that don't start at zero... and how to go and therefore look at the underpinning evidence and find out what's the truth, so yeah, evidence-based medicine is a great subject to teach, love it". (P3 Interview)*

*"We have one of our lectures, it is called the influences of the pharmaceutical industry, so we get one of the lecturers within the Department of Health Sciences, and actually that session, you can see for some students, their eyes sort of open up and they suddenly realise that maybe that lunch that was sponsored by the pharmaceutical rep, they start to think a little bit more about the non-medical prescribing policy that they're going to be working under within their organisation, start to think of their own professional regulatory body and their code of conduct, and they start to think a little bit more deeply about how they can perhaps be influenced subtly ". (P1 Interview)*

However, there was one participant who, due to their previous experience of working within the pharmaceutical industry, taught their students to have a more balanced view of the pharmaceutical industry:

*"Now I'm in an unusual situation, because I used to work in the pharmaceutical industry and I'm also a clinician, so I feel like I've got quite a balanced view on things... One of the things I do find funny from nurses is they have a very anti-view of the pharmaceutical industry, so what I do try and work through is, particularly in the pharmacology session... we actually start to*

*discuss about the pharmaceutical industry. So, we get them to find that real balance and it is very difficult, but I try to get a more balanced view of the pharmaceutical industry from people with a very negative association of it". (P12 Interview)*

The participant added further that the pharmaceutical industry should be seen from a more objective point of view rather than through subjectivity.

#### 5.3.3.4.4 Adapting to Newer Prescribing Technologies

Due to the introduction and development of newer technologies to aid prescribing processes, it is imperative for prescribers to learn how to use such technologies (Omer et al, 2020). Many participants shared the sentiment that working with newer technologies was an area not touched upon as much by NMP programmes as it should be. One participant stated that the reason was due to it being beyond the programme's remit:

*"Well I would say again that really is a little bit beyond the university knowledge and remit, because we don't really know all the different systems that are going on out there... but we don't really have that knowledge-base to be able to talk about different methods of prescribing, we just touch on the fact that they use a different system, it's kind of common knowledge really, but the intricacies of those systems, we don't have the knowledge to be able to talk about that". (P4 Interview)*

One participant stated that the reason for the lack of attention towards newer prescribing technologies was due to an assumption that students already had an experience of working with these technologies from before enrolling upon the programme:

*"Not specifically on the course to be honest, because as they work in such diverse areas, so for example, I would say that the majority of the students that are on the course are working in quite acute areas that are very hands-on, there are some working out in the community, so for example, particularly with the advanced nurse practitioners and maybe general practice nurses in community, there's more of that sort of thing coming in where they're coming in to do video consulting, but as it stands at the moment, it's quite niche, so there's no reason at all why". (P5 Interview)*

*"Probably not as much, because we are like a city university, most of our prescribers will work in cities, probably not as much actually. Most of them will be aware of these things, but we*

*don't spend an awful lot of time talking about telehealth or telelearning if that's what you mean". (P11 Interview)*

#### 5.3.3.4.5 COVID-19 and Teaching Remote Prescribing

Due to the restrictions and constraints caused by the COVID-19 pandemic, some participants mentioned of conversations within the programme faculty around implementing teaching of remote consultations and prescribing:

*"Yesterday, we had a meeting and we were discussing about remote consultations, to add lectures on remote consultations with the students. So, we are going to add remote consultations, advantages, disadvantages, because as you understand, 25% of consultations will remain remote once the COVID-19 situation settles down as well. I think it is an important area". (P14 Interview)*

*"Well, I think we are gradually dragging everybody into a new world of you know, as you say, video consultations and so on, that's all progressing very well, in Northern Ireland I'd say particularly with the students and the latest events, that's really being catapulted forward isn't it"? (P6 Interview)*

*"We do need to try and integrate with that more and we are revising the module become more online anyway and it's perfectly appropriate to have a heavy focus on that, I mean it's very interesting that a lot of the students are now, they don't see patients directly, they have telephone or video conferences with them, many of them work from home, it is a bizarre situation, so yeah, we don't actively teach those at that element now, while we do teach a bit about remote prescribing, but it's something that I'm aware of". (P14 Interview)*

### **5.3.4 Assessment Methods of the Programme**

Overall, the assessment methods of the NMP programmes across the UK are uniform and similarities between these assessment approaches are seen throughout.

#### 5.3.4.1 Written Pharmacology Exam

When assessing the knowledge skills of prescribing students, particularly around pharmacology, pharmacokinetics and pharmacodynamics, programmes on the whole have

implemented a written pharmacology exam with a mixture of multiple-choice questions (MCQs) and short answer questions:

*“Well pharmacology in particular, it's main assessment process is done through an unseen exam, which half of it is multiple choice and 10 questions, and half of it is short answer questions and that's a mixture of ...I say it's unseen”. (P4 Interview)*

*“We have a pharmacology exam, which are short answer question-based and has an 80% pass rate and so, there are five sections with four questions each in it, they have to answer five sections with four questions each in it out of six. We have five core subjects and one that might be more specialised, so say one mental health, or one sexual health section. So they have 20 MCQ/short answer questions, and have to get 16 of those correct in order to pass”. (P15 Interview)*

Some participants stated that the written examination isn't limited to assessing aspects of pharmacology, but also other areas such as ethics, legalities of prescribing and prescribing errors:

*“So for the exam, they have 19 true or false questions, they could be pharmacology, they could be legal side, they could be ethics, prescribing, anything like safe prescribing etc. Then they have a short answer, which is four marks, and that is nearly always a pharmacology question, so it might be key points of adverse drug reactions, key points of half-life, key points of first-class metabolism, that kind of thing”. (P13 Interview)*

*“Then we have a written exam that has scenario-based questions, again it can have question on evidence-based medicine, ethics of prescribing, writing a prescription, legalities of prescribing, errors, public health-related questions. Again, pharmacology, pharmacodynamics, pharmacokinetics kind of things are asked in the written question”. (P14 Interview)*

One participant alluded that the written pharmacology exam is a primary approach to assessing the prescription-writing skills of students:

*“They're also, in their exam, their pharmacology exam, one of the sections, they have to write a prescription and demonstrate that they have included all of the key points for safe prescribing, so they would lose points for every one that they don't include, if they don't get*



*the name right for example, it would be an automatic fail, we encourage them as well with spelling of drugs in particular, how that could have major implications if you were to do it in practice. So, they are taught that throughout the course as well". (P11 Interview)*

The pass mark for the pharmacology exam is the same for all programmes at 80%, something stipulated by the regulatory bodies. One programme prepares their students for this by conducting a mock paper:

*"They also do a mock pharmacology paper prior to doing the real thing, which obviously... and they are very twitchy about the pharmacology paper, because it's an 80% pass rate, they have to attain a minimum of 80%". (P5 Interview)*

One participant provides an explanation behind the steep pass mark by referencing safety as the major factor:

*"It's quite a big ask. You can't just hand somebody a prescription pad if really they don't know what they're really doing with it". (P3 Interview)*

#### 5.3.4.2 Essay-Writing

In addition to the written pharmacological exam, NMP programmes also use essay writing as a major assessment tool given the diverse range of backgrounds prescribers come from:

*"One of the outputs from the course is they have to write a pharmacology essay at the outset, because they're obviously all experts with their different subject matters, different expertise". (P3 Interview)*

*"The final piece of assessment is the essay, which is a 2,000-word case study, which is expected to include Level 6 or Level 7 detail critical analysis". (P12 Interview)*

As was the case with the written exam, the essay assesses aspects of prescribing beyond merely knowledge:

*"For assessment purposes, they write three essays, one is on a consultation, so we are looking for a safety netting and monitoring review as they write part of that. The other is a critical drug analysis, so really digging into the science, looking at the dynamics, kinetics, cost, side-effects, you name it, then the other one is supplementary prescribing, because our module is independent and supplementary prescribing. The only way we feel we can explore their*

*knowledge-base is for them to write an essay on it, and for a lot of them, it is hypothetical, majority of them it is hypothetical, but obviously, monitoring and review are very much of a supplementary clinical management plan that they have to develop". (P7 Interview)*

Some programmes use essay-writing as a reflective tool for the students to critically appraise hypothetical or real-life case scenarios:

*"In the first module, they have to write 2,500-word reflective essay, so they can choose what they want to do, but it has to be relevant to their area of practice, so they could answer critique a guideline, they could critique a case study they could have seen, they could choose to do whatever they like, but it has to be a critical analysis of something related to their area of practice". (P8 Interview)*

*"Well, as I mentioned, this is a part of the summative assessment and the reflective essay, and they will be expected to demonstrate through the... how they work as a part of MDT, how... communication, about ensure patient safety through effective communication with the patient... and so on". (P16 Interview)*

#### 5.3.4.3 Numeracy Exam

For the purpose of drug calculations, NMP programmes all conduct a numeracy examination, where the major requirement is that the student must attain full marks in order to pass:

*"So, the foundation course is assessed through, there's a written exam of pharmaceutical calculations, one-hour exam, 20 questions and it is 100% pass mark". (P14 Interview)*

*"They have two calculations, they have to pass the calculations, so even if they get full marks for everything else, if they fail one of the calculations, they fail the exam, because that is one of the NMC calculations, they have to get 100% in numeracy". (P13 Interview)*

As a result of the requirement to obtain full marks on the calculation exam, some participants highlighted how this has led to numerous students failing the exam:

*"It's really interesting that you should say that, we have a fairly significant number of fails. This must sound difficult, but you will find that an average cohort, so we have about 120 students running at any one time, and you find around about 40-50% fail rate first time around on the maths, a lot of them make stupid errors because what they'll do is they will not read*

*the question properly, people not reading properly or getting overconfident, so they usually get it on the second time, but it's quite interesting how many people we get who never get through". (P8 Interview)*

One participant pointed out how nurses usually struggle more in the calculations exam as compared to pharmacists due to differences in their undergraduate training:

*"Because it's 100% pass mark, we do get a few failures in calculations exam, but then students do better in the formal exams. Generally, as I mentioned earlier, nurses do struggle with pharmaceutical calculations as compared with pharmacists, because they have been trained four years during their undergrad degree with pharmaceutical calculations, then with the previous training... that's a core part of their job, so they do pretty well, but because it is the 100% pass mark, a small error in terms of not being able to find the correct unit or what will convert the units... lead to a mistake and failure, because you're not... a small mistake, we understand and we appreciate a small mistake in prescribing, a ml to a litre can be quite lethal for a patient, so we do pay quite a lot of attention, in order to ensure that the quality of pharmaceutical calculations questions are standardised". (P14 Interview)*

#### 5.3.4.4 Portfolio

Throughout their time completing the programme, prescribing students are required to create a portfolio and build upon it as they progress. They must submit a whole variety of work pertaining to various aspects of prescribing:

*"We have a 3,000-word portfolio which includes them having to submit a whole a variety of things as well as the written work, so they will have an observed consultation which they will be given comments and feedback on from their DPP, they have all of the RPS competencies in their portfolio which their DPP will tick to say that they have achieved, they will, within their portfolio, have a beginning, a middle and an end assessment from their DPP giving them comments and their progression, things to fix on, and then within their sort of written work". (P10 Interview)*

*"The other part of the way we assess them is through their practice portfolio, and that is 50% pass mark for Level 7, and 40% for Level 6, and they have to demonstrate... they have to write about 10 learning outcomes, so that would include diagnostic tools, so it follows the old*

*standards of the NMC, the prescribing pyramid sessions, then they have to do a clinical management plan, because we go over this every single time about supplementary prescribing, which we know they're not going to use... you get a joint qualification, and then they have to do a case history, a case study of 2,000 words. And all of that has to reflect their learning contract that they've gone through with their DMP at the beginning, so what their learning needs were, so when I'm marking, I'm going back to have a look at each time what those learning needs were". (P13 Interview)*

One participant stated that the portfolio is an effective way to assess whether the student has met the stipulated learning outcomes through the work they submit:

*"They are supposed to submit a portfolio, the portfolio is assessed by their personal tutor and again, it comes to me for moderation, in the portfolio, they have to demonstrate that they have met all the learning outcomes by at least adding two reflections against each competency". (P14 Interview)*

The participant further adds that the portfolio enables the students to obtain valuable feedback to aid their reflections upon their individual prescribing practice:

*"The students will get feedback at the end of module one in their portfolios and then in their feedback, we do emphasise have you considered this, have you considered that?". (P14 Interview).*

The role of the Practice Assessor was also discussed in the compilation of the portfolio:

*"OK, so different ways, they have a portfolio of evidence to present to us, which is accumulated over the six months, and that's in conjunction with their practice supervisor, and then their practice assessor". (P7 Interview)*

*"The portfolio relies on them demonstrating that they've met all of the 100 and something competencies, 160, that they have to over their 90 hours of practice, get down, and the person, the practice assessor, the person in practice in their clinical setting, signs them off to say that they can do the given competency, and within those competencies are those or communication". (P15 Interview)*

The portfolio was also discussed as an effective means for work pertaining to communication skills to be assessed:

*“That again is part of the portfolio about them keeping records and also working with multidisciplinary teams, we talk about communication being a very important part and accurate records is a part of it, so this is part of their reflective portfolio where they’re expected to demonstrate how they manage communication and follow up and link it with referrals”.* (P16 Interview)

*“So, if they can’t talk to a patient by look them in the eye and explain something appropriate to them, then I will accept that the person supervising them not to sign that competency which would mean that they fail their portfolio”.* (P15 Interview)

Participants highlighted the portfolio required students to write in an academic manner and to develop their skills in academic writing:

*“The librarian does two sessions with the students and we have an academic skills person who comes in and helps them to really focus on their coursework, you know, so that piece of work that they need to do with their portfolio and supports them to, you know, develop their critical writing in that way”.* (P10 Interview)

*“The other thing in their portfolio that I didn’t say, is that they submit between six and ten 500-word reflections on episodes of practice in their supervised time with their practice supervisor, and they have to be written academically, so not just bullet points and hieroglyphics”.* (P7 Interview)

#### 5.3.4.5 Objective structured clinical examinations (OSCEs)

Although most of the assessment approaches across NMP programmes are uniform, the case with OSCEs is different. It was observed that some programmes afforded utmost importance towards the use of OSCEs as a major examination tool, whereas other programmes discarded their use altogether. For the programmes who still utilise OSCEs, participants provided comprehensive details pertaining to how they are implemented within the programme:

*“For module 2, there is an OSCE and our students will have three stations, the students will have to pass all three stations in order to pass the OSCE, failing one station would mean failing the OSCE, within those clinical skills stations, there will be one communication session, there will be one dose that they use, for example, an ear examination or an abdominal examination or a cardiovascular examination, musculoskeletal examination, a clinical examination, and*

*finally, they will do, for example, urine dipstick test or they'll do a blood pressure, or they'll do an eye examination, in which they'll use a hand tool so that we know their skill with regards to using that". (P14 Interview)*

For the most part, OSCEs are used to assess the students' communication and clinical skills:

*"What we're interested in as academics is a sort of holistic discussion around "was that prescription necessary? Why didn't you assess the cranial nerves or whatever it was", so the patient is gone, and the assessor and the student discussing the OSCE". (P7 Interview)*

*"They have an OSCE exam, which we do in the university normally, obviously that's a bit out at the moment, but that also tests their... for us, it's a partite test of their knowledge, because they are doing their supervised practice, but it gives us a chance to check that they're doing a proper consultation, that they understand which assessments they need to do, that they know when to refer, they take into account, you know, the whole patient. They don't necessarily prescribe, so we test all that within the OSCE". (P8 Interview)*

However, one participant stated that the OSCE is not limited to merely assessing communication skills, but can be used to assess other important aspects of prescribing, such as professionalism and whether a medication is the right thing to prescribe for the particular patient:

*"One of the other assessments is an OSCE, and we have a marking scheme where we tape them interviewing a real person who is a patient and there's basically a tick-box, the first one is: have they been correctly consented? And when we teach them, I teach them, you know, "Hello, my name is", the whole introduction thing, so that we know that the patients understand that they're the student and this is part of their assessment, but also is it... to be making some notes, not going to share them with anybody unless the circumstance where somebody maybe having some harm done to them, so we teach them to really, really consent their patients". (P3 Interview)*

*"They have to obviously discuss it in their OSCE, they have to say everything you tell me is going to be confidential, I'm going to make some notes and then share it with your GP or with your specialist, but that's all within the team of professionals working within your case notes.*

*So they'll explicitly discuss it in their OSCE as well as record-keeping, they have to explicitly explain about record-keeping, and again it's a fail if they don't". (P3 Interview)*

*"Again, when they do the OSCE, there's a tick-box and one of the ticks is have they've considered non-pharmacological measures. We say to them in the OSCEs is look, we're presenting you with a patient, there's a scenario here. At the end of your consultation, you feel actually, this patient isn't appropriate for you to prescribe, we wouldn't fail you in the OSCE, because that in itself is an appropriate choice to make... diabetes is a classic example... on first present, will ask them to try and lose some weight, we won't prescribe metformin straight away, we're first of all going to see if there's any lifestyle measures. When I did my prescribing course, I did diabetes, it was my specialism". (P3 Interview)*

For the purposes of reflection, participants stated how students' OSCE performance is usually recorded for them to look back on and review:

*"Those OSCEs are all recorded, they get sent videos of those recordings, so they can reflect upon their own practice". (P9 Interview)*

*"There's the OSCE which we videotape with a real patient and again that's done in conjunction with their clinical mentor, whether it is a medic or a practice supervisor or practice assessor". (P3 Interview)*

Despite the perceived benefits of using OSCEs as an assessment tool, some participants mentioned how the prescribers' time in clinical practice during the programme rendered the use of OSCEs as obsolete:

*"Well no, we don't have to now. The NMC guidance, because our standards for education on prescribing has changed recently, and we don't now have to incorporate the OSCEs form of assessment, and the reason is because that the students do the 78 hours in practice, why are we replicating that in an artificial setting which doesn't actually prove an awful lot other than create a lot of anxiety and really, that kind of method of examination doesn't really tell us that the student is a safe and competent prescriber, so the NMC has said that now we don't have to incorporate that, it's very resource-intensive as well of course, so we as a university have decided to remove that and I know that other universities have also done a similar thing". (P4 Interview)*

*“Well yeah, and we reluctantly have gone away from OSCEs for reasons, we think OSCEs are excellent and we know whenever we do them for Health Assessment... you know whenever they’ve done an OSCE, especially what you find is, say someone fails the OSCE first time around, and they do a resit of it, say for example, it’s a physical examination or chest, abdomen, something like that, the students will tell you, whenever they come out after doing that, that they really have learnt something, now they were very nerve-inducing to do them... very anxious, so we say look let’s retain them for health assessment, but we’ve released them into practice, what would have been the final OSCE by that SCEP”*. (P6 Interview)

One participant stated that given one of the entry requirements for enrolling onto the programme was for an adequate level of health assessment skills, they would have already taken multiple OSCEs in the past, meaning that the programme implementing them would have no added benefit:

*“Yeah, I think it’s very difficult, because we are asking them to come already with health assessment skills up their sleeve, and if they’ve done anything meaningful that’s been assessed, they will have been through umpteen OSCEs beforehand”*. (P7 Interview)

#### 5.3.4.6 Criterion for Automatic Failure

One participant informed how regulatory bodies provided curriculum writers with certain criteria which would constitute an automatic failure for the student:

*“The professional registering bodies set us the task as curriculum writers to choose what red flags would cause us to automatically fail a student, you know, what aspects of unsafe practice and there’s things like failing to ask about allergies, but also incorrectly writing a prescription and also failing to document, they’re all automatic fails in the OSCE, and they’ll have to pass everything in order to pass the course, so that is a fail of the course. We do get some careless mistakes happening, just out of nerves, but unfortunately, we have to fail those people because those are the automatic fails.”*. (P3 Interview)

This statement from one of the participants summarised how NMP programmes collectively ensure their assessments are as stringent and challenging as possible to ensure they are producing safe and competent prescribers.



### 5.3.5 Aims, Objectives and Goals of NMP Programme

#### 5.3.5.1 Developing a wide range of prescribing skills and working on limitations

When students enrol onto the programme, it is with the purpose of becoming an independent prescriber within their own area of practice. However, some participants have spoken of how the programme aims to equip students to be able to deal with various situations they are likely to encounter in practice:

*“I think interestingly with the current COVID situation, there’s been a lot of chat around people changing their sphere of practice because they have the ability to prescribe, but you know, roles changing due to COVID, you know there’s that consideration of what might my role be for a little while and that means that the person has to take on that responsibility, because that’s not necessarily what we have been doing, but they’re capable, because they have been given the basics of everything within that programme to allow their development and tap back into that if they need to, they know where that is”*. (P10 Interview)

One participant briefly mentioned their own transition in expertise as a result of having to cover various clinical areas:

*“I started my career as a diabetes specialist pharmacist prescriber and I ended my prescribing career doing pain management”*. (P3 Interview)

It was mentioned by one participant that the programme strives to adapt and change the students’ mind-set from before they enrol onto the programme:

*“So, again, when we take our pharmacists on the course, we have to actually get them to unlearn a lot of behaviour, because pharmacists come with a very specific approach to practice. So, it’s trying to put them into those areas of grey. We try to move them from black and white algorithmic thinking into making decisions based on possibilities, probabilities and then trying to get them to think about that wider conversations around that patient impulse, looking at all of these different influences, so that’s kind of how we teach it”*. (P9 Interview)

This is because students from different professions have different strengths and weaknesses according to their background education, area of clinical practice and how long they have been in clinical practice:

*“Students start at different levels, but it’s quite interesting that because even some of the nurses may not have had that experience and find it difficult, but some of the pharmacists may not have done basic pharmacology for 20 years and they’re revising, so you may find people at a similar level, and our first assessment is an examination in that period, so they have a pharmacology... get those exams out the way and then we move onto the practical elements and other aspects...”*. (P12 Interview)

Many participants mentioned the stark contrast in the skills and limitations of pharmacist and nurse prescribing students:

*“Nurses are generally good at clinical skills, but very weak at pharmacology, and pharmacists are generally very good in pharmacology and the drugs aspect of disease management, but not so good in clinical skills, especially community pharmacists that come on our course”*. (P14 Interview)

One participant went further in highlighting how strengths and limitations depend on the particular personality type of the student:

*“So again, this is an area that we worked out that pharmacists needs some help... there’s research been done on the personality types of people who go into pharmacy as a profession and you tend to get introverts, you go into the profession, not very good at talking to people, particularly patients, they get embarrassed by having real world conversations like, you find that particularly with male pharmacists can’t have conversations with female patients about things like female health, they just can’t do it, and so, we give them... we do some work”*. (P9 Interview)

As a result, programmes teach students to be mindful of their current limitations and actively look to address these limitations:

*“We teach them that they should never be prescribing anything that they don’t feel competent to do or is out of their scope, however, we also teach them that where there are ongoing deficits that their role, that we would expect them to be able to fill, that it’s their responsibility to try and find a way to address those gaps and things.”*. (P11 Interview)

#### 6.3.5.2 Role of Programme beyond Qualification

Firstly, some participants talked about the levels of confidence before qualification:

*“They are absolutely scared I think, because we all know, in medicine and healthcare in general, litigation is absolutely rife, it's a climate that... and they all know as well, because we talk about it, that prescribing is the most risky activity that a clinician will ever undertake. I think unless they are in a very protective clinical environment, such as in sexual health, you can't really go wrong in sexual health prescribing, I think most of our students go out very nervous, very apprehensive and yeah, absolutely scared”.* (P4 Interview)

However, some participants reported that having a certain degree of trepidation before entering independent prescribing practice was in fact a good thing:

*“I think we do the best we can, I don't think it's perfect for all of the students, and that's the problem. I think you'll probably get 90% of them are comfortable, competent and happy, 10% who are popping themselves when they walk into prescriptions. And that's the safe thing to be honest with you, you should be scared of writing a prescription, you shouldn't be confident”.* (P8 Interview)

*“My perspective, I think they're all prepared. If a student comes up to me and says I'm confident that I will be able to safely prescribe tomorrow, I will be worried. What I want them to say to me is that, what will you be doing over the next year? If they say to me I will be prescribing for this patient, but I will be discussing with the consultant or GP afterwards. As long as they know what they're limitations are and when they've got the support, they can ask how often they don't feel intimidated by whoever they need to... and the majority of students are like that, those that aren't, I'm worried about, those that have that support, I think are confident in their ability”.* (P12 Interview)

In terms of the programme's role in the development of the students' prescribing practice, participants stated that the programme acted as a starting point in a long journey of learning for prescribers:

*“As I said to you, I tell them we've given you all of the tools, the knowledge, but you have got an L-plate on your back, it's like when you first learn to drive, you're incompetent... window where there's conscious competent and conscious incompetence. So at the moment, you're consciously incompetent, you need more experience to be a good prescriber, you've got the qualification, but it's the beginning of your journey, you haven't flied yet, we've given you all of the tools... actually the stuff that their electronic portfolios, they are theirs for life, they can*

*keep that material, it belongs to them, so they download some of their reflections and use them for future re-validations etc". (P3 Interview)*

*"But a lot of them acknowledge the fact that it is going to be an ongoing learning process, particularly as they expand their formularies, each new drug they have to prescribe, they have to do a lot of learning around that before they can prescribe it, and there's a little bit of trepidation, I would say, generally speaking, almost all of the students coming through feel quite well prepared to make that transition, and are actually really relishing it". (P5 Interview)*

*"We provide them with skills and we prepare them to be independent learners, but also kind of this... giving them this reflective nature of... to kind of develop further and to question things. So, I guess they cover themselves very often in their reflective portfolio, they are novice, and they're very much aware about this at the start of their prescribing, so I feel they enter prescribing as novice, and I think this makes them kind of prepare well and kind of on the journey, they learn more". (P16 Interview)*

Some participants also mentioned how their programmes stimulate students to formulate a plan of development beyond completing the programme:

*"Compulsory outputs is, in the portfolio, is demonstrate how you intend to continue with your professional development after qualification and give us an action plan of what you are going to do and how are you going to share your learning with your wider group. So we get them to access local medicines management groups, journal clubs if they don't have the opportunity to discuss new technologies, we say "then you are the person responsible for setting up a journal club and get a hold of your peers". So we encourage... obviously everybody has to do their professional re-validation, so how does the stuff that you've learnt learned on the course extend into that?" (P3 Interview)*

*"So in their essays, we would be expecting them to identify why they are writing an essay on this subject, what their identified learning needs are, how they are going to enhance their learning. So, once they've finished their essay, at the end of it, we expect them to come up with some action points. But it's building in that "OK, we've learnt this, now what are you going to do?", what's the next step try to learn some more about this or enhance your skills or whatever". (P8 Interview)*

This is of even more relevance given that many prescribers are unable to prescribe for a significant period after qualification:

*“Yeah we do, we do, but none of them really comment on that, and I think because it's such early days, they're not even registered when they complete that course evaluation, because you know, they wait nearly a month or more to go through the exam board, then they have to hang around waiting for their body to register them and all of that jazz. So there's so many barriers, even once they've completed part of the academic stuff, done all of that, they still have quite a few hoops to jump through before they can even get close to writing a prescription”. (P4 Interview)*

*“Well, I think from the students perspective, I don't actually think that they always feel prepared, I think it's a very scary thing actually, and there's often a delay between when you get your PIN number and when you actually start prescribing and when you've actually got your certificate, it could be months before the system actually kicks into gear and allows you to actually prescribe, and that could be quite perturbing for people, because they feel some of the skills that they're already to go and they can't do it straight away in most cases”. (P15 Interview)*

### **5.3.6 Appraising Educational Approaches of NMP Programmes**

#### **5.3.6.1 Didactic Lectures**

As discussed before, most of the teaching around pharmacological knowledge is through traditional, didactic lectures, which one participant states is the only and necessary approach to teach knowledge concepts around pharmacology:

*“I do think as I say, the pharmacology stuff is hard, the students find it very difficult, but they know that they need to know it and I think there's not many ways that you can really teach that apart from in a lecture theatre with recorded lecture for them to relisten to, because we've got classes of sixty, so it would be quite difficult”. (P10 Interview)*

As a result, there is a strong consensus among students and some prescribing educators that these traditional, didactic approaches are dry and mundane:

*“PowerPoints and face-to-face lectures, I just don't think have the same sort of impact”. (P12 Interview)*

*“There’s no question that people get bored if you just stand and talk at them, even if you think you’re a great speaker, people will zone in and zone out”. (P15 Interview)*

*“So we have a pretty good idea of what didn't work, it tends to be those very dry kind of PowerPoint presentations where you have to cram a lot of knowledge in a very boring way, where you have to stop and point at pictures and saying "this is a liver", and that's very difficult for people, so we have to find other ways to get that knowledge, make it interesting and interactive”. (P3 Interview)*

Additionally, teaching around the legalities and ethics of prescribing also suffers from the same issues:

*“Yeah, and the day that they like the least is usually, we usually get someone from the business school to do ethics, and unfortunately, it's a very dry subject, unfortunately it's on the curriculum, it's a requirement, they have to do the law and ethics bit, but it is boring you know, what can you do”. (P3 Interview)*

As a result, some programmes have attempted to supplement this didactic teaching approach with other strategies, such as quizzes and online resources:

*“Yeah, so my pharmacist, she delivers all the dynamic and kinetic sessions and all the other axillary topics on pharmacology, so safe prescribing, adverse drug reactions, all those sorts of things, so she delivers those, and generally, they're done face-to-face classroom sessions, she might introduce quizzes into that and have other teaching strategies to help juice it up a bit”. (P4 Interview)*

*“So basically, the mainstay and the basics are from our own pharmacist lecturer, and it’s a mix of face-to-face kind of lectures, but we also have kind of online activities, quizzes, group work and things like that as well, but that’s also supplemented by specialist clinicians that come out and deliver individual sessions as well”. (P11 Interview)*

*“But he uses all sorts of teaching techniques, so he’s big on short bursts of teaching and then kahoot quizzes and all those different styles of doing things”. (P7 Interview)*

### 5.3.6.2 Flipped Classroom and Blended Learning

Programmes are increasingly implementing a flipped classroom and blended learning approach into their programme:

*“Yeah, devising some more interesting and exciting and interactive things with the students. The idea is this flipped classroom thing, where they do the studying before they come to the lesson, so they've already read all of the boring stuff, then they come in and actually do something during the lesson that applies that knowledge”. (P3 Interview)*

*“The consultation staff, they're being asked to watch videos before they come to class, so we've got some... really thinking about it, we've got quite a few flipped-classroom situations where they'll do work before they come in”. (P10 Interview)*

*“I'm leaning more and more towards a flipped classroom approach, so that students come in with a degree of preparation and can use those sessions, those group activities to develop their knowledge, share them with each other, ask questions... and it's very interesting those sessions where the students will take over and run it, and you leave them with a question, go on to the next group and keep circling around and when you come back, they have to answer the question... if you ask them another question... there's a bit more palpable sort of feeling of learning going on in the room in those sessions. The sessions we've run that way are ones that seem to be the best learning methods”. (P12 Interview)*

*“Our module is officially blended, so the students have 13 days in the university once-a-week for 13 weeks and then they have a lot of stuff online that supplements it all, so it's, if they need it and they want it, there's a lot of stuff there for them”. (P10 Interview)*

One participant stated that the current COVID-19 pandemic could stimulate a further transition towards more flipped classroom learning:

*“I think the ideal scenario for teaching a course like this over six months is a blended learning approach”. (P5 Interview)*

*“Yeah, I mean we are trying very much to do the flipped learning. Now we are going to have to run everything online for the foreseeable future it seems. It's our chance now to flip it more and so, because I teach the ethics and stuff like that, which you can imagine is really... and they're really not that... so I've always wanted to have that kind of: “Look, you listen to the*

*lectures or do the work online, and then we come together as a group in a workshop to reflect and to talk about the content". So that's what we're trying to do now very much more... obviously the pharmacy lectures, they have to be that delivery of narrated PowerPoint or something, but then they do have the chance... we have done recently is some team meetings with them afterwards, to have like a workshop to discuss..." . (P13 Interview)*

#### 5.3.6.3 Group Learning as a preferred educational approach

As discussed in an earlier section, most communication skills are taught through a group work approach, and this is an educational approach which has received universal praise across the board:

*"I'm afraid I'm going to be very traditional here and say I think students learn most by engaging together in groupwork" . (P6 Interview)*

*"Yes. I mean the feedback that we get... they always love the day we have the mystery patient and they have to solve the problem of what was wrong with them and interview them, and it's done as a team exercise, so they're kind of competing to some extent as well, an element of competition in there. That's always their favourite day, always" . (P10 Interview)*

*"I mean, the multidisciplinary team working is really really good... the feedback we get from students is positive on that, certainly ones from pharmacists. Certainly when they do group work, the nurses always want to have a pharmacist in their team because of the knowledge of pharmacology... and we do try to knit people across... and it's been interesting, certainly over the last year with paramedics now involved as well, so I think... we don't see that many physiotherapists, which is a real shame, because physio and they add more to the mix, so I think that... we don't see that many physiotherapists, which is a real shame, they would add another dynamic element to it" . (P12 Interview)*

*"The practicalities of getting in a group with other clinicians from all different backgrounds and getting you heads around the BNF and answering questions and thinking things through is I think engaging and appreciated normally by the students" . (P15 Interview)*

One of the reported advantages of group work is how students from different professional backgrounds can complement one another:



*“And that's what's so lovely actually the A&P presentations that they do, because they divide up into small groups and they just learn so much from each other and you very seldom get a room with forty very experienced and varied clinicians together, you know, all sharing their knowledge, so it's quite a privilege really to be involved in that I think”. (P4 Interview)*

*“It's amazing really the diversity of people you get on the course, you know, from neonatal nurses to substance misuse nurses, physios in ITU, nurses that are working in general practice, I mean, so in a collaborative group, they get a huge amount out of group work and that sort of thing, giving an appreciation of what everyone else is doing”. (P5 Interview)*

### **5.3.7 Improving the NMP Programme for Future Cohorts**

#### **5.3.7.1 Student Evaluation and Validating Programme Success**

To track the success of the programme in the view of prescribing students, NMP programmes have implemented various systems of course evaluation where students are able to provide feedback on the programme:

*“At the end of the course, we ask them to critique the sessions that they've done: "what was your favourite one and why, which thing has advanced your expertise the most and what was your least favourite and why and can you suggest any improvements to the course". (P3 Interview)*

One participant reported that their programme employed a system where a student representative would discuss how the programme could improve in staff-student liaison meetings:

*“Yeah, we have staff-student liaison meetings, we also have a student representative to request if they want extra sessions or if there's any problems like that, and they're represented through our course committee, which feeds into other university committees, we also have a very healthy informal system where students just ring us if they have any problem or emails, so we're not reliant totally on informal networks”. (P6 Interview)*

Other programmes follow a simpler process of surveys and evaluation forms:

*“Yes, so there is a university-wide feedback, and I also send out a survey monkey as well, just 10 questions about... because we've actually gained more from that, about what they thought*

*the strengths were, the weaknesses, what we could do better, and we have changed things, like for example, there wasn't enough on prescription-writing they didn't feel, there wasn't enough on calculation, so we've changed that, so things like that, and then you get things like the rooms are not big enough, and even that kind of thing, it's really helpful for us to control numbers, although we haven't got an excuse now because we are online, so we've got to increase our numbers, so we've had to cancel the module we should have started last month".* (P13 Interview)

*"Every cohort at the end does the student evaluation form".* (P15 Interview)

Two participants mentioned a mid-course review which ensures the programme was operating to the expectations of the students:

*"We do a mid-course review, and that's really to make sure no one is failing, everybody is getting what they need and are on course to pass and do well".* (P3 Interview)

*"That student evaluation happens at the mid-point of the programme. So the programme at the moment runs over 26 days, so at the mid-point of the programme, we do a mid-point evaluation and then once that's collated, we then bring that back to them and say "you've said, now we can perhaps do", we can't always, but we can alter things, so for the second half of the programme. At the end of the programme, they then complete an end-of-programme evaluation. That's then evaluated as a programme team, we'll see if there's any themes, anything that they can change, then that's also fed into our board of examiners as well as a quality assurance, and also the external examiner also gets a sight of that as well. So again, there's a loop there".* (P1 Interview)

Regarding the perceived success of the programme, one participant felt that successful re-validation of the programme along with the competency demonstrated by prescribers qualifying from their programme was a strong indicator that their programme ran successfully:

*"Well first of all, the first thing is the programme we have here has gone through successive re-validation with no conditions, so that to me is a reflection of how good the curriculum is, we also have a very strong team who I believe are very supportive of the students, I wouldn't tell you a lie here, if I felt there were weaknesses, I would be happy to tell you what they are,*

*but I do think that the biggest thing is the students who have finished this programme, they seem competent to prescribe, so we are not really interested in how confident they are, but if they say they are able to confirm they're competent to prescribe, then I think that says everything about the programme". (P6 Interview)*

#### 5.3.7.2 Improving and adapting teaching approaches of programme

Despite the overall positive perceptions of participants on the running of the programme, some highlighted that improvement would always be required and that their programmes were constantly evaluating ways in which the teaching approaches could be improved:

*"So, whether there is a need for improvement, there's always a need for improvement, you can always learn different ways how to make your content more available for students, more interactive for students, and we keep on doing that, so for every year, we look at the content and we see how it can be improved, and we try to improve, adapt every year with the delivery of our content". (P14 Interview)*

One participant implied that an interactive approach to teaching had to be considered going forward:

*"So I think, for me, the bit of the course that I would like to improve on is the interactive bit, making it less of traditional teaching, because it's more interesting, the knowledge goes in, and when you're teaching clinical roles, it's very important that it's always applied to clinical practice, although it's interesting, abstract knowledge, you've got to give the context of the actual, clinical practice. So that bit, I think I need to tie in that connection... tie in the academic knowledge and the clinical practice. So it's more interactive stuff, that's what I'm working on at the moment". (P3 Interview)*

A teaching approach which participants mentioned as gaining traction was simulation-based education (SBE) and role-plays:

*"Some of our lectures sometimes can be a bit heavy-going, so we are all of the team now looking at how we break the lectures up, because the most effective way to teach them is simulation". (P8 Interview)*

*"We do quite a lot of mock-up stuff, particularly on the consulting, using actors, that's kind of something we do on all of the ACP modules to get that kind of rehearsal element, so I suppose*

*didactic, it wouldn't be how I would describe it, though our actual physical spaces are all very mobile and we know that people sitting in lines and listening for 3 hours at a time it doesn't work, it's just tedious for everybody concerned". (P7 Interview)*

One programme reported how patient actors were brought onto the programme to stimulate interactive discussion:

*"Goldfish bowl approach, which is a whole class-simulated conversation, so we will bring in a patient actor, we will give the patient actor a brief which is based around one of these given topics, so the way that the goldfish bowl works is you have students in the room, in a big circle, you have in the centre, you have the patient actor and the student, one of the students will be role-playing the pharmacist prescriber, but they can at any point, they can take a time out, they can ask everyone else in the room about their opinions, we can have a discussions around it, and then they go back into the consultation, or the student can tap-out and ask one of their colleagues to come in and take over the conversation. So, the whole room has to stay engaged in it, even though the consultation is going through one individual, it's a group consultation". (P9 Interview)*

However, concerns over the practicalities of implementing SBE around prescribing education were reported by one of the participants:

*"We haven't gone down that route because whenever we've tried it in the past, it's been a bit of a nightmare, but we are exploring doing it again, because the university's got an arts department that does sort of stage craft and stuff like that and they've actually started asking us if we could use them, so we will start looking at that and we've actually now got as well quite a lot of very experienced service users who work with us, but we won't be able to do that now, whereas when we've tried it before, it's been a little bit of a disaster if I'm honest, it's not the easiest thing to do. It sounds great in practice, but it's not the easiest thing to actually do, and to make it valuable is not that easy". (P8 Interview)*

Given that SBE incorporates discussions with patient actors, one participant stated that the involvement of real patients in the teaching process would be beneficial:

*"So in terms of improvements, what I think we could do better is to perhaps get more patient involvement, so I'd like to... and this is something I am already kind of proposing to my*

*colleagues, invite some patients to talk about the test for example, it's giving them the real life, their real words, and the real kind of... I just spoke with one of the patients who I know, so like, I have to be ? at work, it takes me one hour to take all my medication in the work... say it to our students, but this is the patient... telling them, it sounds so real". (P16 Interview)*

### 5.3.7.3 Adapting to a post-COVID world

One major area where participants reported a need for improvement was teaching around remote prescribing and adapting to newer prescribing technologies, especially considering the COVID-19 pandemic:

*"I think probably I'd say yes there are because we are going to be putting in elements like remote prescribing, that's an element, because we recognise that with new technologies, some of these prescribers, they're going to be faced in settings where they've got to undertake a consultation by using virtual methods, and for some of that, you know, that's definitely going to be on the increase, so things like Skype and Facetime". (P1 Interview)*

*"We do have a self-directed learning activity on remote prescribing, we don't have anything on video consultations, but we do need to. We do need to try and integrate with that more and we are revising the module become more online anyway and it's perfectly appropriate to have a heavy focus on that, I mean it's very interesting that a lot of the students are now, they don't see patients directly, they have telephone or video conferences with them, many of them work from home, it is a bizarre situation, so yeah, we don't actively teach those at that element now, while we do teach a bit about remote prescribing, but it's something that I'm aware of". (P12 Interview)*

*"Yesterday, we had a meeting and we were discussing about remote consultations, to add lectures on remote consultations. So, we are going to add remote consultations, advantages, disadvantages, because as you understand, 25% of consultations will remain remote once the COVID-19 situation settles down as well. I think it is an important area. Generically, yes, we do teach that, but specifically, we will be starting from December 2020, and we had a meeting yesterday where we discussed about that, and one of my colleagues is going to prepare a lecture on that". (P14 Interview)*

Due to the constraints of the pandemic, some programmes were beginning discussions on how to deliver more remote teaching:

*“It’s not an easy one to teach in class to be honest with you, but we are going to have to do it going forward, one of our challenges will be starting again in September because the university has already told us that the likelihood is that we will not open up as a university as a physical building. So, we have to think about how we are going to teach from home only going forward”*. (P8 Interview)

However, participants voiced their concerns on how such changes to delivery of teaching would impact the in-class experience:

*“We feel that that is a massive enrichment for our in-class experience, I think certainly one of the things that we are mourning a little bit with moving everything online for this current situation”*. (P15 Interview)

*“If we have considerable amount of time where we lose that face-to-face teaching element, that’s a real worry for me”*. (P3 Interview)

#### 5.4 Discussion

This study is the first example of any study which aimed to explore and appraise the educational approaches of UK NMP programmes. Previous studies have focused on the experiences of NMPs developing their expertise whilst undertaking the programme (Abuzour et al, 2015), or the experiences of NMPs learning in practice with their DMPs (Ahjuha, 2009).

The qualitative findings of this study indicated towards standardisation across all programmes around concepts of prescribing safety including drug dosage calculations, prescription-writing and treatment monitoring. Prescription-writing has particularly been shown to be developed extensively across the programmes, both through dedicated in-class sessions and during the prescribers’ time in clinical practice. Prescription-writing also formed an integral part of the prescribing students’ portfolio. The importance afforded by NMP programmes towards these three aspects of prescribing enhances confidence in the prescribing practices of NMPs, given that many prescribing errors conducted by medical prescribers have been associated with inaccurate dosage calculations, poor prescription-writing and poor monitoring of prescribed treatments (Cope et al, 2016; Aronson et al, 2006; Dornan et al, 2009). This can also explain

how limited studies have reported an incredibly low rate of prescribing errors in NMPs (Baqir et al, 2015). However, further studies must be conducted to support the findings of Baqir et al (2015) and investigate whether NMPs have specific areas of weakness in their prescribing practice, using a similar approach to Dornan et al's (2009) EQUIP study on prescribing errors in medical prescribers.

All programmes aimed to inculcate a mindset within prescribers of viewing the prescribing of a medication as the last resort option, however, teaching around alternative, non-pharmacological treatments was an area programmes were still developing. Given the vast numbers of prescribers from different backgrounds enrolling on the programme every intake, it is prudent for programmes to identify and select the most appropriate range of non-pharmacological treatment options that should be taught to prescribers. For example, physical exercise is an approach which can be prescribed as a first-line non-pharmacological treatment for a myriad of conditions, including diabetes, cardiac conditions and even diseases related to mental health such as Dementia (Thompson et al, 2020). Therefore, NMP programmes teaching around prescribing physical exercise would be highly recommended given its value for prescribers across the board.

Areas such as remote prescribing were not covered by any programme, however, each participant stated the aim of enhancing teaching around this area given the current world situation and how healthcare provision would have to adapt. Remote consultations have been successfully established across the globe due to the pandemic (Gadzinski et al, 2020; Hong et al, 2020), so NMP programmes have clear examples from the literature of successful remote consultations and can use these to implement teaching around effective remote prescribing within their respective curriculum.

All programmes looked to assess the same prescribing competencies of their students through a uniform approach to the assessment process with written and numeracy examinations and uploading content into portfolios. The use of numeracy examinations and portfolio highlight a clear distinction from orthodox prescribing curricula seen in medical schools, where the main assessment approaches to examine prescribing skill and competency are limited to written examinations such as the Prescribing Safety Assessment (PSA) and OSCEs. Again, this highlights the findings of Baqir et al (2015) with regards to low prescribing error rates in NMPs and if these findings are supported by further studies, will serve to

demonstrate how the stringent assessment approaches of NMP programmes ensure that prescribers are safe once they have qualified and entered clinical practice as independent prescribers.

Regarding OSCEs however, there was a clear divide. Many participants highlighted the obsolete nature of OSCEs given the opportunities students have during their time in practice with their clinical supervisors, however, participants leading programmes where OSCEs are still an integral part of the assessment process provided compelling reasons for continuing their use, particularly the value they provide to assessment and learning. Despite numerous opportunities of demonstrating clinical practice within the workplace, OSCEs are a proven and successful method of assessment which can examine a myriad of skills pertaining to prescribing and additionally, recorded OSCEs are an important source of feedback for students to reflect upon and aid in improving prescribing practice (Franklin, 2005; Meecham et al, 2011). Therefore, even if programme leads deem the implementation of summative OSCEs as unfeasible, they must consider their value as a formative assessment and their robustness as a learning tool for prescribing practice.

One of the major strengths of the teaching approaches of NMP programmes was the group learning approach. The synergistic learning stimulated by group exercises within the programme enabled the development of communication skills with other prescribers, which would potentially come under the category of hidden curriculum (Hafferty et al, 2015). All of the programme leads highlighted the value of group learning and how it established a rich learning environment within the classroom. This is amplified by the small cohort numbers seen across most programmes. As most NMP programmes enrol a small number of students when compared to undergraduate programmes, the group exercises can be classed as small-group teaching, which research has suggested to be more effective in teaching prescribing as compared to large-group teaching (Omer and Danopolous et al, 2020). However, it is yet to be investigated in-depth whether small group learning actually produces safer and competent prescribers in practice, so research must be conducted to compare the prescribing competencies of prescribers who have undergone small group and large group teaching respectively.

Flipped classroom learning enables didactic material to be assigned to learners before attending classes, where more time is afforded to active learning strategies such as reflections



and group discussions (Hurtubise et al, 2015). Flipped classroom approaches would particularly be suited for NMP programmes, given that students are studying on a part-time basis and are attempting to balance academic and work-based commitments. Given that the group learning aspect is a major strength of the programme, the flipped classroom approach can potentially be implemented in a seamless manner and further bolster interprofessional and group learning on the programme. However, this must be validated through comparative trials between NMP students undertaking flipped classroom learning with those learning through traditional lectures. The same would need to be done to evaluate the success of teaching approaches involving SBE. Moreover, as some programmes help students formulate a plan around CPD after qualification, there would need to be measures implemented to ensure prescribers are adhering to this plan and are both maintaining and updating their prescribing competencies. This could prove to further understand how much value undertaking the NMP programme provides to the prescriber as they progress in their professional practice.

#### **5.4.1 Limitations**

This study had certain limitations. The number of NMP programme leads interviewed as part of this study represented just under a quarter of programmes across the country. Had the programme lead from every UK NMP programme been interviewed, we may have obtained information on additional education approaches unknown to the participants selected for this study, including possibly educational approaches that are unconventional as compared to those seen on programmes we obtained information from.

The study was only limited to interviewing programme leads, who were mainly members of teaching staff on the programme. To further widen the breadth of perspectives, it would be prudent to obtain the views of other members of the teaching staff on each programme and even guest lecturers, who may have offered additional perspectives to either complement or even contradict the views and perspectives of programme leads. Moreover, other stakeholders such as members of regulatory bodies, who bear a major influence upon the development of programme curricula, and prescribers who have undertaken these programmes would provide their own perspectives on the optimal functioning of the programme and areas of improvement.

Additionally, changes to current approaches can only be implemented when qualitative perceptions on teaching and assessment approaches are triangulated with objective, quantitative data which examines the effects of the current approaches or lack thereof.

## **5.5 Conclusions**

This study has highlighted the various teaching approaches programmes use to train NMPs and make them as safe and competent in practice as possible. Stringent assessment approaches are utilised to ensure preparedness to prescribe and so far, limited studies demonstrating low error rates in NMPs appear to indicate the effectiveness of both teaching and assessment methods of NMP programmes. However, programme leads have also identified areas where teaching and assessment approaches would need to be improved, such as supplementing traditional teaching approaches with interactive, blended and simulated learning. These views would need to be validated and supported through seeking perspectives of NMPs who have undertaken these programmes and be compared to the perspectives of programme leads. Additionally, teaching and assessment approaches which programme leads have highlighted as needing improvement should be modified and their effectiveness should be examined through longitudinal studies and the outcomes should be determined as positive before these modified approaches are recommended for prescribing curricula in countries seeking to expand prescribing authority to additional healthcare professionals.

## **Chapter Six: Educating Non-Medical Prescribers in the UK – Perspectives and Appraisals of Programme Graduates**

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This Chapter presents the results of the vignette exercise and semi-structured interviews with NMP programme graduates. The vignette exercise highlights the extent to which prescribers demonstrate the core qualities of good prescribing as set out in Study One when prescribing for paper-based scenarios. The semi-structured interviews reflect the perceived strengths and weaknesses of the programmes and the suggestions for improvement from programme graduates.

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### **6.1 Introduction**

The aim of this study was to explore the extent to which graduates from NMP programmes demonstrated the qualities of a high-level prescriber, investigate their views on how the teaching and educational approaches on the programme influenced their prescribing practice and obtain appraisals on how the programme can be improved for future NMP student cohorts.

### **6.2 Methods**

#### **6.2.1 Study Design**

Like Study Two, this study also utilised a qualitative research design due to the study's focus on exploring graduates' demonstration of good prescribing practice and obtaining their views and perspectives on the educational approaches of the NMP programmes.

#### **6.2.2 Participants and Sampling**

Participants were selected based on being graduates from non-medical prescribing programmes. Recruitment followed a snowball sampling strategy, where NMP programme leads who had been interviewed as part of Study Two were contacted through email to circulate the research advertisement (Appendix 15) to graduates they had formerly taught on the programme.

### 6.2.3 Recruitment Procedure

Graduates who were recruited to the study contacted the researcher by email to express their interest in participating in the study. Subsequently, the researcher sent the prospective participant an information sheet relevant to the study and a consent form (Appendices 17 and 18 respectively). Given that studies using thematic analysis generally include between 12-18 participants (Braun and Clarke, 2006), this study interviewed 18 participants, including graduates from multiple programmes across the UK, including South of England, the Midlands, North of England and Scotland. The first two participants served as pilot interviewees, however, the robustness of both interviews enabled them to be included in the overall data set.

### 6.2.4 Ethical requirements

Ethical approval was granted by the HYMS Ethics Committee under their file number 1924. It was essential for the prospective participant to sign and return the consent form before the researcher could confirm their participation in the study and organise a mutually convenient date and time to conduct the interview.

### 6.2.5 Data Collection

Data collection took place from September to November 2020. All interviews were conducted through the online Zoom platform due to the constraints of the COVID-19 pandemic and consisted of two phases. Phase one involved the vignette exercise described in Chapter Five. Vignettes were clinical prescribing exam scenarios purchased from the BMJ OnExamination website or adapted from the NICE Clinical Guidelines. Whilst organising the interview, participants were asked about the clinical areas they were most familiar prescribing in and subsequently, a set of three clinical prescribing scenarios were emailed to the participant five minutes prior to the interview based on their preferences of clinical areas. Upon beginning the interview, I allowed the participant to read and verbalise out loud their decision-making process around what they would prescribe for the patient presented in each clinical scenario. The purpose was to record the extent to which the participant demonstrates the qualities of a high-level prescriber as recommended in Study One.

Following the vignette exercise, Phase Two involved the traditional semi-structured interview procedure. Here, participants could openly discuss, reflect upon and appraise the educational approaches, how they aided in developing their prescribing practice, the perceived strengths and weaknesses of the programme and their recommendations regarding possible improvements to the NMP programme.

Like Study Two, the interview questions were informed by the results of the documentary analysis in Study One, however, prompts accompanying the interview questions were informed by the results of Study Two and responses provided by programme leads.

All interviews varied from lasting 30-70 minutes and were transcribed verbatim by me alone. I examined all the transcripts through line-by-line checking for congruence between recordings and transcripts.

#### 6.5.6 Data Analysis

As was the case in Study Two, interview transcripts were analysed through a hybrid inductive and deductive thematic analysis approach as recommended by Fereday and Muir-Cochrane (2006), as explained in Chapter Five of the thesis. However, the vignette exercise was coded wholly through an inductive approach, where the verbalised prescribing process of participants was mapped to the documentary analysis in Study One. Phase Two of the interview followed the same coding process as Study Two, where coding pertaining to taught content and educational approaches was conducted deductively, documentary analysis, whilst on the other hand, codes pertaining to the appraisals of programme graduates, perceived strengths and weaknesses and their perspectives on how the programme could be modified were identified inductively from the data itself.

Interview transcripts were read and coded both openly and in-depth by me alone. This was conducted using the NVivo 12 software. Transcripts were independently coded line-by-line by me and once the coding process was complete, I held in-depth discussions with the supervisory team on the categories of the codes and how they could be clustered into appropriate themes. No new categories were identified after 13 interviews, with the final five transcripts serving to ensure data saturation (Clarke and Braun, 2014). Final themes were agreed by myself and the supervisory team. Memos compiled during the reading and open

coding phase of data analysis were preserved to help inform the discussion section of the study.

## 6.3 Results

14 nurses, two pharmacists, one physiotherapist and one podiatrist participated in this study. They were actively prescribing in various specialties. Before the interview, all prescribers were asked to choose the clinical therapeutic areas they felt competent prescribing in, and they were provided with clinical exam scenarios accordingly.

### 6.3.1 Vignette Exercise

#### 6.3.1.1 Obtaining Prior Information to Inform Prescriptions

The participants would thoroughly read the clinical scenarios to gain familiarisation of the patient being presented in the scenario, and the first step which universally came to mind was the patient's physical history, including conditions they had been suffering from before and medications they had or were still taking:

*"So obviously I'd do a full medical history, as I said, and I'd ask her what medication that she's on currently, if any, if there's any prescribed". (P15 Interview)*

*"We'd go through family history and things like that as well. Consider birth and developments, febrile seizures, what else? Any history of meningitis, encephalitis those kind of problems. Also, was there any traumas to the brain ever in the past?". (P9 Interview)*

To be able to prescribe an appropriate medication, it is necessary that the prescriber can accurately diagnose the patient's condition. The participant below highlighted the importance of physical history in this process:

*"Any immediate action that she took to address the abrasion that she got because I think that, for me, the history is probably 80% of the diagnosis". (P16 Interview)*

Additionally, the importance around having enough information around physical history was highlighted further by the participant below:

*"I would look in to see what medication he's taking for that, what his renal function is. There's too little information really then to make an informed decision about what treatment I would do next". (P18 Interview)*

To further inform the diagnostic decision-making process, prescribers also afforded great importance towards supplementing patient history with obtaining information through relevant physical examinations:

*"I wouldn't necessarily in that interim, just reading that go to prescribe him. I would find out in an examination. In this instance I would do a full-- after the initial medical history, I would do a full diabetic assessment because of his vascular status". (P15 Interview)*

*"What his renal function is, what his diabetes medication is, what his blood pressure is, so much more information I would want for him before I would begin to make a decision of what to do". (P18 Interview)*

*"I'd want to know I'd want a full pain assessment really and make sure that this was definitely osteoarthritis. We often see people I've mixed disease, where it's osteo plus or minus and a bit of inflammation as well, or one drives the other, or whatever. We would need to know what the full assessment of his case is. Has he had recent x-rays? Does that inform us any more about his condition?". (P5 Interview)*

Overall, prescribers would ensure that before embarking upon deducing an appropriate medication(s) for prescription, they had access to as much information as possible about the patient. This is further encapsulated by the participant below, who mentioned the importance of understanding the patient's symptoms:

*"Also, some probably associated symptoms of this. What else has been affected with her feeling weak and nauseated? Vomiting, diarrhea, shaking, all the soft signs of sepsis would be pretty much at the forefront of my mind because I think, we should always think sepsis, shouldn't we? Certainly, I'd be thinking, "Is this an emergency situation that we need to be not beating about the bush here and we head into A&E?" We're pretending I'm in GP surgery?". (P16 Interview)*

Additionally, participants aimed to consider the source of the clinical problem being presented to them:

*“The main thing that stands out is that she's got symptoms of an infection. Although she's young, because the infection seems to be getting worse because it happened three days ago and it's getting painful and there's a chance that this might be infected. If it was in the garden it might be bacteria and things that might have got into the wound. She says the pain's getting worse”.* (P1 Interview)

*“I'd want to know, what happened with this abrasion in terms of what caused it? Was it on a thorn? Or was it from a fall? Or was it a tick? Was it a spider bite or an ant bite? All of those sorts of things, we're a bit vague on that”.* (P16 Interview)

*“I'd want to know what other possible causes there are to this agitation. Just reading that scenario, if I'd read that in the referral, that was all I'd got. I'd want to know, “Is there any other reason why this man's agitated? What blood tests has he had recently? What's going on here?”.* (P2 Interview)

#### 6.3.1.2 The Drug Prescription Itself

In certain case scenarios, prescribers could choose a drug medication in a simple manner once they were confident enough information was available to do so:

*“63-year-old hypertension he's already on the maximum dose on Amlodipine it's the only antihypertensive he's taking so I would add in ramipril next or lisinopril, one of the ACEs”.* (P18 Interview)

*“As I say, first thing, steroid. That is what this indicated. Well, first get a proper history of everything and imaging and what is happening. Then probably the safest thing, if it's to be a pain and if it was any inflammation would be steroids. Even is not inflammation, steroids one or two injections can be useful for osteoarthritis, then it tends not to work anymore but it can help really well”.* (P5 Interview)

On the contrary, there were many case scenarios where prescribers had to account for the individual patient, and due to some patients being in high-risk groups (i.e. older age, pregnant), prescribing an appropriate medication was more of a challenge:

*“I think for him, I'd probably go with something like naproxen rather than ibuprofen because if he is older, he's 85 and he might be more susceptible to the gastrointestinal side-effects from ibuprofen. I don't want him to get a gastric bleed and have those side effects if he's got*



*cognitive impairment because he might not be able to pick up on the warning signs like black stools. If we give him a more gastro-friendly NSAID like naproxen, that might be better for him". (P1 Interview)*

*"We know that paracetamol has very little effect in osteoarthritis, so this whole thing of how he is with the cognitive impairment and confusion, it's going to be difficult for them to use a TENS machine or rub something in two or three times a day, so it's probably that I would go with a low dose BuTrans patch, a 5 mgs opioid patch, which is the volume he'd need, to put that on every week. In fact, he'd need a carer to do that, or to keep him safe, a carer that could write the day of the week on it". (P12 Interview)*

*"Okay. We'd avoid valproate because unless women have tried and failed other drugs and are of childbearing age, then we should avoid it because of the risk of malformation of problems with the baby and long-term problems with learning disability, autism and developmental delay for babies that are exposed to valproate". (P9 Interview)*

Prescribers were also able to think in a more holistic manner when considering the most appropriate treatment for the patient. This included the consideration of non-pharmacological treatments and measures:

*"I'd probably give him capsaicin ointment on both knees. I'd also ask him to think about physios, and also look at his weight control to see whether his weight was part of the problem because we know with knee pain, especially osteoporotic knee pain, if we could lose some significant weight, then that's helpful. Sometimes, the prescriber's decision is not what you would prescribe, it's what you wouldn't prescribe as well, isn't it?". (P12 Interview)*

*"Looking at conservative treatments first. We prescribe as a last resort, which is medication". (P15 Interview)*

*"I guess that you asked me specifically about pharmacological interventions that I would want to try and initiate some non-pharmacological interventions as well". (P4 Interview)*

There was a commonality across the thinking around how in many cases, the consideration of not prescribing a medication at all was just as important as prescribing a medication:

*"I'm not so sure in this circumstance with it being the first seizure of that I would prescribe anything". (P10 Interview)*

*“As a physio I understand that sometimes it can be joint below, or above. The pain could be coming from his hip and nothing to do with the knee. It could be a leg length discrepancy that could be addressed without the need to prescribe something different, or additional. It could actually be something that doesn't need a prescription at all”*. (P16 Interview)

*“There might be no benefits to medication. Why do they want to sedate him? This whole one concerns me and I would want to look at exactly what the cause is. There may not be benefits from medication”*. (P2 Interview)

### 6.3.1.3 Safety Considerations around Prescribing

One of the biggest considerations around prescribing safety is the ability to accurately calculate drug dosages which are safe and effective for the patient. There was considerable evidence that the prescribers were meticulous in calculating appropriate dosages when prescribing:

*“My gut instinct is to recommend something like cyclizine, 50 milligrams, three times a day, I think but if you start-- bowel obstruction from colon cancer-- he's been taking oral morphine for two weeks. He's probably got opioid induced constipation”*. (P1 Interview)

*“700 micrograms per kilo once daily. Normally, what we do here is we try to keep them on the same dose, so as she gains weight, we don't necessarily increase the dose up unless it's needed”*. (P14 Interview)

*“Probably Amoxicillin 500-milligram tablets. I would probably suggest a short course of steroids, so Prednisone oral tablets, 30 milligrams to be taken once daily for seven days”*. (P17 Interview)

The participant below explained how accurate dosage calculations were vital to eliminate the potential for adverse side-effects from occurring:

*“I think two and a half milligrams is the most effective dose. I think if you give five milligram, you just get more side-effects than you do for the blood pressure control, so I'd probably stick to two and a half milligrams”* (P1 interview).

