

**PRESCRIBING IN TEACHING HOSPITALS:
EXPLORING SOCIAL AND CULTURAL INFLUENCES
ON PRACTICES AND PRESCRIBER TRAINING**

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DECLARATION OF ORIGINALITY

This is to certify that the work embodied in this thesis is the result of original research towards the degree of Master of Pharmacy at the University of Sydney and has not been submitted as part of any other higher degree to any other University or Institution.

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“And it’s a long way there. It’s a long way to where I’m going” (Little River Band)

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GLOSSARY

Key terms used in this thesis are defined in this table. Definitions were derived directly (or with minor adaptations) from the sources as indicated.^a Terms relating to problems associated with drugs (eg, adverse drug events) have been variously defined in the literature, therefore, for consistency, their use in this treatise accords with the definitions set by the Australian Commission on Safety and Quality in Healthcare (ACSQHC), unless otherwise stated.

Adverse Event (AE)	An incident in which unintended harm resulted to a person receiving health care. (1)
Adverse Drug Event (ADE)	A particular kind of adverse event where a drug or medication is implicated as a causal factor in the adverse event. This encompasses both harm that results from the intrinsic nature of the medicine (an adverse drug reaction) as well as harm that results from medication errors or system failures associated with the manufacture or distribution or use of medicines.(1)
Adverse Drug Reaction (ADR)	A response to a drug which is noxious and unintended, and which occurs at doses normally used or tested in man for the prophylaxis, diagnosis, or therapy of disease, or for the modification of physiological function.(1)
Consultants (Medical)	Doctors who have completed an extra six years or more of training after their initial university medical training to become qualified physicians (or medical specialists).(2)
Drug-Related Problem (DRP)	A DRP exists when a patient experiences or is likely to experience either a disease or symptom having an actual or suspected relationship with drug therapy (3)
Electronic Prescribing Decision Support (EPDS)	Rule-based systems designed to present prescribers with patient specific information, such as allergies, and drug-specific information, such as drug interactions, in a format that prevents prescribers from writing incorrect or inappropriate prescriptions (4)
High Reliability Organisations (HRO)	Organisations that are mandated to do everything possible to avoid certain kinds of negative outcomes because risk of error involves dire consequences (5)
Junior Doctors	Medical trainees in postgraduate years 1 or 2 (PGY1 or 2). The term is synonymous with junior medical officer (JMO) or prevocational medical trainee. Internship is the first postgraduate year (PGY1) and in NSW, the succeeding year(s) is termed residency (6).

Medication Incident	An incident associated with a medication. Incident is an overarching term used to describe problems that cause actual harm and “close calls” where harm was averted either by defences built into the system or by chance. Close calls are often indistinguishable from adverse events in all but outcome. (7)
Medication Error	A failure in the (drug) treatment process that leads to, or has the potential to lead to, harm to the patient and includes an act of omission or commission. Errors rarely occur as the result of the actions of a single individual. They are usually the result of a series of system failures (7)
Medicines management (hospitals)	The entire way that medicines are selected, procured, delivered, prescribed, administered and reviewed to optimise the contribution that medicines make to producing informed and desired outcomes of patient care (8)
Near miss or close call or potential ADE	Incident in which harm was averted either by defenses built into system or by chance (7)
Over-the-counter medicine (OTC)	Health care product that can be purchased without a prescription.(7)
Patient harm	Death, disease, injury, suffering, and/or disability experienced by a person (1)
Preventable adverse events	Error in management due to a failure to follow accepted practice at an individual or system level. Accepted practice taken to mean the current level of accepted performance for the average practitioner or system that manages the condition in question.(9)
Resident Medical Officers (RMOs)	Doctors who have completed their internship and who are undertaking further general hospital training (PGY2-4), NSW only (6).
Registrars (medical)	Doctors who have completed at least one postgraduate year of training (usually more) and have entered a physician training program. In NSW, also used to describe doctors (PGY2-4) who have a general training post at a hospital.(6)

^a(1) ACSQHC. Definitions of Safety and Quality in Health Care. Website of Australian Commission on Safety and Quality in Health Care. URL:www.safetyandquality.org/internet/safety/publishing.nsf. Last updated 28 August 2006. Accessed 04 February 2007.

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- (8) Audit Commission. A spoonful of sugar - improving medicines management in NHS hospitals. Report. London: Audit Commission; 2001 December 2001.
- (9) Wilson RM, Runciman WB, Gibberd RW, Harrison BT, Newby L, Hamilton JD. The Quality in Australian Health Care Study. *Medical Journal of Australia* 1995;163(9):458-71

PUBLICATIONS AND CONFERENCE ABSTRACTS ARISING FROM THIS THESIS

Page MA, Bajorek BV, Brien JE. Medication management in teaching hospitals: a review of the role and practice of junior doctors. *Society of Hospital Pharmacists 4th Biennial Clinical Conference, Sydney, October 29-31, 2004*

Page MA, Bajorek BV, Brien JE. A qualitative study to explore influences on prescribing and how doctors learn to prescribe within teaching hospitals. *From Cell to Society. College of Health Sciences University of Sydney Research Conference, Leura, November 3-4, 2004*

Page MA, Bajorek BV, Brien JE. Prescribing in teaching hospitals: developing a qualitative instrument to explore influences on decisions and actions. *Australian Pharmaceutical Science Association Conference, Melbourne, December 4-7, 2004.*

SYNOPSIS

Medicines are a fundamental healthcare intervention, but the benefits they provide depend entirely on the way in which they are used. This begins with prescribing, a complex task with substantial risks. Systematic evaluation of biomedical factors may be viewed as an essential component of this task, but prescribers also integrate an array of individual, social, cultural, environmental and commercial factors into their prescribing decisions. Furthermore, social and cultural characteristics of the prescriber's workplace may influence how well prescribing decisions are carried out. Whilst numerous research efforts have helped to construct an in-depth understanding of non-biomedical influences on GP's prescribing patterns, the characteristics of corresponding sorts of influences in teaching hospitals have not been well determined. In hospitals, supervised medical trainees, registrars and consultants prescribe within the framework of medicines management systems involving nurses, pharmacists and patients. Currently, little is known about whether each of these groups has distinct beliefs, attitudes and values that may affect either prescribing behaviour or how prescribing skills of medical trainees are acquired.

The aim of this study was to explore the social and cultural dynamics of prescribing and prescriber training in teaching hospitals. To do this, established qualitative methods were employed. Junior doctors, registrars, consultants, nurses, and pharmacists from two metropolitan teaching hospitals were sampled purposively and invited to participate in semi-structured interviews. A brief questionnaire was used to collect demographic and contextual information. In the interviews, participants were asked about their attitudes towards prescribing, their perceptions of roles and responsibilities, how they communicated prescribing decisions, their perceptions of influences on prescribing, and their perceptions of factors contributing to

prescribing errors. Participants were also asked for their opinions on various aspects of new prescriber training. Sampling proceeded until redundancy of themes was established.

A pilot study was conducted with one participant from each professional group to optimise the interview schedule, and then using this tool, a further 38 participants were interviewed. In total, eight consultants, eight registrars, nine junior doctors, eleven pharmacists, and seven nurses participated. Using reiterative content analysis of a third of all transcripts, a coding scheme was developed, which was used to label and categorise the remaining transcripts. Categories were further developed and refined. The resultant core themes were cross indexed against the five different health professional types using thematic charts to explore patterns. The main lines of enquiry for this research were mapped, the properties of these categories and interrelationships explored in detail, and a model of the prescribing process was developed.

Prescribing at the teaching hospitals was a complex process consisting of multiple steps undertaken by several different health professionals of varying levels of experience from three different health care disciplines. Because of the intricate separation of responsibilities, the operation of the process was highly reliant on the behaviours of each player and their relationships with each other. Key prescribing decisions associated with patient admissions were made, almost exclusively, by medical teams. Prescribing was therefore chiefly characterised by factors influencing the behaviours of the doctors. Their behaviours were influenced by factors relating to their individual characteristics (eg, knowledge, skills, experience); but also by a web of socio-cultural determinants inherent to the environment in which they worked. These factors were related to: the organisational structure of the prescribing process; the knowledge characteristics of the doctors; the communication patterns they used; the underlying assumptions they made about prescribing; and the work environment.

1. CHAPTER ONE: LITERATURE REVIEW

1.1. INTRODUCTION

Use of medicines is an integral part of Australian health care. It is the most common health-related action with spending on medicines accounting for over 14% of recurrent health expenditure.¹ In 2004, over 230 million prescriptions were dispensed - that is about 11 prescriptions per person.² Ensuring the quality use of these medicinesⁱ is a challenge for healthcare professionals and consumers alike. A key objective is to reduce the incidence of harm caused by medicine use. In Australia, an estimated 150 000 hospital admissions per year are associated with medicines, and most of these admissions are considered avoidable.³

In recent years, community based prescribers (ie, general practitioners) have been the major targets of interventions to improve the use of medicines. With an understanding of influences on prescribing in this setting, the National Prescribing Service (NPS)ⁱⁱ and others have reported success with some interventions^{4,5}, but changing the established behaviours of experienced prescribers is challenging⁶ and difficult to sustain.⁷

Teaching hospitals are unique environments for prescribers. Specific social, cultural, and other workplace factors affecting prescribing in the community may not apply. Patients may be acutely ill, have multiple co-morbidities, with rapidly changing therapeutic needs. Several health professionals with different levels of expertise and experience may be involved in various

ⁱ Quality Use of Medicines (QUM) is a defined objective of the National Medicines Policy and refers to the judicious selection of management options, appropriate choice of medicines - where considered necessary, and their safe and effective use. [Australian Government Department of Health and Ageing. The National Medicines Policy 2000, 1999]

ⁱⁱ NPS is an independent Australian organisation funded by the Australian government to provide QUM services to health professionals and consumers [National Prescribing Service Limited. Evaluation Report No 8, 2005]

prescribing activities, which together form part of complex medicines management systems. Historically, this is the environment where doctors learn to prescribe.

The traditional internship and residency is a formative time for medical trainees; behaviours, beliefs, values and norms they encounter may be powerful determinants of future practice.⁸ For junior doctors, training in prescribing occurs concurrently with performing a key role in hospital medicines management.⁹ It is surprising then that during this particularly impressionable time of their careers in such a highly interactive environment, very little is known about the “prescribing culture” in teaching hospitals and its potential impact on the way in which doctors learn to prescribe.

In this research, weⁱⁱⁱ set out to explore two dimensions of prescribing culture in teaching hospitals; firstly, factors that may influence the prescribing process and secondly, factors that may directly affect the training experience of junior doctors in prescribing. To begin, the literature was reviewed with the aim of gaining a detailed understanding of the central issues related to this research topic.

1.1.1. Search strategies

Two approaches were used to gather information from the worldwide literature base; the choice depending on whether the objective was to provide pertinent background information or to establish the existence of specific gaps in the literature. For all searches, the method was systematic and involved use of electronic databases as well as manual searching of bibliographies. The main resources utilised were: Medline, Embase, Australasian Medical Index (AMI), Australian Public Affairs Information Service (APAIS), and internet resources (eg, government and professional organisation websites). In the main, coverage was limited to

ⁱⁱⁱ MP (author and primary researcher), BB and JB (co-researchers and supervisors)

publication years 1985-2006 and the English language. Primary consideration was given to locating and evaluating Australian data and hospital-based studies. Where considered necessary or relevant, international studies and/or community-based studies were retrieved to provide a more complete picture.

To retrieve background information, the approach involved identifying studies, commentaries, reports and reviews pertaining to the research topic. Following retrieval, papers were initially assessed on the basis of title and abstract. The full content of pertinent articles was reviewed. The decision to cite articles was based on whether they adequately represented the broader body of literature or whether they provided a notable alternative finding. In some instances, search strategies were broadened to provide context to the wider provision of healthcare. An example of this strategy was the review of literature pertaining to risks associated with prescribing. Medline subject headings used included 'Medication Errors', 'Drug Therapy/ae [Adverse Effects]', 'Adverse Drug Reporting Systems', 'Iatrogenic Disease', 'Quality of Health Care', 'Hospitals'. Health department websites of Australia (eg, Australian Institute of Health and Welfare, UK (eg, Audit Commission) and US (eg, Institute of Medicine) were consulted. To provide context to risk of interventions in health care, the search was broadened to include 'Medical Errors'.

A more exhaustive strategy was used to form a thorough knowledge and understanding of two critical elements of the research question: social and cultural influences on prescribing in hospitals, and the prescribing practice of junior doctors. In the first instance, the search focused on social interactions, social influences and cultural factors (such as attitudes, values and beliefs) pertaining specifically to medicines management. The scope was limited to those health professionals at the operational level of health care delivery¹⁰ (ie, those involved in direct patient care, not those involved in hospital administration). Medline subject headings included: 'Drug

Therapy', 'Drug Utilization', 'Medication Systems, Hospital' , 'Personnel, Hospital', 'Organizational Culture', 'Social Behavior' , 'Culture', 'Attitude of Health Personnel', 'Social Psychology' . Terms were "exploded" to retrieve findings published on subcategories. Additional text words used were: prescri\$, influen\$, relat\$. All papers identified were reviewed, but the focus was on findings from original studies, rather than commentaries. Because few studies were located, the search was subsequently broadened to identify any cultural analyses of hospitals that may provide insights into cultures affecting medicines-related processes.

In the search for literature on prescribing practices of junior doctors, Medline subject headings included: 'Internship and Residency', 'Drug Therapy', 'Prescriptions, Drug', 'Drug Utilization', 'Medication Errors', 'Hospitals'. Additional text words were used; eg, prescri\$, influen\$. A modified strategy was used to identify interventions aimed at improving the prescribing practice of junior doctors and other Medline subject headings were incorporated: 'Education, Medical, Undergraduate', and 'Curriculum'. Additional text words included: intervention\$, strateg\$, course\$, train\$, education\$. Again, all papers identified were reviewed, but emphasis was placed on results of original studies.

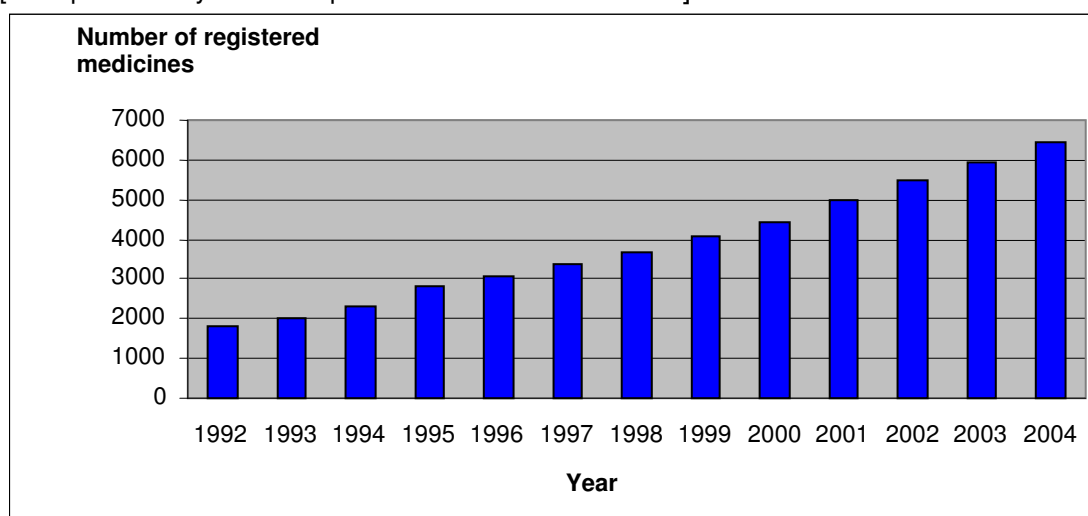
These approaches to the literature allowed a comprehensive review of four central issues relating to the research topics, which are discussed in detail below: (1) the challenges of prescribing, (2) methods used to deal with these challenges, (3) the environment of teaching hospitals for prescribing; and (4) the prescribing practice of junior doctors.

1.2. CHALLENGES OF PRESCRIBING

1.2.1. WHAT IS INVOLVED?

Whilst the term ‘prescription medicine’^{iv} has a specific meaning, the act of ‘prescribing’ is less well defined. Few have attempted to propose what steps it should involve or comprehensively observe how prescribing is done. Yet, the burgeoning number of drug choices would suggest that the task is growing in complexity ¹¹ [Figure 1]

Figure 1. Number of Medicines on Australian Register of Therapeutic Goods
[Data provided by the Therapeutic Goods Administration¹¹]



Various academics, policy makers and educators have put forward approaches to prescribing based upon beliefs of what constitutes ‘rational prescribing’ or ‘good prescribing.’ In the main, these have consisted of avowed principles, general guidance, and specified benchmarks for improving prescribing quality.

^{iv} The Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP), which informs Australian legislation, defines ‘Prescription only medicines’ as “Substances, the use or supply of which should be by or on the order of persons permitted by State or Territory legislation to prescribe and should be available from a pharmacist on prescription.”

1.2.1.1. National policy

In 1999, the Commonwealth Government of Australia formally launched the National Medicines Policy (NMP), which had four central aims. The fourth arm of the NMP set an objective for prescribers as well as all other “key partners” in medicine use, that being to achieve the Quality Use of Medicine (QUM).¹² QUM is defined as: the judicious selection of management options; appropriate choice of medicines, where a medicine is considered necessary; and safe and effective use.¹³ The principles of QUM promote: the primacy of consumers; active and respectful partnerships; consultative, collaborative and multidisciplinary activity; support for existing activity; and system-based approaches. These principles have been incorporated into various educational tools on prescribing.^{14, 15}

1.2.1.2. Educational tools

A model developed by the World Health Organization (WHO) is one attempt at detailing what prescribing should involve.¹⁶ It was developed in the mid 1990s in response to a perceived lack of educational materials specifically devoted to the practice of prescribing as opposed to just knowing pharmacological or therapeutics facts. From the first step of setting a therapeutic objective through to monitoring for effectiveness and tolerability, good prescribing requires careful systematic evaluation of numerous patient-related and drug-related factors [Figure 2]. Although intended as a practical training manual for medical students, the model represents a highly idealised version of prescribing. It provides some “real world” clinical context, but little sense of the real workplace. The lack of focus on non-biomedical influences on prescribing is deliberate - the theory being that promoting a stepwise approach to prescribing will arm students with a method to handle potential influences.¹⁷

Figure 2. The Process of Rational Treatment

[adapted from the WHO "Guide to Good Prescribing"¹⁶]

Step One	Define the patient's problem
Step Two	Specify the therapeutic objective Choose a treatment from personal inventory (information or advice; non-drug treatment; drug treatment; referral) If drug treatment, select a drug from personal inventory (having previously considered: comparative efficacy, safety, suitability, cost). Also select dosage form, dosage schedule, and duration according to therapeutic objective.
Step Three	Verify suitability of drug selection for patient (check above plus: indication; convenience; contraindications; interactions; high risk grouping)
Step Four	Start treatment (write prescription)
Step Five	Give instructions, advice, information to patient
Step Six	Monitor results and determine further action: stop; alter; continue drug treatment

The WHO model also illustrates the inherently complex nature of prescribing. The multiple steps in the process, the numerous choices that need to be made, the duration of the task, and the variety of information that needs to be assessed are all recognised components of a complex task.¹⁸

In another model, Barber defines the goals of good prescribing – these being : to maximise effectiveness, minimise risks, minimise costs, and respect the patient's choices.¹⁹ By proposing goals rather than a recipe for how to prescribe, the author argues that prescribers will better recognise “complex trade offs” between conflicting aims rather than thinking that the “right answer exists.” Like the WHO model, this approach sees good prescribing as a continuum of medicines management and therefore includes monitoring of treatment. Since its publication in 1995, this approach to prescribing has gained wide acceptance in the literature.

An Australian handbook on prescribing advocated a systematic problem-based approach with incorporation of QUM principles.¹⁴ Prospective prescribers are encouraged to ask themselves a series of questions about medicine use, specifically designed to help them minimise harm,

maximise benefit and respect their patient's view. The approach, which acknowledges a general practitioner (GP) perspective, identifies consulting skills as the core issue affecting prescribing with a particular emphasis on incorporating patient's views and utilising the doctor-patient relationship. Mant's approach aims to give prescribers "conscious control" when prescribing, so that the tendency for prescribing to be done "almost as an afterthought, on automatic pilot" is avoided.

In a recent editorial on the unpreparedness of UK medical students for prescribing, Aronson describes the task of prescribing as "formidable for even the best-trained prescriber."²⁰ By emphasising the need for a thorough understanding of the pathophysiology of the disease, the pharmacology of the drug, as well as attention to key processes before prescription writing, he depicts prescribing as a challenge to an individual's ability to apply knowledge through development of clinical reasoning skills.

1.2.1.3. Performance markers

The quest for developing quality standards for prescribing has further expanded the picture of what constitutes good prescribing. Quality in prescribing has proven notoriously difficult to define. A 1991 review of studies measuring markers of quality concludes that "a global measure of quality in prescribing is probably ephemeral. The transaction is so multifaceted that a single criterion of quality can hardly be valid."²¹ Nevertheless, indicators for measuring quality or cost of specific prescribing practices have been used for over 20 years in the UK²² and more recently in Australia.²³ Ideally, a quality improvement indicator represents a prescribing behaviour that is closely associated with a clear clinical outcome, which is supported by strong evidence.²⁴ An example of a quality indicator developed for elderly medical inpatients is "Appropriate use of antithrombotic stroke prophylaxis in atrial fibrillation."²⁵

In 2006, the National Prescribing Service launched a manual of indicators for GPs to measure the quality of their own prescribing. Two types of indicators were developed to give prescribers an insight into their own prescribing and to identify areas for quality improvement.²⁶ Structure indicators were designed to provide prescribers with an assessment of their practice infrastructure to support quality use of medicines; for example, “Does the practice have a policy on prescription of benzodiazepines and opioids?” Process indicators were designed to evaluate how well a process is carried out and can quantify changes over time; for example, percentage of patients prescribed an antihypertensive agent who are not at their target blood pressure.”

The development of quality prescribing indicators has promoted the importance of determining precise clinical objectives. Furthermore, regular review of prescribing decisions as well as maintenance of tools that support prescribing are seen as pivotal to improving quality in prescribing.