Given the vast range of prescribing guidelines and formularies available to help guide practice, prescribers demonstrated awareness of the different types of guidelines available to them and how they helped inform their daily practice:

*"I would default to the Lothian Joint Formulary and BNF guidance also". (P11 Interview)*

*"We've got a Lothian joint formulary that gives us guidance on what antibiotics we use for our trust. I would need to consult back to check which antibiotics it would use prophylaxis for that". (P6 Interview)*

*"To be honest, they are all things that I would deal with in my working life. The meningitis thing, a lot of our stuff is protocolized especially when you're walking in the front door. We have all these protocols for most things. With regards to prescribing, you can pretty much look up the guidelines". (P7 Interview)*

There was widespread acknowledgement by prescribers throughout the vignette exercise that their job as the prescriber goes beyond merely prescribing a medication and that they have a major role in ongoing monitoring of prescribed treatment:

*"The other thing I would want to do once he is completely cleared out is potentially do a marker study on him just to see if there's any sort of bowel dysmotility going on there and is that why it's taking so long for stools to pass. Has he got some lazy bowel anywhere and is that why he's not opening his bowels as regular or is just since the constipation? Normally what we do is we do a bowel clearout. Then we will give bowel biomarkers. They're just like little triangles and squares and they all have different weights. They swallow those and then when we X-ray them, we can see how far down the digestive track they've gone". (P14 Interview)*

*"I would probably give him 30 milligram of steroids for five days with a review in five days' time to see how well that had worked. No, I would see how we went and if after the week, he still wasn't any better I'll maybe think about changing his inhaler but I think if he's just got a cold, I think he just needs to-- he's got no signs of infection, so I think it's just maybe a slight exacerbation, so a short course of steroids should work with that one. Prednisone 30 milligrams once daily for five days". (P17 Interview)*

*"I'd be looking at prescribing something like sertraline, but I'd want to monitor this very closely. I'd want to check the expectations, they don't work immediately, and make sure I'd seen the person I think its within two weeks in NICE guidelines". (P2 Interview)*

#### 6.3.1.4 Communication Skills

Robust communication with the patient plays an indispensable role in the overall prescribing process, and this was apparent across all areas of practice:

*"If I was in real life and I saw this patient, then I would actually ask her, "Have you been taking your medication or not?" or "Is there anything where you stopped your medication from home". (P1 Interview)*

The participant below also pointed out how in some cases, although communication with the patients' friends and family had its place, information communicated from the individual patient was the most important factor to consider:

*"I would want to go through what's happened with the person. I would notice it says she, as well as her parents, are very keen to try anti-depressants, so I would want to make sure I was seeing this person on their own, maybe with a chaperone or whatever. I wouldn't want the parents to overly influence this. They can be good, but not always. This is about this individual". (P2 Interview)*

It was evident participants believed that communication was instrumental in keeping patients well-informed before they embarked on the prescribed treatment regimen:

*"If her saturations were staying steady, 96 plus a few, looking comfortable, then I would encourage her to use her blue inhaler frequently, as she obviously has been doing up until now. I would be encouraging her to use it on every four hours at a minimum, but probably multi-dosing as required". (P11 Interview)*

*"It's no trouble to choose between them. I'd want to give this person the information on antidepressants and how they work, so they had a choice in what they had". (P2 Interview)*

Further to this, communication served an important tool for prescribers to use as a means of subtly gaining information pertaining to their medical history:

*“If I was in real life and I saw this patient, then I would actually ask her, “Have you been taking your medication or not?” or “Is there anything where you stopped your medication from home”, like stopping her blood pressure from going up, so if she ran to the clinic or something, then I'd want to get the blood pressure again”.* (P1 Interview)

*“They're two episodes, so I'd be asking Ayesha herself, I'd ask her lots of questions about how she fell, what was she doing at the time and get a clearer description. On getting that with clearer information and because she's had an episode of unconsciousness”.* (P10 Interview)

*“Dysuria alone might not be indicative of any urinary tract infection without the sample coming back, positive for such. I'd want to ask, do a full systematic inquiry and ask her about other symptoms, such as abdominal pain”.* (P11 Interview)

## **6.3.2 Appraising the Programme**

### **6.3.2.1 Prescriber Insights into Programme**

#### **7.3.2.1.1 Taught Content**

Many participants highlighted differences in how their respective programmes operated and which areas of prescribing they emphasised more learning and teaching upon:

*“At uni, I feel, there's more emphasis on the academic part of the course. For example, they are more into your writing skills and reading skills and they didn't really ask a lot, I felt, about the case. The case study was your only way of trying to get over your expertise and, I felt, letting them know that I have knowledge within my area, but I don't even feel that they were interested in that part”.* (P11 Interview)

The participant below specifically mentioned differences between the prescribing programme they undertook, and a programme undertaken by a colleague:

*“I clearly work alongside other prescribers who are trained in other areas or sorry, done their courses in other universities and their courses were much more geared to teaching about the pharmacokinetics and the biochemistry, et cetera. There was a very basic, very limited approach, but it certainly wasn't in-depth to the extent that, for instance, on another programme where one of my colleagues prescribed or went to prescribe, they went into a lot more depth in that regard”.* (P4 Interview)

Although most participants had completed their prescribing programme within the last five years, there were some who had qualified before then and there were evident changes in how the programme functioned over time. One participant attributed these changes to a rise in patients with long-term conditions over time:

*“Not at the time when I did it, no, not at the time because 2007, we were in a very different world, I think. We didn’t have people living as long with long-term conditions as we’ve got now. What we’re finding with people is that they collect medicines on the way as they get older, and you think, “Why are you taking this medicine? Why is it there as it were?” When I have a consultation, it’s an opportunity for change, it’s an opportunity to look at that”.* (P12 Interview)

As discussed by programme leads, participants affirmed how there was a strong emphasis around creating a personal formulary based on the prescribers’ own area of practice:

*“The program itself was quite well-designed or work-based learning so that the prescribing goals that we were all encouraged to have a formulary of five or six drugs for which we could really focus on those five or six drugs and how we would use them within our current scope of practice. We ran codes to choose areas that we worked in and choose the drugs most appropriately most likely to be involved in those areas”.* (P11 Interview)

*“Yes, there was a heavy emphasis on you need to build your own prescribing repertoire and drugs that you’re familiar with, et cetera, that was heavily emphasized”.* (P4 Interview)

*“You would, right from the start of the course, it was made clear that you would be choosing at least five core drugs, they will become your core formula and you wrote about them and you put some thought into why you chose them, and which ones would I think it’d be prescribing most frequently and find out as much as it could have been”.* (P5 Interview)

It was also an aim for the programme that students can expand their initial drug formulary as they developed their prescribing practice:

*“They certainly encouraged us just to have maybe six to eight drugs initially that was going to be part of your formulary. They were the ones you were going to initially learn about. Certainly in the kinds of disease process that you were most familiar with. Mine was cardiology so that was the kind of drugs I focused on at that point. Then as things progressed, add to your*

*formulary as your confidence and competence grew within other specialties. I'd definitely wouldn't say I'd prescribe everything because I'm not competent in everything". (P6 Interview)*

There was a notion that some programmes facilitated learning around drugs through a self-directed manner:

*"How do I think it did? I mean to be honest, the prescribing course that I undertook was very much a process whereby we were left to our own devices in terms of learning about the drugs that we were using in our daily practice". (P4 Interview)*

*"I feel like because it's a short course and the result of self-directed study". (P17 Interview)*

However, it was highlighted that some programmes did not cover new content pertaining to disease processes:

*"I didn't learn anything new about diseases on the program". (P1 Interview)*

*"For me, I think the one thing that my prescribing course did lack was disease processes. There was a lot about the legality and the policy and pharmacokinetics and pharmacodynamics. In actual fact, when it came to specific disease and processes or even examples of prescribing, they were fairly limited. I think they tried to give an example for each body system". (P7 Interview)*

In general, concepts around prescribing knowledge of diseases and drugs were not covered on programmes specific for pharmacists, given that this was mainly learnt by students from their MPharm degree:

*"Pharmacology wasn't taught. ADME wasn't really taught. Diseases were taught, but it was the same as what I learnt at undergraduate. I also had my MPharm was the same as my independent prescribing qualification". (P1 Interview)*

*"They don't do that, but then, in our defence, a lot of that is covered in our uni degree. Disease pathophysiology, not so much, but definitely, the pharmacokinetics, pharmacodynamics is covered in our university degree. It's not technically covered in the independent prescribing course but it is covered in the university degree. I didn't really feel there was a gap in that way because I already had it". (P14 Interview)*

Participants highlighted how the programme emphasised importance upon following specific local and national prescribing guidelines within their area of practice:

*“Yes. We looked at those. We had to write, like within the case studies and the evidence-based statement, we mentioned, like you say, the NICE guidelines. It was those as well. Then local trust policies and particularly the diabetes center and their antimicrobial policies and things like that”*. (P15 Interview)

*“I had local guidelines, local policies, and procedures of which we have an awful lot in rheumatology, so they would be relevant as well. Very relevant to a lot of the portfolio work that we did and would be to look at local guidelines as well, which are usually also things like professional body guidelines. I don't know if that applies to other areas, but we are regulated quite a lot, not regulated, but in a lot of our guidelines come from the BSR, British Society of Rheumatology, and they make suggestions. Then they are taken on local levels”*. (P5 Interview)

*“Certainly, you own local trust guidelines. We've got them. We've got all the joint formularies, so we prescribe from that. We've got the microbiology guides so then when antibiotic use. They're probably the main ones that we would use”*. (P6 Interview)

One of the most interesting findings around the following of prescribing guidelines was regarding the World Health Organisation's Guide to Good Prescribing (WHO GGP). A plethora of literature worldwide has recommended the use of the WHO GGP as one of the most valuable tools to help inform good prescribing practice and various studies have concluded that adherence to the guidelines in both curriculum development and prescribing practice has led to considerable improvements within prescribing outcomes. However, most of the participants displayed a lack of knowledge of the WHO GGP:

*“We don't reference it in the course at all”*. (P2 Interview)

*“It doesn't surprise me that the World Health Organization has a guide, but I'm not familiar with the document specifically”*. (P4 Interview)

*“No, never heard of it”*. (P7 Interview)

As a result, some participants raised questions as to why there was a lack of awareness around the WHO GGP, providing their own possible explanations:



*“There's obviously something in it that when you actually use it in practice, there's something that doesn't work. I think if it worked in practice everyone would be using it. A lot of the times, these things are developed but the person who has developed them probably hasn't done a day of prescribing in their life. They're probably just missing one or two little points that don't make it as practical. It could be that it's just out there and people don't know about it as much. I think some people look at WHO guidelines and think that they're maybe a bit too robust and that they won't be as specific to what they're going to be doing”. (P14 Interview)*

*“It probably is the case that the curriculum is probably heavily based on it or one of these types of documents, but, I guess that doesn't necessarily mean that filters down to clinical staff who were being taught on the courses. The syllabus could literally echo what the WHO document or guidelines are saying, but if they don't overtly say that in the course—”. (P4 Interview)*

As stated by programme leads, the participants echoed the notion that the programme expected a certain level of professionalism in students before enrolment upon the programme:

*“Yes. It was very assumed. I think it was very assumed that you would have a good sound knowledge already. That was apparent because, as I said to you earlier, many of the people on the course were doing master's level already. They were already working as ACPs in acute areas. They was very, very good knowledge, good sound knowledge of the body and the body systems, much more advanced than I was at that stage for sure”. (P9 Interview)*

*“I'd already worked in pharmacy for three years before that. I'd worked out in community and I'd worked in hospital as well. We knew about the importance of confidentiality. Most people who are going doing a medical prescribing course are healthcare professionals. They know the importance of confidentiality. I would say, yes. That's just kind of the given. I think with the profession you're going into, that just goes hand in hand with it”. (P14 Interview)*

*“I think nursing prepares you for consent, confidentiality, and document writing. Even just writing details down; you need to know how to write. In answer to that one”. (P17 Interview)*

However, when it came to awareness around influences from the pharmaceutical industry, some participants were able to mention instances where their programme covered this:

*“We did actually have a session on that or it was around ethics which is fabulous and obviously very important. That was good and it was great because we had one of the students had worked for Pharma before, he gave us the inside view of-- We have a lot of pharmaceutical reps involved in rheumatology and it's a bit of an ethical minefield and what you can and can't say to them. I guess we were quite aware of, all of that stuff, but no, it definitely covered that. I think it was news to some people, people giving you a free pen and a tourniquet, there's no such thing as a free lunch and all that”. (P5 Interview)*

*“Yes. It was part of the course. I think it's built into the competencies. Also, as I say, it was part of the competencies that we have to achieve. Students, this year, they have to achieve the RPS competencies as well. It mentions those too, in there. They have to give me examples of that. In my field, there's a lot of talk about, for instance, formula companies and the undue pressure that they put on. I think as a cohort of specialist community public health nurses, we're quite aware of that”. (P8 Interview)*

*“Yes, they did cover the ABPI guidance and things. It was definitely mentioned”. (P9 Interview)*

As discussed by programme leads, all participants had undertaken assessments including written and drug dosage calculation exams, and were also required to compile a portfolio:

*“We covered it in session and then when we did the portfolio that we had to hand in with the evidence that we'd-- we had to provide evidence that we'd made so many prescribing decisions rather than physically bringing in completed prescriptions”. (P4 Interview)*

However, there were several participants who had not undertaken OSCEs:

*“Did we do OSCEs for prescribing? No OSCEs, but we did two formal computer exams. Everything else with portfolio based”. (P11 Interview)*

*“Well, so they will go in and do a consultation, have a clinical scenario like you presented me with, and then go through. No, it's-- well, certainly that wasn't the case then, whether that has changed, I'm unsure, but certainly, in 2016, there was no OSCE and there wasn't any talk of introducing OSCEs at that time”. (P4 Interview)*

Again, one participant echoed the views of some programme leads who stated that OSCEs were not used due to the time prescribers spent in practice during the programme:

*“We didn't do OSCEs for this. No, we just did. Oh, sorry, I suppose we did, but it wasn't in our college, so you had to choose the list, they did this in England as well, but a designated medical practitioner, an DMP, that was a doctor within your department. I think they're going to change it so it can be any prescriber, but it's a senior doctor. You worked very closely with them and we had to spend 78 hours of supervised time with a DMP”.* (P5 Interview)

Having a mentor or supervisor during time in practice was a major feature of the programme that was mentioned by many participants:

*“We would have snapped it's like you've had here, I'd see patients regularly, and then take that prescribing an intervention back to my mentor and we discuss it, and then I would log it in my and prescribing workbook”.* (P11 Interview)

*“Yes, it did. That was because in it, you have to do your eight hours with a pharmacist. Eight hours with a pharmacist, I did eight hours with a non-medical prescriber, who was my clinical lead. Then there was my mentor, who was a consultant endocrinologist”.* (P15 Interview)

*“The support I had in practice was phenomenal. I had a brilliant mentor in practice who helped me. When I wasn't prescribing, I would assess patients and go and speak to her about each of them so she could debrief me and we came up with a treatment for that which was brilliant and that's the way I like to learn. I learn by doing really so I found that really beneficial”.* (P18 Interview)

*“As part of the course, they have to stipulate that you have to work with your mentor, and you have to get more involved with them. I think the kind of the more prescribing part of it, I'd like to see a lot more on that”.* (P7 Interview)

This enabled the participants to see the programme as the beginning of a prescribing journey:

*“There was an emphasis that you do need to keep learning, this course isn't the end, this is the beginning of how you learn how to prescribe. It didn't really teach us how to find or evaluate which course might be good for us and our learning needs. Part of the course was about identifying your own learning needs and reflecting on that”.* (P1 Interview)

*“From that, I just think it gave me the foundations for me as a person and as an individual to then go and seek things out that I need to do. However, saying that I do know there's*

*prescribers out there who I've trained with at the same time who've done nothing but prescribe and just get on with it". (P3 Interview)*

*"What I think the course is saying is, "You are not doctors. You are an independent non-medical prescriber." Never forget that. Never forget that. Never think for one minute that you are a doctor. You are a non-medical prescriber. You must, must, must, always prescribe safely. That's what the course should be about". (P16 Interview)*

### 6.3.2.2 Strengths of the NMP Programme

#### 6.3.2.2.1 Teaching around Prescribing Safety

There was a consensus amongst prescribers that the programme strove to emphasise prescribing safety as much as possible throughout the six months of study:

*"I think the course is more based on safety, it's on looking at your own competencies, the legal aspects of prescribing. You do the pharmacokinetics, and pharmacodynamics on the course, it gives you a better idea of why it's important to do what we do. Specific prescribing, I think it helps to look at the safety aspects of things". (P18 Interview)*

*"I don't know what your experience is, I would say that safety is the predominant theme that runs through the non-medical prescribing programs that I deal with. I think that, again, there's good and bad with that really". (P8 Interview)*

The participant below rationalised that the reason behind such an emphasis around safety is due to the weight of responsibility a prescriber needs to feel in practice as they write prescriptions and the dangers of potential errors which are present should there be any miscalculations or negligence during the prescribing process:

*"Yes, I think what it did do was it made all of us hyper-aware of the fact that you print that prescription and you sign your name against it, you carry the weight of that. I think with because that was laid on quite heavily, I think with that it brings the awareness that in every scenario you need to check and check again and to think of all your options. What seem like simple things can easily slip through the net, so just checking the simple thing and making sure that all of the T's are crossed and I's are dotted and things. I remember feeling at the time that it was quite a weighty responsibility, so I think it must have impressed that on us". (P11 Interview)*

*“Yes, I do. I think because there is such a responsibility attached to prescribing, I think that was something that was delivered quite well. I still think it's still a nerve-racking thing, no matter how much somebody reassures you, particularly down the whole safety aspect of it. One wrong number, one misdirection, it can be quite catastrophic. I feel like that was adequately delivered to make you aware of just how big of a responsibility it is”. (P17 Interview)*

As a result, participants reported how teaching around prescribing safety was generally at a high level across NMP programmes:

*“Yes, definitely. Safety netting, you had to demonstrate that all the time. It gave me some very good principles to make sure that safety netting is there and being launched into COVID, safety netting was even more important. We were having to come out of our comfort zone in terms of prescribing and do things that we wouldn't normally do. That was difficult”. (P13 Interview)*

Some participants provided specific areas of prescribing safety around which the programme delivered a high-level of training and education, such as prescription-writing, awareness of prescribing errors and treatment monitoring:

*“They give us practicing handwriting prescriptions which is a handy tool. Like the structure of a prescription but it's very rare that I would actually handwrite a prescription now because everything's electronic. I'm trying to think. Say the things again that you mentioned under safety”. (P14 Interview)*

*“There was-- I seem to remember on the-- there was an exercise in class where we had to complete a prescription and then, we would feed that back to the class and they would talk about what we'd not done and what we should do”. (P4 Interview)*

*“Again, I think there were case studies discussed of example scenarios of where prescribing decisions going wrong could lead to errors in a relatively broad and generic sense. They did give a reasonable coverage, I think, of where prescribing can go wrong and what things to look out for, and what to monitor”. (P4 Interview)*

*“I remember our sessions with the pharmacist were quite good in terms of safe prescribing practice, monitoring renal function after X, Y, and Z. They were quite-- I felt that they did do a relatively good job actually of covering that”. (P4 Interview)*

#### 6.3.2.2.2 Communication Skills and Group Learning

Along with prescribing safety, participants also expressed a high degree of satisfaction with how programmes taught them to be good communicators in practice and the competencies associated with good communication:

*“I would say yes it does. It talks to you about the patient having involvement in the decision-making process and if they can do that, they're more likely to adhere to medications”.* (P14 Interview)

Participants reported how programmes laid particular emphasis upon the patient-prescriber partnership in a shared decision-making process:

*“I think that, again, there was a big part of my training, was around the consultation itself and consultation styles and the importance of involving the patient in any decision that was made about their care. I would say that was a big part of it. We focused a lot on like Calgary-Cambridge for example and being equal partners in care”.* (P8 Interview)

*“Whether it's taking an oral medication or whether it's putting orthotics in a shoe, it's getting - it's having that good, trying to get over to them that it's a partnership. We did touch that within this prescribing course. I'd already been in that more in-depth in my original degree”.* (P15 Interview)

The participant below explained that programmes educated prescribers on shared decision-making as it enhanced patient medication adherence:

*“It talks to you about the patient having involvement in the decision-making process and if they can do that they're more likely to adhere to medications”.* (P14 Interview)

One of the major strength participants reported pertaining to their prescribing programme was the aspect of group learning. There was universal approval of how programmes established a rich learning environment and the group exercises which took place to enhance interprofessional learning:

*“We had dieticians on the course. We had paramedics in the course. We had nurses from all areas of health. Yes, I certainly learned from them and I would hope that they learned from me as well and to respect each other”.* (P18 Interview)

*“Yes, there were group sessions. They did put a lot of emphasis on the fact that there were lots of different specialties in the room and that we should utilize each other's different perspectives and different roles. In fact, they really did lean into that at times. They would talk about the importance of communicating. For instance, if they were starting therapies as an inpatient or as a specialty team, and then they're going to be followed up by the GP, for instance, making sure that it's well-communicated whether there's things that need to be monitored, renal function, liver function, et cetera, what the plan may be if there are deteriorations in certain things. There was certainly a relatively weighty consideration of, I think, communication with other health professionals, as well as the consultation with the patient specifically”. (P4 Interview)*

Participants talked about how the current restrictions due to the COVID-19 pandemic and the subsequent suspension of face-to-face learning meant that students undertaking the programme at the present time were being deprived of this learning environment and opportunity to further understand prescribers from different backgrounds:

*“I think it works well, but I think in the current situation, I really, really feel for the current students who aren't able to experience that face to face in a room, we're talking one to one here and it's working, lovely, but if there was 10 of us, and we all tried to say something at the same time, it wouldn't work, would it?”. (P16 Interview)*

*“Yes. I think, obviously, because of COVID, nothing like that has happened recently. It is kind of good knowing-- being reminded that you have got that group of people who you can go to and ask questions. I think everybody prescribes a little bit differently because obviously, a lot of prescribers here prescribe in their specialized areas, everyone is different. The groups that I have been to, I've found very useful, but unfortunately, because of the COVID, that's all stopped for now”. (P17 Interview)*

#### 6.3.2.2.3 Continuing Professional Development (CPD)

Overall, prescribers were satisfied with their programmes in how they emphasised CPD and remaining updated on current research within their area of practice:

*“I think it was covered nicely. You were getting all. There was some good National Prescribing Centre stuff. NICE still do it, actually, about how to-- NICE refer to the National Prescribing*

*Centre about how to sort yourself out in terms of what research you look at and we filter things". (P2 Interview)*

*"I think the program did a fairly good job of that. I think because we were doing a higher-level degree course anyway, I think the expectation that we would all be proficient with research and literature searches, and searching for evidence is there anyway, but it was part of the prescribing program. We were expected to keep our knowledge up to date and we had yearly updates. We used to have, we still have this, we still have people coming into practices to update us. I think the course did a fairly good job of that. I think they knew that we would be doing that anyway, but it was part of the course, yes". (P8 Interview)*

The participant below reported how their programme urged students to consider how their prescribing practice would develop beyond the programme and how they would stay up to date in their area of practice:

*"I think it really focussed on the importance of that. There was emphasis to say, "This isn't about the next six months; this is about the next so many years. This is about maintaining you safe for the future." I know that it was not a tick box exercise. It was very much about making sure that we are producing safe prescribers going to go on be useful to people". (P16 Interview)*

#### 6.3.2.2.4 Value of Assessment Approaches and OSCEs

Although there was an acknowledgement that the prescribing programme assessed students through a range of approaches, there was widespread support from participants around the stringency and frequency of assessments:

*"Well, I think what you had to learn for the assessments was absolutely appropriate. It's just absolutely appropriate, and I wouldn't mind being expected to learn twice as much if that were the expectation, because I find the learning fascinating". (P5 Interview)*

*"I think prescribing is a very huge responsibility. Usually, they can have given somebody something that could harm them at the end of the day, whether it's just through adverse side effects or an adverse event or something more. I think it has to be a very strict assessment. I think assessment protocols need to be strict. I maybe even feel the assessments could have been harder or worse". (P6 Interview)*



Participants felt that due to the immense responsibility prescribing puts upon them, strictness in assessment was compulsory:

*“Absolutely, but I will be honest. I'm not the most academic, I feel I'm more hands-on, so to be faced with so much pressure of an exam with that kind of pass mark, an OSCE, a portfolio, and an essay, but I think that it needed all of those things for me to be able to prove that, throughout my course, that I was going to be a competent prescriber at the end of it. I think that for all, it was quite intimidating and quite worrying and a lot of work. I feel like that is what is required in order to ensure that people who are passing these are passing well enough to be prescribers”*. (P17 Interview)

*“I think the assessment is key. A good or bad assessment can make your outcome go in a certain direction, can't it? The strength of the assessment is more likely to lead to a successful prescribing or not prescribing outcome”*. (P8 Interview)

Participants also highlighted how collectively, assessments on the programme tested multiple areas and competencies pertaining to prescribing practice:

*“We did a 3,000-word assignment, if I get my head around it, 4,000 word clear strategic. You pick the case relevant to you. You talked about concordance, you talked about the legal ethical issues, you talked about drugs, you talked about the side effects, you talked about the management, you talked about everything, basically, you did with prescribing. It was case based. You have to put your history and your examination in as well. That they prescribed it, they're marking you that you're hitting the right area with your prescribing”*. (P3 Interview)

*“I think it pushed me to be a better prescriber. As a physio prescriber, it's new, and I needed to know everything about prescribing to be safe, in my view that's how I felt”*. (P16 Interview)

*“The portfolio that we had to complete, yes, it was really useful to go into depth with medication, and to learn to look at it and why to look at it and where to get the information from for drugs if it's not obvious in the BNF or wherever. Yes, I found it all useful”*. (P18 Interview)

Only over a half of participants undertook OSCEs as part of their assessment. However, all participants reported positive impressions and perspectives around OSCEs, praising their value:

*“I am a fan of OSCEs, particularly of history-taking. That's the one I specialize in. I've always [crosstalk] on the history taking OSCE. It's changed every time”.* (P2 Interview)

Many participants who undertook OSCEs praised them as a good source of feedback and a positive learning experience around their individual prescribing practice:

*“I think they're absolutely essential. We were videoed as well. I think it's very essential. Again, I suppose it's a research in its own right. It's just because of the actors, and what information they've got. In some respects, I think they have their place, definitely”.* (P10 Interview)

*“I thought it was a great learning experience. I think it's way better than an actual sit-down exam. It's more real life. It's just more realistic so I can get better. At the end of the day, we're going to be patient-facing focused for the rest of our careers so we need to get used to speaking to patients”.* (P14 Interview)

*“I think they were a very valuable experience. I think we learned a lot from them. Yes, definitely”.* (P18 Interview)

One participant highlighted how OSCEs should be implemented more going forward as part of a blended learning approach within prescribing programmes:

*“As part of a blended approach to teaching, I think OSCEs have their place. That was a crop of nine students who thought we should have had much more OSCE style learning and far less didactic lectures and presentations. I know that they're controversial, but the evidence shows they've got benefit, I guess, and I think they do”.* (P8 Interview)

### 6.3.2.3 Criticism of NMP Programmes

#### 6.3.2.3.1 Lack of teaching around Disease, Drugs and Non-Pharmacological Treatments

Despite the strong focus prescribing programmes put upon safety and communication, many participants felt more could have been done to teach concepts pertaining to prescribing knowledge, especially around pharmacology:

*“I think that I would have liked more pharmacology. I would have liked more science in the course rather than the rules and regulations. Pharmacology, it should be more about that, I think, and understanding what you prescribe and how the drugs work. I wanted more than that. I think there wasn't enough of that.”.* (P15 Interview)

*“We had a very good pharmacology tutor. I think now that I teach on courses with, potentially, has pharmacists on as well, more pharmacology would have been really helpful”. (P2 Interview)*

*“I think, my one criticism, and we've covered that to some degree already was, I don't think they went into sufficient depth about the pharmacokinetics, the pharmacology, the biomechanics of how certain drugs work. I feel that potentially there's an area of vulnerability there in terms of if you don't know how a drug that you're prescribing is working in that respect, then there's potential vulnerability there and potential danger. I think that was definitely a shortcoming and I fed that back to the program, whether that's changed or not now is unclear to me”. (P4 Interview)*

One participant stated that although pharmacology was covered, there was not enough on the actions and mechanisms of specific drugs:

*“More teaching on specific areas or specific drug types or groups of drugs. All they really talked about was the pharmacology side of it. That was the only teaching the uni did. They didn't do any teaching on the actual drug groups and pathways and things”. (P6 Interview)*

Additionally, some participants highlighted the lack of teaching around disease on the programme:

*“I didn't learn anything new about diseases on the program”. (P1 Interview)*

*“For me, I think the one thing that my prescribing course did lack was disease processes. There was a lot about the legality and the policy and pharmacokinetics and pharmacodynamics. In actual fact, when it came to specific disease and processes or even examples of prescribing, they were fairly limited. I think they tried to give an example for each body system. They tried to give an example of prescribing for depression, and an example of prescribing for blood pressure”. (P7 Interview)*

Most participants pointed out that the programme should have provided more awareness around the various non-pharmacological treatment options that should be available to patients in practice:

*“No. No, I don't think it went through that enough. I think it should be highlighted on the front page of the competency guidance really. That actually, it's a lot about, "Okay, you've got this*

*pad now, or ability to prescribe electronically. Don't use it. Don't use it. Think about the alternatives." The temptation is to use it, isn't it?" . (P16 Interview)*

*"No, I wouldn't say it was. I think that probably the assumption was that as part of an prescribing module, that perhaps their assumption was that that's what they wanted us to focus to be on. I don't think they emphasized non-pharmacological therapies at all if I'm honest". (P4 Interview)*

*"Not as much as it could've done, I think. I think that could have been much more of a focus on interventions that are just as if not more helpful for people like we know. All these things, especially when you're a nonmedical prescriber, and you are likely to be in a role, which is more of a holistic care role, we should never lose sight of those things". (P5 Interview)*

#### 6.3.2.3.2 Lack of training around keeping patients well-informed

Although participants praised the NMP programmes for their emphasis on shared decision making with patients in the consultation, there was a common perception that programmes didn't teach them about how prescribers should keep patients well-informed during the course of taking a prescribed treatment:

*"For me anyway, it would have been better to actually have some of the time in a prescribing course dedicated to communication about medicines. Because a lot of the time, people just give you a leaflet. But actually, from my own experiences working in general practice, if you explain what the drug is, how it's going to work, what the side effects are to look out for, patients tend to communicate better than if you don't do that. I think we should spend more time on communication skills, and actually get real patients in, talk to about medication". (P1 Interview)*

*"I don't think they communicate well. I think what I was starting to say before I went off on a tangent was that I think there are practitioners who are happy to spend that time and do that. Maybe that is a generational thing, and maybe that we're getting better at it, but there are still a lot of practitioners out there who aren't good at it and they will just expect patients to do what we tell them and to take the pills that we prescribed them". (P4 Interview)*

One participant highlighted how in some situations, the patient's parents or carers need to be given as much information about the treatment regimen as possible and how the programme needs to do more to educate prescribers about such situations:

*"My line of work is slightly different because it is the parents who are ultimately making the decision. They could have maybe touched a bit more on communication with paediatric patients with regards to discussing it with the parents because you are talking about the third person. If you need to start an adult on a statin because you just have to talk to them and convince them but trying to convince a set of parents that their child is going to starting on a drug that suppresses their immune system that increases certain types of cancer, that's a little bit harder. I think the example that they always give you in your independent prescribing are simple things like antihypertensives and some of the statins. It's obviously adults making the decision so if the adult chooses not to do that, then that's fine. However, I've been in situations where adults have chosen on behalf of their child not to give them meds, and then it gets into a safeguarding issue. I think those things need to be talked about a bit more and need to be explored a bit more". (P14 Interview)*

#### 6.3.2.3.3 Lack of Direction around how to Maintain Good Prescribing Practice in Future

Although prescribing programme emphasised the importance of CPD pertaining to prescribing practice, some participants felt the programme did not provide sufficient guidance around how to do this once they completed the programme:

*"What I've learnt is that a lot of the literature that I need to find out about new drugs coming to market and in my specialty of gastro, they're all targeted and aimed at medics. I've actually had to approach those organizations and get them to add me onto their mailing lists, although I'm not a medic. You've got the Journal of Pediatric Gastroenterology that comes out once a month. I only really knew about that because my consultants that I work with get it monthly and that was a good place for me to start. Whereas we would have been told about journals in our independent prescribing course however, it was more from a retrospective point of view. They wouldn't have actively encouraged us to sign up to journals within our specialty fields". (P14 Interview)*

*"I think there should be more emphasis on how you carry on doing that. The nonmedical prescribing Leeds group picks up on that in the Southwest". (P2 Interview)*

Some participants felt the programme expected them to learn for themselves how to stay updated on developments within their area of prescribing practice:

*"I think that they again, put heavy emphasis on the need to do it, but didn't necessarily equip us well to do it". (P4 Interview)*

*"It definitely encouraged it. We've encouraged that, I would say yes. I don't know if it would see guided as I do feel almost just when the course ended that you can left a little bit too at the bases and then to find your own way to find these opportunities. I've seen you're certainly encouraged to do those things. I think at the end of it I was left a little bit confused about what I was supposed to do next in terms of keeping my prescribing practice safe so I sought help elsewhere and I learned more about self-directed audit with my prescribing, peer reviews". (P6 Interview)*

It was also highlighted that the programme could have done more to raise awareness on how to rationally deal with pressure from the pharmaceutical industry:

*"I think there should have been more awareness, and there probably isn't enough now. It's not my specialty, but I know there was a big push around diabetes drugs, which NICE pushed back against. I don't think that was really included enough in the course. People were, and still do quote things in their work that's from the pharmaceutical industry, that actually doesn't- the research-- If you look at the way of evaluating research that NICE teaches you, it doesn't hold water. They're not giving you the actual numbers, things like that. That's still coming through a lot". (P2 Interview)*

*"No. No. That only I've learned again since I've come into private care where in instances they might go into the hospital and say, "We'll sell you simvastatin at a penny a tablet if you'll prescribe it." Then everybody comes up with simvastatin, but then it might not be the appropriate one. They might need atorvastatin, pravastatin. Then they come out and it's like, "Well, it doesn't matter if it's a penny tablet. We'll put you on what is appropriate." I'm more aware of that now in primary care than I have been in secondary care". (P3 Interview)*

#### 6.3.2.3.4 Criticisms of Assessment Approaches

Some participants also highlighted certain issues around how questions were presented within the written and calculation examinations:

*“A large chunk of the pharmacological exam is MCQ, multiple-choice questions, of which I would say 80% of the questions were just trying to catch you out. As I say, the assessment was, I think is shocking really, and did not adequately reflect the knowledge of the people that spent a long time trying to gain. Yes, it was not good.”. (P5 Interview)*

*“What we were frightened more of is not getting 100% on the Safe Medicate test. That could be that you chose tabs instead of caps, or you move the syringe to the right arm on the screen. You could say knowing that you can get even one of those little elements wrong before failing, they have a negative impact on learning”. (P16 Interview)*

One participant questioned the relevance of the questions presented within the MCQ examination:

*“Because the MCQ was really hard. It asks you really, really complex anatomical questions. They might have helped if you were a first-year medical student or a second-year medical student, and you were trying to work out where all the bits of the body where that could go wrong, but as an established pharmacist or an established health professional, you know enough about the body to know where things are. You don't need to know exactly what it's called or things like that. This MCQ was really hard and a lot of the people that I was on the program with failed it the first time. (P1 Interview)*

Despite the widespread praise around the value of OSCEs, some prescribers were critical around the format the OSCEs followed:

*“The OSCE we did was really nerve-racking and was unnecessarily so. We saw one real patient in the whole OSCE. The rest of the stations were dry stations where a lecturer asked you a question and then basically you responded to the question. One of the stations was literally a letter that said, "Prescribe", and then it brought out what you needed to be prescribed and you just needed to copy it out. Even though it was wrong, we had to copy it out exactly as it had been written”. (P1 Interview)*

*“I think they could have done more videoing of OSCEs and then giving you feedback on them. I feel that there was very little feedback on the actual OSCEs that we did. Different communication styles and different array of patients. The majority of patients-- there was one patient who was just quite angry and didn't want to speak and then they had one patient who*

*was quite compliant. It would have been nice to get a more array of patients. Maybe someone who is potentially wanting to start in medicine, but you need to convince them to do that type of thing or you need to give them the reasons to do it. More of a negotiation type of thing, more real life". (P14 Interview)*

One participant felt that there was a lack of relevant OSCE scenarios for certain prescribing backgrounds, particularly community prescribers:

*"Even when it came to- because we had to do an OSCE, even when it came to the OSCE, that became a problem, because if you didn't work in the community, she didn't have an OSCE for you. You've got to make it up. Then you have to tell her what you would do, which to make her think to the object was then you're already, pre-warned what you're getting. You're already pre-warned what you're going to do". (P3 Interview)*

#### 6.3.2.3.5 Programme too Generic

There was a common perspective among participants that the programme lacked specific teaching towards prescribing according to individual specialties:

*"Going in as a specialist nurse, you take that specialist knowledge of pain to the course. Within the course, I didn't learn anything more about my specialist area". (P12 Interview)*

*"I did a lot of work with a consultant that I used to work with in Exeter. I don't think the prescribing course really touched on Parkinson's at all. I learned a lot, but we it didn't help me with my Parkinson's prescribing". (P13 Interview)*

*"Again, the course was designed for the whole spectrum of prescribers. There was actually very little opportunity to really home in on what specifically was relevant to you. With regards to the anatomy and physiology, it needs to be a little bit more specific to the area of specialty. Like I said, they could have specific studies for specific people.". (P7 Interview)*

Some participants stated that it would have been better to group students together according to their area of practice:

*"I think nowadays, there's so many people who prescribe, it would make so much more sense, for me anyway it would be better for me to have been learning how to prescribe with other people who are prescribing in my area". (P1 Interview)*



*“I think perhaps in retrospect, separating the-- I think it was about 70 of us. I think perhaps separating the class into peer groups, where you were prescribing or working in similar areas. I think that might have been effective. Although it's good to find out about other people's circumstances and how they're operating, I think in order for group-based learning to work effectively, it might have been best to put the GPNs and the NPs together and the midwives together and things. I think it was quite diverse. I'm not sure if there would have been opportunity necessarily to do that”.* (P11 Interview)

Again, this lack of specialist prescribing education was highlighted by a participant with reference to OSCE examinations:

*“I think as I said, it could be more specifically orientated to people's roles. There should be more OSCE options out there if you're not a community-based prescriber because that's what kept coming across all the time”.* (P3 Interview)

#### 6.3.2.3.6 Criticisms around Programme Delivery Methods

Some participants offered criticisms of members of staff involved in the delivery of teaching on the programme, particularly the programme leads:

*“She talks so fast, she would never listen, hugely defensive. Anytime anyone pipes up in the class, which happens an awful lot with genuine questions or genuine constructive criticism, instant defensiveness”.* (P5 Interview)

*“There could be a prescribing lead as there is in each trust or group. They should have regular meetings. We had no leadership from our prescribing lead at all”.* (P13 Interview)

Subsequently, some participants were critical of the way in which lectures were delivered on the programme:

*“Some of the things were said a little bit above my head. There were some of the lectures which, in actual fact, were completely irrelevant and totally, totally pitched at the wrong place. There was a massive assumption with regards to anatomy and physiology. There's an expectation that you were coming in with lots of anatomy, physiology, disease, process, knowledge”.* (P7 Interview)

*“Yes. I think it depends on how you respond, and I feel terrible for any student now in the current situation who are relying on PowerPoint presentations with narration. You need to be inspired by the speaker”*. (P16 Interview)

Additionally, participants reported issues whilst using the online learning platform created by the programmes:

*“The one on my programme, absolute just the most terribly designed, chaotic nonsense you've ever met. Moodle as a platform and it is known as "Muddle" because it's just ridiculous. For example, on the homepage, there are three different points you can click on to access the same thing. Just bonkers, absolutely bonkers”*. (P5 Interview)

*“I remember lots of people having issues with their online stuff. Fundamentally, I think it has less to do with the actual course work, but how that's communicated to the students and that's always the problem in university and academic stuff, isn't it?”*. (P11 Interview)

#### 6.3.2.4 Improvements recommended for the NMP Programme

##### 6.3.2.4.1 Practical and Innovative Learning Experiences

Many participants felt that a major area of improvement for the programme would be around more practical learning experiences. This included gaining further exposure to practical patients:

*“They could have had actual patients in there for us to examine. Because rather than me just being laid there, getting a different exam every week, it would have been helpful if we could have actually seen patients that had conditions that we, hadn't seen in practice or we wouldn't see in practice. I think it needs to be a little bit more like the Royal Colleges. You know the Royal College GP's and the Royal College physicians”*. (P1 Interview)

*“You're the one that's writing the kardex, and you're making up this patient in your head, and you're then presenting it to your mentor. We really should have more real-life prescribing and more scenario-based stuff to challenge it and I think a lot more on the job things”*. (P7 Interview)

*"I think we've all been there and done all of that, but nothing hits home more than a real-life example, in front of your eyes, it's happening, where you can go, look at the body language used there, what's this person saying? Where's the eye contact?"*. (P16 Interview)

Even in the absence of seeing real patients, some participants talked of the value of scenario-based learning approaches:

*"Scenario-based work is really good. We've done a lot of that. We used to write scenarios for each individual specialty"*. (P2 Interview)

*"I think it could be more practical work, clinical-based scenarios and discussions to be discussed and fed back as a team. "Well, right. We've got this scenario like you've done there, various different ones. What would you have done for number one? Right. Why? Why would you give that specific antibiotic? Is there anything you would be worried about? Why would you not give maybe trimethoprim or cefalexin? Why?" It's getting you to think as a prescriber"*. (P3 Interview)

One participant highlighted the example of clinical scenarios used in this study during the vignette exercise:

*"To be honest, yes, you've done a reasonably good job of designing for scenarios that are entirely realistic to my day-to-day practice, so well done for that"*. (P4 Interview)

One participant stated that more practical and 'hands-on' sessions around the overall prescribing process would be beneficial:

*"We had a lot of lectures, but I think there could have probably been a bit more practical sessions and hands-on, how to make your diagnosis and how you come to your conclusion of that particular medication. Maybe even the prescription itself because depending on you area of work. I just think it could have been a bit more practical-based. As I said, there was very little practical"*. (P3 Interview)

Blended learning approaches were also mentioned by some participants as a method of teaching which programmes should consider implementing further going forward:

*"What could they have done differently? As I said to you, I think much more blended learning styles would have been good so more e-learning"*. (P8 Interview)

*“For me, obviously, with blended learning, I'm going to come in once in a while, coming in once in a while after family did that needed that time I came in because otherwise, I would say self-directed. I think that learning style, it meant that I had time to be able to think if there's any questions I wanted, to get them done as it were in that way”.* (P12 Interview)

#### 6.3.2.4.2 Expectations of Programme and Refreshing Knowledge

One participant stated how students need to know what is expected of them from the programme in terms of skill development and achievement:

*“I think I remember finding the expectations of the coursework were not as clear as they could have been, they weren't all that well defined. I think people were struggling to meet the demands because they didn't know what exactly what was expected of them. I think that just comes down to good module leaders who are accessible and willing to answer emails about things, and also that the stuff online because everything's online just that it's easily and readily available and accessible”.* (P11 Interview)

Given that programmes expected a level of prior knowledge and skills in clinical practice, one participant highlighted that the programme needed to dedicate sessions to refresh such knowledge and skills:

*“I think they have to have some sort of refresher. I don't think they need to go as in-depth. The way I always explain it to any other non-medical prescriber is if they're going to put pen to paper on a drug, they need to know how it's worked, how it's metabolized, what it might interact with”.* (P14 Interview)

Additionally, one participant talked about how the programme should demonstrate examples of poor prescribing practice to show students the types of prescribing habits they should strive to avoid:

*“I would have preferred to have seen some scenarios played out on how not to do it and some bit more dynamic. This may get a bit of fun, but also show how it shouldn't be done. Let's look at how it can be done, and how it should be done and compare and contrast the two approaches. That would have been a bit more useful to me, rather than being told there's different versions of communication, there is nonverbal and verbal and a lot of it comes from nonverbal, believe it or not”.* (P16 Interview)

#### 6.3.2.4.3 Extending Length of Programme

Numerous participants pointed out how the six-month duration of the programme was insufficient to allow them to fully develop as the best prescriber they could be:

*“The thing is, I suppose, how can they pack everything into an already really busy schedule, to get through to the end of being a prescriber?”*. (P9 Interview)

*“I found it enormously frustrating and, as a result, I massively overstudied. I didn't have a life for six months”*. (P13 Interview)

*“To become a prescriber after six months and have the gravity of the responsibility, and the pitfalls, is tremendous. I think in six months, that's a hell of a lot of learning in six months”*. (P16 Interview)

One participant highlighted the difficulties of undertaking the programme whilst balancing work commitments:

*“I do think that perhaps the course should have run longer. I felt that all the classes were very in-depth, it was a lot of information over a short period of time that you then had to get your head around. On top of working full time, it's a lot to do. Then, also because the assessment side of things is really quite nerve-racking, I had to sit an entry exam. I then had to sit an exam that I had to get 100% on. I had to do a portfolio. I had to write an essay. It was a lot of work that needed to be done in a very short period of time and it was quite stressful”*. (P17 Interview)

Due to the relatively short duration time of the programme, one participant complained that the timetabling of the programme suffered:

*“That was a big problem. In terms of the course structure, again it was all over the shop based on whether tutors were available or not. There was a timetable, the pharmacological teaching fundamental, that was a little bit all over the place”*. (P5 Interview)

As a result, the participant below suggested that the programme needed to be extended by another year:

*“I think it probably could go on longer, the length of time perhaps for me, we could've had a longer course, perhaps 18 months may be more appropriate”*. (P8 Interview)

#### 6.3.2.4.4. Improving Assessment Methods

A major recommendation of improvement provided by one participant was for the programme to tailor theory examinations to the prescribers' area of practice:

*"They've got three parts to be a registrar where you do two theory exams and then one practical exam. I think that needs to be-- that's the thing that you need, if you can do theory in your area of practice that can satisfy the area of practice, then the actual physical skills of examination, and diagnosis and prescribing, could be part of that practical exam as well. I think it would be a more narrowed practice". (P1 Interview)*

Further proving the positive perception of OSCEs, one participant recommended more OSCE-based assessment approaches:

*"I could have been tested a bit better, like even as part of the exam instead of those quite a lot through the pharmacology exam and drug calculation exam and that was it possibly. Then the stuff you did with your mentor under one systematic detailed examination and practice for one thing where your mentor watched you doing a consultation. Maybe that could be an exam where you did more scenarios of communication or maybe there should be more of these OSCEs where your mentor watches you doing it". (P5 Interview)*

## 6.4 Discussion

The data obtained through this study provides a clear overview of areas where participants felt the strengths and weaknesses of the programme were apparent and how they helped develop their respective prescribing practice. This is aided by the responses provided by the participants during the vignette exercise.

Throughout the vignette exercise, it was evident that prescribers approached the prescribing decision-making process in a holistic manner, particularly when deducing the source of the clinical problem and considering the individual circumstances of the patient. However, the vignette exercise did not enable participants to display their pharmacological knowledge. This was an area where participants felt the NMP programme was lacking and where curricular reforms were required, such as providing refresher sessions around pharmacological knowledge, including drug action, pharmacokinetics and pharmacodynamics.

As identified through interviewing programme leads in Study Two, NMP programmes stringently assess the numerical skills of their students, with a perfect score required to pass the calculations exam. The meticulous nature of dosage calculation skills displayed by participants in the vignette exercise serves as a validation for NMP programmes and the strict approach implemented in the calculations assessment and further supports studies suggesting NMPs as being safe prescribers in practice (Baqir et al, 2015).

The vignette exercise demonstrated that participants were aware of various prescribing practice guidelines, however, the major gap in knowledge was awareness of the WHO Guide to Good Prescribing. Despite being an international guideline implemented in prescribing education interventions worldwide, questions are raised as to why most participants lack awareness of the existence of the guidance, given that the WHO GGP provides prescribing guidance for multiple diseases and conditions. NMP programmes must consider the value of such a guidance document for future cohorts and actively consider its incorporation when teaching students about the various prescribing guidelines available to them in practice.

Many participants were afforded the opportunity to explain the communication skills they would use when prescribing for hypothetical cases in the vignette exercise, particularly those from backgrounds pertaining to mental health. Combined with responses in the semi-structured interview segment of the study, this indicated that programmes afforded much attention to developing communication skills of students enrolled upon the programme. As indicated by studies (Omer and Danopolous et al, 2020; Kamarudin et al, 2013), OSCEs are an effective way of not only assessing communication skills, but also enhancing the learning and development of those skills. The value of OSCEs were universally praised by participants, including those from programmes who had not provided them with the opportunity to undertake an OSCE. The positive perceptions around the value of OSCEs mean that programmes which have removed them as an assessment approach should strongly consider reimplementing them onto the programme, even in a formative capacity, where they are recorded on video and performances can repeatedly be watched by students to aid their learning and development around communication skills.

Across the board, there was a demand from participants for programmes to implement more specialised training specific to their individual areas of practice. Curriculum developers of the programme must explore feasible options in dedicating a portion of the programme towards

students expanding their learning in their own area of practice. This could potentially include an additional module on the programme, where the students pick according to their learning interests and programmes must accommodate this through recruiting teachers and mentors from specific areas of practice. Additionally, the WHO Guide to Good Prescribing can serve to be instrumental in prescribing specialty training as it provides guidance of prescribing for conditions relevant to many different areas of practice.

All participants expressed positive views regarding the vignette exercise and even believed that the programme should conduct similar exercises. There is a plethora of ways in which prescribing programmes can conduct learning activities using clinical scenarios like the vignette exercise of this study. They can be presented in a similar, traditional way as this study has demonstrated, where the students are provided a clinical scenario and asked to verbalise how and why they would prescribe a certain medication. However, with the constantly evolving landscape of medical education, more innovative approaches of presenting such scenarios can be utilised by programmes, such as Simulation-Based Educational approaches (Lawson et al, 2018), where learners solve clinical problems such as prescribing medication in a simulated, role-play environment with patient actors. Here, students will be allowed to learn from their failures in a safe environment and develop their prescribing skills in a robust manner. As discussed in Study Two, there is evidence that simulation-based approaches are being actively considered and even implemented on some programmes, but all programmes, according to their capabilities and funding, should look to further incorporate simulated approaches. Additionally, as some participants expressed their desire to see examples of poor prescribing practice be demonstrated on the programme, simulated learning activities can provide students with such examples, and they can subsequently critique these to further distinguish between rational and irrational prescribing practices.

A major area discussed with participants was around remaining up to date in their prescribing practices beyond completion of the programme. Much of the learning around being a contemporary prescriber was self-directed, however, as discussed by participants, curriculum developers should explore the question of whether NMP programmes can expand their role in the development of the prescriber beyond the programme. There was a consensus among both programme leads and graduates that the programme serves as the beginning of a journey for the prescriber. However, the networks and contacts created on the programme



between both educators and students and between peers undertaking the programme could help expand the influences the programme and its teaching approaches could have on the prescribing practices of students as they progress in their respective clinical practice.

Further to the point above, the heavy featuring of prescribers being encouraged to compile their individual personal formulary should mean that this is assessed at the end of the programme. Personal formularies should be signed off and approved by assessors on the programme as another requirement of qualifying as independent prescribers.

As this study opened recruitment for participants who had qualified from any year since the inception of the NMP programme, a minority of participants were from early cohorts and this enabled the researchers to also explore how the nature and the content of NMP programmes have changed over the years. A major area of change observed was the programme's attitude towards the pharmaceutical industry, where participants from early cohorts reported how programmes worked collaboratively with the pharmaceutical industry, who sponsored Continuing Professional Development (CPD) on the programme. However, based on the responses of most participants who had qualified from recent cohorts, this collaborative working has become almost negligible and over the years, perceptions NMP programmes have of the pharmaceutical industry have become progressively worse. However, there are extremely limited explanations as to why the relationship between NMP programmes and the pharmaceutical industry have deteriorated, and future studies should be conducted to address this.

Finally, as most participants have suggested, programmes should consider potentially extending the length of the programme, especially given that students are undertaking the programme alongside their full-time work in clinical practice and their subsequent perception of certain aspects of the programme being "rushed". Extending the programme by at least another six months would enable for the robust implementation of changes to teaching approaches and would accommodate for additions such as an extra module for students to obtain teaching around their individual areas of practice.

#### **6.4.1 Limitations**

Although a healthy number of participants were recruited from various NMP programmes across the country, we acknowledge that additional themes and suggestions for improving

the programme could have been obtained had participants been recruited from all NMP programmes. We also acknowledge that to obtain more information on how the programme have changed over the years, we could have systematically recruited a set number of participants from each cohort since the inception of the NMP programme. However, it is likely that participants from early cohorts may have retained a limited amount of knowledge pertaining to their experiences on the programme, thus the information they provided may have been limited to an extent.

A small number of clinical prescribing scenarios used in the vignette exercise had to be taken from other sources such as guidelines as there were no relevant scenarios from the BMJ OnExamination package. We acknowledge that this may have an impact upon validity. Recognise this, we could have compiled our own clinically-validated scenarios for the study. However, given that the clinical scenarios from the BMJ OnExamination website were exam scenarios which were already clinically validated and designed for medical students, we deemed them appropriate for use in our study.

As was the case with Study Two, the positive and negative perceptions recorded through qualitative means in this study would need to be triangulated with objective, quantitative data.

## **6.5 Conclusions**

The perspectives of programme graduates and their responses in the vignette exercise highlight the strengths and the weaknesses of the programme and the areas they optimally prepare prescribers for practice. However, the data specifically pinpoints areas where the programme should improve and enhance their educational approaches to optimise the learning experiences of non-medical prescribers and prepare them to be the safest and most rational prescribers they can be across all prescribing competencies.

To make the most out of the findings of this study and validate them further, it is imperative that more studies are conducted on the prescribing practices of non-medical practices and the strengths and weaknesses they display in their clinical practice and such studies should be conducted before and after suggestions to improve educational approaches on NMP programmes are implemented, as they will provide a clear picture of how successful the changes in the educational approaches are in improving prescribing practices of NMPs.

## **Chapter Seven: Overall Discussion and Recommendations for Optimising Educational Approaches on NMP Programmes**

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This Chapter provides an overall discussion around the results obtained across all of the studies of the programme of research, illustrates the implications of these findings to education policy and practice and research, highlights the limitation of the study, the effects of COVID-19 upon the research and then provides a set of tips informed by the thesis to optimise teaching and learning on the NMP programme. **Currently, part of this chapter is under review for publication at the journal SN Comprehensive Clinical Medicine as:**

**Omer, UN, Veysey M, Crampton P, Finn G. “Optimising Learning and Teaching on UK Non-Medical Prescribing Programmes” – (under review in the Comprehensive Clinical Medicine Journal)**

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The overall aim of this doctoral study was to first define a nationally and internationally validated list of the core categories of a model prescriber, and following this, explore and appraise the curriculum and educational approaches of UK Non-Medical Prescribing programmes. This was conducted to fill the large gap in literature around the specific training and educational approaches utilised to produce independent prescribers and obtain an understanding around the extent to which these educational approaches inculcate the core qualities of high-level and rational prescribing.

### **7.1 Study aims and major findings**

The entire programme of study was conducted through a qualitative approach. The defining of core qualities related to a model prescriber was conducted in Study One through a Documentary Analysis of 13 national and international prescribing practice guidelines and were analysed through Grounded Theory. It was felt that rather than using a single, previously published prescribing practice guideline to inform the categories of a model prescriber, it would be effective to utilise multiple guidelines both UK-based and those from other countries to inform a reliable list of categories applicable to all countries and all prescribing healthcare professionals.

Exploration of the curricula and taught content of NMP programmes took place in Study Two through the interviewing of 16 programme leads across the UK, which meant that the educational approaches of almost a quarter of NMP programmes across the country were represented on this project. However, Study Two produced an extremely large data set, given that the aim of the individual study was to both explore the taught content of NMP programmes and obtain the participants' appraisals of the educational approaches. We felt that although the use of survey questionnaires may have potentially obtained data from a higher number of participants, the responses would be of a limited nature and would be inadequate in achieving the aim of the study of comprehensively addressing the gap in literature regarding the educational approaches of NMP programmes, particularly because it is an area where there is no observable research previously conducted (Kamarudin et al, 2013; Omer and Danopolous et al, 2020).

Study Three was essential in further appraising the educational approaches of NMP programmes through the perspectives of those who had undertaken and completed the programme. Additionally, the vignette exercise conducted as phase one of the interview was the most feasible and robust method this research project could use in attempting to understand the extent to which prescribers demonstrated the core categories of a model prescriber. Other methods to address this aim, such as clinical observations were beyond the scope of this research project and would be more appropriate as a recommendation for future research. Additionally, the vignette exercise proved to be an effective stimulant in Phase Two of the interview, where participants could refer to their experience of the vignette exercise to bolster discussing their perspectives and appraisals of the educational approaches of the programme. 18 participants in the study proved to be a healthy number, and the data set was enhanced due to multiple participants in the sample being alumni from the same NMP programme, enabling their perspectives and appraisals to be more reliable.