1.2.1.4. Prescribing curricula for non-medical practitioners

Historically, prescribing has been viewed as the domain of medical practitioners. Further insights into the act of prescribing may be gained, however, by looking at the involvement of other professions in drug therapy management.

Under Australian legislation, medical practitioners are the only health professionals with full independent prescribing authority, but limited prescribing rights exist for accredited nurses (nurse practitioners), and Australian pharmacists have the authority to prescribe pharmacy only and pharmacist only medicines.^{v 27}

^v SUSDP classifies “Pharmacy only medicines” as “Substances, the safe use of which may require advice from a pharmacist and which should be available from a pharmacy or, where a pharmacy service is not available, from a licensed person. “Pharmacist only medicines” are classed as “Substances, the safe use

In other countries, pharmacists and nurses have extended prescribing authority. For example, in the UK, Canada (some provinces) and the US (some states), accredited pharmacists are currently involved in collaborative drug therapy management. Because they do not have sole authority to make treatment decisions, they are termed dependent or supplementary prescribers.^{vi} In general, they are involved in various prescribing activities subsequent to the diagnoses being made.^{27, 28} The nature of these proposed activities can be surmised from a competency framework, which was developed by the National Prescribing Centre in the UK. The competencies are broad ranging and are organised under three major elements: the consultation, prescribing effectively, and prescribing in context. Some examples include: taking medication histories, generating treatment options, helping patients to make informed decisions about treatment options, checking doses and calculations, working within professional and organisational standards, understanding and using tools to improve prescribing, recognising and dealing with pressures that might result in inappropriate prescribing, and so on. Some of these activities – albeit not conventionally recognised as part of prescribing - are already performed by nurses and pharmacists in Australia as part of medicines management.

Therefore, whilst doctors may instigate most drug therapy, pharmacists and nurses are also involved in some prescribing activities. Of course consumers also select and self-monitor various unscheduled medicines. Arguably, all “prescribe” in some way: either by deciding to commence drug therapy, choosing a drug, or being involved in supporting decisions or activities.

of which requires professional advice but which should be available to the public from a pharmacist without a prescription”.

^{vi} Although there are plans to extend prescribing privileges of accredited nurses and pharmacists in the UK toward independent prescriber status. (A guide to implementing nurse and pharmacist independent prescribing within the NHS in England: April 2006)

1.2.1.5. Observational research

Contrary to notions of what prescribing should be, an educationalist's observations of "how prescribing gets done" are that GP prescribing was a "materially hybrid practice" and not the "rational cognitive practice" that is conventionally conceived.²⁹ Based on her observations of GP consultations, as well as interviews and questionnaires, Deveny argues that despite the desire of academics to portray prescribing as a linear sequential process, this was seldom supported by her data. She concludes that prescribing could be only "partially understood from a purely clinical perspective" and that "practice defies algorithmic reasoning". No corresponding forms of observational research into prescribing in hospitals were able to be located.

1.2.1.6. Other perspectives

There are other forms of research that help to define what prescribing involves including attempts to map how prescribing is done from the perspective of key decisions that are made, such as how doctors choose drugs.³⁰⁻³² Studies analysing causes of prescribing errors^{33, 34}, research examining pharmacist interventions on prescribing³⁵⁻³⁸, and investigations into inappropriate prescribing practices^{39, 40} reveal problems with how particular prescribing activities are sometimes performed. Research examining potential influences on prescribing³² and studies measuring the impact of interventions⁴¹ provide insights into behavioural aspects of prescribing. These are reviewed later.

In summary, prescribing is a complex and interactive task – one that ideally involves a clear series of decisions and activities to help achieve clinical and, if possible, economic aims, all the while incorporating the patient in these decisions - but in reality appears to involve a less explicit and multifaceted practice that is difficult to characterise.

1.2.2. WHAT ARE THE RISKS?

1.2.2.1. Patient harm

Hospital admission statistics and medical record examinations have shown that use of medicines is a risky intervention. The Harvard Medical Practice Study (HMPS), involving retrospective review of medical records during 1984 from hospitals in New York State, raised worldwide awareness of medical intervention as a cause of patient injury. This study found that nearly 4% of patients admitted had an accidental injury, the most common type being a drug complication.⁴²

In the last twenty years, there has been a wide variation in internationally reported incidences of drug-related hospital admissions. Pooled data (1980-1999) indicate that hospitalisation due to adverse drug events is common in developed countries, and may account for between 3 to 9% of admissions.⁴³ In Australia, an analysis of over 20 studies (1988 – 2001) found that drug-related problems (adverse drug events, over-use and under-use of medicines) accounted for between 2 and 3% of all hospital admissions.⁴⁴ In the UK, a recent analysis of admissions to two Merseyside hospitals during the winter of 2001- 2002 found that up to 6.5% of admissions were related to an adverse drug reaction.⁴⁵ The incidence of drug-related hospitalisation has been found to be higher in the elderly. One Australian study found that nearly sixty percent of such admissions involved patients over 60 years, with the highest rates in patients aged 80+ years.⁴⁶

The severity of patient harm caused by drug therapy can be significant. The HMPS found that most drug complications resulted in minimal impairment, but in 14% of cases, the outcome was a serious disability.⁴² The Quality in Australian Health Care Study (QAHCS) involved review of over 14 000 admissions to 28 hospitals in New South Wales and South Australia during 1992

and found around a sixth of all admissions were due to health care management (ie, adverse events^{vii}). In this study, over 10% of adverse events were due to drugs, and a quarter of these were severe enough to cause permanent disability or death.⁴⁷ In the Merseyside study cited above, over 2% of drug-related admissions resulted in death.⁴⁵

In the community, harm caused by medicine use is common⁴⁸⁻⁵⁰ and it is estimated that approximately 400 000 ADEs are managed each year by Australian GPs.⁴⁴ Furthermore, a recent Australian study reported that 10% of all patients attending general practices experienced an ADE within the previous six months.⁴⁸

1.2.2.2. Hospital costs

The hospital costs of ADEs are high. Based on ICD-10-AM^{viii} diagnoses coding (which identifies less than half all adverse events³) the Australian Institute of Health and Welfare (AIHW) reported almost 320 000 hospital separations^{ix} associated with an adverse event for 2003-04, and over a quarter of these involved adverse effects of drugs, medicaments and biological substances.² Assuming a seven day length of stay per drug-related hospital admission⁵¹, and using further AIHW data for 2003-4 to calculate a national average daily cost of stay^{2x}, the hospital costs of 83 000 medication-related hospital admissions would be in the order of \$AUS560 million annually.

^{vii} In this study, adverse event was defined as an unintended injury or complication, which resulted in disability, death or prolonged hospital stay and was caused by health care management.

^{viii} ICD-10-AM: International Statistical Classification of Diseases and Related Health Problems, 10th Revision, Australian Modification.

^{ix} Separation is the term used to refer to the episode of care which can be a total hospital stay or a portion of a hospital stay beginning or ending in a change of type of care. [Australia's Health, 2006]

^x The national average case mix separation (\$3293) divided by national average length of stay (3.4 days) = \$968.50 per day.

1.2.2.3. Other adverse consequences

Other adverse consequences include: increased length of hospital stay⁵²; other health care costs^{44, 52}; social costs – for example, increased drug-resistance of bacteria due to poor prescribing of antibiotics;⁵³ and human costs.

1.2.2.4. What is the trend?

In Australia and internationally, there are indications that rates of ADEs requiring or extending hospitalisation are increasing^{44, 46, 54}, but whether or not this reflects an exposure effect (ie, related to increased medicine use) is unclear.⁵⁵ South Australian admission data for the years 1988 to 2001 show a steady increase in adverse drug reactions associated with hospitalisations⁴⁴, and an admission study in Western Australia found a five-fold increase in adverse-drug reaction related hospital stays in people aged 60 years and over between 1981 and 2002.⁴⁶ In the UK, the Audit Commission reported a five-fold increase in the number of deaths in England and Wales due to adverse effects of medicines between 1990 and 2000. The Commission also reported an upward trend in the number of deaths due to medication errors over the same period.⁵⁴

1.2.2.5. How much is preventable?

Although some adverse consequences of medicine use are inevitable, resulting from calculated risks with accepted standards of care, studies have found that many – if not most – ADEs are avoidable. The QAHCS rated 43% of drug-related AEs as highly preventable.⁴⁷ Other Australian studies have also reported high rates of preventability for drug-related problems or ADEs^{48, 56} and one review suggests up to 75% are potentially avoidable.³ Consistently, anticoagulant, anti-inflammatory, and cardiovascular drugs together make up half of all potentially preventable ADEs.³

The picture is similar in other developed countries. A US study rated 28% of drug-related admissions as preventable⁵⁷; 72% of ADR-related admissions were considered at least possibly avoidable in a more recent UK study.⁴⁵ Pooled analysis of admission studies internationally (1980-1999) suggest over half drug-related admissions are preventable.⁴³

These statistics do not represent a new phenomenon. In 1971 Melmon suggested that about 70% of adverse drug effects were predictable and preventable through logical application of existing information.⁵⁸ A resolve to improve medication safety at governmental levels of healthcare provision has been more recent.^{44, 54, 59}

To sum up the hazards, prescribing is a high risk activity with potentially serious and costly consequences. The worldwide literature indicates that the rate of patient harm due to drug-related therapeutic interventions is increasing. The majority of adverse drug events leading to hospitalisation are considered to be avoidable.

1.2.3. MINIMISING ERRORS IN PRESCRIBING

1.2.3.1. Defining prescribing errors

According to a UK expert consensus, “a clinically meaningful prescribing error occurs when, as a result of a prescribing decision or prescription writing process, there is an unintentional significant (1) reduction in the probability of treatment being timely and effective or (2) increase in the risk of harm when compared with generally accepted practice.”⁶⁰ Historically, however, medication error research has focused more on errors that increase harm than on errors that reduce efficacy, and more on administrative and procedural tasks (such as prescription writing) than on problems with decision-making or communication. Conversely, decision-making and communication skills have been studied within frameworks of quality improvement or appropriateness in prescribing rather than the context of medication safety. Yet in a recent

study, most serious prescribing errors resulted from prescribing decisions rather than medication ordering.⁶¹ As is discussed below, through the growing interest in medication safety and systems analysis of errors, the importance of workplace influences on ill-conceived prescribing decisions as well as unintended actions in hospitals is being recognised.

1.2.3.2. Size of the problem

Prescribing errors are a proven major cause of preventable ADEs. Just over half of preventable ADEs were associated with drug ordering in one US study⁵⁷, and problems with prescribing were the leading cause of preventable drug-related admissions in a UK study.⁶²

Errors that result in ADEs represent approximately 1% of all medication errors, but a further 7% of errors have potential to cause harm (“near misses”).⁶³ Although there are inadequate data to estimate the incidence of prescribing errors in Australian hospitals, research indicates that prescribing errors are ubiquitous⁶⁴⁻⁶⁸ and that errors with potential to cause patient harm are not uncommon.^{38, 67} Medication incidents represent the second most common type of notification to hospital incident reporting systems^{69, 70}, and according to the NSW Incident Information Management System, most of these originate from drug administration and prescribing problems.⁷⁰

Internationally, incidence studies of prescribing errors in hospitals vary greatly depending on the study design and definitions of error. Investigators, however, agree that the frequency of potentially serious prescribing errors represents a significant healthcare problem.^{61, 63, 71, 72} A rate of 0.4% of potentially serious errors detected in one UK hospital, for example, equated to an average of five potentially serious prescribing errors per day.⁶¹

1.2.3.3. Types of errors

In Australian hospitals, dose errors (including omission of strength) are the most common type of prescribing error^{36-38, 65, 67, 73}, which is consistent with reports from other countries.^{33, 57, 61, 74, 75}

Other notable prescribing errors from studies internationally include: prescription of a drug when patient is documented as allergic; incorrect frequency of administration of therapy; duplication; and dosage form unspecified.^{67, 74, 76} There is great variation in the most common types of drugs found to be associated with clinically important medication errors.⁷⁷ Because the clinical significance of errors varies greatly depending upon the type of drug, current emphasis for surveillance of errors is on drugs with a greater potential for harm (for example, potassium chloride, morphine, warfarin, vincristine) than those that may be involved in the greatest number of errors (eg, paracetamol⁶¹, antimicrobials⁷⁸, or ACE inhibitors³⁶).

1.2.3.4. Systems analysis

The widely accepted approach for preventing patient injury due to medical interventions in hospitals is to use incident or error surveillance not only to monitor rates of error, but to identify weaknesses in medical management systems.^{59, 79} This system approach has been adopted from other high reliability industries, such as the nuclear power and aviation industries.⁸⁰ Historically, the common practice within health care systems has been to blame individuals for making mistakes, but this does not prevent similar errors from occurring again.⁸⁰ The system perspective on errors assumes that most people working within a system are doing their best. It acknowledges that humans are fallible and that errors seldom result from a single mistake but from a system that makes slips, lapses and mistakes easy to occur or difficult to detect.^{33, 59, 79}

1.2.3.5. Conditions that lead to prescribing errors

In the last ten years, national medication safety reports^{44, 54} and other literature have raised awareness of factors that make prescribers working in hospitals vulnerable to error. The most

frequently cited are: workload and staffing^{34, 81-83}; individual factors, such as lack of skills and knowledge^{33, 34, 54, 76} and the health of the prescriber, in particular tiredness and stress.^{34, 54, 82, 84}

In relation to individual factors, a number of studies have examined the link between level of experience and prescribing errors, but interpretation of these data is difficult because: junior medical staff write most prescriptions⁷¹, error severity is infrequently related to experience level, and some studies have not taken place under workplace conditions.⁸⁵ Overall, however, there is adequate evidence to suggest that first year postgraduate medical trainees are more likely to make errors than more experienced staff^{71, 86}, particularly at the start of the academic year.⁸⁷

Of growing interest, many cultural factors have also been linked to prescribing errors in hospitals including: team factors (such as responsibilities³⁴, communication^{34, 88}, and supervision^{34, 83}); and attitudinal factors, such as a low perceived importance of prescribing^{34, 89}, hierarchical medical team^{34, 89}, transcription viewed as lesser form of prescribing^{33, 34} and an absence of self-awareness of errors.³⁴

Other error-producing conditions in hospital that have been cited include: lack of accessibility to drug and patient information^{33, 34}, inadequate training^{34, 54}, distractions and interruptions⁵⁴ and the physical environment³⁴ – especially unfamiliar surroundings.⁵⁴

In short, evidence for casualness in prescribing is abundant. Prescribing errors may result from poor decisions, miscommunication or poor attention to procedural tasks. Prescribing errors can have serious consequences and are the biggest source of preventable drug-related hospital admissions. A range of conditions within hospitals have been linked to prescribing errors; whilst individual factors such as lack of knowledge and skills are important, a mass of factors associated with the structure, organisation, and culture of the workplace have been implicated.

1.2.4. MAKING APPROPRIATE DECISIONS

1.2.4.1. Defining inappropriate prescribing

In addition to error, there are other prescribing behaviours that fall short of an accepted standard of care. Various terms such as “suboptimal”, “inappropriate”, “irrational” and “poor” have been used to describe this type of prescribing behaviour. Because standards of care vary – depending on the setting, resources and evidence available at the time – concepts of appropriateness and inappropriateness in prescribing have proved difficult to globally define. Tully and Cantrill ⁹⁰ described appropriate prescribing in holistic terms as “the outcome of the process of decision-making that maximises net individual health gains within the society’s available resources.” Dartnell ⁹¹ proffered that drug use problems arise from practices that fail to meet any one or more of Barber’s goals of good prescribing, ie, maximising effectiveness, minimising risk, minimising cost, and fulfilling patient’s choice. Others have emphasised the differences between patient and health professional perspectives of appropriateness. ^{92, 93}

For the purpose of evaluating drug use quantitatively, a dichotomous definition has been used to aid ease of data collection. In these circumstances, inappropriate drug use is defined as a lack of concordance with an agreed treatment protocol. ⁹⁴ But this definition ignores patient acceptability of treatment, and can be disputed on the grounds of the strength of the evidence base for the protocol, opinions about those who agreed on it, and relevance to the local situation. Also, whilst consensus might easily be achieved when evidence stacks up clearly on the side of a particular drug choice, dispute is likely in cases where safety data are similar and where efficacy data do not allow direct comparison of options.

“Appropriateness” might be a “slippery customer” ⁹², yet when a choosing treatment, a clear understanding of this concept is important as uncertainty about what constitutes the best

possible therapy for an individual may increase a prescriber's vulnerability to environmental⁹¹ or social influences.⁸

1.2.4.2. Examples of inappropriate prescribing

Despite recent improvements in prescribing in some therapeutic areas (eg, benzodiazepine prescribing in the elderly^{5,95}), suboptimal prescribing persists in others (eg, antibiotic prescribing for upper respiratory infections⁵³). Also, the impact of strong marketing of new therapeutic entities (eg, coxibs – COX-2 inhibitors) illustrates the way in which prescribing practices can be readily swayed, at the expense of considered evaluation of added benefit.⁹⁶

There are a range of problems with quality of prescribing, but the potential consequences are the same as for errors. For example, failing to prescribe or adequately manage anticoagulants (heparin and warfarin) accounted for up to one third of potentially preventable adverse medication events in the QAHCS.³ Other major problems with prescribing include: inappropriate use of antibiotics⁹⁷, use of a potentially toxic drug when a less toxic one would work as well⁹⁸, insufficient monitoring⁹⁹, prescribing unnecessary drugs or polypharmacy in the elderly³⁹, prescribing excessive doses, particularly in the elderly²³, prescribing unnecessarily expensive drugs⁴⁰, and lack of patient participation.¹⁰⁰

1.2.4.3. How prescribing decisions are made

Understanding how prescribing decisions are made is viewed as a critical step to improving prescribing behaviour.²¹ Two pivotal decisions in the process have been examined in detail: (1) the decision to treat (or selection of a management option) and (2) the drug selection process.

Deciding to treat. According to recent Australian data, 83 out of every 100 encounters with GPs results in a drug prescription^{2xi} which is typical of historically reported rates of prescribing in primary care.^{21, 101} This propensity to write prescriptions coupled with the reluctance of prescribers to consider non-drug options¹⁰² has stimulated sociological analysis of doctor-patient interactions that may influence the decision to treat. A range of social, logistical and prescriber-related factors have been proposed including use of the prescription to: fulfil the patient's expectation, resolve conflict with the patient, deal with uncertainty, save time, and to end the consultation.²¹ Furthermore, concern for preserving the doctor-patient relationship was cited by GPs as one of the main reasons for difficulty experienced in making decisions about treatment options.^{103, 104}

Research into factors affecting treatment option decisions in hospital settings is scant, possibly because the option of not prescribing a drug is less feasible or because of assumptions about the powerlessness of hospitalised patients to affect decision-making.

Choosing a drug. The drug selection process has been intensively studied in both community and hospital settings. A number of drug choice models have been developed for predicting prescribing patterns or as a framework for understanding influences on prescribing.^{30, 31, 105-107} These so-called 'expectancy-value' models are based on cognitive theories modified from social learning theory¹⁰⁸, and have been used to test whether prescribers use reasoned action (stimulus-cognitive response) or habit (behavioral response) when choosing drugs.^{106 31} According to cognitive theories, doctors choose drugs in a rational way by balancing cognitions (conscious knowledge, beliefs and assumptions) of probabilities that various outcomes will occur (expectancies) and attaching a value to these outcomes.¹⁰⁹ In other words, they weigh up the

^{xi} This does not include medications that are advised. BEACH (Bettering the Evaluation And Care of Health) study data from 2004/5 puts the rate of medications prescribed, advised or supplied at 104 medications per 100 encounters.

pros and cons of various drug treatments and choose the treatment with the highest weighted score.

Collectively, drug choice models reveal prescribing outcomes and drug attributes that are important when doctors make prescribing decisions.¹⁰⁹ However, the models vary in terms of the range of outcomes considered, whether or not outcomes were presented to or evoked by prescribers, and their predictive success. For example, one drug-choice model, which includes respondent-derived outcomes (control of disease state, compliance, side effects, cost, patient demand and criticism from colleagues), correctly predicted 72% of therapeutic decision made by 12 doctors for the treatment of mild hypertension in a simulated case.¹⁰⁶ Another model, tested on 72 hospital-based doctors found that biomedical expectancies and values predicted preferred treatment of eight specific therapeutic scenarios in 53% of cases, but by adding in aspects of the social environment (particularly opinion of colleagues) and experiences (particularly personal experiences) prediction was improved to 77%.³⁰

Overall, the predictive power of some drug-choice models has lent support to the view that prescribing is substantively a cognitive rather than habitual process.^{106, 110} However, few models have been tested on actual prescribing practice¹¹⁰ and ranking of outcomes may depend on the therapeutic area being studied^{30, 32, 111} and on prescriber-specific factors.^{108, 111}

An alternative view is that prescribing involves a combination of cognitive and habitual behaviours depending on familiarity of the clinical problem or other factors.^{21, 107} This view is supported by an observational study of GPs who verbalised their thought processes when prescribing for patients with urinary tract infections or stomach complaints. Most prescribed habitually without any specific contemplation of treatment options.¹¹² Whilst this did not

necessarily result in suboptimal prescribing, important aspects, such as ensuring patient suitability (eg, asking about allergies) were sometimes overlooked.

Prescribing has also been conceptualised as a problem-solving process, and schema theory has been used to examine how doctors problem-solve when prescribing. According to the theory, if similar information is repeatedly encountered it is eventually incorporated into some form of schematic representation, which facilitates rapid and efficient decision making.¹¹³ In a study comparing schemas used in prescribing by hospital doctors with different levels of experience, junior doctors were found to use simplistic schemas emphasising logical elements of prescribing, whereas consultants used sophisticated schemas emphasising the bigger picture and incorporating the patient's view.¹¹³

To sum up, appropriate prescribing is difficult to universally define, but concordance with locally accepted standards of treatment is the operational definition commonly applied. Many and varied types of inappropriate prescribing behaviours have been identified. Prescribing decisions are complex and may involve reasoned risk-benefit analysis of multiple outcomes. Alternatively, as a way of dealing with complexity, prescribers may make some decisions without lengthy contemplation, which may be inferred as either habit or use of a schema developed through experience to shortcut cognitive processes. Factors external to biomedical concerns, including social, personal and logistical, are integrated by prescribers into their decisions and may impact on the appropriateness of those decisions. These factors are examined in greater detail in the next section.