#### 7.1.1 General Observations

It was observed that NMP programmes across the country displayed both homo and heterogeneity regarding educational approaches throughout. All programmes followed the same learning aims and objectives, set the same entry requirements and utilised similar assessment approaches such as written examinations, calculation examinations and a portfolio for the students to compile. However, some programmes taught certain aspects of

prescribing to a higher degree than others, for example, one programme would place more emphasis on producing more communicative prescribers whilst others would aim to produce prescribers who were safer, with respect to calculating drug dosages and adhering closely to guidance and protocols. But in general, prescribing safety was emphasised the most across all programmes.

#### 7.1.2 Commonalities in Perspectives

A major area where perspectives of both programme leads and graduates overlapped was around group learning being a strength of the programme. Both stakeholders agreed that the variety of prescribers from differing background coming together to undertake the programme established a rich learning environment, where students were able to learn from one another, complement each other and subsequently, enhance their prescribing practice. This validates studies which highlight the benefits and values of group learning in the context of prescribing education and how curriculum developers must consider increasing the incorporation of this in future.

Both stakeholders agreed on the teaching of skills around prescription writing and their robustness on the programme. Prescribing educators, particularly those involved in teaching delivery in medical schools should take note of this, given that errors in prescription writing was identified as a major area hindering the prescribing practices of junior doctors (Dornan et al, 2009). Also, there was a consensus amongst both stakeholders around the steep requirements of passing assessments, especially the 100 percent mark needed on the drug calculations exam. The nature of this finding was unexpected, considering that the high scores needed to pass the assessment would place added pressure on examinees, however, both programme leads and graduates shared the same view that such requirements were essential to ensure prescribers were safe and competent before embarking upon their independent prescribing career.

Commonalities in views were also recorded around aspects of potential improvements to the programme. Both stakeholders agreed that more innovative educational approaches were required on the programme, such as the further implementation of flipped classroom, blended learning and simulation-based educational approaches. Both described how blended approaches to teaching would be more engaging for learners as compared to traditional,

didactic approaches and how simulated approaches would enhance learning experiences around key areas such as diagnosis and communication skills with the patient. Additionally, there was a common acknowledgement that, due to the current pandemic situation, there was a need for the programme to implement teaching around remote prescribing for future cohorts.

### 7.1.3 Differences in Perspectives

Many discrepancies were also seen in perspectives of stakeholders. Firstly, graduates believed that the programme should dedicate some time to refreshing prescribing knowledge in areas such as pharmacology, whilst numerous programme leads believed that prescribers, especially from a pharmacy background should enrol upon the programme well-versed in their prescribing knowledge. Similarly, nurse prescribers and AHPs expressed a desire for programmes to refresh knowledge around professionalism and ethical practice, whilst programme leads expected students to bring in their awareness of concepts around professionalism from clinical practice.

Although as discussed above, both stakeholders agreed on the requirements of passing assessments, some graduates criticised the format and style of questions presented in assessments. Also, there was a disparity on opinions pertaining to OSCEs, where approximately half of the programme leads questioned the value and use of OSCEs on the programme, whilst there was a near-universal consensus among graduates that OSCEs were both an effective assessment and learning tool.

Discrepancies also existed around the CPD plan beyond the programme. Although both sets of stakeholders agreed that the programme served as the beginning of a lifelong prescribing journey, programme leads felt that the programme sufficiently equipped them on the approaches of how to best develop their practice beyond qualification, whereas many graduates felt there was a lack of guidance and clarity provided by the programme on how to enhance and develop their prescribing practice post-qualification. Some felt that the programme left them to “fend for themselves” when developing awareness of areas such as appropriate dealings with influences from the pharmaceutical industry and keeping up to date with developments in their own area of practice.

Regarding the collective programme, programme leads felt that a generic approach to teaching which can be applied to prescribers from all areas of practice was the best and most feasible approach to teaching, however, this was a major criticism of the programme in the view of most graduates, who collectively expressed their desire to see more specialty training on the programme according to their individual areas of practice.

Despite these discrepancies, results obtained from both sets of stakeholders highlight specific areas where improvements can and should be made in respect to the current NMP programme curriculum and potential actions and approaches which can be used to make these improvements.

## **7.2 Contribution of Doctoral Study to Current Knowledge-Base**

Before conducting this doctoral study, the majority of research in prescribing education was based on how medical students were trained to prescribe in clinical practice. There was a major gap in knowledge of how NMPs were educated and trained to become independent prescribers and as a result, there was a lack in knowledge of the educational needs of NMPs. Due to the expectations of postgraduate clinical experience, the educational needs of NMPs would probably differ from those of medical students and junior doctors, and subsequently, it would not be pragmatic to assume the educational needs of medical students would be transferable to apply to NMPs. This is highlighted in Chapter One, where the differences in prescribing educational needs of medical students and NMPs are compared and contrasted. However, the rapid review of Chapter Two highlighted various educational approaches used to teach prescribing, including small-group learning, use of the WHO GGP to inform prescribing education, self-directed learning, IPL, peer-based learning and simulation-based educational approaches such as role-play. This doctoral study highlighted the extent to which these educational approaches feature specifically on NMP programmes, the prescribing skills and competencies these educational approaches are used to teach according to the Documentary Analysis of Chapter Four and how these educational approaches can be modified and enhanced to meet the learning needs of future NMP student cohorts. Additionally, this thesis examined the pedagogical standpoint of the current educational approaches used in NMP programmes, and these are discussed further in the next section.

## 7.3 Implications

### 7.3.1 Implications for Education Policy and Practice

The findings from this doctoral study have the potential to highlight specific areas where NMP programmes could be optimised for the benefit of NMPs undertaking the programme and to improve their learning experiences and subsequently, their competency as independent prescribers.

A major strength of NMP programmes was the emphasis on group learning and establishing a rich learning environment of students from various backgrounds. Such a learning environment enabled students to learn from one another and to recognise the role of a team in prescribing practice. Additionally, the rich learning environment established on NMP programmes with various health professional backgrounds strongly aligns with the ALP pedagogical approach, given that the group activities are designed for learners to learn from the differing experiences of their peers on the programme (Cross, 1981; Collins, 2004). However, there were some who, despite praising the aspect of group working, preferred to be grouped together with students from the same professional background, citing that they learnt better from those prescribing the same medications as themselves. This highlights the need for further adapting group learning approaches on NMP programmes. Bryan et al (2009) recognised how educational approaches based on the pedagogy of ALP should be varied and contextualised according to the individual learners in the group. Subsequently, curriculum developers must recognise areas of the programme where students should be grouped together based on professional backgrounds and areas relevant to students from all prescribing backgrounds to avoid undermining the rich learning environments established across most programmes.

Curriculum developers must recognise the demand from programme alumni for the implementation of training and education specific to different prescribing specialties. However, there exist major barriers and practical complications in implementing specialty training according to the vast array of prescribing backgrounds students represent on the programme. Firstly, prescribing education according to specialty training would require both a significant expansion to the length of the programme and additionally, there would be a need to recruit further members of staff onto the programme who could provide training



according to different prescribing backgrounds. Although programme alumni have expressed their desire to see an expansion to programme length, this, along with further staff recruitment would require significant additional funding from organisations such as the GPhC and NMC. Also, each NMP programme cohort may have students from different prescribing backgrounds from the previous cohort, meaning that recruitment of staff according to specialty would have to be done before each cohort intake and on a short-term basis, which would be an extremely complicated process requiring major, additional resources. As a result, curriculum developers and accrediting bodies must take into account the student demand for extended learning on the programme and learning according to prescribing specialty and find ways in which these can be implemented pragmatically to a level which improves learning on the programme whilst mitigating and navigating around the major barriers. Recommendations relevant to this will be presented later in this chapter.

NMP programmes have traditionally followed pedagogical approaches in line with IDP, where lectures are the main tool of knowledge delivery, particularly with regard to developing prescribing knowledge. However, the consensus from programme alumni around a desire for curricular reforms relevant to the teaching of prescribing knowledge exacerbate the need for innovation in pedagogical approaches in this part of the curriculum. Studies by Kroezen et al (2014) and Hall and Cantrill (2006) have reported that the majority of nurse prescribers felt the training they received in their prescribing education was inadequate in providing them with confidence in their prescribing decisions, to the extent that they felt their prescribing knowledge was insufficient to warrant continuing to prescribe in clinical practice. This was particularly emphasised in relation to learning pharmacological concepts. Rissman et al (2012) state that large-scale pharmacology lectures restrict awareness of individual needs of learners as they minimise student participation within the session due to the sheer volume of information which must be transmitted from lecturer to student within any given area. While there currently exists a lack of comprehensive research around overall safety of NMPs in practice, a lack of in-depth understanding of pharmacological concepts could compromise learning quality on NMP programmes and subsequently, safety of NMPs in clinical practice (Walls, 2019). This point is further highlighted in the results of the Documentary Analysis, where Prescribing Knowledge is one of the four core qualities a high-level prescriber must demonstrate in practice. Additionally, the notion of NMPs discontinuing prescribing in clinical

practice due to insufficient prescribing knowledge could lead to a lack of prescribers in practice in future at a time where healthcare systems require increased numbers of prescribers. Therefore, given the importance of learning pharmacological concepts for knowledge progression in NMPs and enhancing their understanding of various complexities within prescribing (Walls, 2019), curriculum developers and accrediting bodies must expand the educational approaches in teaching concepts around prescribing and pharmacological knowledge beyond merely the mainstream, traditional approach of information transmission through lectures. There were a minority of participants in the study who were pharmacist prescribers and graduated from pharmacist-specific NMP programmes. They discussed clinical and communication skills relevant to prescribing as more important to their learning needs, given that they brought a wealth of prescribing knowledge from their time undertaking undergraduate pharmacy education. However, given that the vast majority of participants on this study were nurse or AHP prescribers, most NMP programmes across the UK and most NMPs in prescribing practice are from a nursing or AHP background, their learning needs pertaining to prescribing and pharmacological knowledge must be given priority by curriculum developers. This priority is further exacerbated through a new regulation published in January 2021 by the GPhC, which states that undergraduate pharmacy courses will incorporate the skills, knowledge and attributes for prescribing, allowing pharmacists to independently prescribe from the point of registration (Power et al, 2021).

It is clear that medical educators across the spectrum are beginning to apply elements of flipped classroom educational strategies into their teaching (Ramnanan and Pound, 2017). The system of flipped classroom learning, where students are exposed to educational content such as videos, websites and other electronic medium prior to attending classroom activities, can be seen as ideal to NMP programmes based on the part-time nature of the programme. From a pedagogical standpoint, flipped classroom approaches place the student at the centre of their own learning experience. Flipped classroom approaches are in accordance with ALPs by facilitating self-direction in student learning and allow them to learn in a manner which takes into account their own professional backgrounds (Zamora-Polo et al, 2019). Additionally, flipped classroom approaches fulfil the requirements made by the NPC in 2005 around designing learning approaches which encourage self-direction and cater to the needs of the individual. It would also allow for students to learn from the lens of their own

prescribing background and partially serve as a type of specialty learning for them. Although flipped classroom approaches are increasingly being implemented across NMP programmes, there needs to be a uniform approach discussed and agreed by organisations such as the GPhC, NMC and HCPC. Curriculum developers should then apply these in ways best suited to learners on their programme.

Simulated learning activities have been positively perceived by programme leads who offer such educational activities and programme graduates who have experienced these educational activities. However, there is an overall lack in simulated learning activities across NMP programmes. Firstly, there needs to be an increase in understanding on the part of NMP curriculum designers around the vastness of approaches SBE can offer. There were suggestions from programme leads that funding and resources compromise the ability of implementing high fidelity SBE approaches, however, there needs to be a clarification that SBE does not necessarily need to involve high-tech equipment such as virtual reality or screen-based simulators (Sorensen et al, 2017). SBE can be low-fidelity and involve simple, low-cost learning activities such as role play and standardised patients. Such SBE approaches are low-cost, but are known to be very effective in developing technical and non-technical skills, especially those important to improving prescribing skill and competency (Riaz, 2019).

The absence of teaching around remote prescribing was apparent across the board. Organisations involved in setting learning outcomes for NMP programmes should recognise the dramatic rise in remote prescribing practice due to the COVID-19 pandemic and as in the case of flipped classroom approaches, agree a uniform approach of teaching the major concepts of remote prescribing given the anticipation of prescribing remotely becoming a feature of prescribing practice going forward.

I feel that some programmes have been hasty to discard the use of OSCEs, a perception exacerbated by the positive perspectives held by programme graduates around these assessment approaches. Bevan et al (2019), whilst acknowledging OSCEs as a source of pressure and tension for learners on health professions programmes, highlight the indispensable role OSCEs play in ensuring students attain the minimum clinical standards. Robinson et al (2017) also acknowledge the stress OSCEs put students under, however, they advocate for formative, mock OSCEs to be implemented within health professions education, given that not only do they provide students with valuable feedback, but reduce stress

students feel before undertaking summative OSCEs. Although literature validates the issue of stress and pressure OSCEs put students under, curriculum developers should recognise the value they provide as learning experiences and as opportunities for students to obtain feedback on their prescribing practices. It should be kept in mind however, that feedback must be presented in a manner which 1) facilitates actionable change and 2) is easily accessed by students and encourages revision (Ahmed et al, 2017). Additionally, formative OSCE implementation will be important to fulfil the educational needs of pharmacist prescribers, for whom developing of clinical and communication skills are particularly important given that they do not bring the same level of clinical skills as nursing and AHP students onto NMP programmes.

Finally, given some of the discrepancies the thesis has highlighted regarding the views of programme leads and graduates, organisations such as the GPhC, NMC and HCPC should recognise and prioritise learner satisfaction around the programme as this is key for them to achieve their learning objectives. Subsequently, more robust processes of student feedback should be sought to inform curriculum design of NMP programmes.

### 7.3.2 Implications for Research

This research project was conducted as part of a PhD, meaning that it was limited by time and resource constraints. However, the findings of this research project can be used as a foundation for future research endeavours.

As stated earlier in the thesis, the qualitative findings and recommendations of this project need to be supported by objective, quantitative studies. Once the recommendations from later in this chapter are implemented by NMP programme curriculum developers, the examination scores and performances need to be recorded and compared to those of students who have graduated from previous years, before the recommended changes were recommended. If the examination scores of students undertaking the programme following implementation of recommended changes are higher than of previous years, this would serve as validation that the recommended changes are effective.

However, this would only be a preliminary step. There needs to be more research investigating and observing the prescribing practices of NMPs in practice, including the rate

of errors, where there is currently only a single study researching this (Baqir et al, 2015). Similar to the EQUIP study conducted by Dornan et al (2009), there is an urgent case for conducting a similar study specific to NMPs. The vignette exercise of this study provides a possible foundation for assessing the prescribing quality of NMPs, however, quality of prescribing decisions must be assessed in practice on real patients. Such a study should then be repeated once recommended changes to the NMP curriculum have been incorporated and several cohorts of prescribers have graduated from these enhanced NMP programmes. Following this, the findings of both studies can be compared and the effect recommended changes in NMP programmes have had on NMPs in practice can be identified.

Implementation and discontinuation of OSCEs still remain a contentious issue on NMP programmes. To further investigate their need as a summative assessment, the prescribing practices of NMPs who have undertaken summative OSCEs should be compared to those who have qualified from NMP programmes that have discarded their use. Data which potentially indicates a higher prescribing safety profile for NMPs who have undertaken summative OSCEs would provide further evidence advocating for OSCE reimplementation.

Given the recent GPhC stipulation of implementing prescribing education onto undergraduate pharmacy programmes, there will inevitably be two populations of pharmacist prescribers in practice, one who will have qualified through undertaking an NMP programme and the other having qualified through undergraduate education. The safety and quality of prescribing practices of both pharmacist prescriber populations should therefore be compared to one another to explore which prescribing qualification pathway is potentially more effective and to further investigate the educational needs of both prescribing populations.

Subsequently, countries looking to expand prescribing authority to other healthcare professionals like the UK can use the results of this thesis and benefits it may potentially offer to NMP programmes to pilot their own NMP education curricula and explore if they experience the same level of success.

As this doctoral study focused upon addressing the gap in knowledge of the NMP programme curricula, explicit research upon the safety of NMPs was beyond the scope of this thesis.

Therefore, there is a need for further research to be conducted upon the safety of NMPs in practice.

As is typical of doctoral work within the institution, this doctoral study had no patient and public involvement (PPI). However, there was input from peers who themselves are lay members of PPI groups, such as HealthWatch York. These peers had regular input into study development through our research group meetings. Future work related to this project would seek to build more formally on these PPI links. Patient involvement in development and delivery of medical education has been seen in areas such as: student selection; curriculum development; course management and programme evaluation (Spencer et al, 2018). Given the extent to which this doctoral study has highlighted the importance of robust patient-prescriber communication to good prescribing practice, there is major scope for PPI in further developing effective educational strategies to teach effective medication adherence and ideal patient-prescriber communication.

#### **7.4 Limitations of the Research**

The programme of research utilised entirely qualitative methods to achieve its aims. These qualitative methods included a Documentary Analysis, a Vignette Exercise and semi-structured interviews. In terms of data triangulation, the research design allowed for data source triangulation, which is triangulation involving data collection from different groups (Carter et al, 2014). However, given the lack of quantitative data collection in the programme of research, the study may be criticised for its lack of triangulation between qualitative and quantitative data.

Given that many qualitative studies use multiple researchers to code the data, this study could be criticised as apart from the rapid review of Chapter Two, all data collection and analysis, including coding was conducted by myself only. As described within individual chapter, I attempted to mitigate this through regular discussion and review of codes of all studies with my entire supervisory team.

Based on the recommendations in literature around sample sizes in studies using thematic analysis (Ando et al, 2018; Braun and Clarke, 2006), the sample sizes were of an adequate

number as verified through the reaching of data saturation. However, obtaining a complete picture of the extent to which UK NMP programme teaching approaches would require the programme lead of every NMP programme in the country to be interviewed along with graduates from each programme. Additionally, no two programmes were exactly the same in their teaching approaches, meaning that even minor differences were present when comparing the pedagogy of the programmes, indicating that more programme leads being included in the study could have highlighted enhanced heterogeneity in programme teaching approaches.

To gain a further understanding of the most suitable educational approaches programmes should implement, it is possible that focus groups could have been employed to bring together groups of programme leads and stimulate a discussion and comparison around the approaches of individual programmes. This would be pertinent in the case of OSCEs, where a focus group discussion could have programme leads both for and against their use on the programme. This would have further highlighted the advantages and disadvantages of the assessment approach and possibly enhanced clarity on whether they should be used as a summative approach. However, due to the complexities of setting up focus groups with programme leads, such as conflicting schedules, they were not used as a data collection approach in this research project.

It should be acknowledged that the perspectives of programme leads may be inherently biased towards presenting the workings of their respective programmes in a positive light. Similarly, perspectives of programme graduates could be biased towards a more negative light as the interviews may have presented frustrated prescribers with an opportunity to voice their criticisms and concerns surrounding the programme.

The interview questions and discussions in Study Two and Study Three were guided based on the results of the Documentary Analysis in Study One. The Documentary Analysis results were informed using of mainly UK-based guidelines, with the remaining guidelines originating from Australia, New Zealand and the WHO. If we had identified guidelines from other countries, including non-English speaking countries, the breadth of the Documentary Analysis results could have been expanded, potentially leading to a more comprehensive set of interview questions and subsequently, more insights and perspectives around NMP programmes.

A limitation of Study Three was that the vignette exercise did not occur in a real-life setting. However, this could only be done through an ethnographic, observational approach and this was beyond the scope of the research project. Therefore, a vignette exercise was deemed the most pragmatic way of assessing the extent to which prescribers demonstrated the qualities of high-level prescribing as stipulated by the results of Study One. The vignette exercise, along with the semi-structured interview could only be conducted virtually due to the constraints of the COVID-19 pandemic.

## **7.5 Impact of COVID-19 upon Research**

As mentioned above, the constraints of the COVID-19 pandemic meant that the entire process of data collection could only occur through remote means. Conducting interviews remotely through the Zoom application meant that there was increased ease of access to participants and a degree of flexibility when arranging dates and times for interviews, however, the major disadvantage was the reduction of social cues which would be present in face-to-face interviews, such as body language (Opdenakker, 2006). Social cues can be an important source of extra information. Another disadvantage was the reduced interview ambience which can be more easily established in face-to-face interviews (Opdenakker, 2006). This was most apparent in the couple of interviews which had to be conducted through telephone due to the participants not having access to applications such as Zoom or Microsoft Teams.

Some participants in Study Three had to undertake the interview from their work setting. Interviews where the participant was taking part in a work setting were more difficult to conduct due to the busy environment as compared to me as the researcher, who conducted all interviews from my home office. To optimise interview ambience, it is imperative to arrange qualitative interviews when both researcher and participant are in similar environments (e.g. home office) and at a time where participants are free from other responsibilities and are able to fully concentrate on the interview.

Additionally, data collection for Study Two commenced at the end of March 2020, the period when the UK first entered into a nationwide lockdown. This meant that programme leads were unable to work at university, and the availability for them to take part in interviews from home highly increased availability. Before the doctoral study commenced, it was assumed



that due to the busy schedule of programme leads, data collection for Study Two would take a period of six months, however, the lockdown conditions due to the pandemic meant that data collection was completed in a period of just over two months.

## **7.6 Personal Reflection**

At the beginning of this programme of research, I was new to qualitative health research. My Master's thesis consisted of a systematic review of the strengths and weaknesses of UK General Practice training as compared to international training systems. During my Master's programme, I had obtained some training on qualitative research methods, but my PhD enabled me to use this training in practice. The research project emphasised the utmost importance of conducting pilot interviews, as they are arguably the most important part of qualitative data collection. Not only did it provide me an opportunity to review and appraise my own interview technique, but it also allowed me to refine and slightly modify my interview STEMS for the benefit of the remainder of participants to optimise quality of data attained.

I also realised that conducting semi-structured interviews are an effective way to bolster a researcher's confidence in describing and explaining their research because inevitably, the research ideas and aims have to be presented in a robust way to participants to ensure their participation. Subsequently, it was of great satisfaction for me when most participants provided positive feedback regarding the need and relevance of undertaking this study given the rapid expansion of prescribing authority and the increase of NMPs in practice.

Although I highlighted coding the data of all three studies alone as a possible limitation, I feel that the experience has been hugely beneficial and has aided in my development as an independent researcher. I must again thank my supervisory team for giving me the confidence to undertake this endeavour and for all the time they took to discuss and review the coding process for all of the studies. Additionally, being able to use the documentary analysis of Study One, my own published study, as a coding framework for Study Two and Three was an extremely rewarding experience.

Given the multiple backgrounds of students represented on NMP programmes, I feel that this programme of research enabled me to enhance my understanding of the holistic benefits

regarding group learning in health professions education. Group activities are mutually beneficial when it comes to learning in any area of life, but in the context of prescribing, this is of even more importance.

If I were to undertake this doctoral study again armed with the knowledge I have now, providing that the constraints of COVID-19 were no longer imposed, I would like to add an ethnographic/observational aspect to the study where I could immerse myself in the learning environment of NMP programmes to fully understand the learning experiences of NMP students and verify their appraisals.

## **7.7 Recommendations to Optimise Teaching and Learning on NMP Programmes**

Both sets of interviews conducted as part of this research project generated a plethora of insights into NMP programmes across the UK and how they educate prescribers. The interviews highlighted disparities in the way which individual programmes functioned but despite this, both programme leads and graduates provided interesting and overlapping ideas around how the existing educational and teaching approaches of NMP programmes could be improved to enhance learning outcomes for all prescribers undertaking the programme. These findings from the interviews were amalgamated with the findings from the rapid systematic review in Chapter Two around innovations in prescribing education interventions. This informed our Recommendations to enhance the teaching approaches of all NMP programmes and the learning experience of students (Bowskill et al, 2014).

### **7.7.1 Expand the scope of prescribing educators on the programme to include recent programme alumni**

Currently, prescribing programmes have multiple educators from various healthcare backgrounds to aid in delivery of teaching in addition to external speakers delivering sessions around their area of specialism. However, a study by Gibson et al (2014) demonstrated the success of prescribing sessions run by junior doctors and how these sessions enhanced students' prescribing knowledge, skill and competency.

NMP programmes have already expanded the role of the PA and Practice Supervisors (PS) to allow prescribers from all backgrounds to mentor and assess NMP programme students during their time in practice. Programmes should go a step further and recruit programme alumni as tutors to deliver sessions on the programme. In studies where junior doctors have successfully led tutorials, it was reported that medical students found the recent experiences of junior doctors undertaking the same programme and the ease in which they could approach junior doctor tutors to aid in their learning (Gibson et al, 2014; Remmen et al, 2000). These same principles would apply should NMP programmes recruit their alumni as tutors, given that programme alumni could use their own experiences of undertaking the programme to inform their prescribing sessions.

#### **7.7.2. Expand the role of Practice Supervisors in clinical practice to provide students with specialty training**

Although there exists a consensus from NMP students around a requirement for specialty training according to their respective areas of practice, there exist many barriers in implementing this into the taught segment of NMP programmes. However, to meet this educational need, other feasible methods must be explored. In the context of NMP programmes, a study by Bowskill et al (2014) demonstrated the successes of a mentoring scheme where students on the NMP programme were allocated a recent graduate from the programme to act as a mentor.

Given that practice supervisors can be selected from all NMP backgrounds, accrediting bodies must stipulate that time dedicated on the programme to clinical practice with practice supervisors must include a comprehensive coverage of prescribing knowledge and skill relevant to the prescribers' own areas of practice. NMP programmes must ensure that practice supervisors have a minimum requirement of experience practicing in the area where they will be supervising their student so that they can provide adequate mentoring and specialty training. Additionally, student portfolios must demonstrate a sufficient level of specialty training and this should specifically be assessed by programmes to ensure students graduate with both appropriate generic prescribing education from the taught segment of the programme and specialty training during their time in practice with their supervisors.

### **7.7.3 Run sessions around refreshing prescribing knowledge and skill and set an early, formative assessment to identify strengths and weaknesses of students**

Across all NMP programmes, it is mandated that students enrolling onto the programme will have a certain level of prior knowledge and skill around diagnostic and consultation skills. However, this can be complicated on most programmes given that students are coming from various professional backgrounds, and with them, they bring their own sets of strengths and weaknesses. For example, prescribing students from a pharmacy background will be more skilled in prescribing knowledge around drug actions and mechanism as compared to prescribing students from a nursing background, who will be more skilled in clinical experience.

To ensure all students are at a similar level of competence, NMP programmes should dedicate some of their opening sessions to refreshing concepts informed by their prerequisite criteria. This would be of most importance regarding areas of prescribing knowledge, due to most prescribers coming from a nursing or Allied Healthcare Professional (AHP) background. Programmes should reach a consensus of the level of prescribing knowledge and skill all their students should have when embarking on the programme and dedicate the first segment of the programme towards refreshment of this knowledge and skill. Additionally, programmes should set an early formative written assessment to examine the extent to which students are demonstrating the prerequisite prescribing knowledge and skill. Formative assessments are an effective tool in highlighting the learner's level of skill and competency at a given time as compared to the required standard (Rushton, 2005). This early formative assessment will help inform the student of any remaining weaknesses and aid in the compilation of a personal development plan before embarking upon the main part of the programme, dedicated to their development as an independent prescriber. A study by Makoul et al (2002) demonstrated the value of early formative assessment in medical schools to help inform students of their strengths and weaknesses early in the medical programme, so such an approach being replicated on the NMP programme would immensely benefit prescribing students as they undertake the programme.

#### **7.7.4 Incorporation of teaching around the World Health Organisation Guide to Good Prescribing (WHO GGP)**

The WHO GGP is a prescribing manual published in 1994 based on a 6-step model for rational prescribing. It was published to aid prescribing education in medical schools (Tichelaar et al, 2020). Numerous studies conducted in various countries have demonstrated the positive effects of the WHO GGP upon prescribing education and practice in the years following its publication (Kamarudin et al, 2013; Omer et al, 2020). Despite the well-documented international acclaim of this prescribing guide, most NMPs reported having no knowledge of the WHO GGP and its impact upon prescribing education worldwide. This highlights a major consideration for educators involved in the curriculum development of NMP programmes.

Firstly, educators on the NMP programme must provide a comprehensive awareness of the WHO GGP and its principles to students on the programme. Presently, NMP programmes guide students mainly to follow the Royal Pharmaceutical Society's Framework for All Prescribers and the NICE Guidelines in addition to local protocols once they become independent prescribers. The WHO GGP must be added to this list of guidelines and a session should be dedicated around introducing the manual and its uses. Secondly, the WHO GGP provides prescribing guidance using clinical scenarios from a wide range of areas of specialties. Given that NMP programmes enrol students from multiple areas of specialties, this makes the WHO GGP an ideal source for educators to use to inform curriculum planning and development. The guide has been implemented by prescribing educators worldwide in various forms, from a single session to an entire prescribing curriculum being based on the guide, so educators on NMP programmes have many examples to learn from when deciding how to incorporate the WHO GGP into the NMP curriculum.

#### **7.7.5 Implement a blended learning and flipped-classroom approach for areas relevant to pharmacology and drug knowledge**

There was a perception from both sets of interviewees that didactic, face-to-face teaching alone was "dry and mundane" and therefore difficult to aid towards the achievement of learning objectives. As a result, programmes are increasingly working towards a more blended learning approach to teaching.