1.2.5. INFLUENCES ON PRESCRIBING

1.2.5.1. Biomedical perspective

According to biomedical models, clinical, drug and cost factors should determine all prescribing decisions.^{16,90} Indeed, these factors are often cited by prescribers as the prime factors governing their decisions. Efficacy, compliance, cost, tolerability, duration and adverse effects were nominated and ranked by doctors in two Australian teaching hospitals as the most important factors for determining prescribing choice in a clinical scenario³², which is consistent with findings from other countries.^{30, 114, 115} Following this line of reasoning, problems with prescribing might be expected to be solved by concentrating on knowledge deficits of prescribers and honing of their clinical reasoning skills. But unsuccessful educational efforts based upon this premise¹¹⁶ and problems arising from lack of patient participation in decision-making¹⁰⁰ have exposed flaws with this construct. This is because the biomedical perspective does not represent reality. It fails to take into account the social, cultural, environmental and commercial context in which prescribing takes place.¹¹⁷

1.2.5.2. Multifactorial perspective

An alternative perspective is that prescribing is not just a test of knowledge utilisation and clinical reasoning skills alone, but a more complex challenge of acknowledging and dealing with a web of biomedical, historical, psychosocial and commercial influences.¹⁰¹

Community and outpatient settings. Abundant evidence from actual prescribing practice (as well as from analysis of decision-making³⁰) shows that a range of personal, social and environmental factors can and often do heavily influence prescribing decisions in primary care.

Several characteristics related to the individual and their professional contacts have been shown to affect the prescribing patterns of GPs. Personal experience^{31, 118} and the opinion of professional colleagues¹¹⁹, particularly hospital specialists^{106, 118, 120}, have been nominated as two of the most important influences on their prescribing decisions. Age of the prescriber and training status has also been shown to account for variation in prescribing patterns. Younger GPs have been found to prescribe in a more rational way than older GPs, partly through having more professional contacts with their colleagues and making more use of up-to-date resources.¹²¹ Older GPs have been found to have higher prescribing rates.^{122, 123} Higher training status of GPs has been associated with lower rates of prescribing of antibiotics.^{124, 125}

Factors affecting knowledge acquisition have also been identified as influential, such as continuing education¹²⁰ and types of information sources used such as academic and professional literature.^{118, 126} Reliance on information provided by the pharmaceutical industry has been negatively correlated with rational prescribing¹²¹, yet drug company representatives have been cited as one of the most important sources of information for GPs about new drugs.¹²⁷

Patient expectations¹⁰¹ as well as doctors' perceptions of their expectations^{104, 128} have been shown to affect the decision to prescribe. Patient's social circumstances have been proven to be important in drug selection decisions¹²⁰ and patient requests have been shown to be influential in uptake of new drugs by prescribers.¹¹⁸

Environmental factors such as practice location, training status of the practice, or whether a doctor works alone or in a group practice have also been identified as influential. GPs in rural areas are more likely to avoid prescribing drugs that require a significant amount of monitoring than their urban counterparts.¹²⁰ Lower prescribing rates of benzodiazepines¹²⁹ and

antibiotics^{125, 130} (and by implication, more appropriate prescribing of these drugs) have been reported in group practices and in training practices.

Hospital settings. Compared with general practice, far less is known about situational drivers that may predict prescribing patterns in hospitals. Whilst similar types of factors to those cited in community-based studies have been nominated by surveyed hospital doctors¹¹⁴, the nature and interrelationship of these factors within the hospital environment is less well understood. A recent qualitative study examining the processes by which new drugs are prescribed by hospital doctors found that a configuration of varied influences affected drug adoption in this setting. The study found that doctors drew on four forms of knowledge that were interconnected: scientific knowledge, social knowledge, patient knowledge and experiential knowledge.¹³¹ In particular, social processes, such as supervisory consultants' prescribing practice, played a big role in grounding interpretations of ambiguous scientific research findings.

Experiential knowledge and social influences have also been identified as major influences in other hospital studies. In a survey of Australian doctors and clinical pharmacy staff at two teaching hospitals, drug familiarity was rated as a highly important influence on prescribing for a clinical scenario, with a mean weighted score of 8.5 ± 1.5 (on a scale of 1 to 10), following drug efficacy (9.3 ± 1.0) and illness severity (9.2 ± 0.9).³² Based on a Likert scale (0= no influence and 5=greatest influence), a US telephone survey of hospital-based doctors, pharmacists and formulary committee members, found that personal experience was the third most highly rated influence (mean rating 4.14 ± 0.71) nominated by doctors, following drug effectiveness (4.73 ± 0.45) and safety (4.73 ± 0.49).¹¹⁴ In contrast, the pharmacists and committee members surveyed did not rate personal experience highly (3.44 ± 1.01 and 2.72 ± 0.93 , respectively). A Dutch study examining the expectancies and weightings (on a scale of 0-10) that hospital doctors placed on potential drug treatments for clinical scenarios found that efficacy (average

value of 9.7) was the most highly valued aspect of prescribing; however, personal experience (8.5) was valued similarly to some biomedical influences, such as serious side effects (8.2) and rate of onset of effect (7.8).^{xii 30} In this study, the opinion of medical colleagues was also highly regarded (6.4), and the opinion of pharmacists (4.7) and nurses (4.5) were rated more highly than pharmaceutical detailers (2.2). A study involving interviews with Australian interns revealed that the opinion of senior medical colleagues (particularly registrars) was highly valued as was the opinion of nurses and pharmacists (particularly specialist practitioners).¹³² In the UK, a qualitative study with doctors of varying experience found that early on in their careers, senior colleagues were the major influence for hospital-based doctors. However, as their career progressed, personal experience became the leading influence.¹³³ The opinion of patients has been cited as influential, but considered less so than a doctor's personal experience and opinions of their colleagues.^{30, 133}

Findings are conflicting regarding the impact of guidelines on prescribing in hospitals with some studies finding them influential^{32 114}, whilst others reporting a poor awareness of their existence¹³³ and low adherence.¹³⁴ General prescribing references have been shown to be popular sources of prescribing information.^{133, 135} As in community settings, drug company promotion has been cited as less influential than other sources of information¹¹⁴, but inconsistency between views and behaviours towards companies exists. Whilst 70% of hospital-based consultants in a UK study saw pharmaceutical representatives up to once a week, they rated independent sources of information as more important.¹³⁶

Environmental factors nominated as influential in hospitals include administrative interventions, such as prescriber-feedback and formulary restrictions.¹¹⁴

^{xii} The statistical significance of these relative values was not documented by the authors of this study.

Drug cost. Several studies in primary care have found that whilst some doctors believe costs should be taken into account when prescribing, this belief did not necessarily translate into action.^{137, 138} In one study, even when cost data was provided to doctors, there was great variation in the extent to which this information was applied.¹³⁸ In some cases, espoused efforts to minimise cost have been associated with whether costs are directly borne by the patient or indirectly through insurance companies or the health care system.^{137, 139} In hospital-based research, drug cost has been rated more influential by pharmacists and formulary committee members than by hospital doctors¹¹⁴, and when making prescribing decisions has been considered by some specialist doctors more than others.¹⁴⁰

Pharmaceutical industry. Numerous studies have demonstrated that pharmaceutical industry has a major influence on prescribing patterns both in general practice and in hospitals, particularly on new drug adoption through advertising, information provision (via representatives or printed information)^{118, 127, 141}, seeding trials and samples,^{118, 142} and indirect methods, such as gifts, food and sponsorship of education.^{114, 143} The impact of industry on prescribing behaviour is principally the result of its enormous expenditure on marketing – approximately one third of revenue.¹⁴³ Nevertheless, despite overwhelming evidence, when surveyed, doctors typically believe that that they themselves are not influenced by marketing techniques of companies,^{144 145} although they think that their colleagues are.¹⁴⁵

Therefore, contrary to what some prescribers may feel and some educators may hope, evidence indicates that prescribers are influenced by multiple factors external to consideration of the patient's physiology and the drug's pharmacology. As addressed previously (see 1.2.3.5), psychosocial and environmental factors can also contribute to error by affecting either decision-making or prescription writing. In primary care, the effect of various social influences on prescribing is well established - with opinion of colleagues, extent of professional contacts,

group practices, and training practices being important determinants of prescribing patterns. In hospital environments, social influences also appear to be important determinants of prescribing, but their nature is less well understood.

1.3. DEALING WITH CHALLENGES

1.3.1. Strategies

A wide range of interventions has been developed to help prescribers make appropriate decisions about medicines.^{41, 91, 94} The main types of methods used include: (1) system-based interventions, such as, drug formularies, policies and restrictions; (2) educative interventions, such as, undergraduate curricula, postgraduate training in teaching hospitals, and continuing medical education; (3) persuasive strategies, such as educational outreach (academic detailing), and dissemination of information through opinion-leaders; (4) information provision and decision support tools, such as clinical practice and prescribing guidelines, drug bulletins, routine reminders, feedback, and computer-based decision-support; (5) and patient-directed strategies, such as promotion of medicine adherence or improving understanding of the role of antibiotics.

How effective are they? The rigour of evaluation of these interventions has been variable^{41, 146} and therefore conclusions are not straightforward. General lessons learnt are that the distribution of educational printed materials alone has little sustained effect on changing behaviours.^{41, 94} Multifaceted interventions are more likely to be effective than single interventions.^{41, 147}

Specific findings are that restrictive system-based approaches are effective, but can be politically contentious.¹⁴⁶ Patient-directed interventions, such as campaigns to reduce overuse of antibiotics have been effective in reducing prescription rates.¹⁴⁸ Educational outreach and feedback to prescribers are considered generally effective.^{7, 41, 147} In hospitals, the fast and

specific feedback provided by pharmacists following chart review has been found to be effective in preventing potential adverse events from prescribing problems^{35, 38, 66} as has pharmacist participation on medical rounds.¹⁴⁹

There is convincing evidence that electronic prescribing decision support (EPDS)^{xiii} systems are useful in reducing rates of certain types of medication errors.^{150, 151} These are rule based systems designed to present prescribers with patient specific information, such as allergies, and drug-specific information, such as drug interactions, in a format that prevents prescribers from writing incorrect or inappropriate prescriptions. One study in the US showed a 55% reduction in serious medication errors following introduction of an EPDS system.¹⁵⁰ However, these systems have limitations. They do not eliminate all errors¹⁵² (eg, errors of omission¹⁵³) and can increase some forms of inappropriate prescribing¹⁵⁴ and also errors¹⁵⁵ through injudicious design. They are also difficult to implement in complex hospital environments.^{154, 156}

Educative interventions involving medical undergraduates and postgraduate trainees are discussed in more detail under Prescribing Practice of Junior Doctors (see 1.5.3).

1.3.2. Behavioural change and the importance of context

An underlying assumption of early interventions aimed at changing prescribing behaviour was that improved knowledge results in improved behaviour¹¹⁷, but as already discussed, dissemination of information alone has not been found to bring about lasting change. Repeated failures of such interventions lead to examination of causes for success of interventions in other areas of healthcare (for example, lifestyle effects on health). The basis for many of these has been the utilisation of behavioural change principles.

^{xiii} Known as Computerised Physician (or Prescriber) Order-Entry (CPOE) in the US.

Based on findings from professional behavioural change research, these principles can be summarised as ¹⁴⁷ :

- most interventions are effective under some circumstances but none is effective under all circumstances
- interventions based on an assessment of potential barriers are more likely to be effective
- multifaceted interventions targeting different barriers are more likely to be effective than single interventions
- successful strategies need to be adequately resourced; and all strategies should include a plan to monitor and evaluate the change.

Therefore, to effect behavioural change, an important starting point is to identify potential barriers to change. Barriers may relate to the individual (eg, knowledge, skills, attitudes, habits), the social context (eg, patients, colleagues) or the organisational context of care provision (eg, organisational structure) ^{147, 157} For example, in order to optimise the design of an EPDS program for GPs, Deveny surveyed, interviewed and observed GPs to improve understanding of how prescribing is actually done and how computerised decision support could best enhance prescribing practices. ²⁹

A further assumption of many interventions is that prescribing is part of a discrete episode of care involving one prescriber and one patient. In other words, the doctor who writes the prescription is also (in collaboration with the patient) the decision-maker. This assumption may be valid in community and outpatient settings, but is not valid for most prescribing in teaching hospitals, which involves not one doctor, but medical teams.

In summary, despite interventions such as EPDS being hailed by some as universal problem-solvers, no single intervention has been shown to solve all prescribing problems. Multifaceted interventions appear to have the greatest potential for success. According to behavioural change principles, another important predictor of success is a good understanding of the local context in order to best identify potential barriers to change. Assumptions about the prescribing practice of GPs may not be valid for the practice of hospital doctors. Therefore, there is a need for greater understanding of the organisational and social dynamics of prescribing practice in hospital settings to guide the development of interventions.

1.4. PRESCRIBING IN HOSPITALS

In Australia, GPs write more prescriptions than hospital doctors^{xiv} and in recent years, GPs have been the main focus of interventions to improve quality use of medicines. The efforts of the National Prescribing Service, for instance, focus more on primary than on secondary healthcare.⁵ But hospitals are not only a further source of prescribing problems⁴⁴, arguably, they also legitimise and perpetuate them. Prescribing problems in teaching hospitals have multiple and sustained consequences. Not only can poor prescribing practices result in suboptimal patient care⁹⁷ and cost blow outs¹⁵⁸, but they act as poor role models for medical trainees⁹⁴, and as an additional spin-off effect, may be copied by general practitioners.¹¹⁸

So, what is known about prescribing practice in teaching hospitals? What is the scene, who are the players and how do they interrelate?

1.4.1. Prescribing process

Australian teaching hospitals are dynamic and challenging workplaces for prescribers. These hospitals care for the most complex patients, who are often severely ill, have multiple co-

^{xiv} There are no Australian data on medicine usage in hospitals, but it is widely accepted that general practitioners write more prescriptions than hospital doctors. In the UK, based on cost, about 80% of prescribing takes place in general practice [Prosser H and Walley T. *Soc Sci Med* 2006; 62: 1565-1578].

morbidities and require multiple drug therapies.⁹¹ Drug regimens can be complicated and carry significant risks. The choice of drugs is usually restricted by drug formularies, which are determined by local committees. The use of drugs is governed by a bevy of institutional and ward-level drug use policies and protocols. Historically, medication order forms vary between hospitals with local rules regarding their proper use. However, the national implementation of the National In-patient Medication Chart in January 2007 is an attempt to streamline prescription-writing and reduce problems associated with unfamiliarity of process.¹⁵⁹

In Australian teaching hospitals, nearly all prescribing is done by medical teams. Typically, doctors with different levels of expertise and experience undertake particular prescribing activities. The most junior members, interns, write most prescriptions⁹, but they make few therapeutic decisions alone.¹¹⁶ They “prescribe” according to advice from registrars, who usually have several years of experience, and who may be undergoing specialist training (advanced trainees). Registrars make most prescribing decisions operating within parameters defined by consultants⁹¹, the most experienced members of the team.

1.4.2. Medicines management systems

Prescribing activities form part of complex medicines management systems, which are comprised of numerous activities from diagnosis and prescription through to receipt of medication.⁴⁴ Several different health professionals are involved, and the patient is also viewed as an active player.^{44, 160} In a simplified representation, doctors diagnose and prescribe, pharmacists review and dispense, nurses administer and monitor,⁴⁴ and ideally, the patient is involved in some or all of the steps.¹⁶⁰ Empirically, however, the steps are not sequential or discrete, and overlap of some roles and responsibilities is necessary to ensure that the system works. Indeed, the successful operation of the medicines management system is considered to depend on multidisciplinary teamwork⁴⁴, communication, and partnership with the patient.¹⁶⁰

Providing consistency in delivery of quality use of medicines is an ongoing challenge for these systems. This is because the health professionals responsible for managing the medication of any particular patient will change. Some of this is due to logistics, such as change of shifts, but the organisational structure and the workplace environment of hospitals also bring about a lack of continuity in staffing, such as training rotations, and the rapid staff turnover of certain professional groups, such as nurses and pharmacists.

Therefore, there are ideas about what is required to make the system work, but how does it actually work? What actual processes and communication exchanges take place day to day? How do the pieces fit together in the real world?

1.4.3. Social and cultural influences on medicines management

The conceptual framework of organisational culture can be an effective and highly sensitive means of understanding how and why groups of people behave in certain ways in the workplace. There are two major perspectives on organisational culture that have received recent attention in prescribing and medicines management research and it is important to distinguish between them and indicate which one is relevant to the aim of this study and hence our examination of the literature.

“Desired attributes” perspective. Despite being long recognised in other high reliability organisations^{10, 161}, the importance of organisational culture to quality and safety in healthcare organisations has only recently been embraced. A great deal of discussion in the medical literature and government policy papers has focused on “safety culture” or “reporting culture” and how it is cultivated.^{10, 80} In this context, organisational culture is depicted as a group of desired attitudes (such as openness when discussing errors¹⁶²) and behaviours (such as teamwork¹⁶²) that might be imposed through management interventions in order to achieve

specific goals.^{10, 163, 164} Permeation of these tenets has been measured using survey-based tools.¹⁶⁴

“Shared beliefs” perspective. Anthropological definitions of culture, however, are based on the idea that certain things in groups are shared or held in common – such as values, ideas, concepts and rules of behaviour.¹⁶³ These elements are held implicitly by the group and are typically resistant to change. An often quoted distillation of this concept is, “the way we do things around here”¹⁶⁵ (Figure 3). In developing this idea, Schein¹⁶⁶ argues that there are three levels of culture: 1) visible artifacts; 2) espoused values, norms and rules of behaviour; and 3) underlying basic assumptions – unconscious, taken-for-granted beliefs, perceptions, thoughts and feelings.

The concept of shared beliefs is useful for examining cultural phenomena in various organisational units. In healthcare, this perspective has been used to explore the dynamics of the whole organisation and its structure¹⁶⁷, as well as the various subcultures of those involved in delivery of care.¹⁶⁸ This is the perspective chosen for this study to aid exploration of everyday social and cultural dynamics affecting prescribing in hospitals.

Figure 3. Organisational Culture illustrated^{xv}



There are few studies that have examined the direct effect of organisational structure or professional subcultures on prescribing or medicines management. A small number have explored the relationship between doctors and pharmacists. In an Australian teaching hospital, doctors appreciated the role of pharmacists in reviewing prescribing, but did not know that pharmacists had specialist knowledge in patient counselling.¹⁶⁹ In a UK study of junior doctors, pharmacists were well appreciated for their role in preventing errors, even to the extent that some doctors felt that they could be less diligent in their prescribing as they believed that pharmacists would detect any mistakes made.¹⁷⁰ Evidence from studies in the US and the UK

^{xv} Cartoon by Neil Hardie (2004) and reproduced with his permission.

indicate that advice from pharmacists is well accepted by doctors with most suggested interventions being implemented.^{35, 149}

A Belgian study examining processes leading to inappropriate prescribing in acute wards of five hospitals identified paternalistic decision making by doctors (for example, underestimation of patient's ability to comprehend) as a problem as well as a reluctance of prescribers to interfere with treatment prescribed by a colleague. Other flawed processes observed included reliance on short term treatment (tendency to overlook management of chronic conditions) and a passive attitude towards learning (reliance on supervisor's advice rather than self-directed learning).¹⁷¹

A Danish study examining implementation of drug prescribing sheets identified a number of cultural obstacles among doctors and nurses, including: unclear responsibilities of nurses and doctors, low community spirit among doctors, insufficient communication, and the view among doctors that prescribing was a low priority.¹⁷²

Some of these findings accord with socio-cultural influences associated with prescribing error: the assumption among hospital doctors that prescribing is not important or has a low priority^{9, 14, 34, 89}, problems of communication of prescribing decisions and uncertainties about responsibilities.³⁴

1.4.4. Other potential cultural influences in hospitals

In view of the paucity of qualitative analysis of prescribing and medicine management in hospitals, other qualitative studies were sought examining cultural phenomena or latent conditions in these organisations with arguable potential to affect medicine-related processes. The following represents the major factors that were identified:

- the vertical power structure of medical teams^{34, 89}, which places the person with least experience or influence (the intern or resident) in a key role in medicines management.
- the so-called “culture of blame”, which is the expectation that those found at fault will be individually held accountable and responsible.¹⁷³
- the collegiality and professional autonomy of the medical profession, which was reported to impede error notification and sharing of errors data outside of their closed peer groups.^{10, 174}
- the professional identity of consultants, which was found to affect their collaboration with other health professionals within the organisation and with the consumer: older Visiting Medical Officers (VMOs) distinguished by having little association with the organisation and seldom involving other health professionals in decision making; younger VMOs and staff specialists who have a collaborative approach and close association with the organisation.¹⁶⁸
- acceptance of error by doctors as an inevitable part of complex medical systems¹⁷³
- resident doctors’ view of the hospital environment in the US, that “there is often little co-ordination among medical staff, nurses, pharmacists, respiratory therapists, social workers and other team members, with no system of organized interaction.”¹⁷⁵

So, whilst formal analyses of the effect of local influences on prescribing decisions in hospitals are few and far between, cumulative evidence from a range of sources points to an environment with distinctive characteristics to shape how prescribing is done. Examination of the medicines management process and the cultural landscape of teaching hospitals reveals a spectrum of organisational and social dynamics, which may affect how well medicines are managed and whether errors are avoided. In particular, dynamics such as: communication, teamwork, recognition of responsibilities, and whether prescribing is seen as a priority.

1.5. PRESCRIBING PRACTICE OF JUNIOR DOCTORS ^{xvi}

In Australia, after graduating from university, medical graduates are required to undertake at least two years pre-vocational training in hospitals.¹⁷⁶ In NSW, the first year is known as internship and the second year as residency.¹⁷⁷ This period of training consists of five term attachments each year of 10-12 weeks duration, and aims to provide experience in general medicine, general surgery, accident and emergency, as well as in subspecialties.¹⁷⁸ This is an intense and formative time for medical graduates. Behaviours, beliefs, values and norms they encounter may be powerful determinates of future practice.⁸ As discussed previously, for junior doctors, training in prescribing occurs concurrently with performing a key role in hospital medication management.⁹ Therefore, in teaching hospitals, the training received and behaviours learnt have a bearing on the future prescribing practices of junior doctors as well as the day-to-day quality use of medicines in teaching hospitals.

1.5.1. Evaluation of prescribing practice

There are few detailed analyses of the prescribing practice of junior doctors in hospitals. Those located were categorised according to quantitative and qualitative measures.

Quantity of prescriptions and types of drugs prescribed. In quantitative evaluations, a US study found that first and second year postgraduate doctors wrote nearly 75% of all medication orders.⁷¹ In an Australian study, whilst interns wrote almost a fifth of all prescriptions, they made an independent prescribing decision in less than a fifth of these.¹⁷⁹ The majority of this intern-initiated prescribing was for symptom relief, such as prescribing simple analgesics. A survey of

^{xvi} Many terms are used throughout Australian hospitals to describe medical trainees in their first two years of postgraduate training: junior doctor, junior medical officer (JMO), postgraduate year 1 and 2 (PGY1 and PGY2), intern and resident, prevocational trainee, hospital medical officer, and junior house officer. [National Training and Assessment Guidelines for Junior Medical Doctors PGY1 and 2, July 2003: Resource 1: Prevocational and Vocational Training Post Definitions. [www.health.gov.au/internet/wcms/publishing.nsf/content/health-workforce-new-jmonatgui.htm]. Accessed 01/07]

hospital doctors in the UK found that pre-registration house officers (interns) were responsible for prescribing nearly 90% of fluid orders.¹⁸⁰

Quality of prescribing practice. Of studies examining quality of prescribing, most focused on clinical skill acquisition using surrogate measures of performance (eg, tests or surveys) rather than on actual behaviour. Many of these studies identified problems including: knowledge of a therapeutic area¹⁸¹; dosage knowledge¹⁸²; and dose calculation skills (eg, paediatric doses^{85, 183}, adjustment for renal dysfunction¹⁸⁴, narcotic dosage conversion¹⁸⁵). A UK survey found that routine use of safe prescribing practices, such as checking for potential drug interactions, was poor among interns and residents.¹⁸⁶

Of the small number of studies evaluating actual practice, a few found an association between the experience of junior doctors and quality of pharmacotherapy decision-making^{187, 188}; for example, more patients were found to receive venous thromboembolism prophylaxis at the end of junior doctors' surgical rotation compared with the start.¹⁸⁸ Also, there was evidence to suggest that first year postgraduate medical trainees are more likely to make errors than more experienced staff^{71, 74, 82, 87} and more likely to make them at the start of the academic year.⁸⁷ Conversely, two studies examining antibiotic prescribing found that junior doctors had arguably more appropriate prescribing practices than those of their experienced colleagues.^{189, 190}

Further to the issue of quality, two studies reported a positive correlation between appropriateness of prescribing and supervision of resident doctors.^{191, 192}

Confidence and perceived competency to prescribe. A number of surveys examined perceived competence to prescribe. Several reported low levels of confidence to write a correct

hospital prescription at the beginning of internship^{132, 193, 194}, another found a significant increase in confidence and experience in prescribing between interns and first year residents.¹⁹⁵

1.5.2. Influences on prescribing practice

Senior colleagues. Few studies have specifically examined influences on the prescribing practices of junior doctors. Nevertheless, findings consistently report that senior colleagues are a major if not the most important influence. In one Australian study, interns identified registrars, subspecialty nurses and pharmacists as important positive influences on prescribing. In contrast, consultants were perceived as being physically and mentally remote and poor teachers.¹³² A separate Australian study of resource use found that when unsure, junior doctors prescribed mainly according to advice from registrars.¹³⁵ Two similar studies (one from the UK and one from Ireland) found that senior doctors were a major influence when junior doctors made prescribing decisions about antimicrobial therapy.^{133, 134}

Undergraduate training. Although the UK study cited above reported that medical school teaching was influential¹³⁴, the Irish study, previously cited, found that recollection of formalised undergraduate teaching (and hospital guidelines) were a very minor influence compared with the immediate influence of senior colleagues.¹³³

Pharmaceutical Industry. Based on surveys, resident doctors appear to have naïve views about the influence of interactions with pharmaceutical industry on their prescribing practice.^{144, 145, 196}

Organisational influences. In the Australian study cited previously, interns also nominated various organisational factors that had a detrimental effect on their prescribing practice including: theoretical, inconsistent and irrelevant teaching (such as grand rounds and didactic

education sessions), inconsistent and inaccessible resources, a confrontational and accusatory way of dealing with prescribing errors, and other pressures such as time and hospital hierarchies.¹³²

Pressures experienced by junior doctors. Broadening the literature search to include influences on junior doctors generally and/or on their acquisition of clinical skills resulted in many more studies. Long working hours and sleep deprivation have been shown to increase medical errors^{197, 198}, as well as potentially dilute the effectiveness of the intern training experience.⁸¹ Interruptions¹⁹⁹, perceived mistreatment by colleagues²⁰⁰ and psychological stress⁸⁴ may also negatively impact on the learning experience of interns. Workload may also be a problem. According to an Australian study that analysed the intern's role, up to 80% of their time was spent in a service role (patient care, clerical, telephone)– much of it working alone – leaving little time for formal or informal education and training.²⁰¹

1.5.3. Strategies to improve prescribing practice

A number of strategies have been devised by universities, hospitals, and professional training bodies to improve the preparedness of students and the quality of prescribing of junior doctors.

1.5.3.1. Undergraduate training

Overall, the effort to improve prescribing competency of junior doctors has tended to be greater at the undergraduate rather than the prevocational stage of training. This is probably because of the expectation that junior doctors will be able to prescribe, albeit under supervision, from day one of internship.²⁰²

From facts to skills. Traditionally, medical undergraduate courses in clinical pharmacology and therapeutics concentrated on accumulation of facts.^{202, 203} Teaching students *what* to prescribe

was the focus. In the 1990s, a greater appreciation of the clinical reasoning skills required, along with evidence suggesting that many medical graduates lacked confidence to prescribe^{193,}
²⁰⁴ shifted the focus to teaching students *how* to prescribe.²⁰³

As part of curricula development for universities in The Netherlands, an ideal model of prescribing was developed, based on medical problem solving and decision-making analysis.²⁰⁵ The basic premise is to view prescribing in a similar way to solving a scientific problem, which has sequential steps or activities. Emphasis is placed on learning the particular skills required to perform each activity – be it cognitive, motor or communication. As acknowledged by its developers, the main criticism of the approach is that it “over-simplifies a highly complex reality.”²⁰⁵ Nevertheless, its perceived utility as an educational tool is illustrated by its endorsement, adoption, and wide distribution by WHO.¹⁶

In collaboration with Australian medical schools, the NPS modified the WHO model of good prescribing for incorporation into local undergraduate curricula. A web-based interactive prescribing program was developed based upon 12 therapeutic topics seen by interns as the most important to their daily practice: chronic obstructive pulmonary disease, peptic ulcer, hypertension, the confused patient, seizures, acute chest pain, otitis media in children, heart failure, anticoagulation, postoperative pain and vomiting, polypharmacy, and an intern orientation module. As of 2004, the program was being used by 9 of 11 medical schools throughout the country.²⁰⁶ Other countries have also utilised the WHO problem-based model as the basis for prescribing curricula.²⁰⁷

Other innovations to curricula. In the UK, various skill-based training programs have been devised at a local level for improving prescribing competencies of medical students.^{208, 209} In addition, one UK medical school also designed a program to improve students’ attitudes towards

concordance in medicine taking.²¹⁰ However, of far wider potential impact is an integrated core curriculum in clinical pharmacology and therapeutics, which has recently been developed for national implementation across UK medical schools.²⁰² The main innovations of this new curriculum are: the vertical integration of prescribing and therapeutics throughout all years of medical school, a core list of drugs or student formulary, and the formal assessment of prescribing competence.

In addition to therapeutics-focused interventions, several other recently developed areas of learning would be expected to impact on the prescribing competency of medical students: patient safety education^{211, 212} (which in Australia has been integrated into curricula of all traditional health professions²¹¹); interprofessional clinical education (for example, joint therapeutics sessions for pharmacists and doctors²¹³); and training in the principles of evidence-based medicine (which has been integrated into pharmacist and nurse supplementary prescribing curricula in the UK^{28, 214}, but is also part of most undergraduate health professional curricula)

How effective are they? The impact of specific undergraduate curricular in clinical pharmacology and therapeutics on subsequent prescribing behaviour has proven difficult to evaluate and is unknown.²⁰² Evaluation has generally consisted of testing students' knowledge and skill in prescribing for simulated cases,²⁰³ their confidence to prescribe,^{5, 209} and their uptake of an intervention.²⁰⁶ Whilst short and medium-term success in prescribing for simulated cases (up to 6 months²¹⁵) has been reported^{203, 208, 209, 215}, problems with ability to transfer skills to similar but different cases was identified as a problem in one study.²⁰³

1.5.3.2. Prevocational training

Currently in Australia, state-based Postgraduate Medical Councils or equivalent (in NSW, The NSW Institute of Medical Education & Training) are responsible for developing and supporting the training needs of prevocational trainees (medical postgraduate years 1 and 2). The central aim of this training period is to ensure trainees gain appropriate knowledge, training and skills to equip them to proceed to general practice or specialist training.¹⁷⁶ In NSW, this period of prevocational training is overseen by Directors of Clinical Training, who are usually active hospital-based specialists appointed at each accredited hospital. Junior doctors are assessed formally and informally on various competencies (including clinical, professional, and procedural tasks) by term clinical supervisors. Historically, there has been no specific assessment of prescribing skill²¹⁶; however, this may soon change as a draft Australian Curriculum Framework (ACF) for Junior Doctors²¹⁷ includes prescribing among explicitly stated competencies expected to be mastered by junior doctors during prevocational training.

In relation to prescribing, the skills outlined in the ACF include: prescribing and monitoring anticoagulants, antibiotics and insulin. Furthermore, there are specific information management skills related to prescribing, such as knowing how to communicate prescriptions and the accurate documentation of prescriptions; and specific competencies related to medication safety, such as knowing the medications most commonly involved in prescribing and administration errors, and routine reporting of medication errors and near misses.²¹⁷

Despite calls for better training in prescribing during internship^{9, 94}, review of literature from around the world reveals a paucity of interventions specifically devised to improve the prescribing practice of junior doctors working in hospitals. Of note, in the US, far greater effort has been devoted to improving prescribing of resident doctors in family medicine residency

programs. There are several possible explanations for this apparent bias in selection of research setting. Firstly, because of their time-consuming service role, interns working in hospitals often lack the time or opportunity to participate fully in educational interventions.²¹⁸ Secondly, because interns rotate positions and move between urban and rural placements, post-intervention follow-up can be logistically difficult. Thirdly, because of variation in exposure to different therapeutic areas due to their rotations, confounding influences can be difficult to control for. Lastly, if testing of all subjects is not conducted simultaneously, contamination is likely due to the social nature of the hospital environment.¹¹⁶

Due to the dearth of hospital-based strategies, interventions aimed at junior doctors working in family medicine residencies and outpatient care facilities were reviewed collectively along with interventions at inpatient care facilities. In broad terms, interventions were either designed to improve appropriateness of prescribing or to minimise prescribing errors.

Types of strategies aimed at improving appropriateness of prescribing have included: a web-based prescribing training program²⁰⁶, problem-based tutorials¹¹⁶, workshops on concepts of essential drugs and rational drug use^{219, 220}, feedback reports on prescribing patterns^{221, 222} on drug or prescription costs^{223, 224} and on generic drug prescribing²²⁵, promotion of guidelines through “in-service” discussions and lectures²²⁶, bi-monthly drug information sessions with a quiz²²⁷, lectures and discussion on pharmaceutical promotion^{228, 229}, and variations in drug sampling policies.²³⁰

Compared with the other interventions, the web-based training program for interns developed by the NPS is notable for its scope and comprehensiveness. It is based on a similar but more sophisticated set of online prescribing modules to the program developed for medical students. The program has undergone pilot testing and is in the process of being implemented nationally.⁵

Types of strategies aimed at reducing prescribing errors have included: written tests of dosage calculation ²³¹, a monthly quiz aimed at improving prescription writing skills ²³², academic detailing to improve conformity with legal requirements of prescription writing ²³³, a medication error competition and intern orientation workshop²³⁴, evaluation and feedback of prescription writing errors ^{235, 236}, and a tutorial and written test at orientation to an emergency department. ²³⁷

How effective are they? Similar to undergraduate prescribing programs, there has been negligible evaluation of long term prescribing behaviours. Furthermore, few studies have rigorously evaluated impact on short and medium term prescribing. Of those interventions that have been evaluated, the overwhelming majority appear to have significantly improved prescribing with very few failures described. ^{116, 224, 226, 237} In light of the known poor success rate of single interventions on sustaining behavioural change, this raises the possibility of publication bias or may indicate the relative ease of improving some skills in the short term and not others, or improving behaviours in some settings (family medicine residencies) and not others (hospitals).

One report of an unsuccessful intervention demonstrates the difficulties involved in effecting behavioural change of interns working in hospitals.¹¹⁶ Pearson designed an education program in antibiotic prescribing for interns consisting of three 45 minute problem-based tutorials lead by DCTs. The program was evaluated against a control group of interns using Objective Structures Clinical Examination (OSCE) involving simulated patients. Prescriptions written by the interns for the simulated patients were graded for appropriateness by two experts. Unanticipated problems were encountered during the study in attaining agreement on appropriateness of intern prescribing by the two experts. Despite eventual resolution of these issues, overall, the program failed to effect change in prescribing quality. Explanations proffered by the author included: the limited impact and intensity of the program, its focus on mainly

positive influences on practice, and its failure to address “the powerful negative forces’ that act on interns’ prescribing practice.

In essence, the prescribing practice of junior doctors is difficult to characterise because there are few analyses and findings have been mixed. It would appear however, that junior doctors are charged with responsibility for much of prescription writing in hospitals, but with narrow limits placed upon the quantity and types of independent prescribing decisions they can make – at least as interns. A number of problems identified with prescribing quality of junior doctors have been identified, the main being: inadequate knowledge base (particularly regarding dosing and calculations) and a greater propensity to make errors than more experienced doctors.

Supervision and advice from registrars and selected other hospital colleagues are positive influences on their practice, whilst long working hours, stress, and perceived mistreatment by colleagues are detrimental. The need to improve the prescribing competency of medical graduates and to provide support for interns to further develop and extend their prescribing capabilities has become well recognised. Broad-reaching innovations – such as in undergraduate curricula: the use of problem-based models, vertical integration of therapeutics, emphasis on patient safety and evidence-based medicine; and in prevocational training: the stipulation of specific prescribing competencies – are arguably the most important strategies developed in order to meet this need. Whether these strategies will result in improved decision-making and reduction in errors by novice prescribers is unknown. Long-term evaluation of such strategies is difficult and the hospital environment presents many potential confounders.

1.6. CONCLUSIONS

Maximising the benefits of medicine use begins with prescribing, an inherently complex and high risk activity. A thorough knowledge of the pathophysiology of disease and pharmacology of drugs may be appropriate foundations for prescribing, but multiple forms of evidence from a

diverse range of prescribing research show that in practice these are not the only resources used by prescribers. Prescribers also integrate an array of individual, social, cultural, environmental and commercial factors into their decisions. Furthermore, social and cultural characteristics of the prescriber's workplace may influence how well prescribing decisions are carried out. Although some of these non-biomedical factors may impact negatively on appropriateness or safety of prescribing, other factors, for example, certain social influences, may be important and legitimate determinants of prescribing decisions, particularly for supervised novice prescribers.

1.7. AIM OF THIS RESEARCH

Whilst numerous research efforts have helped to construct an in-depth understanding of non-biomedical influences on GPs' prescribing patterns, the characteristics of corresponding types of influences in teaching hospitals have not been well determined. As outlined in our review of the literature, prescribing in teaching hospitals occurs in a highly dynamic social environment. Supervised medical trainees, registrars and consultants prescribe within the framework of complex medicines management systems involving nurses, pharmacists and patients. Currently, little is known about whether each of these groups has distinct beliefs, attitudes and values that may affect either prescribing behaviour or how prescribing skills of junior doctors are acquired. Furthermore, the effect of intra and interprofessional relationships on the prescribing process is also poorly understood.

The aim of this project was to explore social and cultural factors in two teaching hospitals that affect prescribing in general, and the way in which junior doctors learn to prescribe. This study was conducted in two teaching hospitals. The study sought to identify and characterise attitudes, beliefs about behaviours and perceived influences that may shape the practice of professionals typically involved in making and implementing decisions about drug therapy.

2. CHAPTER TWO: METHODS

2.1. METHODOLOGY

Since the underlying objective of this study was to improve understanding of naturalistic elements of prescribing (ie, how the social world of a workplace impacts on how prescribing is actually done in that setting), qualitative methods were chosen as the most appropriate means of exploring the research question.²³⁸ Qualitative methods place emphasis on participant's own understanding of the meanings of their actions, interactions and experiences.²³⁹ This feature has been used effectively in health services research to help provide explanations for often complex social and cultural phenomena which shape the day to day provision of health care.²⁴⁰ This includes topics related to this research question, such as prescribing decisions^{118, 241}, interprofessional relationships^{168, 242}, and organisational culture.¹⁶⁷

2.1.1. Philosophical approach

The approach adopted in this study was essentially pragmatic, which means that the fit between the research instrument and research question was viewed as more important than the degree of adherence to a particular ontological or epistemological stance.²⁴³ Pragmatism or methods-based approaches are widely accepted as legitimate modes of qualitative enquiry^{244, 245} and adopting prescribed methods according to a particular philosophical paradigm is considered unnecessary for demonstrating analytical quality and rigour^{243, 244} Nonetheless, underpinning methods choices and analytical processes to broad philosophical perspectives on the nature of social reality (ontology) and the basis of knowledge (epistemology) is also argued to be of particular value when conveying qualitative findings in health care research.²⁴⁶

Although provision of health care is informed by both the natural and social sciences, the impact of the philosophies and traditions governing the natural sciences (such as those underlying

clinical and biomedical research) is debatably the more powerful and pervasive.²⁴⁰ This has led to misunderstandings by healthcare decision-makers about the methodological goals of qualitative research (ie, the type of information being sought) and persistent doubts about its role and validity.^{240 247} In qualitative literature, it is widely accepted that quantitative and qualitative traditions are based on very different sets of assumptions about the nature of reality and how it is possible to know about it.²⁴⁴ Therefore, to ensure clear communication of our findings and to maximise their accessibility, we have outlined the philosophical beliefs to which our approach is most strongly aligned in order to help make transparent the methodological intent of the study, the basis for which certain design decisions were made, and the broad theoretical basis for interpretations we have made of the interview dialogues.

Study of the natural sciences is underlined by a philosophy of recognising only observable data, separating facts from values (thus making it possible to conduct objective enquiry), and developing universal causal laws.^{243, 248} These principles constitute what is known as the positivism. In contrast, most qualitative research is associated with a different set of beliefs known as interpretivism.²⁴³ This stance is characterised by recognising that the researcher and the social world impact on one another, facts and values are not distinct, and the social world is governed not by laws but is mediated through meanings of human actions and experiences.²⁴³ In short, qualitative research values “the subjective”, which is the approach adopted in this study.

Since there is a wide spectrum of beliefs about the nature of social reality, which is at the core of qualitative enquiries, it is also important to define the form of reality that we are attempting to capture. Aligned with the positivist philosophy, the realist perspective asserts that an external reality exists independent of our beliefs or understanding and that there is a clear distinction between beliefs about the world and the way the world is.²⁴³ A diametrically opposing position

is that of relativism, which puts forward that there is no external reality independent of human consciousness – there are only different sets of meanings and classifications, which people attach to the world.²⁴⁹ At the core of these divisions are the notions of objectivity and subjectivity²⁴⁸, but several “middle grounds” exist.

Subtle realism acknowledges that an external reality exists independent of our beliefs and understanding, but that reality is only knowable through the human mind and socially constructed meanings.²⁴³ The goal of this approach is to represent reality rather than attain truth.²⁴⁶ This philosophy is therefore compatible with both quantitative and qualitative research methods because whilst acknowledging an underlying reality, the philosophy allows that this reality maybe multifaceted and diverse²⁴³, embracing selected features of a relativist or post-structuralist approach. Subtle realism has been adopted by researchers interested in maximising the accessibility and practical application of their findings whilst drawing on the methodological strengths of qualitative enquiry^{243, 246, 249}, namely capturing the diversity and range of participant’s own interpretations of the social phenomenon being studied. Likewise, in this study we aim to capture the diversity of perspectives of how prescribing is done in order to build a comprehensive picture (but not a grand explanation) of what may actually be going on.

2.2. STUDY POPULATION

The study population consisted of health professionals working in teaching hospitals who were involved in making day-to-day decisions about prescribing. Staff members from pre-determined groups were recruited: consultants; registrars; junior medical officers; pharmacists; and registered nurses. These professional groups were chosen because they were involved in prescribing or they had potential to influence it due to their role in medicines management.⁴⁴ In addition, they had been identified as having characteristic influences on the prescribing practices of interns.¹³²

A major potential benefit of using multiple data sources (ie, sampling from different professional groups) was that influences on prescribing practices could be explored from differing perspectives. In theory, this so-called triangulation of data collection allows examination of patterns of convergence and divergence and so helps to build an overall interpretation of what may actually be occurring.²⁴⁶ Although there is much debate in qualitative research literature on the use of multiple perspectives as an absolute means of verifying findings²⁴³, others view its strength as being less about forming a “single totally consistent picture”, and more about capturing different points of view and generating enquiry into why differences might exist.²⁵⁰ The main benefit of triangulation, therefore, is in extending understanding and gaining a fuller picture of the phenomena rather than a more certain one^{243, 246} (a view consistent with the philosophical approach of subtle realism). In addition, incorporation of multiple views and voices is valued as a means of adding depth to the analysis of culture.¹⁶³

Although the need to acknowledge consumers as partners in medicines management was appreciated by the investigators of this study, hospital patients were not chosen to participate. As is, the study design concentrates analysis on professional behaviours, relationships and subcultures only. Arguably, including patients' views would have shifted analytical focus toward patient-professional interactions and away from interprofessional relationships, potentially weakening depth of analysis of the latter. Furthermore, the scope of this study was already broad including both prescribing processes and training processes, extending the scope further may have made analysis unwieldy.