One of the main suggestions for improving the programme from both programme leads and graduates was for the further implementation of a blended learning or flipped classroom approach to teaching. Blended learning is the combination of electronic and face-to-face learning which is gaining in popularity across health professions education (Thakore et al, 2006). Electronic learning enables student learning in a self-paced manner with face-to-face teaching filling the gap of learning in a real environment. Flipped classroom approaches to learning require students to undertake self-directed learning, usually electronically, before attending a face-to-face class for more active learning strategies such as discussions and group projects (Hurtubise et al, 2015). Studies have demonstrated that flipped classroom approaches led to significantly higher levels of examination achievements across the medical education continuum for higher-level learning outcomes as compared to traditional, didactic learning approaches (Chen et al, 2018)

In this recommendation, I suggest that all programmes should implement a blended, flipped classroom approach to all aspects of the programme currently being taught through traditional, didactic lectures. This includes teaching around prescribing knowledge such as pharmacology, drug actions and the ethics and legalities around prescribing. Lectures should be recorded by the lecturer through a video platform such as Panopto and uploaded onto the Virtual Learning Environment (VLE). Students should view this lecture along with conducting their own reading around the subject area of the lecture prior to attending a face-to-face group session, which should be aimed at stimulating discussion around the lecture and their own reading. In these discussions, students can highlight the individual reading they have conducted prior to the face-to-face session, which would be a means of fostering a strong learning environment where the students can fill the gaps in knowledge of one another based on their own reading.

#### **7.7.6 Increasing involvement of real-life patients on delivery of teaching**

Although Recommendation Five suggests an innovative approach to the teaching of theory on the programme, there are aspects of good prescribing such as good patient-prescriber communication which need to be taught practically. Subsequently, programme graduates provided suggestions around the addition of more practical learning experiences, one of which was further exposure to real-life patients.

In recent years, health professions education has seen an increase in patient involvement, where they are playing more of an active role in the education of doctors. Reasons for this include enhancing student experience of real-world medicine and allowing people with experiences of medical conditions to play the role of 'expert' pertaining to their condition and teach students about their experiences (Jha et al, 2009). These reasons for adding patients to health professions education also apply to the education of NMPs and would increase their exposure to real-life patients. Patients could be brought into face-to-face classes on the programme, where students can take turns in conducting consultations with the patient, and in accordance with Recommendation Five, these consultations could form the basis of student discussion. Additionally, NMP programmes could recruit trained patient-educators who can deliver teaching based on the experiences of living with their condition. This would be a means of providing further specialist prescribing training as recommended by interviewees and could be used to enhance Recommendation Four.

#### **7.7.7 Implementing an innovative, but feasible Simulation-Based Educational (SBE) approach across the board**

Simulation is defined as “a technique to replace or amplify real experiences with guided experiences that evoke or replicate substantial aspects of the real world in a fully interactive manner” (Gaba, 2004). SBE education can be conducted through many ways, such as through simulated patients, screen-based simulation or virtual reality. The General Medical Council

(GMC) has mandated that “postgraduate training programmes must give doctors in training the opportunity to develop their clinical, medical and practical skills and generic professional capabilities through technology enhanced learning opportunities, with the support of trainers, before using skills in a clinical situation” (GMC, 2018).

SBE has been utilised to varying degrees across UK NMP programmes, but this has been heavily dependent upon access to relevant resources such as appropriate patient actors and funding. However, there was a perception amongst programme leads and graduates that SBE needed to become more of a prominent teaching approach, particularly in the training of consultation, teamwork and communication skills, areas which are defined in medical education as 'nontechnical skills' (Lawson et al, 2018).

A SBE approach could be high or low fidelity, where the higher the fidelity of the approach, the more it replicates the real-life scenario (Curran, 2011). NMP programmes across the board should collaborate to agree and create a SBE approach to teaching prescribing consultation and communication skills in a way which is both engaging for the learner and fosters the best opportunity to inculcate relevant skills to the highest extent whilst being feasible and easily implemented across most, if not all programmes.

One innovative approach which is gaining traction within medical education is that of gamification. Gamification is the application of game design elements to traditional non-gaming contexts (Rutledge et al, 2018). Not only does gamification replicate real-world scenarios but presents them as challenges which allows the learner to develop certain skills through repeated practice. It also allows them to fail in a safe environment and learn from their mistakes (Yunyongying, 2014). Given the advantages of gamification, NMP programmes should consider developing a learning tool which heavily features elements of gamification and widely introduce this into curricula.

#### **7.7.8 Extension of group learning through remote means**

One of the strongest aspects of the NMP programme according to both programme directors and graduates was the extensive opportunities for group learning and activities and the establishment of a rich learning environment. Both sets of interviewees expressed how it enabled learners from various backgrounds to come together, learn from one another and highlight each other's strengths and weaknesses in view of developing themselves as prescribers. This positive perception of group learning is supported by studies where medical students have undertaken interprofessional learning (IPL) activities around prescribing and have similarly expressed positive views such as being able to interact with students from other backgrounds and learning more about the process of rational drug choice (Achike et al, 2014; Dekker et al, 2015). However, both sets of participants reported how the constraints of the current COVID-19 pandemic had deprived students of being able to partake in these learning experiences.

The events of the last year has seen an almost complete transition to remote learning across all areas of education, including postgraduate medical education. However, with the



emergence of e-learning, strategies such as videoconferencing have become more widely implemented. Videoconferencing is a distance learning strategy which includes synchronous delivery of learning content whilst enabling direct communication between facilitators and learners (Ruiz et al, 2006). Videoconferencing has also been effective in the facilitation of small group learning where learners are located remotely and the facilitator is based at a central site (Davies et al, 2012). With the increase in blended teaching approaches coupled with the issues caused by the constraints of the pandemic, educators involved in NMP programme curriculum planning must consider the advantages of remote group learning and look to increasingly implement this going forward. Not only would this prevent the deprivation of the group learning experience in unforeseen events, but remote group learning could also serve to complement and enhance orthodox group learning activities by extending the rich learning environment beyond the classroom.

#### **7.7.9 Implement teaching around remote prescribing in curricula**

In the wake of the COVID-19 pandemic, efforts to limit face-to-face contact and control the spread of the virus has led to telecommunication strategies such as video and telephone consultations to play a prominent role in the diagnosis and management of disease (Iyengar et al, 2020). Programme leads across all programmes admitted that to date, teaching around remote prescribing was not at all featured on the NMP programme, but acknowledged that given the increasing pertinence of remote consultation, even in a post-pandemic world, NMP curricula would need to seriously consider ways in which teaching around remote prescribing would have to be implemented.

In the last year, studies have been conducted across the world regarding the pragmatic functioning of telemedicine (Iyengar et al, 2020). Educators of NMP programmes must critically analyse these studies and refer to guidance such as the General Medical Council Remote Prescribing High-Level Principles and use these to inform a framework for the pragmatic teaching of remote prescribing as this is a skill which all prescribers will need to develop going forward.

### **7.7.10 Use Objective Structured Clinical Examinations (OSCEs) as a formative assessment, learning and feedback tool**

Throughout the interviews with programme leads, the area where there was a clear divide in opinion was of the use of OSCEs on the NMP programme. Whilst half of the programmes utilised OSCEs as a vital assessment tool, others has discontinued their use in recent years, for reasons including being the cause of added stress for students and the 12 days in clinical practice rendering the use of OSCEs as obsolete. However, there was a consensus among programme graduates that OSCEs were important and had important benefits, including that of being a valuable learning tool. As a result, this led some graduates to recommend the wider implementation of OSCEs as its own teaching approach, particularly for consultation and communication skills.

OSCEs are a widely used form of clinical assessment throughout medical education which evaluates clinical skills and knowledge. Summative OSCEs are mainly undertaken by medical students as part of end-of-year or final year examinations. However, formative OSCEs are used as an effective learning tool which does not contribute to the final mark and serve as a source of providing feedback on performance (Chisnall et al, 2015). Studies have demonstrated that the best way in which students learn from formative OSCEs are through a combination of videorecording their performance and being provided supplementary expert feedback on the performance (Hammoud et al, 2012; Ozcakar et al, 2009).

Despite the discontinuation of summative OSCEs by numerous NMP programmes, we recommend that formative OSCEs should widely be adopted in NMP curricula given the advantages it provides as a learning tool. Given the formative nature of the OSCEs, they can be conducted in a stress-free environment. These OSCEs should also take place early on the programme as the video recordings and supplementary expert feedback can be a robust tool to prepare NMP students for their time in supervised practice.

### **7.7.11 Ensure Summative OSCE's accommodate for prescribers of all backgrounds**

Further to the criticism of the programme being taught at a generic level, some programme graduates felt a lack of relevant OSCEs based on their area of practice. As a result, we recommend that where programmes continue to use OSCEs as a form of summative assessment, educators on the programme must ensure that the OSCEs offer scenarios relevant to the prescribing areas of all students undertaking the programme. There are various ways in which programmes can develop OSCE scenarios to cover all areas of practice. One would be using the WHO GGP as recommended in Recommendation Three, due to the prescribing manual's coverage of a vast array of clinical conditions and another would be through using exam scenarios from assessments the Prescribing Safety Assessment (PSA), which are written to assess medical students that, as a result, present scenarios for all disease conditions.

### **7.7.12 Implementing an effective system of Continuing Medical Education (CME) for programme alumni**

Many participants expressed dissatisfaction at the length of the programme, stating that it placed too much strain on their workload, given they undertake programme part-time alongside their own work commitments. Also, the timetabling of the programme was criticised for being compromised due to the short length of the programme. Based upon the suggestion of many participants, expansion to the length of the overall NMP programme should actively be considered by curriculum developers and regulatory bodies. However, this thesis acknowledges the potentially major barriers around funding and the need for additional staff time commitment, which could likely render the concept of extending the NMP programme beyond six months unfeasible.

To address this need for further learning, accrediting organisations must implement an effective, but feasible system of CME for prescribers once they have completed the programme and began independent prescribing in practice. CME approaches could include workshops held bi-annually, where prescribers can continue to populate personal portfolios from their time undertaking the NMP programme and appraise their prescribing skills and competencies and the extent to which they have developed since completion of the NMP

programme. They can subsequently identify the remaining gaps within their learning and develop strategies to address these gaps before the next bi-annual CME workshop.

## **7.8 Conclusions**

The scope of healthcare professionals able to independently prescribe is ever increasing along with the need of more prescribers both domestically and globally. Therefore, it is imperative that the training and education of these prescribers is to the optimal level.

This thesis identified the gap in knowledge around a comprehensive set of core qualities of a high-level prescriber from all healthcare backgrounds and subsequently, developed a consensus of these core qualities of high-level prescribing for all prescribers, nationally and internationally. The consensus is aimed at ensuring prescribers are knowledgeable, safe, good communicators and contemporary in their practice.

Regarding the rapid expansion of NMPs in practice, this thesis also identified a gap in knowledge around UK NMP programmes and the specific educational approaches they used to train NMPs as independent prescribers. Using the consensus developed on the core categories of high-level prescribing, this thesis has addressed the gap in knowledge around how the UK trains and educates non-medical prescribers. This included how the programme of study operates, the content NMP programmes teach to the prescribers and the various educational approaches used to teach this content. The thesis also appraised the strengths and weaknesses of the programmes relative to the consensus developed around high-level prescribing. Strengths included the value of having a rich learning environment of students from wide-ranging professional backgrounds, the emphasis on prescribing safety across all prescribing programmes and the meticulous nature of assessment, weaknesses included the lack of innovative teaching approaches relative to what is emerging throughout the medical education continuum, the lack of specialty training on the programme for specific groups of prescribers and the general lack of using OSCEs as a formative assessment tool.

Subsequently, the thesis concludes by presenting a set of recommendations around optimising the training and education of NMPs. These included increasing of innovative educational approaches such as flipped classroom, blended learning and SBE, refreshment of

prescribing knowledge at the beginning of the programme, increasing of prescribing specialty training through increased mentoring by practice supervisors. These recommendations will ensure the optimisation of teaching and learning on UK-based NMP programmes and serve as a starting point for countries seeking to expand prescribing authority.

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## Thesis Appendices

**Appendix One** - Rapid Review Summary Tables

**Appendix Two** - Databases Searched in Rapid Review

**Appendix Three** - Study One: Databases Searched in Documentary Analysis Searches

**Appendix Four** - Study One: Documentary Analysis Table of Themes and Subthemes

**Appendix Five** - Study Two and Three: University Research Ethics Committee Approval Letter

**Appendix Six** - Study Two: Invitation Email

**Appendix Seven** - Study Two: Research Advertisement

**Appendix Eight** - Study Two: Participant Information Sheet

**Appendix Nine** - Study Two: Consent Form

**Appendix Ten** - Study Two: Semi-structured Interview Questions

**Appendix 11** - Study Two: Themes and Subthemes

**Appendix 12** - Study Two: Entry Requirements of NMP Programmes

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**Appendix 15** - Study Three: Research Advertisement

**Appendix 16** - Study Three: Invitation Email

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**Appendix 19** - Study Three: Clinical Case Vignettes

**Appendix 20** - Study Three: Semi-structured Interview Questions

## Appendix 1 – Rapid Review Summary Tables

**Table 1 – Randomised Controlled Trials**

<b>Authors</b>	<b>Setting</b>	<b>Study Design</b>	<b>Number of Participants</b>	<b>Type of Intervention</b>	<b>Learning Outcome Measures</b>	<b>Result of Intervention</b>	<b>BEME Score</b>
Celebi et al, 2009	University of Tübingen, <b>Germany</b>	Randomised Controlled Trial	74 Final Year Medical students; 36 Early Intervention (EI) group; 38 Late Intervention (LI) group	Intervention involved a week-long prescription training course including a seminar on ADRs and prescription errors, practical training based on a virtual case, prescription practice on wards, discussion sessions with lecturers on avoiding prescription errors. Intervention ended with assessment where student had to prescribe for two virtual cases.	Could a DRP teaching module reduce prescription errors made by final year medical students in varying clinical contexts?	Students in the EI group committed significantly fewer prescribing errors after the intervention as compared to the LI group.	5 - Results are unequivocal



Kamat et al, 2012	Medical College and KEM Hospital, Mumbai, <b>India</b>	Randomised Controlled Trial	179 Second Year Medical students; 96 in intervention group; 83 in control group	Before intervention, themed lectures on specific topics delivered along with concept of P-drug and rational medicine use. After a pre-test, students randomised into 15 groups of 12, where 8 groups received Case-Based Teaching (CBT). CBT involved discussing a case amongst a group and following the WHO 6 Steps. A month later, post-test were administered for both intervention and control groups, where therapeutic problems similar to those encountered in the CBT were added	Could an intervention comprising of CBT lead to more rational prescribing in students?	Students from the CBT groups attained higher marks than those from the control group and had more confidence to attempt more questions in the test	4 - Results are clear and very likely to be true
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Sikkens et al, 2018	VU University Medical Centre Amsterdam, <b>Netherlands</b>	Randomised Controlled Trial	356 Fourth Year Medical students; 71 in intervention group; 281 in control group	e-learning module offered to intervention group for 6 weeks. Module offered online through email and comprised 8 clinical scenarios based on the WHO GGP. Both intervention and control group completed pre- and post-tests.	Can a problem-based, interactive e-learning module on antimicrobial prescribing improve antimicrobial prescribing skills and behaviours?	Students in the e-learning group scored significantly higher in both the post-test and OSCE simulation exercises as compared to control students. Students also expressed satisfaction for the e-learning course in a survey	5 - Results are unequivocal
Thenrajan et al, 2016	Tertiary Care Medical College, <b>Netherlands</b>	Randomised Controlled Trial	50 Second Year Medical students; 25 in intervention group; 25 in control group	Two groups of medical students given introduction on prescription writing, prescribing format and WHO GGP for selecting preferred drug. Both groups taught prescription writing through five clinical conditions. Group	Is a patient-based teaching approach more effective in improving prescribing skills in medical students than case-	Students who underwent patient-based learning performed much better than the control group who underwent case-based teaching.	5 - Results are unequivocal

				one underwent patient-based teaching where they interacted with real patients, group two only trained in prescription writing. After 2 days, all students wrote prescriptions in standard format which were assessed	based teaching?	Students from test group provided high praise, stating the approach gave them higher motivation, focus, responsibility, empathy and helped with memory recall	
Tichelaar et al: 2016	VU University Medical Centre Amsterdam, <b>Netherlands</b>	Randomised Controlled Trial	251 Second Year Medical students; 69 SMART group; 82 WHO group; 100 control group	Problem-based intervention using case-studies. Students formed treatment plans either using the SMART goals, the WHO Guide to Good Prescribing or neither, which were assessed	Do SMART criteria improve treatment plans of medical students	Treatment plans of students from SMART group had higher scores than the WHO and control groups, especially in treatment goal setting and monitoring	4 - Results are clear and very likely to be true

**Table 2 – Non-Randomised Comparative Control studies**

<b>Authors</b>	<b>Setting</b>	<b>Study Design</b>	<b>Number of Participants</b>	<b>Type of Intervention</b>	<b>Learning Outcome Measures</b>	<b>Result of Intervention</b>	<b>BEME Score</b>
Al Khaja and Sequiera, 2013	College of Medicine and Medical Sciences of the Arabian Gulf University, <b>Bahrain</b>	Non-Randomised Comparative Control	910 First -Third Year Medical Students; 460 test group; 460 control group	2-hour interactive session where students take 5-6 clinico-therapeutic case scenarios as carry-home exercises and these help in acquiring critical appraisal skills, use of drug formulary and prescribing skills. Prescriptions checked and formative feedback provided to students	Does attending an optional 2h interactive prescribing session improve prescribing skill of attendees as opposed to non-attendees?	Attendees of the sessions performed significantly better in both exams and prescription writing skills than non-attendees.	4 - Results are clear and very likely to be true

Tayem et al, 2016	Arabian Gulf University, College of Medicine and Medical Sciences, <b>Bahrain</b>	Non-Randomised Comparative Controlled Study	108 Second Year Medical students	Students attended a session which included discussing complete prescriptions for different cardiovascular diseases. Then students provided with role-play demonstrations on appropriate patient communication with patients regarding drug treatment. Role-play included correct way of relaying information to patient, such as explaining disease, aim of drug therapy	Does a prescribing education intervention based on role-play demonstrations improve the prescribing communication skills of medical students?	Students felt that their skill in communicating prescriptions to patients had improved as had their confidence in prescription writing. They also felt that developing this skill would be more beneficial in small groups. Students who attended the session also performed better in the OSPE prescribing communication examination than controls in the three domains of introducing	5 - Results are unequivocal
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				and major ADRs.		themselves to the patient, explaining the patient's condition and providing instructions on drug use	
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**Table 3 – Before-and-After Studies**

<b>Authors</b>	<b>Setting</b>	<b>Study Design</b>	<b>Number of Participants</b>	<b>Type of Intervention</b>	<b>Learning Outcome Measures</b>	<b>Result of Intervention</b>	<b>BEME Score</b>
Gibson et al, 2014	University of Edinburgh, Scotland	Before-and-after study	183 Final Year Medical students	196 junior doctor-led prescribing tutorials delivered to 183 final-year medical students. Tutorials lasted 1 hour, delivered throughout academic year and consisted	Could an intervention involving prescribing tutorials delivered by junior doctors improve the prescribing abilities and confidence of final year medical students?	Students reported increased confidence in their prescribing knowledge and skill as a result of attending tutorials and students who attended more tutorials performed	4 - Results are clear and very likely to be true

				of discussing clinical vignettes and agreeing on reaching principles of clinical management. Individual feedback given to students by tutor as well as group feedback. Tutorials ended with discussion about further patient management and prescribing principles		better in the prescribing components of their final examinations	
Krishnaiah et al, 2013	Kempegowda Institute of Medical Sciences, Bangalore, <b>India</b>	Before-and-after Study	78 Second Year Medical students	Interactive teaching session using the WHO GGP, followed by hypothetical case-studies	Does the WHO GGP improve the prescribing treatment plans of medical students	WHO GGP-based teaching intervention lead to statistically significant improvement in treatment plans	4 - Results are clear and very likely to be true

						of medical students	
Newby et al, 2019	University of Newcastle, <b>Australia</b>	Before-and-after Study	16 Final Year Medical students	Clinical pharmacist-run tutorials on prescribing and drug calculations, including case-based scenarios	Does an 8-week pharmacist-led prescribing programme enhance the prescribing skills and confidence of final year medical students?	Students expressed significant improvement in generic prescribing confidence based on questionnaire results, however, they demonstrated small, non-significant improvements in prescribing appropriateness based on clinical scenario scores	5 - Results are unequivocal
Paterson et al, 2015	University of Edinburgh and Edinburgh Napier Universities, <b>Scotland</b>	Before-and-after Study	6 NMP students; 2 Medical students	Intervention consisted of three cases commonly encountered in practice by foundation doctors and	Could a simulated inter-professional masterclass enhance inter-professional prescribing	Readiness for Inter-professional Learning Scores (RIPLS) increased significantly from pre- to	4 - Results are clear and very likely to be true



				NMPs. Two scenarios required history-taking from simulated patient, suitable diagnosis and prescribing management plan. Third case was paper-based scenario and developed skills in medication review and recognising ADRs. Each scenario lasted 45-min, after which facilitator checked prescribing decision.	skills of medical and NMP students?	post-masterclass for both medical and NMP students as well as Self-Efficacy scores. In focus group discussions, participants expressed positive opinions of the masterclass. However, cohort of participants was small and there would need to be further testing of the intervention	
Raghu et al, 2017	Tagore Medical College Chennai, <b>India</b>	Before-and-after Study	117 Second Year Medical students	Sessions on rational prescribing	Can group discussion sessions on	There was a significant improvement	3 - Conclusions can probably be based on

				included group discussions on previous prescriptions written by students, pointing out mistakes. Students then rewrote prescriptions and these were assessed for quality using the WHO GGP	rational prescribing and improve prescription writing skills in second-year medical students?	seen in the overall prescription writing skills of the students post-intervention.	the results (exact figures of improvement not reported)
Wilcock and Strivens, 2015	School of Medicine, University of Liverpool, <b>UK</b>	Before-and-after Study	48 Fourth Year Medical students	After a pre-test questionnaire, students devised into six groups of 6-10 whom each underwent a 40-min tutorial on a specific drug, the drug efficacy and effectiveness, a range of prescribing considerations	Can short pharmacology tutorials over an extended period of time improve the prescribing critical thinking skills of medical students	Interventions did not appear to lead to clear, sustained improvements in medical student critical thinking	3 - Conclusions can probably be drawn from results

				and various prescribing scenarios where different prescribing judgements could be made. Later, students ran these tutorials amongst themselves. 8 weeks after last session, post-test administered.			
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**Table 4 – Qualitative Studies**

<b>Authors</b>	<b>Setting</b>	<b>Study Design</b>	<b>Number of Participants</b>	<b>Type of Intervention</b>	<b>Learning Outcome Measures</b>	<b>Result of Intervention</b>	<b>BEME Score</b>
Bowskill et al, 2014	University of Nottingham, <b>UK</b>	Qualitative Study	63 Non-Medical Prescribing students	Mentoring scheme paired NMP students with qualified NMP mentors who provided support around the integration	Is a mentoring scheme collaborating NMP students with qualified NMP mentors seen as useful in integrating their theoretical	Students found mentors helpful for moral support and implementing prescribing into practice, but expressed	5 - Results are unequivocal and comprehensive

				of prescribing theory and practice. Data was collected through surveys and semi-structured interviews recording perceptions and experiences of mentoring scheme	learning with clinical practice?	difficulties in contextualising course knowledge into practice given academic demands	
Cooke et al, 2017	Queen's University Belfast, <b>Ireland</b>	Qualitative Study	19 – 10 Fourth Year Medical students; 9 Third Year Pharmacy students	Simulation-based IPE activity on patient actors and small-group deliberations in specific intervals during sessions	Does a Simulation-based IPE activity enhance professional development and perceptions of working collaboratively in students when prescribing	Students gained a much better understanding of the role of others in the prescribing process and how important working collaboratively is. Also learnt about the empathetic aspect of patient-	4 - Results are clear and very likely to be true

						prescriber communication. However, there needs to be an analysis using quantitative methods to truly determine the success of the intervention	
Dekker et al, 2015	VU University Medical Centre Amsterdam, <b>Netherlands</b>	Qualitative Study	31 First, Third and Final Year Medical students	First, third and fifth-year medical students prepared consultation plan consisting of history-taking, physical examination, additional investigations and treatment plan based on WHO GGP a week before proper consultation. 3rd year	How feasible are Student-Run Clinics on improving the pharmacotherapeutic skills of future doctors?	Patients, students and supervisors all expressed positive perceptions of the SRCs, with students finding that it enhanced their feeling of having responsibility and thinking about differential diagnosis. Patients also expressed satisfaction	4 - Results are clear and very likely to be true

				<p>student performed consultation with 5th year, whereas 1st year student compiled the medical record. Follow-up consultation also occurred later for treatment monitoring, after which a feasibility questionnaire was administered to patient, students and supervisors.</p>		<p>with care they received. Supervisors stated that intervention had added value for medical education. However, assessment through tests would be needed to truly evaluate effectiveness of intervention</p>	
Hauser et al, 2017	Faculty of Medicine, University of Cologne, <b>Germany</b>	Qualitative Study	12 Third – Fifth Year Medical students	<p>Intervention combined both traditional and innovative methods. Students given paper case based on</p>	<p>Could a newly implemented elective in the medical curriculum improve the physician-patient communication skills of medical students</p>	<p>Participants expressed high levels of satisfaction with the elective, however, outcomes were</p>	<p>3 - Conclusions can probably be drawn from results</p>

				<p>patient becoming non-adherent. Students define learning goals by end of first PBL session and return two days later for second PBL session having conducted research upon learning goals. This was followed by workshop where students and tutors developed medication conversation guide based on aspects of drug treatment and patient participation. Optional simulated talks</p>	<p>when coming to prescribing medications?</p>	<p>measured merely through perceptions and not through tests</p>	
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				<p>conducted at end of course lasting 15 mins each and observed by two tutors and videotaped. Students also filled in portfolios, including own strengths and weaknesses in prescribing communication</p>			
James et al, 2016	College of Medicine and Medical Sciences of the Arabian Gulf University, <b>Bahrain</b>	Qualitative Study	116 Second Year Medical students	<p>After exposure to case scenarios, students first devised into small groups of 13-15 where they discussed rational prescribing and general format of prescription and chart order and how to use the BNF. Then</p>	How well are small and large group prescription-writing sessions received by medical students?	<p>Students perceived small group learning much better than large group learning given there's more chance to ask questions and improves communication skills, problem solving skills and teamwork and leadership.</p>	4 - Results are clear and very likely to be true



				<p>there was discussion of clinical scenarios. Later in the year, large-group session with whole class conducted discussing the same things as the small group discussions. Questionnaires were administered after both small and large group discussions and there was also an additional focus group discussion</p>		<p>However, no attempt by study to assess effectiveness of intervention through tests</p>	
<p>Tittle et al, 2014</p>	<p>Barts and the London School of Medicine, UK</p>	<p>Qualitative Study</p>	<p>1110 Final Year Medical students</p>	<p>Weekly 2-hour teaching sessions in hospital consisting of</p>	<p>Does a pharmacist-taught prescribing course improve the prescribing confidence of final-</p>	<p>Students taking part in focus group interviews expressed that</p>	<p>3 - Conclusions can probably be based on results</p>

				<p>small group tutorials, pharmacist ward rounds and shadowing of ward pharmacists</p>	<p>year medical students?</p>	<p>the course improved their prescribing confidence and were happy with the role of the pharmacist as a teacher. However, there were no quantification of this in the study, so success of intervention cannot be fully determined</p>	
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**Table 5 – Cohort Studies**

<b>Authors</b>	<b>Setting</b>	<b>Study Design</b>	<b>Number of Participants</b>	<b>Type of Intervention</b>	<b>Learning Outcome Measures</b>	<b>Result of Intervention</b>	<b>BEME Score</b>
Achike et al, 2014	University of Hattiesburg, Mississippi, <b>United States</b>	Cohort Survey Study	108 – 88 Second Year Medical students; 20 Fourth Year Nursing students	Interactive workshop class. 10 groups consisting of 10-12 medical students and 2-3 nursing students. Inter-Professional Learning (IPL) class consisted of lecture about rational prescribing steps, small group discussions on choice of drug for particular drug scenario, group presentations on drug choices and prescriptions and finally, feedback and Q&A. WHO GGP significantly involved throughout intervention	Is a rational prescribing IPE class well-received by medical and nursing students?	Overall student perception of intervention was very positive based on survey responses, especially regarding interaction with other healthcare professionals. However, there was no form of assessing the impact of intervention on prescribing skill.	4 - Results are clear and very likely to be true
Keijsers et al, 2015	Utrecht Medical	Longitudinal Cohort Study	1652 Medical students	WHO-6-Step incorporated into	Could the implementati	Both Bachelor and Master's	4- Results are clear

	School, <b>Netherlands</b>		across the programme	medical curriculum as part of integrated, longitudinal learning programme in pharmacology and pharmacotherapy. WHO-6-Step method used in large lectures, small group tutorials and small group practical sessions	on of the WHO-6-Step across all stages of a medical curriculum increase prescribing knowledge and writing skills of medical students	students significantly outscored controls in areas of basic and applied pharmacological knowledge and pharmacothera py skills. Students receiving intervention in both Bachelor and Master's phases expressed greater appreciation of education and more confident in clinical practice	and very likely to be true
Zgheib et al, 2011	American University of Beirut, <b>Lebanon</b>	Prospective Cohort Study	109 Fourth Year Medical students	Investigating the effects of teaching clinical pharmacology over 18 months to fourth- year medical students using a	Does a TBL approach for teaching clinical pharmacolog y improve student	Students performed much better on tests pertaining to prescription writing and formulary after	4 - Results are clear and very likely to be true

				Team-based Learning (TBL) approach on medical student satisfaction and performance	satisfaction and performance ?	the course and expressed high satisfaction with the TBL format. However, further studies needed to assess longevity of improved performance	
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## **Appendix 2 – Databases Searched in Rapid Review**

OVID MEDLINE

EMBASE

PsycINFO

Scopus

Academic Search Premier

CINAHL Complete

Cochrane Library

NIH PubMed

Google Scholar

## **Appendix 3 – Databases Searched in Documentary Analysis Search**

Google

Google Scholar

PubMed

Web of Science

### Appendix 4 – Documentary Analysis Table of Themes and Subthemes

Document	Prescriber has a comprehensive understanding of diseases and conditions they prescribe for							
	Accurate disease knowledge	Ability to take patient history	Being as well-informed as possible	Diagnostic decision-making	Access to all information needed for prescription	Prescribing with strong evidence-base	Prescribing within own area of expertise	Strives to enhance knowledge
Ten Principles of Good Prescribing		X		X		X	X	X
Good Practice in Prescribing and Managing Medicines and Devices		X		X	X	X	X	X
The Quality of GP Prescribing	X	X	X	X		X		X
A Guide to Good Prescribing Practice for Prescribing Pharmacists in NHS Scotland	X	X	X	X	X	X	X	X
Guidelines for Good Prescribing in Primary Care	X		X				X	X



A Competency Framework for all Prescribers	X	X	X	X	X	X	X	X
Selecting the Right Drug						X	X	
Standards of Proficiency for Nurse and Midwife Prescribers	X	X		X	X	X	X	X
Guidance on Prescribing								
Prescribing Drugs of Dependence in General Practice, Clinical Governance Framework, Benzodiazepines and opioids (Australia)		X		X	X	X		X
Statement on Good Prescribing Practice (New Zealand)					X	X	X	X
Basic Principles of Prescribing								
WHO Guide to Good Prescribing	X			X	X			X

Document	Prescriber is confident that they have adequate understanding of the overall properties and potential actions of medications they prescribe in practice							
	Accurate knowledge of different drug groups	Being as well-informed as possible	Knowledge of Adverse Drug Reactions (ADRs)	Ability to create own personal formulary	Prescribing generically as much as possible	Prescribing with strong evidence base*	Prescribing within own area of expertise	Taking benefit vs harm into account
Ten Principles of Good Prescribing						X	X	X
Good Practice in Prescribing and Managing Medicines and Devices			X			X	X	X
The Quality of GP Prescribing	X	X	X		X	X		X
A Guide to Good Prescribing Practice for Prescribing Pharmacists in NHS Scotland		X	X			X	X	
Guidelines for Good Prescribing in Primary Care	X	X	X				X	
A Competency Framework for all Prescribers		X	X		X	X	X	X

Selecting the Right Drug	X			X	X	X	X	
Standards of Proficiency for Nurse and Midwife Prescribers	X		X			X	X	
Guidance on Prescribing								X
Prescribing Drugs of Dependence in General Practice, Clinical Governance Framework, Benzodiazepines and opioids (Australia)						X		
Statement on Good Prescribing Practice (New Zealand)			X			X	X	X
Basic Principles of Prescribing								
WHO Guide to Good Prescribing	X			X				

Document	Provides the patient with the correct amount of medication according to their needs									
	Ability to calculate accurate dosage	Avoids drug wastage	Ability to take accurate patient history*	Knowledge of other medications taken by patient	Being as well-informed as possible	Consideration of overall medication supply	Access to all information needed for prescription	Knowledge of ADRs*	Knowledge of how to use drug formularies	Medication Monitoring
Ten Principles of Good Prescribing			X							
Good Practice in Prescribing and Managing Medicines and Devices			X	X			X	X	X	
The Quality of GP Prescribing		X	X	X	X			X	X	X
A Guide to Good Prescribing Practice for Prescribing Pharmacists in NHS Scotland			X	X	X		X	X	X	
Guidelines for Good Prescribing in Primary Care	X				X			X	X	

A Competency Framework for all Prescribers	X		X		X		X	X		
Selecting the Right Drug									X	
Standards of Proficiency for Nurse and Midwife Prescribers	X		X				X	X	X	
Guidance on Prescribing						X			X	
Prescribing Drugs of Dependence in General Practice, Clinical Governance Framework, Benzodiazepines and opioids (Australia)			X				X			
Statement on Good Prescribing Practice (New Zealand)	X						X	X		
Basic Principles of Prescribing										

WHO Guide to Good Prescribing	X						X		X	
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Document	Prescriber thoroughly considers the individual patient, their condition and prescribes accordingly				
	Prescribing in patient's best interests	Recognising when to prescribe non-standard treatment	Taking all considerations into account	Taking individual patient case into account	Diagnostic decision-making*
Ten Principles of Good Prescribing	X	X		X	X
Good Practice in Prescribing and Managing Medicines and Devices	X			X	X
The Quality of GP Prescribing	X		X	X	X
A Guide to Good Prescribing Practice for Prescribing Pharmacists in NHS Scotland	X	X		X	X
Guidelines for Good Prescribing in Primary Care	X	X		X	
A Competency Framework for all Prescribers	X	X	X	X	X
Selecting the Right Drug	X			X	

Standards of Proficiency for Nurse and Midwife Prescribers	X	X	X	X	X
Guidance on Prescribing	X	X		X	
Prescribing Drugs of Dependence in General Practice, Clinical Governance Framework, Benzodiazepines and opioids (Australia)	X	X	X		X
Statement on Good Prescribing Practice (New Zealand)	X	X			
Basic Principles of Prescribing		X	X		
WHO Guide to Good Prescribing	X	X	X	X	X



Document	Prescriber always endeavours to robustly track effectiveness of prescribed treatment and if appropriate, end treatment regimen when objective is achieved						
	Always mindful of safety*	Keeps accurate records*	Knowledge of ADRs*	Assessing appropriateness of prescription	Regular reviewing and monitoring of treatment*	Recognising when to stop treatment	Awareness of potential drug misuse
Ten Principles of Good Prescribing	X	X					
Good Practice in Prescribing and Managing Medicines and Devices	X	X	X		X		
The Quality of GP Prescribing	X	X	X	X	X	X	
A Guide to Good Prescribing Practice for Prescribing Pharmacists in NHS Scotland		X	X	X	X		
Guidelines for Good Prescribing in Primary Care	X	X	X	X	X		
A Competency Framework for all Prescribers	X	X	X		X		X

Selecting the Right Drug	X				X		
Standards of Proficiency for Nurse and Midwife Prescribers	X	X	X	X	X		X
Guidance on Prescribing	X			X	X	X	
Prescribing Drugs of Dependence in General Practice, Clinical Governance Framework, Benzodiazepines and opioids (Australia)	X	X		X	X		X
Statement on Good Prescribing Practice (New Zealand)	X	X	X	X	X		X
Basic Principles of Prescribing					X		
WHO Guide to Good Prescribing	X			X	X	X	

Document	Prescriber complies with regulations and takes necessary safety precautions when prescribing							
	Adherence to guidelines and protocols	Safety of self, administrative safety and ethics	Appropriate dealing with outside sources	Awareness of types of prescribing errors	Being as well-informed as possible*	Knowledge of ADRs	Maintaining concentration	Professionalism when prescribing
Ten Principles of Good Prescribing	X	X		X				
Good Practice in Prescribing and Managing Medicines and Devices	X			X		X		X
The Quality of GP Prescribing	X	X	X	X	X	X	X	
A Guide to Good Prescribing Practice for Prescribing Pharmacists in NHS Scotland	X	X	X		X	X		X
Guidelines for Good Prescribing in Primary Care	X	X		X	X	X		
A Competency Framework for all Prescribers	X	X	X	X	X	X		X

Selecting the Right Drug	X	X						
Standards of Proficiency for Nurse and Midwife Prescribers	X	X	X	X		X		X
Guidance on Prescribing		X						
Prescribing Drugs of Dependence in General Practice, Clinical Governance Framework, Benzodiazepines and opioids (Australia)	X	X		X				X
Statement on Good Prescribing Practice (New Zealand)	X	X	X			X		X
Basic Principles of Prescribing								
WHO Guide to Good Prescribing		X						

Document	Building and maintaining rapport and trust with patient							
	Ability to write clear and accurate prescription*	Communication skills with patient	Keeping accurate records*	Keeping patient well-informed	Maintaining patient confidentiality	Regular reviewing and monitoring of treatment*	Shared decision-making with patient and carers	Obtaining consent
Ten Principles of Good Prescribing		X	X	X				
Good Practice in Prescribing and Managing Medicines and Devices	X	X	X	X	X	X	X	
The Quality of GP Prescribing	X	X	X	X		X	X	
A Guide to Good Prescribing Practice for Prescribing Pharmacists in NHS Scotland		X	X	X		X	X	X
Guidelines for Good Prescribing in Primary Care	X	X	X	X		X	X	X
A Competency Framework for all Prescribers	X	X	X	X	X	X	X	

Selecting the Right Drug		X				X		
Standards of Proficiency for Nurse and Midwife Prescribers	X	X	X	X		X	X	X
Guidance on Prescribing		X		X		X		
Prescribing Drugs of Dependence in General Practice, Clinical Governance Framework, Benzodiazepines and opioids (Australia)	X	X	X	X		X	X	X
Statement on Good Prescribing Practice (New Zealand)	X	X	X	X		X		X
Basic Principles of Prescribing				X		X	X	
WHO Guide to Good Prescribing	X	X		X		X	X	

Document	Prescriber effectively co-ordinates with other colleagues towards the common prescribing objective, regardless of professional background				
	Communication with non-healthcare professionals	Good communication with other prescribers	Team-working with other colleagues	Keeping accurate records	Reflects upon prescribing practice of self and others
Ten Principles of Good Prescribing		X	X	X	
Good Practice in Prescribing and Managing Medicines and Devices			X	X	
The Quality of GP Prescribing		X	X	X	X
A Guide to Good Prescribing Practice for Prescribing Pharmacists in NHS Scotland		X	X	X	
Guidelines for Good Prescribing in Primary Care			X	X	
A Competency Framework for all Prescribers		X	X	X	X

Selecting the Right Drug					
Standards of Proficiency for Nurse and Midwife Prescribers		X	X	X	X
Guidance on Prescribing					
Prescribing Drugs of Dependence in General Practice, Clinical Governance Framework, Benzodiazepines and opioids (Australia)			X	X	X
Statement on Good Prescribing Practice (New Zealand)	X	X	X	X	
Basic Principles of Prescribing					
WHO Guide to Good Prescribing		X	X		



Document	Prescriber is mindful of other considerations when prescribing and is able to adapt accordingly					
	Prescribing cost-effectively	Prescribing appropriate amounts of medication*	Taking all considerations into account*	Adherence to guidelines and protocols*	Avoids drug wastage*	Consideration of overall medication supply*
Ten Principles of Good Prescribing				X		
Good Practice in Prescribing and Managing Medicines and Devices				X		
The Quality of GP Prescribing	X	X	X	X	X	
A Guide to Good Prescribing Practice for Prescribing Pharmacists in NHS Scotland				X		
Guidelines for Good Prescribing in Primary Care	X			X		
A Competency Framework for all Prescribers			X	X		

Selecting the Right Drug	X			X		
Standards of Proficiency for Nurse and Midwife Prescribers	X		X	X		
Guidance on Prescribing						
Prescribing Drugs of Dependence in General Practice, Clinical Governance Framework, Benzodiazepines and opioids (Australia)			X	X		
Statement on Good Prescribing Practice (New Zealand)				X		
Basic Principles of Prescribing		X	X			X
WHO Guide to Good Prescribing	X	X	X	X		

Document	The prescriber is always seeking to further develop their knowledge and skills in order to enhance their prescribing practice						
	Awareness of different information resources	Evaluating information sources critically	Being as well-informed as possible*	Keeping up with technology in prescribing process	Reflects upon prescribing practice	Strives towards professional development	Strives to enhance knowledge
Ten Principles of Good Prescribing	X	X					X
Good Practice in Prescribing and Managing Medicines and Devices	X			X			X
The Quality of GP Prescribing	X	X	X	X	X		X
A Guide to Good Prescribing Practice for Prescribing Pharmacists in NHS Scotland			X	X		X	X
Guidelines for Good Prescribing in Primary Care	X		X				X
A Competency Framework for all Prescribers	X	X	X		X	X	X

Selecting the Right Drug				X			
Standards of Proficiency for Nurse and Midwife Prescribers		X		X	X	X	X
Guidance on Prescribing							
Prescribing Drugs of Dependence in General Practice, Clinical Governance Framework, Benzodiazepines and opioids (Australia)					X		X
Statement on Good Prescribing Practice (New Zealand)				X			X
Basic Principles of Prescribing							
WHO Guide to Good Prescribing	X	X		X			X

## Appendix 5 - Study Two and Three: University Research Ethics Committee Approval Letter



Hull York Medical School

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24 July 2019

Mr Usmaan Omer  
PhD Student  
Medical Sciences  
Hull York Medical School

Dear Usmaan

**19 24 – An Investigation of Non-Medical Prescribing Programmes and their role in producing high-level prescribers.**

Thank you for sending the requested clarification.

I have reviewed your response and confirm that the clarifications meet the conditions of approval.

Please let me know if I can be of further assistance and on behalf of the Ethics Committee, we wish you success with this study.

Kind regards

Yours sincerely

A handwritten signature in black ink, appearing to read "Sathyapalan", written over a horizontal line.

Professor Thozhukat Sathyapalan  
Chair  
HYMS Ethics Committee

## Appendix 6.0 – Invitation Email

Dear Sir/Madam,

I hope you are well and you and your loved ones are safe during these unprecedented times. I am a PhD student from Hull York Medical School who is investigating the teaching approaches of non-medical prescribing programmes. Part of my project involves interviewing programme leads of NMP programmes across the UK to gain a deeper insight on the teaching approaches of their programme and how they help their students transition from supplementary to independent prescribing.

I was writing to ask that if you were happy to do so, would you be able to spare around 30-40 minutes to take part in a Skype or telephone interview? I would be extremely grateful if you could but would completely understand if it is difficult, given the situation we are currently living through. Please let me know if you would be interested.

Kind Regards

Usmaan Omer

## Appendix 7 - Study Two: Research Advertisement



**Are you a Programme Director of a Non-Medical Prescribing Programme?**



Hull York Medical School are conducting a research study evaluating the effectiveness of educational approaches of Non-Medical Prescribing programmes in producing high-level prescribers. You will have the opportunity to provide an in-depth appraisal of current educational approaches and provide your suggestions towards improving them and the programme at large. You will receive a £5 Amazon gift voucher as a token of gratitude for participating.

If you are interested in participating, please email  
[hyuo1@hyms.ac.uk](mailto:hyuo1@hyms.ac.uk)

## **Appendix 8 – Participant Information Sheet**

### **Introduction**

Thank you for considering to take part in this research study. Before you decide to participate, there are a few things to explain about the study, including the rationale behind the study and what participation will involve. Please take time to read the following information carefully and feel free to ask if you feel there is anything you do not understand or would like more information – the contact details are at the bottom of this sheet. We would like to reiterate that you are under no obligation to accept this invitation and should only agree to participate if you desire to do so.

### **1. Title of the study**

An Appraisal of the Pedagogy of UK Non-Medical Prescribing Programmes and their Role in producing High-Level Prescribers

### **2. What is the purpose of this study?**

Recent years have seen the emergence of independent prescribing for pharmacists, nurses and Allied Healthcare Professionals (AHPs), mainly to provide patients with quicker access to medicines and widen the use of the skills of pharmacists, nurses and AHPs. However, the literature reports that despite the emergence of independent prescribing and the magnitude of background work conducted on prescribing competencies, there remains no absolute definition of what constitutes a good prescriber. In addition, there is a dearth of information specifying the educational approaches used in training prospective independent prescribers. Therefore, the aim of this study is to build a consensus of the qualities required in a high-level prescriber and evaluate, through interviews and think-aloud protocols, the educational approaches being used by Non-Medical Prescribing programmes to cultivate these qualities and the effectiveness of these approaches.

### **3. Why have I been chosen to take part?**

You have volunteered to be interviewed as you are the programme director or module lead of a Non-Medical Prescribing programme and are involved in teaching non-medical prescribing students.



#### **4. Do I have to take part?**

No, participation is voluntary and you are free to withdraw at any time without explanation. You would need to contact the main investigator – Usmaan Omer, to confirm withdrawal.

#### **5. What will happen if I take part?**

The interview will be semi-structured. The investigator will ask a series of questions based on the consensus of qualities needed in a high-level prescriber and will be aiming to find out about the different educational approaches used in cultivating these qualities and your appraisal of these approaches. However, there will be scope to discuss other areas that you feel are important and relevant to the discussion. Prior to the interview, the investigator will agree with you a mutual time for the telephonic interview to take place. The interviews are expected to last 30-40 minutes, however, there is a wide degree of flexibility depending on the progression of the discussion. The entire length of the interview will be audio-recorded. This is to ensure that what is stated in the interview can be noted accurately and aid data analysis. This will consist of all the data from all the interviews being analysed looking for important themes and how these are conveyed during the discussion. This combined with the data from the think-aloud exercises and follow-up interviews with students will form the conclusions of the study.

#### **6. Expenses and/or payment**

There is no provision for travel expenses as the interviews will take place through telephone.

#### **7. Are there any risks in taking part?**

There are no conceivable risks to your health by taking part in this study. The topics covered in the interview should not be considered sensitive, embarrassing or otherwise uncomfortable. However, if you do have any concerns about the risks, feel free to contact the main investigator – Usmaan Omer – or a member of the project supervisory team to discuss them.

## **8. What if I am unhappy or if there is a problem?**

If you are unhappy, or if there is a problem with the interview, please feel free to let us know by contacting Usmaan Omer (mobile no. 07539256896) or a member of the project supervisory team and we will try to help. If you remain unhappy or have a complaint which you feel cannot come to us with, please contact the HYMS Research Support Office directly (01904 321780 or [research@hyms.ac.uk](mailto:research@hyms.ac.uk)).

## **9. Will my participation be kept confidential?**

Recordings from the interview will be anonymised and stored without any identifiable information. They will be destroyed upon your withdrawal or at your specific request. If neither of these occur, the recordings and other documents will be destroyed five years after the study concludes. In the unlikely event where something is said which could raise a potential concern about fitness to practice and/or safeguarding, specific details will be gathered and shared with a member of the project supervisory team. The supervisor will then follow HYMS guidelines on fitness to practice and/or safeguarding concerns and they will navigate subsequent escalation to the relevant individuals and committees.

## **10. What happens if I am harmed taking part in this study?**

In the extremely unlikely event that you are harmed during the interview, the interview will stop and the incident documented and reported to both the project supervisory team and HYMS.

## **11. What happens to the results of the study?**

The anonymised results will be used to formulate the conclusions of the study, which will feature as the dissertation of the main investigator, Usmaan Omer, as part of a PhD project in Medical Sciences. This will eventually end up in the public domain.

## **12. What will happen if I want to stop taking part?**

You retain the right to withdraw from the project at any time, for any reason, without explanation. If you are happy for this to occur, results up to the period of withdrawal may

be used. If not, you are free to request that they are destroyed and no further use is made of them. To do so, contact the main investigator – Usmaan Omer – or a member of the project supervisory team.

### **13. Who can I contact if I have further questions?**

The main investigator, Usmaan Omer, is the first point of contact. Questions should be addressed to the investigator initially. If this is not appropriate, then you may contact a member of the research supervisory team: Gabrielle Finn, Martin Veysey or Paul Crampton

#### **Principal Investigator**

Usmaan Omer – [hyuo1@hyms.ac.uk](mailto:hyuo1@hyms.ac.uk)

#### **Supervisory Team**

Professor Gabrielle Finn – [gabrielle.finn@manchester.ac.uk](mailto:gabrielle.finn@manchester.ac.uk)

Professor Martin Veysey – [martin.veysey@hyms.ac.uk](mailto:martin.veysey@hyms.ac.uk)

Dr Paul Crampton – [paul.crampton@hyms.ac.uk](mailto:paul.crampton@hyms.ac.uk)

## Appendix 9 - Study Two: Consent Form

**Project Title: An Investigation of UK Non-Medical Prescribing Programmes and their effectiveness in producing high-level prescribers**

**Name of Researcher:** Usmaan Omer

**Name of Participant:**

I confirm I have read the Participant Information Sheet in its entirety, and understood its contents.

I confirm I have had the opportunity to ask questions about my involvement in this project.

I understand that my involvement is entirely voluntary and that I am free to withdraw from the project at any time, without giving reason or excuse.

I understand that I will be expected to take part in a 30-40 minute telephonic interview, and that my involvement is voluntary.

I understand that audio from the interview will be recorded and stored securely, and then transcribed. I understand that anonymised recordings and transcriptions may be kept so long as they are deemed to be of academic use for up to five years.

I agree to take part in this research as an interviewee

Initials: \_\_\_\_\_ Date: \_\_\_\_\_ Signature: \_\_\_\_\_

## Appendix 10 – Semi-structured Interview Questions

1) Introductory exchanges with participant

2) Can you please provide a little bit of information regarding your role in the NMP programme and the responsibilities you are tasked with?

3) For a prescriber to be successful, it is imperative they have a strong grasp of the fundamental knowledge of disease and drugs in their area of expertise. Could you tell me a little bit about the approaches your programme takes in developing a robust knowledge-base in your students?

- **Disease pathophysiology (taught a new or expanded from undergraduate?)**

- **Pharmacodynamics, pharmacokinetics, pharmacotherapeutics and ADME**

- **Diagnostic tools and their use**

- **Drug groups and their properties**

- **Non-pharmacological treatments**

- **Determining genuine need for prescription**

- **Types of patients (high-risk, multimorbidities)**

- **Cost-effective prescribing**

4) To what extent do you think these teaching approaches build a robust knowledge-base in the students and if possible, how would you go about modifying the teaching approaches to improve this knowledge-base?

5) According to many sources of literature, such as the EQUIP study by Dornan et al, a lot of prescribing errors are as a result of lapses in safety. Could you tell me about the teaching approaches your programme uses in ensuring you produce safe prescribers?

- **Drug dosages and accurate prescription-writing**

- **Monitoring treatments and recognising signs of treatment failure**

- **Recognising possible prescribing errors and ADRs**

- **Adherence to guidelines and protocols**

- **Professionalism, confidentiality and consent**

- **Keeping accurate records**

6) To what extent do you think these teaching approaches inculcate prescriber safety and do you think the teaching approaches can be improved to make the prescriber even safer in practice?

7) Without good communication skills with both patient and other healthcare professionals, the risk of prescribing errors are increased. How are your students taught to be good communicators in practice?

- **Verbal, non-verbal, written and electronic communication**

- **Shared decision-making and medication adherence**

- **Right to treatment refusal**

**- Wider prescribing team and reflection of practice of self and others**

8) Can you think of any ways in which you can enhance the communication skills of your students?

9) A prescriber's learning is lifelong and they must continue to develop themselves as prescribers. How does your programme emphasise the importance of this to your students?

**- Critical analysis of knowledge sources**

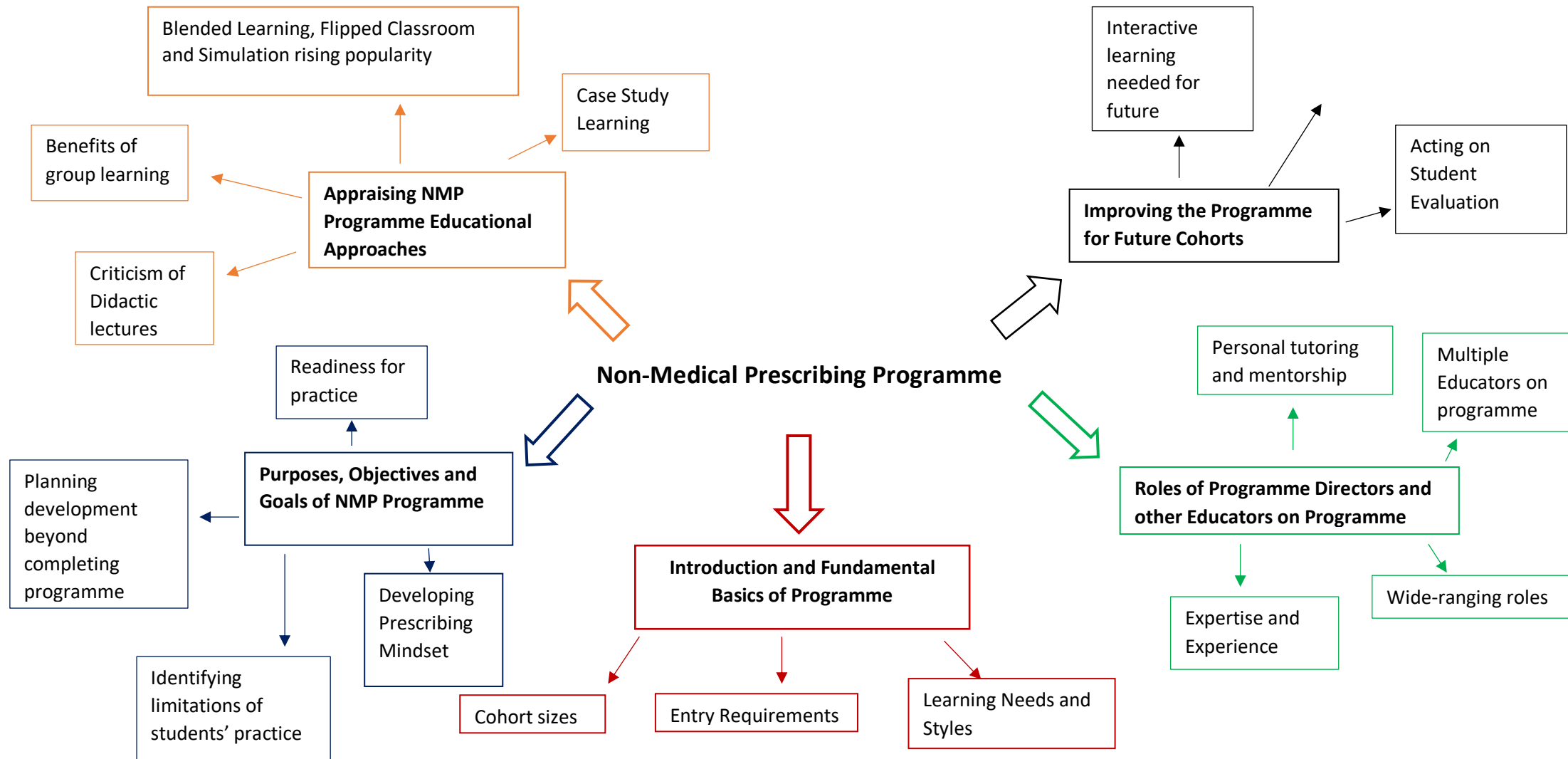
**- Importance of updating knowledge**

**- Dealings with outside influences (pharmaceutical industry)**

**- Adapting to newer technologies created to aid prescribing**

10) Can you provide an overall reflection of how prepared you feel your students are at the point of graduation and entering their first day in practice as independent prescribers? How do you think you can improve your programme to increase this preparedness for prescribing?