2.3. STUDY SITES

The sites were two large metropolitan teaching hospitals in Sydney, NSW: 1) St Vincent's Hospital, Darlinghurst, Sydney; 2) Royal North Shore Hospital, St Leonards, Sydney. These hospitals were chosen because they are both metropolitan teaching hospitals with large staff

numbers, are both publicly funded, are within close proximity of one another, and have broadly similar organisational characteristics. This allowed convenience of sampling as well as maintaining the focus of this investigation on the cultural phenomena of those involved at the operational level of the prescribing process (ie, on those directly involved with the process) rather than on broader cultural differences at two hospitals. The intent of sampling from two sites rather than one was largely to facilitate recruitment, but this design also provided additional confidentiality protection for participants' responses.

2.4. SAMPLING METHOD

In the main, purposive sampling was used to locate appropriate data sources. This method refers to the deliberate and strategic selection of participants based on a judgement that they will be informative about the questions under study.²⁴⁴ It is an accepted means of sampling in qualitative research and widely utilised^{100, 118 241}, the rationale being to target individuals who have particular features or characteristics which will enable detailed exploration of the topic^{243 244}, not necessarily individuals whose views are representative of a population.

Therefore in this study, medical consultants were targeted rather than surgical consultants since the former were considered more likely to prescribe regularly and have views on prescribing.¹²⁷ Also there was deliberate selection within each group of health practitioners to ensure heterogeneity of clinical specialty and therefore breadth of opinion about the research topic. Nurses, pharmacists and registrars were selected in the main using snowball sampling (people who knew people who were likely to have views on the research topic²⁴⁴). In the case of junior doctors, by necessity, sampling was based more on convenience (ie, interviewed those willing and available to participate) than strategy.

2.5. SAMPLE SIZE

Originally, approximately 12 staff members from each group across both sites were anticipated to be required for adequate exploration of the topic. This number was selected based on qualitative studies with related research objectives^{132,251} and on expected coverage of the phenomenon under investigation.²⁴⁴ Recommendations for sampling in qualitative studies include selection to the point of theme redundancy.²⁴⁴ Using this criterion, a total of 43 interviews were conducted: seven nurses, eight registrars, nine junior doctors, eleven pharmacists, and eight consultants.

2.6. ETHICS APPROVAL

Ethics clearance was received from the Human Research Ethics Committees of: the University of Sydney, Northern Sydney Health (Royal North Shore Hospital), and St Vincent's Hospital (Appendix A).

2.7. RESEARCH TOOL DEVELOPMENT

Semi-structured in-depth interviews served as the primary research tool and a brief questionnaire was used to collect demographic data. In-depth interviews are considered to be an appropriate means of furthering understanding of complex processes and issues²⁴³ and for this reason have been used widely in prescribing research.²⁴¹ Although interviews result in “generated data” as opposed to observational methods, which collect “naturally occurring data”, interviews give participants a direct and explicit opportunity to convey their own meanings and interpretations²⁴³ and so were deemed to be an appropriate means of exploring this research question.

2.7.1. Steering Committee

A Steering Committee was set up consisting of 11 experts in the fields of clinical pharmacology, medical education, and medicines management with the aims of: obtaining local opinion leader

support for the study, to aid recruitment of study participants, to help refine methods, and to assist with data interpretation. All members of the committee were invited to participate by letter (Appendix B).

2.7.2. Interview topic guide

A preliminary interview topic guide was developed based upon a literature search and input from selected members of the Steering Committee. Coverage of potential influences was underpinned by two bodies of literature: influences on appropriateness of prescribing decisions and contributors to prescribing errors. There were three main reasons for this approach. Firstly, the WHO normative model depicts prescribing as a series of decisions and actions¹⁶, which suggests that in order to best explore determinants on what medicine a patient actually receives, it is important to examine influences on prescribing activities as well as decisions. Secondly, most studies examining influences on prescribing have been based on a model of one prescriber, one patient, and one decision (treatment or drug selection), and haven't taken into account factors associated with the participation of multiple health professionals, which is the model in teaching hospitals. So, in theory, by examining influences on failures in decision execution as well as prescribing decisions, a more complete picture might be formed of the social dynamics shaping prescribing in teaching hospitals. Lastly, there are data suggesting that most prescribing errors in hospitals result from problems with prescribing decisions⁶¹; so by exploring perceived causes for error, fuller insights might be gained into why problematic decisions in this setting are made.

Consistent with Schein's theory of organisational culture, questions were devised with the underlying objective of eliciting perceptions, thoughts, feelings and unconscious beliefs of participants about prescribing and the training of new prescribers. Schein argues that in order "to understand a group's culture, one must get at [these] shared basic assumptions"¹⁶⁶ rather

than espoused values, which may not be congruent with what people actually do. In order to achieve this, the interview schedule contained a question concerning “a critical incident” related to a prescribing error, which was an attempt to produce a natural narrative and is an established method of accessing participant’s experiences, thoughts and views.^{118, 166, 252} Other questions designed to evoke participant’s beliefs covered topics such as: attitudes and values on prescribing, roles and responsibilities in prescribing, how prescribing decisions are communicated, influences on prescribing decisions, contributors to prescribing errors, attitudes on prescriber training, roles and responsibilities in training prescribers, and influences on training experiences of prescribers.

Five pilot interviews were conducted by the author (MP) between May and August 2004 with a participant from each of five pre-determined groups: consultants; registrars; junior medical officers; pharmacists; and nurses. The objectives of the pilot interviews were to: 1) identify any questions in the interview topic guide that were ambiguous or not easily understood; 2) assess richness and relevance of data collected to the research question; 3) ensure that questions elicited accounts tied to local experience rather than conjecture; 4) establish the schedule of interview questions; 5) refine the style of questioning; 6) and develop a preliminary coding scheme for emergent themes. Whilst attempts were made during interviews to ask most of the questions (to ensure coverage of research objectives), ad lib probes were also used to explore particular insights in greater depth. Thus the resultant format of interviews was semi-structured. Prior to these pilot interviews, MP practiced her interview technique by interviewing her co-researcher (BB) using the guide.

Using a computer program (NVivo 2²⁵³) to organise the data, the text of the pilot transcripts was segmented according to interview questions and responses. The content was systematically analysed for themes²⁴⁴, and the themes were organised and categorised to create a provisional

coding scheme. Responses to questions were compared across subjects. Interview questions and, in some instances, the order of questions were modified following these interviews to try and optimise the richness of information elicited. For example, the placement of the critical incident question on prescribing errors was changed when it appeared to be too confronting as the leading question in the first two interviews.

To cater for the different roles of participant groups in medicines management, three versions of the topic guide were created for use in the main study: one for consultants and registrars; one for nurses and pharmacists, and one for junior doctors (Appendix C).

2.7.3. Demographic questionnaire

A questionnaire designed to collect demographic and background information was also tested by the pilot interviewees and refined for use in the main study (Appendix D).

2.8. SUBJECT RECRUITMENT

A range of strategies was used to recruit subjects at each hospital based upon differences in: communication networks of researchers at each hospital, advice and form of assistance from members of the Steering Committee, and types and frequency of various staff meetings.

Subjects were recruited via means of: promotion through departmental, continuing education, or other regular meetings (pharmacists, registrars), direct assistance of members of the Steering Committee (email to consultants), and via formal education sessions and fliers (junior doctors) (Appendix E). Ultimately, however, success with recruitment depended on direct invitation and endorsement from an influential staff member or face-to-face appeal from the researcher (MP).

2.9. DATA COLLECTION

Interviews were conducted by MP between August and December 2004. All interviews took place in private consulting rooms, private offices, or hospital meeting rooms booked for the

exclusive purpose of conducting the interview. Prior to interview, all volunteers were provided with written information about the study (Appendix F) and all consented in writing to take part (Appendix G). The purpose of the study and conditions of consent were reiterated verbally as part of the interviewer's introductory statements (Appendix H). Using the guides developed from the pilot interviews, each volunteer participated in a one-to-one interview of approximately 45 minutes duration (range: 29 to 71 minutes). The interviews were recorded using a digital voice recorder. Each participant also completed the demographic questionnaire. All collected data were de-identified and assigned a code.

2.10. PRE-ANALYTICAL DATA HANDLING

A flow chart for data handling (management, analysis and interpretation) illustrates the processes that were utilised based upon established methods^{243, 244} (Appendix I). Each interview was transcribed verbatim. Pilot interviews were transcribed by MP and remaining interviews were transcribed by an external transcription service. Each transcript was proof-read for accuracy against sound recording (MP). At this stage, the NVivo2 computer program²⁵³ was used to organise the transcripts.

2.11. DATA ANALYSIS

2.11.1. Preliminary analysis

Following each interview, field notes were compiled. In addition to noting methodological factors, (eg, the number of interruptions and the interviewer's perception of the participant's state of ease), the interviewer documented her general sense of the interview including a list of themes, which she perceived at the time to be the most informative of the research objectives.

Since integrating or dovetailing systematic analysis with data collection was not logistically possible for the main part of the study (ie, it was only feasible for the interviews to be conducted in a block), the preliminary analysis of each transcript served as the means for determining the point of theme redundancy when no further interviews were required.

2.11.2. Construction of a Coding Scheme

The provisional coding scheme formed from the pilot interviews was further developed by thematic analysis of a further eight transcripts. These transcripts were selected by strategic randomisation of the remaining 38 interviews to ensure a heterogeneous mix of health professionals. The content of all thirteen transcripts (one third of all interviews) was examined systematically to identify themes (MP). The approach to coding was consistent with the general principles of grounded theory²⁵⁴, but with some modifications. Transcripts were read reiteratively to identify categories or themes, which were determined by the researcher to represent the substantive meanings of the participant's responses.^{243, 244} Most of these categories were then labeled (or coded) using terms devised by the researcher to capture the participant's general sense (eg, "Influence of Pharmacists – dose checker"), but some were labeled according to the language of the participants (eg, "Intern attitude – willingness to learn") and others influenced by terms used in the literature to describe similar types of phenomena²⁴⁹ (eg, "Prescribing errors – workload, busyness, time³⁴"). Whilst emphasis was placed on encapsulating participant's own interpretations of the research issues, coding involved both deductive and inductive processes, as the effect of the researcher's (ie, MP's) knowledge (experiential and derived from literature) on forming a representation (ie, categorising participant's views) was acknowledged.

Related categories were clustered and then organised into an overall hierarchical structure. This process involved the constant comparison of categories and rereading of text to ensure that

categories were well defined and distinct from one another.^{243, 255} Also, the relevance of each category was constantly questioned in relation to the research objectives of the study.²⁵⁵ The NVivo2 computer program²⁵³ facilitated comprehensive deconstruction of the text by allowing assignment of multiple categories to text segments. This helped to detect and characterise subtle differences in meanings of particular issues.

Two lots of five different transcripts were selected by strategic randomisation for review by two co-analysts (supervisors, JB and BB). Each co-analyst reviewed one transcript from each of the professional groups. The primary aim of dual readings of transcripts was to seek concordance of the categorisations used (and therefore, basic themes inferred) by the primary coder (MP) to represent the participants' accounts.²⁵⁶ To this aim, the co-analysts read their allotted transcripts and critiqued: (1) the assignment of codes (ie, whether labels used were a reasonable categorisation of the situations and meanings expressed by participants), (2) consistency of coding²⁵⁷, and (3) coverage of pertinent themes (ie, whether any pertinent themes were omitted). Using multiple analysts (triangulation of analysts) for the express purpose of checking or establishing validity of analysis in qualitative research is widely contested^{239, 243}, and furthermore, the rationale for comparing individual ways of "packaging" themes has also been questioned, as this is an inherently subjective process.²⁵⁶ Whilst some researchers persist in using numerical intercoder reliability ratings as a means of validating their interpretative findings²⁵⁸, the groundswell of opinion is that quantitative measures are ill-equipped to verify whether an interpretation of reality is "true" as "we have no independent and completely reliable access to reality."²⁴³ The rationale for using multiple analysts in this study was therefore primarily to extend the breadth and depth of analysis, which some qualitative researchers believe may act as a check on selective perception and blind interpretative bias of the primary coder.²⁵⁰

2.11.3. Labelling or tagging data

All remaining transcripts were labelled or tagged systematically according to the Coding Scheme (MP).^{243, 255} During this process, the scheme was further refined with some categories becoming more precisely defined and others being redefined into more conceptual terms.

2.11.4. Cross-sectional analysis of data

The computer program (NVivo2) facilitated retrieval of coded slices of text and cross-sectional analysis of data. The program was used to compare differences in text fragments between different professional groupings assigned to a specific code. This facility also assisted discovery of linkages in data or responses elicited from different questions.

2.11.5. Analysis of questionnaire responses

Data collected from the questionnaire were analysed using Microsoft Office Excel 2003.

2.12. DATA INTERPRETATION

Data generated from the interviews were interpreted at several conceptual levels. Since the study was primarily about *exploration* of social and cultural phenomena, the chief level of interpretation involved identifying and characterising factors, determined by the analytical process to have a substantive influence^{xvii} on prescribing and medicines management practices, to form a descriptive map of the social landscape in which prescribing takes place. At a further level of interpretation, explanatory accounts were developed by the researcher to help provide possible reasons for particular phenomena.²⁴³ This involved examining patterns in the data, particularly within the professional subgroups of the population, which was facilitated by

^{xvii} Patton uses the term “substantive significance” to describe important findings in qualitative research. He states that substantive significance can be determined by questioning the solidity, coherence and consistency of evidence in support of the findings, the extent to which the findings increase and deepen understanding of the phenomenon being studied, the consistency of findings with other knowledge, and the extent to which the findings are useful for some intended purpose. [Patton MQ. *Qualitative Research & Evaluation Methods*, 3rd ed, 2002].

manually creating thematic frameworks or matrices.²⁴³ A third conceptual level of interpretation involved developing core concepts from the data and using theoretical frameworks from the literature to help deepen understanding of these concepts and to generate theory. As part of these processes, the original transcripts were scrutinised for deviant cases (ie, cases that did not fit into categories or conceptual frameworks developed) in order to further strengthen and refine explanatory accounts and ensure that these accounts were grounded in the data.²⁴³

2.12.1. Validation

A number of established qualitative methods were used to optimise the accuracy of the interpretation of respondents accounts, most of which have been mentioned already. In summary, these were:

An iterative approach to analysis.²⁵⁹ Categories that were developed at each stage of analysis were constantly compared with the original transcripts and also the audio files to ensure accuracy of fit.

Deviant case testing.^{243, 250} Explanatory accounts and core concepts were “tested” by searching the transcripts for deviant cases for reasons already specified.

Use of multiple data sources²⁵⁰ Five different data sources were used, although as mentioned previously, the use of triangulation to demonstrate certainty of findings has been debated.²⁴³

Reflective account of researcher. As presented below, an account of the researcher was provided to show how prior assumptions of the researcher may have influenced findings.²⁶⁰

External forms of validation were not used in this study. Whilst the original intention of researchers was to present findings to the Steering Committee for peer review and to the participants for “member checking”, due to resource limitations, this was not possible. The purported benefit of peer review is to challenge the researcher’s interpretation of data from a

variety of perspectives²⁶⁰, but some qualitative researchers argue that this does not ensure credibility of interpretation as peers can never have the same engagement with the original data as the principal researcher.²⁶¹ Advocates of member checking see its value as ensuring the privilege of participants' perspectives²³⁹, but other researchers feel that it only adds to confusion since participants have a different role in the process²⁴⁶ and may have changed their minds in light of the findings.²⁶¹ Thus, the merits of these methods for demonstrating accuracy of interpretation are contentious anyway; and other qualitative studies involving prescribing have not used them.¹¹³

2.12.2. Researcher characteristics

Qualitative research aims to improve understanding of the social world of research participants and their subjective experiences.^{240, 243} In workplace environments, analysis and interpretation of a social situation is facilitated by appreciating, recognising, and empathising with humans involved. Understanding the complexities of a situation may be enhanced by having experienced something of it, but this experience may limit the researcher's ability to hear and represent all voices equally.²⁴⁴ However, by not openly acknowledging the humanity of self and others, the qualitative analyst is effectively denying that she (or he) has any ability to fully identify with the attitudes, motivations or values espoused by those she is interviewing, when in all likelihood she may be recognising some better than others. The conventional solution to deal with this spectre of bias is for the analyst to declare her biases up front, to acknowledge her vested interest, and her reasons for involving herself in the study.²⁵⁰ This allows inference of how much the researcher and her assumptions may have shaped collected data.²⁴⁶

Researcher's account

I am a pharmacist and have worked in several metropolitan teaching hospitals. I have also worked for a pharmaceutical company in the field of medicines information. Most recently I have worked in the public

health system as a drug information pharmacist and was involved in writing a component of an educational tool on prescribing for medical students and medical trainees. It was my latter involvement coupled with reflection on my experience as a hospital pharmacist that lead to my interest in this area of research.

When I first started working in a teaching hospital, I was surprised by the casual if not cavalier attitude of some junior doctors to prescribing. Ordering medications seemed to require little contemplation and the consequences of this were clear. I found that a large part of my working day (like that of other hospital pharmacists), involved clarifying, correcting, adjusting or modifying prescribing decisions, commonly to optimise therapy, but more often than not to avoid medication incidents. This it seemed was a pharmacist's job, which I grew to accept, but why were junior doctors so off-hand with prescribing?

The association of risk with medication use was firmly instilled in me during my first year working as a hospital pharmacist, yet this did not seem to be the case for medical trainees. Of course, most hospital pharmacists are intimately if not exclusively involved in medicines management and this no doubt heightens awareness of medication safety. Yet, an appreciation of risk with medicine use was clearly also essential for prescribers. Like my pharmacist colleagues, in carrying out my work, I provided feedback to junior doctors on medication orders that I felt were unsafe or suboptimal. I was also aware during participation on medical ward rounds that the fundamental components of prescribing decisions – such as the dose, frequency, duration, patient acceptability, and so on – were seldom discussed in any detail within medical teams.

Some years later, whilst I was assisting in the development of a problem-based educational tool on prescribing for medical students, a hospital pharmacist commented on the idealistic nature of the tool as a training device as she felt that it did not reflect everyday prescribing practices in teaching hospitals. She felt that the value of such a tool would diminish as soon as an intern observed first-hand how prescribing was actually done by her or his influential senior colleagues. This comment resonated with my

experiences and reflections. What impact does workplace culture have on the prescribing behaviour of new doctors? What factors in teaching hospitals reinforce and/or hinder good prescribing practices?

The supervisors and co-researchers (JB and BB) for this study are academic pharmacists who have worked in hospitals during their careers. The implications of potential professional bias on data interpretation are discussed later.

3. CHAPTER THREE: RESULTS

A total of 43 health professionals participated in the study. At the time of the interview, twenty-five participants were working at St Vincent's Hospital and eighteen at Royal North Shore Hospital.^{xviii} The average duration of an interview was 45 minutes. The longest interviews were with consultants (average of 52 minutes) and the shortest interviews were with junior doctors (average of 40 minutes).

3.1. CHARACTERISTICS OF RESPONDENTS

The sample consisted of eight consultants, eight registrars, seven junior doctors (PGY1-2) and two senior resident medical officers (PGY3), seven registered nurses, and 11 pharmacists. For the purpose of analysing group characteristics, the two resident doctors were categorised as junior doctors. The characteristics of the participants were compiled using responses to the questionnaires, with some data clarified at interviews.

3.1.1. Age and experience

The entire careers of nearly all participants had been spent working within hospitals with two major exceptions, a registrar (who had spent most of his career in general practice) and a pharmacist (who had worked predominately in the community). Nevertheless, for each health professional category overall, the number of years since graduation was a reasonable indicator of the length of experience working in this environment. As might be expected, the consultants were the oldest and most experienced group with half having graduated more than 20 years ago (Figures 4 and 5).

^{xviii} In the case of Visiting Medical Officers and the academic physician, meaning that they had admitting rights at the hospital.

There were four staff specialists, three of whom had academic affiliations, and three visiting medical officers, one of whom had an academic affiliation. The remaining consultant was an academic physician. There was a wide range of experience among the registrars; half were advanced trainees (ie accepted into specialist training programs). The junior doctors were the youngest and least experienced group; six were interns (PGY1) and had completed three to four rotations at the time of interview. Of the remaining junior doctors, one was in the second year of postgraduate training (PGY2) and two were in their third year (PGY3). Of the seven nurses, two were clinical nurse consultants and one was a clinical nurse educator. There was a broad range in the age and experience of the pharmacists; four were specialist clinical pharmacists.