## Appendix 11 – Study Two: Themes and Subthemes





## Appendix 12 – Study Two: Entry Requirements of NMP Programmes

Type of Healthcare Professional	Requirements stipulated by programme for entry
Nurses	Should be registered with Nursing and Midwifery Council (NMC) for minimum of one year. (NMC, 2018)
Pharmacists	Should be registered with General Pharmaceutical Council (GphC) for minimum of two years. Minimum two years of patient-oriented experience in UK hospital or primary or community care setting. (GphC)
Allied Healthcare Professionals	Should be registered with Health and Care Professions Council (HCPC) in a relevant allied health profession. Minimum three years relevant post-qualification experience within chosen clinical area (HCPC, 2012)

## Appendix 13 – Study Two: Teaching Content Tables

### Knowledge

Subcategory of Knowledge	Overview of coverage of subcategory across NMP Programmes	Overview of educational approaches used to teach concepts around subcategory
Pharmacology, Pharmacokinetics, Pharmacodynamics and Administration, Distribution, Metabolism and Excretion (ADME)	<ul style="list-style-type: none"> <li>- Concepts pertaining to pharmacology are taught in a generic fashion.</li> <li>- Programmes strive to teach kinetics, dynamics and ADME relevant to multiple drug groups and a range of conditions.</li> <li>- Teaching of concepts around this subcategory more intense in programmes with nurses and AHPs and less intense for programmes with pharmacists only</li> </ul>	<ul style="list-style-type: none"> <li>- Mostly through traditional, didactic lectures.</li> <li>- Lectures supplemented with approaches such as online self-directed learning, group discussions and case-study learning</li> </ul>
Creating a Personal Formulary	<ul style="list-style-type: none"> <li>- Many programmes teach around basics of creating small personal formulary for each student.</li> <li>- This approach enables students to understand why they choose a particular drug and learn to justify prescribing decisions</li> </ul>	<ul style="list-style-type: none"> <li>- Information from lectures used by students to create formularies through self-directed learning</li> </ul>
Drug Prescription as a Last Resort, Deprescribing and Non-Pharmacological Treatments	<ul style="list-style-type: none"> <li>- Mentality of prescribing as a last resort adopted across all programmes.</li> <li>- Awareness raised around dealing with situations where pressure to</li> </ul>	<ul style="list-style-type: none"> <li>- Traditional, didactic lectures</li> <li>- Case-based sessions</li> <li>- Some programmes ask students to write reflections upon experiences in practice of patient scenarios. Asked to reflect what non-</li> </ul>

	<p>prescribe could arise and how to negotiate these pressures.</p> <ul style="list-style-type: none"> <li>- Teaching around considering non-pharmacological treatments on the rise. Students urged to consider patient lifestyle when considering appropriate treatment</li> </ul>	<p>pharmacological treatments they could have considered</p>
Cost-effective Prescribing	<ul style="list-style-type: none"> <li>- Taught to the extent required by major prescribing guidelines.</li> <li>- Treat as a consideration when attempting to justify prescribing decisions.</li> </ul>	<ul style="list-style-type: none"> <li>- Mainly taught through in-class discussions.</li> <li>- Asked to discuss concept in reflective accounts for portfolio.</li> </ul>

## Safety

Subcategory of Safety	Overview of coverage of subcategory across NMP Programmes	Overview of educational approaches used to teach concepts around subcategory
Drug Calculations	<ul style="list-style-type: none"> <li>- All programmes teach this as an integral part of the curriculum.</li> <li>- But some expectation from programmes that students enrol with satisfactory numerical skill.</li> <li>- Some programmes have personal tutors for drug calculations should students need them.</li> </ul>	<ul style="list-style-type: none"> <li>- Lectures</li> <li>- Work booklets</li> <li>- One-to-one sessions with personal tutors.</li> </ul>
Prescription-writing	<ul style="list-style-type: none"> <li>- Integral part of curriculum for all programmes.</li> <li>- Major feature of student portfolios.</li> <li>- Students exposed to written templates from sources such as the British National Formulary (BNF)</li> </ul>	<ul style="list-style-type: none"> <li>- Practical prescription-writing sessions using case studies.</li> <li>- Learnt during time in clinical practice with supervisors.</li> </ul>
Monitoring Effectiveness of Treatment	<ul style="list-style-type: none"> <li>- High-level of attention afforded by all programmes towards treatment monitoring and safety netting.</li> <li>- Extent to which individual student learns this depends on area of practice.</li> </ul>	<ul style="list-style-type: none"> <li>- Skill mainly learnt during time in clinical practice.</li> <li>- Case study discussions in some programmes</li> </ul>
Awareness of Prescribing Errors	<ul style="list-style-type: none"> <li>- Small number of programmes cover this through in-class discussions.</li> </ul>	<ul style="list-style-type: none"> <li>- Programmes discussing this use the Swiss Cheese Model as the basis of discussion.</li> </ul>
Compliance with Guidelines and Regulations	<ul style="list-style-type: none"> <li>- Most programmes make students aware of the RPS Competency Framework and NICE Guidelines.</li> </ul>	<ul style="list-style-type: none"> <li>- Limited amount of lectures.</li> <li>- Learning of guidelines mainly through self-directed learning.</li> </ul>

	<ul style="list-style-type: none"> <li>- Students urged to follow guidelines from own healthcare professional backgrounds (e.g. GphC guidelines for pharmacists and NMC standards for nurses).</li> <li>- Examples of some programmes asking students to look at GMC guidelines given their applicability to all prescribing backgrounds.</li> <li>- Most programmes teach students selectivity around guidelines best suited to their respective areas of practice.</li> <li>- Students taught they must be prepared to justify any decision taken outside of guidelines.</li> </ul>	
Professionalism and Accountability	<ul style="list-style-type: none"> <li>- Teaching around professional and legal frameworks heavily featured across most programmes.</li> <li>- Expectation that students have some level of prior knowledge of ethical and professional procedures – but clear that refresher sessions should be incorporated.</li> <li>- Consent and capacity covered in sessions around professionalism.</li> <li>- Record-keeping also covered by curricula as a way of inculcating effective multidisciplinary working</li> </ul>	<ul style="list-style-type: none"> <li>- Ethics and legal frameworks usually covered through traditional lectures.</li> <li>- Role-plays</li> <li>- One example of a “speed-dating” discussion approach with service users.</li> <li>- Reflective pieces for prescribing portfolio.</li> <li>- Case studies</li> </ul>

## Communication

Subcategory of Communication	Overview of coverage of subcategory across NMP Programmes	Overview of educational approaches used to teach concepts around subcategory
Communication with Patients	<ul style="list-style-type: none"> <li>- Stated to be a major component of teaching on the curricula of all the programmes.</li> <li>- Teaching conducted around consultation models.</li> <li>- Communication teaching with patient based around medication adherence, concordance and shared decision making</li> </ul>	<ul style="list-style-type: none"> <li>- Consultation models taught through lectures.</li> <li>- Role-plays with patient actors</li> <li>- One example of a blended-learning approach where students conduct prior reading before attending a discussion session around concordance and adherence.</li> <li>- Skill developed in clinical practice working with supervisor</li> </ul>
Communication and co-ordination with colleagues and other prescribers	<ul style="list-style-type: none"> <li>- A rich learning environment with students from various healthcare professional backgrounds inculcates developing this skill.</li> <li>- Insights are gained of the roles of other prescribers through in-class discussions.</li> <li>- Some programmes implemented specific interprofessional working sessions.</li> </ul>	<ul style="list-style-type: none"> <li>- Group discussions</li> <li>- Group presentations around specific case studies.</li> <li>- Small group teaching through mixing different healthcare professionals</li> </ul>

## Continuing Professional Development (CPD)

Subcategory of CPD	Overview of coverage of subcategory across NMP Programmes	Overview of educational approaches used to teach concepts around subcategory
Updating Knowledge and Skill in Practice	<ul style="list-style-type: none"> <li>- Programmes strive to inform students of ways in which they can update prescribing knowledge and skill.</li> <li>- Programmes adopt a though process that their role is of a supportive and advisory nature, but responsibility to develop this skill was on student beyond graduation</li> </ul>	<ul style="list-style-type: none"> <li>- In-class discussions</li> <li>- Self-directed learning</li> </ul>
Critical Thinking	<ul style="list-style-type: none"> <li>- Some programmes run sessions on critiquing literature sources.</li> <li>- Other programmes don't run specific sessions, but outsource developing skill to other departments in university</li> </ul>	<ul style="list-style-type: none"> <li>- In-class discussions, followed by recommended reading in students' own time</li> </ul>
Dealing with External Pressures	<ul style="list-style-type: none"> <li>- Most programmes teach students to avoid drug representatives and events organised by pharmaceutical industry.</li> <li>- One example of teaching a more balanced view of pharmaceutical industry due to participant's history working in the industry</li> </ul>	<ul style="list-style-type: none"> <li>- Lectures</li> <li>- In-class discussions</li> </ul>
Adapting to Newer Prescribing Technologies	<ul style="list-style-type: none"> <li>- Most programmes don't teach this as it is beyond the programme's remit.</li> </ul>	<ul style="list-style-type: none"> <li>- N/A</li> </ul>
COVID-19 and Teaching Remote Prescribing	<ul style="list-style-type: none"> <li>- Remote prescribing not taught before, but programmes actively</li> </ul>	<ul style="list-style-type: none"> <li>- N/A</li> </ul>

	seeking ways of incorporating it further into curricula due to the events of the pandemic and the inevitable relevance of remote prescribing going forward.	
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## Appendix 14 – Study Two: Assessment Approaches of NMP Programmes Table

Assessment Approach	Main features of assessment approach within programmes	Use of assessment approach across programmes
Written Exam	<ul style="list-style-type: none"> <li>- Mixture of multiple-choice questions (MCQs) and short answer questions on pharmacology, pharmacodynamics and pharmacokinetics.</li> <li>- Some programmes have essay-based questions where the student can choose which questions to answer or omit.</li> <li>- Essay questions could also ask students around ethics and legalities of prescribing and public health-related questions.</li> <li>- Some programmes also use written exam to assess prescription-writing skills.</li> <li>- Pass mark is 80%</li> </ul>	<ul style="list-style-type: none"> <li>- All programmes implement a written examination, although the contents of the exam could vary</li> </ul>
Essay Writing	<ul style="list-style-type: none"> <li>- Usually a 2,000 – 3,000-word essay around a case study specific to the students' area of practice.</li> <li>- Essay assesses aspects of prescribing beyond knowledge, such as safety netting, treatment monitoring and critical drug analysis.</li> <li>- Some programmes use essays as a reflective tool to appraise</li> </ul>	<ul style="list-style-type: none"> <li>- Essays used as a primary assessment approach across all programmes</li> </ul>

	hypothetical or real-life case scenarios.	
Numeracy Exam	<ul style="list-style-type: none"> <li>- One hour examination consisting of 20 questions.</li> <li>- Pass mark is 100% - no margin for error. This has led to a higher failure rate in some programmes as compared to other assessments</li> </ul>	<ul style="list-style-type: none"> <li>- All programmes use numeracy exams as a primary assessment approach.</li> </ul>
Portfolio	<ul style="list-style-type: none"> <li>- Compiled by student throughout time undertaking programme.</li> <li>- Portfolio consists of submissions including written work, feedback from practice supervisor on observed consultation performance, written prescriptions and evidence of fulfilling requirements stipulated by the RPS Competency Framework</li> <li>- Portfolio examined by personal tutor and moderated by programme lead on one programme.</li> <li>- Reflective accounts submitted to portfolio aid in developing academic skills and critical thinking of students.</li> </ul>	<ul style="list-style-type: none"> <li>- Portfolio a strong element of assessment in all programmes</li> </ul>
Objective structured clinical examinations (OSCEs)	<ul style="list-style-type: none"> <li>- Usually organised as multiple clinical skills stations and primarily examine students' consultation and communication skills.</li> <li>- Some programmes also use OSCEs to assess professionalism, obtaining</li> </ul>	<ul style="list-style-type: none"> <li>- Although use of OSCEs as an assessment approach is widespread, a significant number of programmes have discontinued their use.</li> <li>- Main reasons for discontinuation of use included: time in clinical practice for student being adequate for</li> </ul>

	<p>consent and types of medications students prescribe.</p> <ul style="list-style-type: none"><li>- Some programmes videotaped OSCEs as a means of reflection for students over their prescribing practice</li></ul>	<p>Practice Assessor to determine competency; OSCEs being a source of unnecessary anxiety for some students and the expectation that students enrol onto programme with a satisfactory level of clinical skills</p>
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## Appendix 15 – Research Advertisement



**Are you a graduate of a Non-Medical Prescribing Programme?**



Hull York Medical School are conducting a research study evaluating the effectiveness of educational approaches of Non-Medical Prescribing programmes in producing high-level prescribers. You will have the opportunity to conduct prescribing tasks on hypothetical patients, explain the development of your prescribing practice, provide an in-depth appraisal of current educational approaches and provide your suggestions towards improving them and the programme at large. The interview will be conducted remotely through Zoom. You will receive a Certificate of completion and a £5 Amazon gift voucher as a token of gratitude for participating.

If you are interested in participating, please email  
[hyuo1@hyms.ac.uk](mailto:hyuo1@hyms.ac.uk)

## **Appendix 16 – Invitation Email**

Dear NMP,

Thank you very much for your interest in the research study.

Please find enclosed a research information sheet and consent form. As part of the interview, I will be asking participants to verbalise their prescribing thought process for clinical paper-based scenarios, so could you please let me know what area of practice you prescribe for?

Once you have read the enclosed information sheet and are happy to proceed, please let me know some suitable dates and times for you to take part in the interview.

Many Thanks

Usmaan

# Appendix 17 – Participant Information Sheet

## Introduction

Thank you for considering to take part in this research study. Before you decide to participate, there are a few things to explain about the study, including the rationale behind the study and what participation will involve. Please take time to read the following information carefully and feel free to ask if you feel there is anything you do not understand or would like more information – the contact details are at the bottom of this sheet. We would like to reiterate that you are under no obligation to accept this invitation and should only agree to participate if you desire to do so.

### 1. Title of the study

An investigation of UK Non-Medical Prescribing Programmes and their Effectiveness in producing High-Level Prescribers

### 2. What is the purpose of this study?

Recent years have seen the emergence of independent prescribing for pharmacists, nurses and Allied Healthcare Professionals (AHPs), mainly to provide patients with quicker access to medicines and widen the use of the skills of pharmacists, nurses and AHPs. However, the literature reports that despite the emergence of independent prescribing and the magnitude of background work conducted on prescribing competencies, there remains no absolute definition of what constitutes a good prescriber. In addition, there is a dearth of information specifying the educational approaches used in training prospective independent prescribers. Therefore, the aim of this study is to build a consensus of the qualities required in a high-level prescriber and evaluate, through interviews and think-aloud protocols, the educational approaches being used by Non-Medical Prescribing programmes to cultivate these qualities and the effectiveness of these approaches.

### **3. Why have I been chosen to take part?**

You have volunteered to undertake a think-aloud prescribing practice exercise and follow-up interview as you have completed a Non-Medical Prescribing Programme and are able to prescribe independently in clinical practice

### **4. Do I have to take part?**

No, participation is voluntary and you are free to withdraw at any time without explanation. You would need to contact the main investigator – Usmaan Omer, to confirm withdrawal

### **5. What will happen if I take part?**

Firstly, the investigator will present you with 4 clinically-validated case vignettes according to your area of expertise. You will verbalise all of your thoughts as you devise and come to a final prescribing decision. Following this, you will take part in a follow-up interview asking you to expand upon the reasons why you came up with these prescribing decisions and how the educational approaches you have experienced throughout your non-medical prescribing education have helped you in your prescribing practice. Prior to the think-aloud exercise and interview, the investigator will agree with you a convenient date and time to conduct the interview through the online platform Zoom. The think-aloud and interview process is expected to last 30-40 minutes in duration, however, there is a wide degree of flexibility depending on the progression of the discussion. The entire length of the think-aloud exercise and interview will be audio-recorded. This is to ensure that what is stated can be noted accurately and aid data analysis. This will consist of all the data from all the think-aloud exercises and follow-up interviews. This combined with the data from interviews with programme directors will form the conclusions of the study.

### **6. Expenses and/or payment**

There is no provision for travel expenses as the think-aloud exercises and follow-up interviews will take place remotely through Zoom. As a show of gratitude for sacrificing your valuable time, you will receive a certificate of completion along with a £5 Amazon gift voucher at the end of the follow-up interview.

### **7. Are there any risks in taking part?**

There are no conceivable risks to your health by taking part in this study. The topics covered in the interview should not be considered sensitive, embarrassing or otherwise uncomfortable. However, if you do have any concerns about the risks, feel free to contact the main investigator – Usmaan Omer – or a member of the project supervisory team to discuss them.

#### **8. What if I am unhappy or if there is a problem?**

If you are unhappy, or if there is a problem with the think-aloud exercise or interview, please feel free to let us know by contacting Usmaan Omer (mobile no. 07539256896) or a member of the project supervisory team and we will try to help. If you remain unhappy or have a complaint which you feel cannot come to us with, please contact the HYMS Research Support Office directly (01904 321780 or [research@hyms.ac.uk](mailto:research@hyms.ac.uk)).

#### **9. Will my participation be kept confidential?**

Recordings from both the think-aloud exercise and follow-up interview will be anonymised and stored without any identifiable information. They will be destroyed upon your withdrawal or at your specific request. If neither of these occur, the recordings and other documents will be destroyed five years after the study concludes. In the unlikely event where something is said which could raise a potential concern about fitness to practice and/or safeguarding, specific details will be gathered and shared with a member of the project supervisory team. The supervisor will then follow HYMS guidelines on fitness to practice and/or safeguarding concerns and they will navigate subsequent escalation to the relevant individuals and committees.

#### **10. What happens if I am harmed taking part in this study?**

In the extremely unlikely event that you are harmed during the think-aloud exercise or interview, the process will stop and the incident documented and reported to both the project supervisory team and HYMS.

#### **11. What happens to the results of the study?**



The anonymised results will be used to formulate the conclusions of the study, which will feature as the dissertation of the main investigator, Usmaan Omer, as part of a PhD project in Medical Sciences. This will eventually end up in the public domain.

## **12. What will happen if I want to stop taking part?**

You retain the right to withdraw from the project at any time, for any reason, without explanation. If you are happy for this to occur, results up to the period of withdrawal may be used. If not, you are free to request that they are destroyed and no further use is made of them. To do so, contact the main investigator – Usmaan Omer – or a member of the project supervisory team.

## **13. Who can I contact if I have further questions?**

The main investigator, Usmaan Omer, is the first point of contact. Questions should be addressed to the investigator initially. If this is not appropriate, then you may contact a member of the research supervisory team: Gabrielle Finn, Martin Veysey or Paul Crampton

### **Principal Investigator**

Usmaan Omer – [hyuo1@hyms.ac.uk](mailto:hyuo1@hyms.ac.uk)

### **Supervisory Team**

Professor Gabrielle Finn – [gabrielle.finn@hyms.ac.uk](mailto:gabrielle.finn@hyms.ac.uk)

Professor Martin Veysey – [martin.veysey@hyms.ac.uk](mailto:martin.veysey@hyms.ac.uk)

Dr Paul Crampton – [paul.crampton@hyms.ac.uk](mailto:paul.crampton@hyms.ac.uk)

## Appendix 18 - Study Three: Consent Form

**Project Title: An Investigation of UK Non-Medical Prescribing Programmes and their effectiveness in producing high-level prescribers**

**Name of Researcher:** Usmaan Omer

**Name of Participant:**

I confirm I have read the Participant Information Sheet in its entirety, and understood its contents.

I confirm I have had the opportunity to ask questions about my involvement in this project.

I understand that my involvement is entirely voluntary and that I am free to withdraw from the project at any time, without giving reason or excuse.

I understand that I will be expected to attend a 30-40 minute think-aloud exercise and follow-up interview through Zoom, and that my involvement is voluntary.

I understand that audio from both the think-aloud exercise and follow-up interview will be recorded and stored securely, and then transcribed. I understand that anonymised recordings and transcriptions may be kept so long as they are deemed to be of academic use for up to five years.

I agree to take part in this research as an interviewee

Initials: \_\_\_\_\_ Date: \_\_\_\_\_ Signature: \_\_\_\_\_

## Appendix 19 - Study Three: Clinical Case Vignettes

### Infection

1) A 47-year-old woman presents with a three day history of a painful lower leg following an abrasion while gardening. The pain is getting worse.

On examination, her temperature is 38.2°C and she is feeling weak and nauseated. The leg is swollen, warm, and tender with ill-defined erythema. Her body weight is 65 kg and her eGFR is 92 mL/min/1.73 m<sup>2</sup>.

Which treatment should you prescribe?

2) A 27-year-old female who is 38 weeks pregnant presents with dysuria. A urine specimen is cloudy and you send a mid-stream urine sample. You decide to begin empirical antibacterial treatment. Which antibiotic would you choose?

3) A 23-year-old woman, whose boyfriend has recently recovered from swine flu, comes to the surgery complaining of flu symptoms which started yesterday. She has a history of asthma and is using her salbutamol inhaler more frequently than usual.

Her drug history includes:

Salbutamol CFC-free aerosol inhaler 100 micrograms/metered inhalation - 2 puffs when required

Symbicort 400/12 turbobaler - 2 puffs twice daily

Montelukast 10mg every evening

On examination, she has clear symptoms of an upper respiratory tract infection and is pyrexial with a temperature of 38.8°C.

Investigations show:

Haemoglobin	124 g/L	(115-160)
White cell count	7.2 ×10 <sup>9</sup> /L	(4-11)
Platelets	205 ×10 <sup>9</sup> /L	(150-400)
Sodium	140 mmol/L	(134-148)
Potassium	4.6 mmol/L	(3.5-5)
Creatinine	94 µmol/L	(60-120)
Swab Influenza A +	H1N1 subtype	

What would be an appropriate intervention?

4) A 25-year-old patient who has been diagnosed with asthma attends the surgery complaining of wheeze in the morning and during exercise. He takes his salbutamol at least four times a day. The patient is finding it difficult to co-ordinate actuation of his metered dose inhaler with inhalation despite counselling. How should his asthma drugs be administered?

5) You see a 27-year-old patient who takes Clenil 400 micrograms daily for his asthma. He is also prescribed salbutamol as and when required. He has had a cold for a week and feels his breathing has got worse. He is bringing up minimal white phlegm but does not complain of fevers. He becomes wheezy at night. There are no associated chest pains but he does feel his chest is tight.

On examination, he is afebrile and has oxygen saturations of 95% in air. His peak flow is 340 L/min (usually 475 L/min). He is able to speak in full sentences. His respiratory rate is 20 respirations per minute and pulse is 88 beats per minute.

Which would be the most appropriate treatment option for this patient?

## **Cancer**

1) Investigations show that a 58-year-old man with advanced colon cancer has bowel obstruction, but surgery is inappropriate. He has been taking oral morphine for over two weeks and this is to be switched to a continuous subcutaneous infusion of diamorphine. He also had four episodes of vomiting today.

Which antiemetic will you prescribe for him?

## **Rheumatology**

1) An 85-year-old man comes to see you with pain in his right knee. He is known to suffer with osteoarthritis and is taking the maximum dose of paracetamol without much effect; he is keen to try something stronger. His past medical history includes cognitive impairment and confusion.

Which medication is most appropriate?

2) You see a 67-year-old man with osteoarthritis of the knee that is not responding to either paracetamol or co-dydramol. He had a non-ST segment elevation myocardial infarction two years ago and takes atenolol 100 mg daily, aspirin 75 mg daily, and simvastatin 40 mg daily. What regimen would you prescribe?

**3)** A 67-year-old gentleman complains of a red, hot, swollen big toe on his left foot. He finds that walking around the house is causing him significant pain and he is putting more weight on this right foot. He also suffers with hypertension for which he takes ramipril and chronic kidney disease. One month ago, his eGFR was 41. He has tried paracetamol for the pain which is not helping.

On examination, he has a red, swollen big toe on the left foot. It is very sensitive to touch but he is able to move his toe and he is afebrile.

What would you prescribe as a best management option?

## **Mental Health**

**1)** A 16-year-old girl is seen by a psychiatrist after trying watchful waiting, counselling, and cognitive-behavioural therapy for her depression. She, as well as her parents, are very keen to try antidepressant medication. What is the best medication to prescribe?

**2)** An 82-year-old man with known dementia is on a psychiatry ward and has become acutely agitated. He is starting to hit other residents and is also threatening to harm himself. He is not complaining of any other symptoms. Which medication should be used to sedate him?

**3)** A 33 year old woman has come to the GP after a 2 month history of low mood with tiredness. She can't sleep and then wake up early in the morning. She states a lack of interest in work as well as her ballroom dancing which she used to go to weekly. Her husband is worried that she isn't eating much and has lost weight since she has no appetite. Would a medication need to be prescribed in this situation?

**4)** A 21 year old man has been brought to A&E after his family found him with a knife cutting his head, to try remove a brain implant he believes the FBI put in to read his thoughts. He is also worried that they are putting thoughts into his head. When speaking to him he mentions that even when his family aren't there he can hear them saying negative things about him. Would a medication need to be prescribed in this situation?

## Cardiology and Blood Pressure

1) You are fast bleeped to the resuscitation room in the Emergency Department where a patient has collapsed. On your arrival he is unconscious, there is no respiratory effort and no palpable pulse. Staff have initiated cardiopulmonary resuscitation (CPR) and an intravenous cannula has been inserted. A cardiac monitor is attached and shows pulseless electrical activity (PEA).

2) A 63-year-old male is being reviewed for hypertension associated with type 2 diabetes mellitus. Currently he is prescribed aspirin 75 mg, amlodipine 10 mg and atorvastatin 20 mg. His blood pressure is consistently around 160/92 mmHg.

What drug would you add to improve this patient's hypertension?

On examination, she has clear symptoms of an upper respiratory tract infection and is pyrexial with a temperature of 38.8°C.

3) A 45-year-old male is admitted with a one hour history of severe central chest pain. On presentation, he is in pain, feels nauseated, and is sweating. Investigations reveal an acute inferior myocardial infarction (MI).

What would be the drug of choice to relieve his pain?

4) A 69-year-old man is admitted to the Emergency Department with worsening breathlessness. He is short of breath at rest and is unable to lie flat.

On examination, his jugular venous pressure is raised and he has bilateral pleural effusions, as well as pitting oedema to both feet.

What would be the most appropriate initial management?

5) A 58-year-old man comes to see you after his blood tests. He initially presented because of a strong family history of angina. He suffers with type 1 diabetes mellitus and hypertension. His blood tests reveal the following:

Serum Cholesterol	7.4mmol/l
Serum LDL	5.2mmol/l
Serum HDL	1.0mmol/l
Serum Cholesterol/HDL ratio	7.4

Serum Triglycerides	5.5mmol/l
Renal function	normal
Liver function	normal
HbA1c	52mmol/l

What would be the best management plan?

## General Emergency

1) A 19-year-old student is admitted to hospital with a two hour history of severe headache, neck stiffness, and photophobia. A lumbar puncture is performed indicating acute bacterial meningitis. Cultures of blood and cerebrospinal fluid grow *Neisseria meningitidis*. He has no past history of note. He lives at home with his parents and 16-year-old sister.

Which of the following prophylactic treatments, if any, should his family receive?

2) A 19-year-old student is admitted to hospital with a two hour history of severe headache, neck stiffness, and photophobia. A lumbar puncture is performed indicating acute bacterial meningitis. Cultures of blood and cerebrospinal fluid grow *Neisseria meningitidis*. He has no past history of note. He lives at home with his parents and 16-year-old sister.

Which of the following prophylactic treatments, if any, should his family receive?

## Pain

A 28-year-old lady is struggling with labour pains on the obstetric ward. She has tried paracetamol without effect; she is not known to have any allergies to medication.

Which of the following can be used for pain relief?

## Epilepsy (taken from NICE Clinical Guidelines 137)

1) Aisha is a 24-year-old female who attends your surgery after an episode of odd behaviour. Her mum, who has come with her, witnessed an episode last week when Aisha suddenly stood up from the table, started making an 'mm, mm, mm' sound, and wandered around before collapsing to the ground, looking stiff followed by a few jerks. She regained consciousness after about a minute, but had bitten her tongue. She was confused for a further hour or so and she can't recall the event. She had a similar episode about 6 months ago at work, where a colleague commented on her looking bewildered, walking around the office and muttering to herself. At the time, Aisha put this down to stress.

What further information would you need and in turn, what would be the best treatment to prescribe?

2) Kieran is a 19-year-old male who has been referred to a first seizure/urgent assessment neurology clinic from A&E after a single episode of collapse with jerking. He is unable to give you much of a history; he was at his girlfriend's house, sitting and chatting on the sofa, and the next thing he remembers is feeling disorientated on the floor.

What further information would you need and in turn, what would be the best treatment to prescribe?

3) Molly is 18 years old. She has made an appointment because her friends have noticed that she has 'funny turns' and persuaded her to seek advice. Molly has a history of two febrile convulsions at the age of 18 months and 22 months. She drinks 20 units of alcohol a week, usually on Friday and Saturday nights. She drives a car. She has had stereotyped feelings of déjà vu associated with a rising feeling in her abdomen for 4–5 years, but has previously ignored them. Her friends have witnessed three episodes when she has looked blank, fiddled with her hands, and opened and closed her mouth repetitively. Molly is unaware of her friends during these episodes and afterwards has no memory of the events. There is no abnormality on examination.

What medication would you prescribe?

### **Parkinson's Disease (taken from NHS Greater Glasgow and Clyde Medicines Information Service Guideline MedicinesUpdate Extra, Aug 2018)**

1) Patient with Parkinson's disease (PD) presents with symptoms of confusion and is diagnosed with community acquired pneumonia.

The patient is unable to swallow and is not able to tolerate an NG tube.

PD medications on admission include: Co-careldopa 25/100 at 7am, 11am, 3pm, 7pm and 11pm Ropinirole m/r 8mg each morning

Would you prescribe any other medications to their treatment regimen?

2) Patient with PD admitted with aspiration pneumonia.

Patient has swallowing difficulties but can manage soluble/liquid preparations.

PD medications on admission include: Co-beneldopa 50/200 capsules at 7am, 12pm and 7pm



Would you prescribe any other medications to their treatment regimen?

**3)** Patient with PD admitted over the weekend with a UTI.

PD medications on admission include: Pramipexole M/R 3mg (2.1 mg base) at 7am

Patient did not bring in her own medicines and only the standard release preparation of pramipexole is available within the hospital.

Would you prescribe any other medications to their treatment regimen?

## **Paediatric Gastroenterology**

**1)** A mother brings her 5-month-old baby girl to see you with problems after feeding. This has been going on for a couple of months. She arches her back and cries after her feeds. She is otherwise thriving well. Her weight yesterday was 6 kg according to the health visitor. You feel she is suffering from reflux. Conservative measures have not helped.

Which medication would you prescribe?

**2)** You see a 5-year-old boy who is in discomfort and has to strain while passing stools. This has been ongoing for a few months. He has not had any rectal bleeding and he is still putting on weight. He does not complain of any abdominal pain. His mother has increased his fibre intake and he drinks over a litre of water a day. He last opened his bowels this morning. On examination, you can feel faecal matter in his left iliac fossa.

**3)** The mother of a 3-year-old boy is becoming increasingly concerned about his constipation. She informs you that she noted soiling of his underwear on numerous occasions. When he does finally manage to open his bowels, he has to strain considerably leading to some fresh blood spotting on wiping. The stools are usually very firm and his mother has noted that on occasion stools have blocked the toilet. She is very worried. On examination there is no abnormality. Which medication would you prescribe? (taken from NHS Education for Scotland CPD Connect Guideline - October 2015)

## Podiatry

A 35-year-old man presents to his general practitioner with 'unsightly toenails on his right foot'. On examination, the toenails of three toes are thickened and discoloured with brittle edges. The patient has a history of hypercholesterolaemia and is taking simvastatin 40 mg at night. Which medication is most appropriate for him?

A 67-year-old gentleman complains of a red, hot, swollen big toe on his left foot. He finds that walking around the house is causing him significant pain and he is putting more weight on this right foot. He also suffers with hypertension for which he takes ramipril and chronic kidney disease. One month ago, his eGFR was 41. He has tried paracetamol for the pain which is not helping.

On examination, he has a red, swollen big toe on the left foot. It is very sensitive to touch but he is able to move his toe and he is afebrile.

Which medication would you prescribe?

## **Appendix 20 - Study Three: Semi-structured Interview Questions**

- 1) As you can tell from the vignette exercise, it is essential for a prescriber to be well versed in their knowledge of diseases and drugs in their area of expertise. How would you reflect upon the experiences of learning these concepts during your time completing the program? How do you think they have helped you shape your knowledge based on prescribing?**
  
- 2) Non-medical prescribing programs approach inculcating prescribing safety through various approaches, such as specialized sessions, self-directed learning, group work, and learning and clinical practice. These are teaching things such as drug, dosage, calculations, prescription writing, monitoring treatments, and professionalism and confidentiality. Do you believe the program prepared you as much as it could have to be the safest prescriber that you could be?**
  
- 3) The next question is that as important as being able to write a prescription it's itself is also being able to communicate effectively with both patients and other healthcare professionals involvement within the prescribing process. Upon reflection, do you feel the program helped develop your communication skills to the highest extent possible?**
  
- 4) In an ever-evolving world and healthcare system, especially these days, a prescriber must keep themselves up to date and contemporary with developments around newer research and drugs in their area of expertise. Do you feel that the program trained you adequately to be able to critically seek out the appropriate information, resources to update your prescribing practice and use newer prescribing technologies?**
  
- 5) The program uses assessments very extensively and at times, demanding. Do you feel these assessments help to push you to be a better prescriber or did you feel the demands were too excessive?**

- 6) In conclusion what are your overall reflections of your time completing the non-medical prescribing program? What could the program have maybe done to enhance your experience and then what could they do to improve learning for NMP students in the future?**