Figure 4. Age bracket of respondents (n=43)

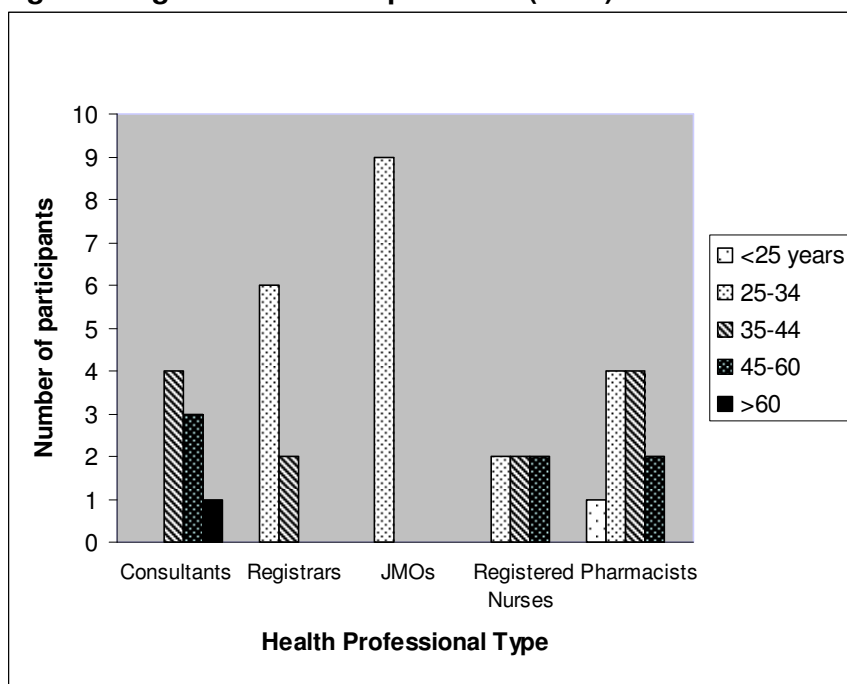
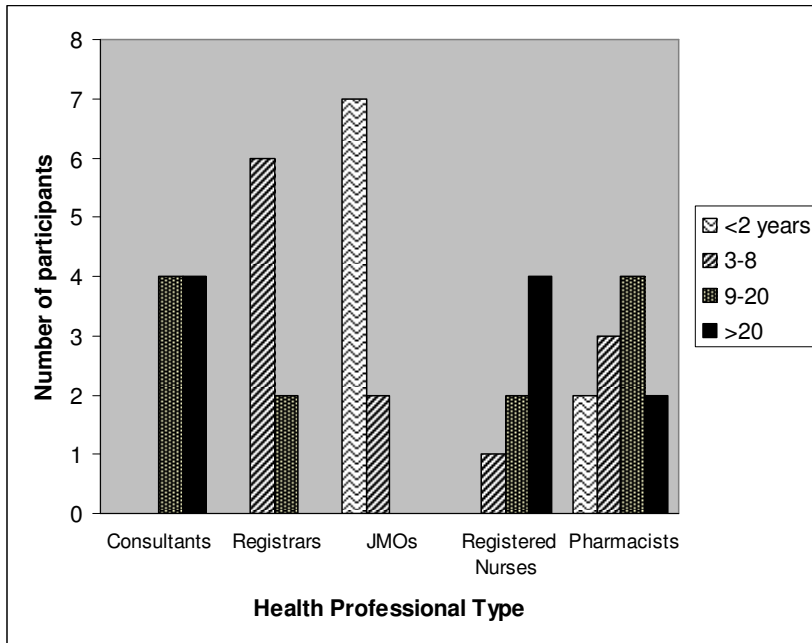


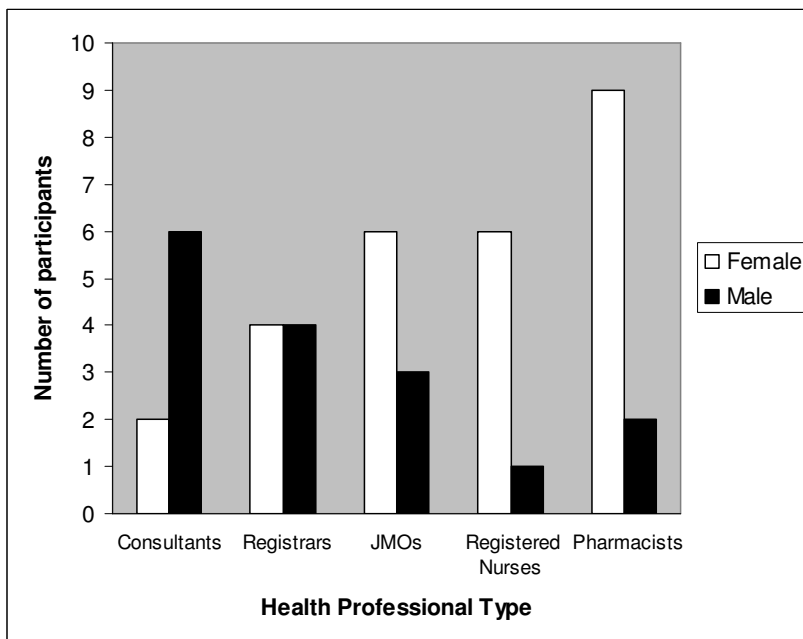
Figure 5. Number of years since graduating (n=43)



3.1.2. Gender

The gender ratio differed among the health professional categories as shown in Figure 6.

Figure 6. Gender of respondents (n=43)



3.1.3. Experience in medicine use activities

The consultant and pharmacist cohorts had more experience in medicine-related activities outside of their practitioner roles than the other groups. This may be associated with a greater awareness of issues concerning medicine use. It was noted that more than half of the consultants had been on advisory committees set up by pharmaceutical companies (Table 1).

3.1.4. Experience in training junior doctors

In the last 12 months, most of the consultants had provided training in therapeutics or other medicine-related topics to both undergraduates and junior doctors, on a formal or informal basis. Most registrars had provided training to junior doctors in medicine-related topics, whilst fewer indicated involvement in the same for medical students. A smaller proportion of pharmacists and nurses had provided therapeutics or prescribing training to students and junior doctors within the preceding year (Table 1).

Table 1. Experience in medicine use activities and education (n=43)

	Consultants (n=8)	Registrars (n=8)	Junior Doctors (n=9)	Nurses (n=7)	Pharmacists (n=11)
Any experience on drug-advisory committees (excluding pharmaceutical industry)					
Yes	7	2	0	2	4
Any experience on drug advisory committees set up by pharmaceutical industry					
Yes	5	0	0	0	0
Any experience in conducting drug-related research					
Yes	8	3	4	2	3
Any experience in developing drug-related protocols/ policies					
Yes	7	3	2	3	10
Recent experience* in providing drug-related (eg,therapeutics) training (formal or informal) to:					
Medical students Yes	7	4	0	2	3
Junior doctors Yes	7	7	0	1	4

shaded boxes ≥ 50% of participants in that health professional category; * in the last 12 months

3.1.5. Therapeutic areas

The participants had a range of therapeutics training and experience. The specialist training area of consultants, advanced trainee registrars, specialist nurses and pharmacists; and the rotation or ward description of other doctors, pharmacists and nurses are represented in Table 2.

Table 2. Specialisations or current therapeutic area of rotation

	Consultants (n=8)*	Registrars (n=8)	Junior Doctors (n=9)	Nurses (n=7)	Pharmacists (n=11)
Cardiology	1		2		1
Cardiothoracic surgery					1
Colorectal surgery			2		
Endocrinology	1	1			
Haematology		1		1	2
HIV medicine					1
Intensive care and burns					1
Geriatrics	1	1	1	1	
Neurology	1			2	1
Obstetrics		1			
Oncology	3		2	1	
Orthopaedics			1		1
Pain management	1	1		1	
Palliative care	1				
Psychiatry				1	
Renal		2	1		1
Respiratory		1			1
Rheumatology and pain	1				
None					1

* One consultant was a specialist in both rheumatology and pain management, and another was a specialist in both neurology and oncology

3.1.6. University education of junior doctors

Six of the junior doctors were graduates of the University of Sydney, two from the University of NSW, and one was an overseas graduate.

3.1.7. Medical teams

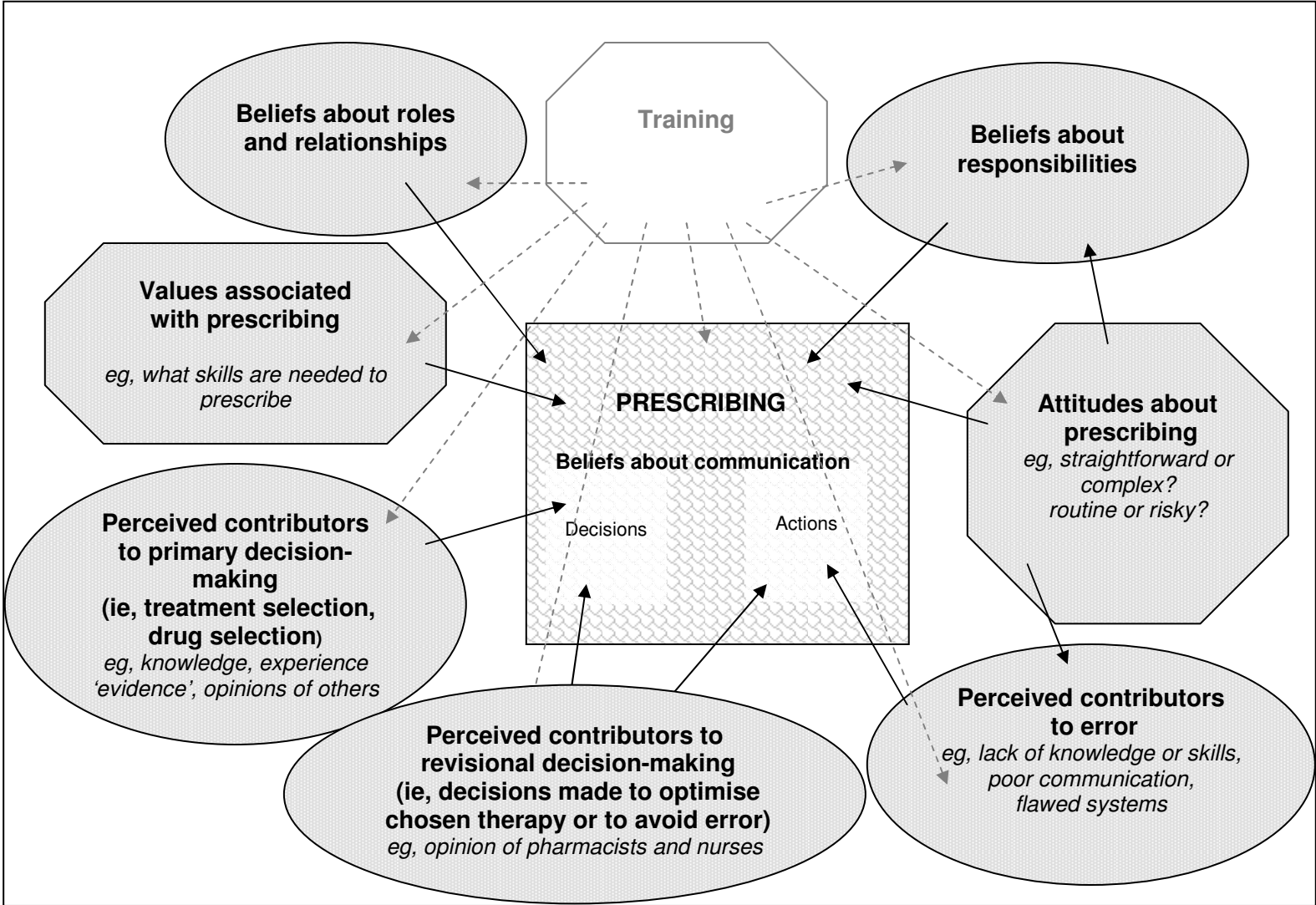
Most consultants that were interviewed had a medical team assigned to them consisting of at least one advanced trainee registrar and a junior medical officer (JMO). However, two did not have an advanced trainee [Consultants 5 and 8] and their registrar was regarded by as having

similar expertise to other junior medical staff. Another consultant did not currently have a JMO attached to his team [Consultant 3]. Because sampling took place at two sites over several months, to the best of our knowledge, none of the doctors interviewed were from the same medical team (e.g, none of the registrars were working with any of the consultants or any of the junior doctors), and no attempt was made during sampling to find direct working relationships between nursing, pharmacy, and medical staff. Therefore, comments made by each respondent about their working relationships may be interpreted as unrelated to any other individual involved in this study.

3.2. SITUATING RESPONDENTS' ACCOUNTS

Since interviews are a form of generated data and are used to construct a picture of how the social world surrounding a process is perceived, a map of the social and cultural factors under exploration was developed to help clarify the connections between these factors and the prescribing process (Figure 7). The map was based upon the major descriptive themes derived from the analysis. Because these themes have minimal abstraction from respondents' meanings, their labels are closely tied to the broad lines of enquiry pursued in the interviews. Essentially, the map provides context and navigation for the main findings of the study, which are then described in detail.

Figure 7. Map of social and cultural drivers influencing prescribing at the teaching hospitals



3.3. ROLES AND RELATIONSHIPS

3.3.1. CONSULTANT

3.3.1.1. Policy maker and reviewer of prescribing decisions

The consultant cohort believed that their core role in prescribing at the teaching hospitals was a 'reviewer' or appraiser of the prescribing practices of registrars and less directly, of that of JMOs. Working within a consultant's predetermined approach or policy for patient management decisions, the registrar was viewed as making the pivotal day-to-day decisions affecting patient management. A consultant's role in prescribing involved review or modification of the registrar's decisions using the clinical information provided to them or their own assessment of the patient:

Depending on what is being treated, a policy decision - we will treat this patient's stroke in a certain way - there would be a policy for management, that's been laid down by the consultant. Often the registrar knows the consultant's patterns well enough for that illness, that the registrar will... initiate treatment that we can adjust later. [Consultant 7]

Examples of prescribing policies preset by consultants varied widely from informal personal drug preferences to formal written protocols, sometimes comprising part of broader clinical management guidelines:

...well I tend to prescribe according to what I think is the consultant's drug of choice.... Like someone, like here, for example, for the geriatrics they tend to prescribe ampicillin instead of benzympenicillin and things like that, and certain consultants in geriatrics give ceftriaxone in favour of penicillin ...[JMO 3 PGY1]

...where I'm working at the moment because there's a certain set of medications that people get after they come in. I mean our commonest presentations are quite standard. And they get their ACE inhibitor, beta blocker, statin, aspirin, and that's about it. And that's almost like a guideline, but it's not actually written down as such... I guess the

bosses initiated it with their evidence-based pharmacology reading. There's been a lot of studies around on the drugs that we prescribe, but they [consultants] don't control it day-to-day necessarily, unless they're known to have a specific preference for one drug or the other. [JMO 6 PGY2]

In haematology, a lot of it's protocolised, so most of the chemotherapy, the bosses, or consultants will say what they want and we follow that protocol for what they want - that treatment for whatever particular disease they've come in with.[Registrar 1]

The consultant cohort used words such as “review”, “appraise”, “modify”, “adjust” to describe the way in which they responded to the prescribing practice of registrars. Notably, none described their actions as supervisory or managerial, although clearly, some form of organisational hierarchy exists. One possible explanation is the connotation of ‘dependence’ with ‘supervision’, as in “supervised training”, which is a term used to describe training received in internship before medical trainees are legally registered to practice. Clearly, registrars’ prescribing practices were not perceived to depend upon the decisions of consultants, and this degree of control was not generally desired by the consultants. Nevertheless, the registrars interviewed were in no doubt as to their relationship with their senior colleagues and many saw the relationship in managerial terms:

That's the thing, I will make it and then discuss it with my boss, and then my boss will think about that...and then we'll just change it. [Registrar 3 advanced trainee]

Accounts from both consultants and registrars revealed substantial variation in how closely consultants working at the teaching hospitals reviewed prescribing decisions and also the extent of their delegation of decision-making responsibilities. A number of consultants stated that they altered their approach depending on the calibre of the registrar (or JMO) and their relationship with them, a theme corroborated by registrars’ accounts, with advanced trainees indicating a much higher level of prescribing autonomy than that expressed by basic trainees:

In most of the teaching hospitals, very little [on the role of consultants in prescribing], we're responsible for the day to day management of the vast majority of care. We get general guidelines and we may be responsible for initiating immediate therapy as a team member or given overtime as the senior doctor on the wards and probably 75% of that or three quarters of that would be under our own initiative based on our experience and we may, you know, we may then discuss any other problems with the relevant consultant. [Registrar 2 advanced trainee]

Something really basic, pain relief, bowel care, those sorts of things I'll do. At first with blood pressure I was asking the bosses but I guess now I'm more confident with starting that medication myself...If there's certainly a new diagnosis that has come up in hospital, that's brand new, I normally don't start prescribing until I've checked with the boss. But if it's something that's ongoing, I will change the doses, chronic conditions I'm happier, on the whole. If it's the exact reason why they came in or an acute thing, then I won't. [Registrar 5]

Alternatively, the type of control on decision-making was sometimes related more to the personal preference or style of the consultant, their area of expertise, or even to their attendance at the bedside:

I think I do [make most prescribing decisions], but I think because I probably have a particular interest in it, because I'm not an interventionist. Whereas if you're do a lot of interventions, let's say you're a surgeon for example, or even in cardiology, then therapeutics is of less importance...they delegate more responsibility to the resident staff. [Consultant 4]

Sometimes-it's probably 50/50, but you would tend to, you would kind of understand whether your boss would be happy with you prescribing or whether you would know that particular boss would like to do - make the complete decision about what you're prescribing. [Registrar 7 advanced trainee]

I think in renal, the consultants have a high level of direct patient input, they make a lot of the decisions, perhaps more than in some other fields. [JMO 7 PGY1]

...in different situations the influence of the boss changes because it depends on how much they're around. From [being] there every day to never there....Well you would still be communicating across the phone to the consultant what you're doing, maybe in general rather than specific. He won't actually have his own validation of what I am saying is correct or what I am doing is necessarily working in a way, it's just what my word is saying over the phone because he won't actually necessarily see the patient before the patient goes home... [Registrar 2 advanced trainee]

Some consultants implied that they had a greater direct input into day to day decisions about global treatment (whether to treat or not) than drug selection:

Like last week I had someone who had a disseminated rash and I suppose that raises your awareness at the time, but also trying to look at the bigger picture of, well, is it actually appropriate to treat [them] for an infection?... So I suppose that's looking at the indication on a... not just on the immediate 'what's the goal here for the short-term', but also perhaps try and look at longer-term goals as well. [Consultant 2]

...those are sort of more global dimension things that I have to think about more, but if I decide I need to treat something with medication then the decision to choose the medication is the easy part. It's whether to treat or not to treat is the harder thing to overcome, or think about. [Consultant 1]

Overall, however, the typical pattern described by both consultants and registrars was that registrars made the majority of prescribing decisions affecting the day-to-day care of patients admitted to the hospital; these decisions were discussed with consultants, whose role it was to appraise them, but who usually intervened minimally:

Probably the registrar, yes, because I guess they do most of the prescribing and I just 'okay' what they do in the majority of times. [Consultant 1]

Yeah, I talk to my consultant. So if I see someone - nine times out of ten- then I'll start them on a therapy and then I'll talk to my consultant and then say 'I've seen this patient, and this is what I've done - and this is my plan.' And usually they say, 'That's fine'. Occasionally they might say, 'Well no, I want this medication instead,' for whatever reason. But usually I'll start them and my consultant will say yes or no - and yeah it goes like that. [Registrar 4 advanced trainee]

Processes. The 'reviewer' role of a consultant was acted out in two ways: via phone conversations with registrars about acute patient management needs; and more systematically, via regular ward rounds or patient management meetings. Based on consultants' perceptions, common elements of both interactions were a collaborative approach to decision-making, and a questioning style of discussion directed by the consultant. In the case of discussions with registrars, this typically involved questions about alternative diagnoses, appropriateness of alternative management options, and the indications or goals for prescribing in that particular patient. In the case of discussions involving a JMO, some consultants also spoke of questioning on drug dosage and administration:

That for me is always I think one of the major roles that the consultant plays in asking questions that might identify whether there has been some error or omission in diagnosis. That's one element. [Consultant 3]

Usually with the junior medical officer's I'd say, well, 'What dose do you think they should be going on?' You know, if they are going on gentamicin, I'd say, well, 'What dose are you going to put them on?', 'How frequently are you going to give it?' And then if we agree then that's fine and if we disagree then we just sort of suggest something else. [Consultant 5]

Based on accounts from the other doctor cohorts, the degree to which consultants clarified the specifics of a prescribing decision for the benefit of the prescription writer was sometimes related to their perceived competence of the recipient or to the complexity of the clinical situation:

But the boss and prescribing, if he or she wants something, it depends on the boss and the situation. Sometimes, they'll say just a class and sometimes they say exactly what they want...If it's complicated, definitely, they'll discuss a dosage plan. Less complicated, it's more up to us. [Registrar 5]

I think the consultants, particularly in surgery, do their quick rounds and don't have time to sit and explain doses. They usually speak to the registrar, there's a chain of command. The consultants usually speak to registrars, and expect the registrars to know what to prescribe. [JMO 8 PGY1]

Settings. Ward rounds were described by consultants as the period during which most decisions affecting the primary management of their patients were made. Ward rounds principally were recounted as involving the consultant leading his or her medical team on a methodical review of their patients. During this time, as part of their joint patient assessment, medication charts would be reviewed, and if deemed necessary, prescribing decisions would be made, principally between the consultant and the registrar, and as will be discussed, sometimes involving the patient. However, registrar-led rounds were also commonly described, and a few consultants described sometimes reviewing their patients alone, which gave them the opportunity to personally review and check on all aspects of patient management:

You do see the patients sometimes when the registrar's not there, just to make sure because you're taking responsibility, just to make sure everything's going well. Sometimes you do it very quickly because the registrar's just going smoothly, and other times the more difficult the patient is, you have to take the story and look into it. [Consultant 7]

Nurses and pharmacists also attended rounds in some clinical areas; most examples given involved specialist nurse and pharmacists (eg, clinical nurse consultants or specialist clinical pharmacists), who described active participation. But other data from a range of respondents revealed that their participation in ward rounds was not customary throughout the hospitals and was not seen by doctors as integral to prescribing decisions made at these times. This may have related in part to the commonly reported difficulty of attending rounds, largely due to competing work priorities. A recurrent theme from some consultants and registrars was that in the past, pharmacists played a very valuable role in aiding prescribing decisions at the time of treatment initiation, but this situation had changed. Both nurses and pharmacists appeared to have a greater current profile with respect to prescribing decisions at other forums, such as regular multidisciplinary meetings and certainly a more active role in addressing prescribing issues, informally, as will be discussed under their respective roles.

In summary, the salient depiction of ward rounds was that they were lead by doctors for the purpose of assessing their patients and determining among themselves what management decisions were required, such as decisions about pharmacological interventions. (Figure 8)

The ward round also afforded consultants the opportunity to personally review their patients' medication charts. During this review, they would check on what had been prescribed by the registrar or JMO and also whether the drugs had been given as intended. This formal review of charts was commonly cited by consultants as the way in which they exercised their professional responsibility for medication safety:

It becomes such a routine that you look at the prescribing chart with the same care as you do the temperature chart. And you can see drugs that are missed. Also you can see where there's an inappropriate mix of drugs. [Consultant 7]

...I see my responsibility as really reviewing their [JMO written] charts and making sure that the medications that we've discussed have actually been prescribed as we've talked about...[Consultant 5]

Figure 8. Attendees during ward rounds

Yes, senior registrar, junior registrar, resident, two senior medical students, and odd others, and so that team always does rounds together, and it follows a sort of chain of command.

[Consultant 7]

I have ward rounds and also multi-disciplinary meetings, which I attend, where patients will be discussed with nursing or with other allied health and then based on their reports I may modify the medications according to what they've reported to me. For example, if the nursing staff tell me that a patient can't swallow any more, then I would direct the registrar that the patient's routes of administration be changed to the subcutaneous route. [Consultant 1]

The number of ward rounds that go on in the HIV unit are just quite large, in fact there'll be a daily ward round with the registrar and the resident. And often I'd get paged to say, 'Are you coming?' to see, to make sure. [Pharmacist 11 specialist clinical pharmacist]

I try and sneak in the ward rounds where I can do at least in terms of hearing what's going on if I'm about at the time. It's difficult to actually tie in a ward round with your schedule because the times vary greatly. [Pharmacist 2]

We do, there's a formal ward round, well it's more like a haematology meeting on a Thursday morning and the nurses, it's only the last few months really we've been invited to go, attend that and we do try, but it is difficult. [Registered Nurse 2]

I like prescribing in a multidisciplinary setting so with a pharmacist there for oncology prescribing, which doesn't happen here. With the pharmacist and the nurses there. That happens in a lot of oncology units, a chemo write-up. [Consultant 8]

However, close scrutiny of the medication chart was not systematically undertaken by all consultants for all patients who were admitted to the hospitals:

You rely on trust a bit. I might say, I suggest Oxycontin 10 mg twice a day for this patient, or maybe 8th hourly and tell the pharmacist not to worry about that. And then I don't go back and necessarily check that that's been done because of time practicalities. Yes, it's not, that's why I think you really need to have close scrutiny by the pharmacists for hospital prescribing. That's the real safety net, that and an effective computer based organisation. [Consultant 6]

I don't think consultants check the medication charts, or don't thoroughly check the medication charts of their patients. I'd say they probably look at them, but I don't think they go through and check the dosing or anything. I'd say it's between the registrar and the intern because they should be looking at it each day. [JMO 8 PGY 1]

Patient involvement. Consultants' perceptions about ward round discussions commonly emphasised the patient's involvement in decision-making. Patient ownership of decisions was seen as a vital step in ensuring patient adherence to treatment and maximising the probability of an effective outcome. This theme was consistent over a range of specialties:

Well, this it's usually a three-way conversation between patient, myself and the junior hospital staff, the resident or registrar (or fellow)... if you just impose drug therapy on patients, you open the way to all kinds of problems. Lack of understanding, resentment, greater increase in liability of non- adherence, so it's got to be a joint decision. [Consultant 6]

I think there's risks and benefits and I often discuss that with the patients or their proxy- decision makers and let them as much as anything make a decision, but without being, you know, wishy-washy and not giving them some advice, because people need advice as to what would be the best course of action.[Consultant 2]

I think they're equal partners. So particularly with chemotherapy, you can have patients who say, "I'm not having anything, even to save my life, if I have to lose my hair". You

have other people who, you know, want treatment when you don't think it's appropriate. You have to - especially with cancer because it's often a terminal disease with so much at stake - so the patient's bear a huge part of that, a huge part. [Consultant 8]

According to respondents who worked in the fields of oncology and palliative care, patient involvement in making global decisions about cancer treatment or palliative treatment was well established, and this was not specifically disputed by any other respondents interviewed. However, perceptions of patient involvement in prescribing decisions in the teaching hospitals, more generally, did differ from the active participation desired by the sample physicians. In talking about how prescribing decisions for inpatients were made, with reasonable consistency (although there were a few exceptions), the other respondent groups described the discussions as being purely between staff members with no specific reference to the patient. This inference was further substantiated by a registrar's admission:

I must admit, we're not always the greatest at telling the patient, [the] information, we probably should. On the ward round with the boss, they're always so quick, that for a start, I may be back in touch with the patient later, but never with the boss. It's just too quick. I shouldn't say never, but rarely with the boss. He's in too much of a hurry.... I think that's something we don't do very well, we tend to medicate in hospital. [Registrar 5]

One of the exceptions articulated by a junior doctor was prescribing decisions about warfarin, where patient acceptance was more keenly recognised:

I'm just trying to think of different sorts of things that they might be involved with and obviously things like anticoagulation require a big input from the patient, not [inaudible] on the ward, that's a huge decision, you need to do that very much in consultation with the patient. [JMO 7 PGY1]

There were also perceptions among nurses that patients were not routinely advised of newly initiated treatments:

[On patient involvement] Very little, I would say. Usually, the patient gets told by the doctor that they are going to put them on a new drug, but not even always. So they'll just start something on the medication chart and then... Then you say, the first time you're with the patient, "This is the dadadada, did the doctor tell you about it?" Probably, fifty percent of the time, it's "No, no, no". Now whether that's because they've forgotten or what, but often it's not something that the patient gets told. [Registered Nurse 7]

Recognition for the importance of patient *education* about prescribed medicines was more marked in these groups, with a number of registrars and JMOs indicating their awareness of patient adherence problems. Nevertheless, the overall inference from the complete interview sample was that whilst the importance of patient ownership for decisions was espoused by the consultant cohort, this prominence was not realised by other medical respondents.

An educative approach was also a common element of consultants' recalled conversations about therapeutic management, directed at both the other members of the medical team and sometimes also to the patient.

3.3.1.2. Educator of patients and doctors

Patient education. Patient education was illuminated as an essential part of prescribing by the consultants interviewed. The two major educational topics included: the scientific evidence supporting various treatment options, which was explained to patients to assist them in making prescribing decisions; and information about administration or side effects of specific drugs for the purpose of maximising patient acceptance and ongoing adherence to treatment:

For example, the adjuvant treatment for Dukes C, I go right through it... Twenty years ago we did studies to see whether any treatment after surgery would prevent the cancer from coming back and we took two groups of equal people, one we gave treatment to, and one we didn't. And the people we gave the treatment to, less cancers came back.

*But some people had no treatment and they didn't get the cancer back and some people had treatment and the cancer still came backl...So I go through that whole thing.
[Consultant 8]*

[In describing his role in prescribing] and also to check that people are taking things the way they should be. The sort of medications we use, for example the bisphosphonates group of drugs require taking in very, very specific ways and we still find sometimes, after years of when you've been talking to people that they've been taking it in some way which is very wrong, either because they've misunderstood something or someone else has told them something incorrect.[Consultant 4]

Because they rated patient education highly, some consultants were keen to show their recognition of the role that pharmacists played in this area, particularly in regard to medication lists provided to patients on discharge, which is discussed in further detail under the role of the pharmacist (3.3.4.6).

Prescriber education. Consultants saw themselves as mentors for registrars and their contribution to their training was provided implicitly through discussions about prescribing decisions. Registrars perceived consultants to have a very strong influence on their prescribing practices for inpatients at the hospital, and although not fully explored in this study, consultants' practices were also cited as influential to registrar training in prescribing (ie, development of registrars' personal prescribing behaviours). This was because consultants' experiences were considered to provide a form of experiential legitimacy.

*I mean they [consultants] may use a particular evidence base, but then if 3 or 4 out of 5 of them have had a terrible time with a particular medication, then you might steer well clear of it or you'd be thinking twice about using it, despite what the evidence says.
[Registrar 7 advanced trainee]*

... it's not necessarily about getting the right therapy, it's getting the acceptance, it's getting the accepted therapy... Now I have learnt about CAL^{xix} and I have studied an exam, I have read the articles on CAL, but it is also fitting it to a local protocol in a sense, so... I don't have to go back and change the thing because he wants... it for five days instead of four or doesn't want it at all [Registrar 2 advanced trainee]

Consultants also uniformly felt a sense of responsibility toward the education of junior doctors in therapeutics and prescribing. However, some lacked the opportunity to do this in anything other than an opportunistic fashion as they did not interact with JMOs on a regular basis. For the remainder, the educative aspects of their role were articulated as either giving formal tutorials or lectures to JMOs (or medical students) – two consultants in the group; or more commonly through informal discussion during ward rounds. The main topics cited as the focus for education were the evidence for various therapeutic choices, and aspects of drug knowledge. These were integrated into their review of the patient's management and so took the form of further questions posed by the consultant to the junior medical staff:

It's very much Socratic^{xx} rather than didactic- this is the way I do it and therefore don't question it. What is the evidence that this works? A lot of it is questioning... what dose of dexamethasone should be used...? What is the half-life? - to the junior. He did pharmacology only six months ago whereas I did it 30 years ago. What's the half-line of dexamethasone? How many times a day do you have to prescribe it? [Consultant 7]

I think I always...we do discuss all the drugs and we always discuss why we are using those drugs and what the trials showed that affected or which was the basis for prescribing it. We try and discuss it, in terms of evidence-based medicine. [Consultant 4]

^{xix} Chronic Airways Limitation

^{xx} "The essential nature of Socrates' art lay in the fact that he did not appear to want to instruct people... So instead of lecturing, like a traditional school master, he *discussed*." Jostein Gaarder. *Sophie's World*; London: Phoenix House;1995.

Junior doctors predominately cited registrars as their leading trainers in prescribing; but consultants were viewed by one as particularly influential in teaching them *what* to prescribe rather than how to prescribe:

*...but I suppose it would be the various specialists in terms of 'what' to prescribe
[JMO 4 PGY1]*

Somewhat ironically, based on reflections of their own prescribing practices, a consistent theme from the consultant sample was a need for medical training focused purely on prescribing principles, specifically, “what is good prescribing” and “how to prescribe”, which some felt was gathered all too opportunistically over a long period of time:

So I think just a knowledge of what is good prescribing and what is not, at JMO level, does help. [Consultant 7]

I'd be inclined to reorientate undergraduate training to much more towards to what doctors actually do and that includes a lot of evaluation of therapeutic initiatives and regimens and pharmacological information... There's a whole lot of stuff that they learn that is far less important than that. [Consultant 6]

*I mean I think it probably needs to be formalised. I just don't think you can expect people to just passively pick it up. You know, I 'm surprised at how much I still continue to learn about prescribing, having written scripts for probably nearly 20 years now, just because I didn't really know that that existed or that you could do that or how you found out that information about a drug, the practicalities are pretty important but no-one tells you.
[Consultant 5]*

3.3.1.3. Distance supervisor of junior doctors

Some consultants spoke of their role in supervising the prescribing practices of junior doctors often in regard to specific issues or relating to the orientation stage of the JMOs' learning cycle.

Registrars, however, were acknowledged to be primarily responsible for directing the daily work practices of junior staff. The key discussion point of the consultants' supervision of JMOs' prescribing was the accuracy of their medication history taken from patients on admission. Consultants outlined general difficulties associated with this task, including problems with relying on GP records and a perceived lack of diligence of junior doctors, which necessitated their close scrutiny of JMO practices (Figure 9).

Figure 9. Consultants' supervision of junior doctors

I would, as part of my assessment of that JMO, maybe take charge of the management, even to the point of saying, 'This is what I want.' And maybe after a week or two when I have an understanding of the level of that JMO's ability, then I will be giving that JMO more leeway to explain to me what he or she wants to do. [Consultant 1]

Typically I would ask them [the JMO] what the patient has come in on, what medication they have come in, whether they've brought their medications with them. So whether the patient has actually brought along a plastic bag full of the pills that they reckon they are currently taking or whether they've got a written record of what they are taking. And then we just basically go through the medications that the patients thinks they're taking, over the phone and decide whether those ones are really what they should be taking, yea or nea. [Consultant 5]

They will, you know, when the patients are admitted, they will copy an out-of-date medication lists, rather than actually going through with the patient themselves as to what they are on at the time. [Consultant 1]

3.3.1.4. Expert decision-maker and/or prescription writer

Whilst the usual situation described by the consultants was that they modified prescribing decisions initiated by registrars, for highly specialised areas and/or prescription of medications with small margins for serious errors, prescribing decisions were considered the sole domain of

the expert consultants. This informal system of prescribing according to level of expertise was widely accepted by all respondents:

One of my roles as a neurologist is that people are referred specifically for a prescribing algorithm so patients with chronic pain or epilepsy or particularly areas like multiple sclerosis and brain tumours, the range of prescribing is somewhat limited and somewhat sophisticated, so part of my role is to actually outline a treatment program, prescribe into that, hopefully the GP will or whoever it is who is involved in the team of management will keep the prescribing going. [Consultant 7]

...but I think if it came to a specialist and their entity, where with a particular specialty, things like the management for Cushings syndrome or things like that, then I would certainly not just start the medication without, it would come from the consultant.[Registrar 7 advanced trainee]

Absolutely, the most difficult ones, just talking about my current term, those antiarrhythmic medications, they tend to be more risky and the consultant usually makes those decisions. [JMO 2 PGY3]

In the case of chemotherapy, the oncologists interviewed stated that prescribing decisions were initiated by themselves based upon the mutual agreement with the patient (a collaboration, which was strongly emphasised in this particular context). Some also voiced a preference for writing their own prescriptions. Interestingly, although in other fields, cases of challenging prescribing were cited as being educational for junior medical staff, this was not the case with chemotherapy, where observational learning was considered potentially dangerous for those without a specialised knowledge base.

It would be unusual for an experienced senior registrar to not pre-empt the consultant to some degree in starting appropriate treatment. But, if for instance the decision is which chemotherapy we give for a malignant disorder, then I think the consultant lays down the

*policy, the registrar writes up the doses and the more junior residents carry it out.
[Consultant 7]*

*I think that the principle should be that the oncologist writes up the chemotherapy.
Because I don't believe the junior residents or even the registrar staff know enough about
particular chemotherapy - and neither should they - I mean really it's a very specialised
field and it's changing rapidly, but they should understand the principles of it.
[Consultant 8]*

*I think there's been instances where it's been, where dangerous things have been
charted and not understood by the residents, so it's a reason for us not having to do it.
There's a sense of understanding, you don't have much involvement at all. So your
understandings not built up at all, so there is a downside. [JMO 5 PGY 3]*

3.3.1.5. External roles

Unlike the other groups of health professionals interviewed, the main focus of each consultant's clinical practice was not necessarily inpatient care at the teaching hospital. On the contrary, due to the nature of the medical conditions that they managed, their employment relationships at the hospital and other factors, many (but not all) viewed the care of patients admitted to the teaching hospital as a small portion of their work. Some also intimated a closer relationship and greater understanding of medicines management systems of other hospitals where they worked. It was therefore not unexpected that a sense of distance was often conveyed about the specifics of the day-to-day activities at the teaching hospital and also on occasion, a remote relationship with their resident staff:

*Largely, my role is to be responsible for most of the prescribing that occurs with my
patients, with the patients predominantly seen in an outpatient setting, where I am really
the only person seeing them. It is the minority of patients that I see are actually seen by,
or that I am responsible for, are seen by someone else, like a junior medical officer and
their drugs are written up by them. [Consultant 5]*

Oh, the hospital resident or registrar often does [make major prescribing decisions] and that's an essential part of it because they're the ones who may well know the patients a good deal better, and know their general medical status than I do as visiting physician. [Consultant 6]

I mean I don't think the pharmacy - the pharmacists in a public hospital, I'm not aware of the role they play. I mean they occasionally provide a list of drugs for the patients although I think they're sometimes too busy for that, you know, for complicated cases or patients. So I think...sometimes they do do that. I think that's sort of arranged through the resident staff rather than myself. [Consultant 4]

There were indications that this self-perceived remoteness of some consultants from day-to-day patient care at the teaching hospital was also felt by other staff members at the hospital and affected the way in which they queried prescribing decisions. Some pharmacists associated a lack of approachability of some consultants to their accessibility. The pharmacists felt that they were less likely to develop a rapport with VMOs or with consultants who they did not see during their working hours, and therefore less likely to directly discuss prescribing issues with them compared with staff specialists based at the hospital; a theme that was reiterated by some junior doctors:

Yes there's a bit of variety. Some in particular are very approachable, the ones that are sort of around a lot more, and that's probably more the staff specialists as opposed to the VMOs. And some that are shared with other hospitals and so they're just less obtainable, but I know the registrars contact them very easily and quickly.[Pharmacist 1 specialist clinical pharmacist]

Oh yes, I'm fortunate in the area that I'm working in, in that, I've worked there for quite a while, and so I have quite a good relationship with the consultants. And they're very approachable and they do work very much as a team, more so than a lot of other teams within the hospital, whereas certain other teams you, they're either not around for a lot of

the time, just uncontactable or they're very aloof or not really seeing pharmacy as really a part of that, that sort of team, that's just the patient's medications.[Pharmacist 7 specialist clinical pharmacist]

[On contacting consultants about prescribing concerns] Although that's very consultant-dependent, how much direct contact you have with them... Some consultants you don't always feel like, as the intern, you are in a position to be discussing things with... [JMO 7 PGY 1]

3.3.2. REGISTRAR

3.3.2.1. Operational decision-maker

Registrars were perceived to be the managers of inpatient medical care and were therefore seen to be charged with the responsibility for making the acute and key prescribing decisions for the management of the problem that brought the patient to hospital and for any problems arising during admission which could prolong the patient's stay. This role appeared particularly important at the time of admission, as registrars generally initiated the preliminary course of patient management, which they would, in most cases, subsequently discuss with the admitting consultant. The main exception was for difficult or unusual cases, or as alluded to previously, instances where the registrar lacked experience and therefore confidence in prescribing within a highly specialised field. In these cases, registrars contacted the specialist physicians to discuss management options and then implemented the decision:

But, you know, let's face it. They're the ones that are there at the bedside at the beginning and they're the ones that are prescribing. In general when people come in, and most of our patients come through emergency, they're probably going to prescribe most of the things that they're already on and then it's actually the process of de-prescribing that I'm involved in when we review the patient [Consultant 2]

In the transplant population – the consultants [make most prescribing decisions]. In the non-transplant population, I think myself as a senior registrar, I play a fairly large role. The consultant then obviously has the over – you know – they can over-rule anything you say. But usually they're agreeable, and there's many ways to skin a cat, there's not just one right drug – so you may not pick something the consultant may have initially chosen, but it's still fine. [Registrar 4 advanced trainee]

A further exception was when registrars were acting in a consultative capacity. In this case, the primary team managing the patient had the choice of whether they would allow the consulting registrar take over the day-to-day management for that aspect of the patient's care or whether they would integrate the treatment advice into their own management plan:

[In relation to the role of registrars in decision-making] It sort of depends. I mean if you're consulting to another medical team they'll likely integrate what you say and make choices based on that. If they're in intensive care they will integrate it and make choices depending on what they think is most important, and if it's a surgical team they're more likely to say, "Well, you know, you're the drug lot. You make those decisions."
[Consultant 4]

This situation sometimes created confusion among medical staff because of divergent views about responsibility for prescribing, which will be addressed in more detail under Responsibilities (Section 3.4).

Some registrars emphasised the importance of their own regular critical review of medication charts as part of their patient assessment, and as will be discussed, was sometimes, but not invariably used as a check on the prescribing practices of JMOs:

I will often do a medication review of the patient because 20% or so of geriatric admissions are due to medication problems, too much, too little, incorrect type, overdoses, side effects. So often as part of my medical review of the patient, if I think

that it hasn't been well explored or there is a lack of insight as to what is wrong with the patient then I will look into that. [Registrar 2 advanced trainee]

3.3.2.2. Primary supervisor and educator of junior doctors

Registrars were uniformly perceived to be the chief supervisors and trainers of junior doctors; and prescribing was seen by them as a component of their broader training of JMOs in patient management skills. The registrar cohort commonly espoused open communication lines with their junior colleagues, who were repeatedly urged to ask if they were uncertain, an approach which was seen as beneficial to both patient safety and the training of JMOs. This willingness of registrars to be accessible to the needs of junior doctors was widely corroborated by accounts from the JMOs. However, some nurses and pharmacists felt that junior doctors did not always feel comfortable or were not given adequate time to question their senior colleagues, which sometimes compromised quality of patient care:

I say, "you're more than free to ask me, before you make a decision". Obviously we can't teach them in one day...if you don't understand, you should ask us why this drug has been used and why this dose, and what are the side effects. [Registrar 3 advanced trainee]

I don't think they actually expect too much of you and they are actually very happy if you just check if you are not sure because that makes you a safer practitioner, in medicine I think the most important thing is to be safe, that's very important.[JMO 2 PGY3]

And I think they get - they come out thinking they're not allowed to ring a senior doctor unless it's life-threatening, and if they get over that then they've got a tool there that's better than a MIMs or a senior nurse or anything... [RN 7]

And sometimes they [the patients] have a lot of intravenous antibiotics going into the veins and at the end of the day they suffer from phlebitis in their vein, they get really hard and knotty. And the young doctors will prescribe it [intravenous antibiotic] on the

medication sheet, without even thinking whether the patient needs to have it all, without asking the consultant, how many weeks are we doing this for? I always feel there is a lack of care towards the patient. [RN 6]

The closeness of their supervision (such as, how explicitly they provided prescribing instructions to the junior doctors), and the degree of educational emphasis they gave, depended on the junior doctor's experience and their assessment of the JMO's competency. The rationale or the evidence supporting a prescribing decision, details of the dose, frequency and duration of a drug treatment were more likely to be specified in detail at the start of a junior doctor's term; but as the junior doctor was perceived to gain knowledge of standard types of drug regimens within a therapeutic field and confidence in prescribing them, then less specific information would be provided. Less specific information might also be provided due to time constraints, but a widespread understanding of both registrars and JMOs was that if dosage instructions were not given, the onus of locating this information was on the junior doctors. So, whilst registrars provided dosage details to new interns and to junior doctors at the start of terms, the presumption was that correct dosing of patients was the responsibility of junior doctors. As one junior doctor commented, "I guess, there's a balance between being condescending and teaching". However, there were indications that the assumption that junior doctors could locate and interpret dosage information was not always sound. For example, circumstances where junior doctors' knowledge was inadequate to cater for exceptions in general dosing rules, such as prescribing morphine in the elderly (Figure 10).

Figure 10. Closeness of registrars' supervision of junior doctors' prescribing practices

...it depends on their level, if they're interns usually it's fairly specific, for example, the name of the drug, the dose, how you give the drug, and for what period of time that will be required. If they're more senior, and I know them and I know that they already have that sort of... knowledge, then I will just say, 'Start them on such and such' and assume that they will know those other details, and if they don't, then they can ask or look it up or whatever. [Registrar 4 advanced trainee]

Initially my registrar didn't expect me to know the Imodium dosing for colorectal surgery patients so he'd usually explain it whereas now he's usually happy to say, "Just start them on Imodium^{xxi}".
[JMO8 PGY 1]

I guess probably that initially it was inadequate and that perhaps supervision should have been greater for things like that, where there is potential for harm. And even things where you're inexperienced with prescribing your S8s, you know you're not quite sure initially how much morphine you start someone on or how much Endone^{xxii} you use and how much is safe for a 99 year old compared to a 55 year old. You don't know those things and while there's reasonable supervision by the registrars, and certainly you would get picked up if it was a very inappropriate dose, it leaves particularly the very elderly quite vulnerable to overdosing, because they get overdosed quite easily.[JMO 6 PGY2]

The registrar should be responsible of making sure the new doctor, the relatively new doctor under supervision, are doing the right thing... [but] they assume that he's been through the schools; he or she should know what they're doing. I work on one day over the weekend, Saturday, and there's no young doctors around, just the registrar, and they go on a round and they usually get me on the round. So that's when I say to them, "OK, do you think this is the right prescription? And they say, "No, I want more than that." And I say, "Did you specify? It's not written anywhere in the notes how much a patient should be getting", especially when they've been in a febrile state for so long. [RN6]

^{xxi} Tradename for loperamide

^{xxii} Tradename for oxycodone

In addition, accounts from various respondents suggested that prescribing difficulties experienced by JMOs may also emanate from a lack of self-awareness of knowledge deficits and a consequent misjudgement of when to seek advice about prescribing decisions. In other words, a problem of “not knowing what they don’t know” or not being able to identify likely exceptions to how knowledge is usually applied and therefore not knowing what questions to ask at the time a verbal medication order is given. Collectively, these factors implied a gap between undergraduate training and workplace responsibilities, which, based on examples of prescribing errors described in the interviews, were not always met by the supervision provided by their registrars, particularly at the start of their internship (Figure 11).

Figure 11. Presumptions about asking

It's presumed that they will ask. It's presumed by your registrar that they will be asked if there's a problem. So if they - if the resident does not perceive that they're having a problem, then it will be done by the resident. [RN 7]

Well, I mean. I'm sure nobody would have thought that I wouldn't know how to prescribe morphine as a doctor. But I'm sure patients are not aware of...patients are not aware of how inexperienced interns are when they first begin...I say to my family, "Don't go near a hospital in January" [JMO 9 PGY1]

Especially dosages I think in the first term, we're just not sure at all. We know sort of from knowledge, like basic knowledge, like pharmacology, but whether, how to apply it, so nothing, like as I say, "Do we use 20mg now or 40mg of frusemide?", things like that.[JMO 3 PGY 1]

I prescribed pethidine at way too high a dose once and the order was seen by two nurses and they saw the number and went , "Do you really mean that? And then I saw the number and thought "No, that isn't what I really meant." [The error was due to] probably a degree of unfamiliarity with pethidine, it's not a drug that I use a whole lot... [JMO 7 PGY1]

Irrespective of the perceived adequacy of registrars' guidance, the relationship between registrars and JMOs was understood unambiguously by all groups as being supervisory. Most of the registrars expressed an awareness of the steep learning curve that interns experienced when they started prescribing and that in addition to issuing directives, junior doctors needed checks on their practices:

The check would come when you see them on a daily basis and I certainly always check the medication chart every day and I guess that would be my check.[Registrar 7 advanced trainee]

I guess from the obstetric point of view we're always keeping a pretty close eye on whether the medications are compatible with pregnancy anyway, so initially the consultants when doing their rounds will have a look at the med charts, and each day one of the registrars will usually have a look at a medication chart with a resident as well. [Registrar 6 advanced trainee]

However, descriptions of interactions between registrars and junior doctors revealed that because the priority for registrars was acute management of their patients, this necessarily took precedence over systematic checks on how accurately junior doctors prescribed. Registrars, therefore, did not always personally review medication charts or conduct a detailed check on whether intended medications had been prescribed and administered. According to one account, to facilitate making timely decisions about patient care, registrars relied on junior doctors to provide them with "filtered" patient information, including information about the patient's medications. The needs of the patient at the time were addressed and according to the respondent, the JMO worked "synergistically" with the registrar; however the implication of this practice was that inexperienced prescribers were likely reviewing their own prescribing practice:

But often on a ward round I will be examining the patient and it will be the RMO^{xxiii}, the intern or resident's responsibility to flip through the observation charts...and then flip through the medication chart and have a look and see what the medications are going and where we are up to and I might say "How many days have we had them on ceftriaxone?", "Are they afebrile now?" "Well they're looking better and the chest is starting to clear, so let's put them onto oral therapy and see how they go". So it's a synergistic role. Often the resident's are just an extra eye to see as to what's going on...The things are all filtered in just the bare minimum of information ...I've just got to accept that, unless, if specifically I have a reason I might look.[Registrar 2 advanced trainee]

In general, the registrar cohort fully accepted that training of JMOs was one of their core responsibilities. However, there was one notable exception; a registrar who had worked for a number of years as a GP, who thought that there was too much hand-holding in the training of JMOs and that they needed to be taught to take responsibility for their own learning. His views of responsibility were possibly influenced by his own experience as an intern being "sent to the bush" in his first term with little registrar support, which forced him to become assertive and resourceful in the way in which he sought information and advice. (Figure 12).

Whilst the junior doctor group was in agreement that registrars were largely responsible for teaching them how to prescribe, a few JMOs also expressed the need to accept responsibility for their own training:

I really see myself as responsible for that. I mean the registrars aren't really, I mean they're influencing me, but ultimately, it's my responsibility to make sure I know the side effects of all of them, you know, the interactions and the doses of the drugs that I'm prescribing.[JMO 9 PGY 1]

^{xxiii} Resident Medical Officer

A recurring theme from the registrars' accounts of training in prescribing was that prescribing was a skill which was best acquired through experience. Whilst some thought that their own undergraduate training, usually described as pharmacology or therapeutics lectures, was inadequate preparation for their internship, at the same time they saw it as appropriate that the strongest influence on their prescribing practice came during their hospital apprenticeship. Influences such as registrars, pharmacists, peers, and their own observations of medication charts and prescribing practices were cited as being the formative factors that shaped their prescribing practices (Figure 13).

Figure 12. Responsibilities of registrars to train JMOs

If they are there, then I will direct them...far more to write them up and that's part of, I think, any physician should review medication charts daily when they're seeing patients. I do think that's an important part of you learning review because it's how you treat patients... we should be doing daily reviews. [Registrar 8 registrar]

[On whether he felt a responsibility in training JMOs to prescribe] Yes, because we have to make sure that the patients are on their appropriate treatment, for their condition and everything. They are not over-treating them or under-treating them...[Registrar 1 registrar]

You know, you've graduated with a degree, you now have a practicing registration in New South Wales, you've got to be held professionally responsible for learning about what you're prescribing and so forth. I know there's a very hold-your-hand attitude here in public hospitals, some of these people have been stuck in public hospitals forever. It's a different world out there. When you're admitting patients in individual rooms, then you're the one who's responsible. We're often very poor in teaching that to registrars here, and residents here, because everyone gets their hand held so much, and if anything goes wrong, then it's always, why wasn't the consultant informed and all this sort of thing, the teaching of responsibility to people could be improved. That's what happens in the real world. [Registrar 6 advanced trainee]

Figure 13. How registrars learnt to prescribe

Well, in terms of the actual writing of the prescriptions, it's usually from how you see things done on the chart. If you particularly, I guess, thinking back to my intern days, you'd be transcribing across and you'd see different ways people did things... But also influence from pharmacy, we had a couple of sessions on the proper abbreviations for things. [Registrar 7 advanced trainee]

We did get a, in fifth year we got some lectures on therapeutics, what to prescribe for certain conditions, side effects and so forth... I guess when you're an intern it comes down to the nuts and bolts, you've got a person in pain, you've got to write something up. It doesn't come down to, oh, there's a GABA pathway in a spinal cord. You've just got to give them something. Oxycodone, what the hell's that? Oh that's right. A lot of it too is informal too when you ask around your mates... what do you do? What do you give? Because we'd all been through med school together so we'd bounce things off each other. Learn that way [Registrar 6 advanced trainee]

You don't get taught it well. I didn't get taught at University how to prescribe and the week before you started work, you did an orientation and they showed you the basics of how you fill it out and how you fill out the medication chart... And in the beginning you shouldn't expect them to have anything. You should teach them how to do it, because it's very much a learn-as-you-do skill. [Registrar 4 advanced trainee]

3.3.2.3. Prescription writer

Variations in registrars' assignment of prescription writing activities were described by the respondents. Sometimes, this related to the organisational structure of their medical team. For example, one advanced trainee worked with another registrar and had no JMO assigned. He described how they made joint prescribing decisions at the bedside and either one of them would write the medication order. In other instances, it related to workflow. For example, one registrar felt that the reason she wrote most medication orders for her patients was because she made prescribing decisions whilst looking at the medication chart, so it was easier to write it there and then. Alternatively, some registrars were perceived by other respondents to have a

preference for tighter control on medication ordering and so wrote their own orders, even though they had a JMO. More typically however, registrars were perceived to delegate medication ordering or writing to junior medical officers:

...it depends, some of the registrars do like to take quite a lot of control ... to be hands on, but others don't, they like their resident to do most of it for them, and that just depends on the individual. Some of the registrars are very active and their signature you'll see all through the ward and other times you just see the junior's signature through the ward which is quite interesting.[Pharmacist 5]

I think a lot of other registrars, I can't speak, I can speak for other registrars, but I think that a lot of others would probably just let the JMO do it. I think, fifty fifty...most people feel fairly relaxed if you've given a good verbal order to them over the bedside, then they'll understand and write, write the drug. [Registrar 7 advanced trainee]

3.3.2.4. Patient educator

In general, the inference from registrars' accounts was that patient education about medicines was not one of *their* core responsibilities, although they did recognise that it was important to patient adherence. A number of registrars provided examples of problems with patients' understanding of medications leading to poor adherence, but often these were proffered and interpreted by them as cases whereby patients had exercised their free will despite best efforts, rather than opportunities to reflect upon the quality of their own communication and education of the patient:

Well you know, they'll often go home and they'll say, 'Oh when I started taking that drug, it really made me feel this or that' and they'll just stop taking it. Or they won't see the necessity of taking aspirin after their heart attack - someone hasn't explained it to them, so they'll just stop taking it. Well, one woman went home after a transplant and stopped taking her prednisone because she ran out and she didn't know that she was meant to keep taking it! So, we have in the transplant department, we have a lot of education - as

you can imagine - so I don't know how that one slipped through!.[Registrar 4 advanced trainee]

An exception to this was a registrar with an interest in clinical pharmacology whose role it was to review the pain management of patients in the Emergency Department, who appeared keenly sensitised to the importance of patient education about medicines, as well as patient involvement in making decisions about drug therapy:

I have to look at things like, you know, an individual, whether their, you know, social circumstances are appropriate for them to have a lot of opiates on them so if they're living on the street, if they have small children at home, you know, giving them advice on... storage, you know, ensuring that they understand why they're getting the medicine, like the side effects they're going to have and I guess empowering them to be involved in the prescribing decision-making process as well, not as a sort of legal cop out but as a sort of enhancing efficacy and compliance. [Registrar 8]

3.3.3. JUNIOR DOCTOR

3.3.3.1. Medication history taker

A fundamental role of junior doctors in prescribing was perceived to be obtaining a medication history when patients were admitted. As outlined earlier, consultants identified inherent difficulties associated with the task, as well as levelling some criticism at the diligence of JMOs in carrying it out. Furthermore, there was divergence of perceptions from JMOs and pharmacists as to the typical methods junior doctors used to take a medication history:

I guess on initial admission, I'd usually check and make sure that the patient's actually on the drugs they think they are. I often call in the GP if the patient is confused, demented, things like that, check or look at their boxes. Occasionally call the local pharmacist particularly if they've got a webster pack [JMO 6 PGY3]

So if I'm admitting a patient, I'm transcribing whatever drugs they are taking. I'm ensuring that I am getting the correct dosages, the correct drugs and all that, so that often requires me to I check the packaging that they bring it in with, to call nursing homes to call GPs to make sure that all that's correct [JMO 4 PGY1]

Well, first of all, I think when a patient gets admitted through emergency, it would appear to me that the medication history taken by the admitting officer is taken from the previous discharge medication. So, it may not necessarily reflect the patient's true medications. So, very often I notice that they go in the notes and write it down from the discharge medication [Pharmacist 9 specialist clinical pharmacist]

Some doctors will treat it as a very mundane task, writing up regular medications, and they don't actually think about what they're writing and why the patient came into hospital. They just write up, you know, duplications and so on. It's not considered a high-priority task I think. [Pharmacist 1 specialist clinical pharmacist]

As will be discussed later, there was a strong belief among the pharmacist cohort that they were more proficient in carrying out this activity than junior doctors, which may have some bearing on their opinion of JMOs' practices.

3.3.3.2. Prescription writer

Junior doctors were universally perceived to be the principal writers of medication orders and discharge prescriptions within the hospitals. Few of these written orders emanated from their own prescribing decisions, but involved transcribing prescribing instructions provided verbally by a senior colleague onto medication charts, or copying written medication orders from an old chart to a new one. Transcribing was a contentious activity among junior doctors and some recent JMOs (registrars) for several reasons:

Responsibility. There was confusion over the extent of responsibility attached to the activity. Did transcribing carry the same responsibility as making a prescribing decision for a patient or was it a lesser form of prescribing? Was it the responsibility of the junior doctors to write down exactly what their registrar told them to prescribe, or was it their responsibility to check on the appropriateness of what they had been told before they put pen to paper?

Well our role isn't to initiate medications, it's more often to rechart medications or it's to actually chart whatever my registrar or consultant or consulting team, registrar consultant has requested [JMO 8 PGY1]

I feel quite secure knowing that someone who is more qualified than I am is making the decisions, and all I need to do is make sure that I've heard it correctly and carry it out appropriately...I don't have that same risk as someone who is actually making the decision to start the medication I think [JMO 1 PGY1]

I think the way is that whoever makes the decision is responsible for the prescribing. So if I decide that this person is going to have 1.2, like I say to the resident 1.2 grams of penicillin qid okay IVI. And [if] I am wrong, then I am wrong and then I am responsible if they write it down that way. [Registrar 2 advanced trainee]

I think in terms of transcript, because often that's what the JMOs are doing, I think that's their responsibility, if writing something that they're not sure what it is, they should ask. I think that it's the responsibility of whoever's writing the order [Registrar 7 advanced trainee]

On the question of whether JMOs felt responsibility to check verbal orders, consistently the junior doctor cohort emphasised that their usual practice was to check with their registrar when they were uncertain of an order. In addition, all mentioned using MIMS (an Australian drug compendium) and many also the Therapeutic Guidelines (an Australian series of guidelines on therapeutics) on their PDAs (personal digital assistants) to locate drug information when

needed. All felt that they had good access to information about drugs through use of their PDAs or computers on the wards and none identified any problems with locating information at the teaching hospitals when they felt they needed it:

I don't like prescribing something - and I mean especially in this hospital - I don't like prescribing or writing something that I don't... that I'm not very familiar with. I mean we've got very good access to computer-based MIMS and so it's very easy to look up something and verify the dose.[JMO 9 PGY1]

...most commonly I refer to my own medical knowledge, in terms of what medications are appropriate in what situations and I back that up with expert advice from registrars and consultants. I also cross check that with MIMs in terms of two drugs that need to be prescribed and they might have an interaction I will always check that with the MIMs and make sure that there is nothing. I will look at what the contraindications are to prescribing the particular drug. So, it's kind of a combination of all three things. [JMO 4 PGY1]

Therefore, in general, the cohort of junior doctors recognised the importance of verifying unclear medication orders and they were aware of ways to do this efficiently. However, accounts from nurses and pharmacists suggest that in their experience, junior doctors encountered difficulties in routinely verifying orders:

It's no good saying "Well you should go and look that up", they won't, they can't. Because while they're going to look something up there's about four other things being held up for them to do, and they're constantly being interrupted. So they don't get a chance to sit down and absorb something properly. [RN 1 Clinical Nurse Educator]

Sometimes they [junior doctors] don't use the MIMS appropriately to check the dose, but you know, Flagyl TDS 400mg when they mean it to be intravenous, you know, it's 500 mg. So young doctors have a bit of problem initially at the beginning of the year, but after that, they improve.[RN 6]

Importance. The commonly used terms “transcribing” and “charting” (as opposed to prescription writing or prescribing) appeared to underscore an unspoken but widely held belief that it was essentially an administrative task. At the same time, there was also a pervasive suggestion that it was menial and of little consequence in the big scheme of patient management:

Well in cardiology, I don't think the junior medical officers determine any prescribing. It's all determined per team....So basically they're seen as if they're the scribes.

[Pharmacist 9 Specialist Clinical Pharmacist]

I don't think JMOs prescribe on day shifts other than transcribing medications particularly other than...I suppose on ward rounds I might say, 'Would you write up this?' and I'd tell them what the drug is and usually tell them the dose. [Consultant 2]

Uhh, I guess I'm pretty important if I write out the med charts every week, but I guess I'm not really. I mean a lot of the time what's written up doesn't depend on what I...when I'm following instructions from the registrar or consultant [JMO 9 PGY1]

According to the pharmacist cohort, the perception of transcribing being unimportant or a low workload priority was a contributing cause for transcribing errors made by junior doctors. This was surmised from instances where verbal orders given by senior colleagues were not clearly understood by JMOs, who, according to the pharmacists, did not seek to verify the orders. Within these examples also lies the implicit suggestion that the senior colleagues did not routinely check to see whether their orders had been understood:

...but some of the JMOs... they mis-hear the direction from the consultant or the registrar and, depending on their personality, they don't want to keep asking and they think they should know, and they're too busy to look it up and so they just think, "Oh I'll just write that down. I'm sure they said that" and I'll check later or something.[Pharmacist 1 specialist clinical pharmacist]

Prescribing-wise, I mean we've had, and this has occurred actually a few times... is when the patient was started on cyclosporin and they meant to be on cyclophosphamide And it is just...it's clearly written as the wrong drug...I think when it did happen the last time, it was again written by a junior medical officer who heard, like been verbally given the order from someone senior to write the person up and I think probably in the busyness of it all they would be more familiar with cyclosporin and so they just wrote that up because it sounded like it and it was sort of hours later and they had done 15 things in between.[Pharmacist 5]

Well they were anti-retrovirals and it was more to do with the dosing of someone who had never been on them before and they [the JMO] were told - as far as I was aware - they were told by the consultant to start them on a certain combination of treatment and they just wrote up the names of the drugs. But the doses weren't particularly correct in any way shape or form and that's where the uncertainty was admitted to later on, but it wasn't actually seen to, actually confirmed what they really were meant to write. [Pharmacist 11 specialist clinical pharmacist]

Weekly rewrite of medication charts. For the junior doctor cohort, the weekly re-prescription of medicines onto a new chart was often cited as the time most likely for them to make errors. At one hospital, this was related, by a junior doctor, to recharting on overtime for patients he didn't know. At the other hospital, it was related by several JMOs to the onerousness of recharting all patients' medications on the same day, which was the system in place at that hospital. Because of these factors, several junior doctors cited problems with losing concentration when transcribing:

Even if the handwriting's alright, you're running from this choking person to that vomiting person and doing a med chart in between, you can spill something up pretty quickly ... it's easy to put the wrong number in the wrong place, or a decimal point...I find it a problem. Recharting on overtime can get dangerous, it's a dangerous way to do things generally. [JMO 8 PGY1]

Look errors happen even when you're sitting down and recharting, sitting down, nothing else to do, you can still sometimes do it. I don't think you can eliminate errors entirely, but it's reduced by sitting down and not rushing round while you're doing it - doing five things at once. [JMO 6 PGY2]

Several of the junior doctors described methods that they used for minimising the risk of errors, such as matching the number of medicines or aligning new and old charts. In the accounts provided by JMOs, the aim of the weekly rechart was purely to transcribe the patient's existing medicines as accurately as possible; none specifically mentioned using this time to critically review the patients' medicines. Although several pharmacists espoused what appeared to be an informal institutional creed that commencing a new medication chart was an opportunity for review of medications, the limited role of junior doctors in making independent prescribing decisions as reported in this study, would suggest that few would have felt that it was their role to do so. This was corroborated by a pharmacist's observation:

I think they just re-write them. I've probably met one or two, maybe two, residents who make changes on the re-write... how the patient is going so far... But on a whole, [for] most people it's just an automatic rewrite, sometimes it's not even re-written right. [Pharmacist 6]

Discharge prescriptions. Junior doctors were perceived to have a pivotal role in ensuring that patients were discharged from the hospitals with an appropriate supply of medicines. By all accounts, junior doctors were often placed under pressure to prescribe discharge medications within a short time frame:

Time is another important thing, that the doctors are not given enough time to do things like writing medications, writing discharge prescriptions. I mean if you can't do discharge prescriptions. They're so often done so badly that the doctors are so pressurised, you know, to get the patients out that sometimes they write the discharge way too early and

then it's not fixed before they change it and at other times they just write it way too late because they're on ward round or doing theatre or whatever, and it is a major problem.[Pharmacist 1 specialist clinical pharmacist]

Prescribing for patients being discharged from the hospital was seen by the pharmacist cohort to require not only accurate transcribing of medications from an inpatient chart to a discharge prescription and summary sheet, but also a systematic review to work out which medicines were needed following discharge. This review of medications appeared to be one of the main opportunities for junior doctors to make prescribing decisions independently, yet this particular role was cited by only one of the junior doctors interviewed:

Well, I'm an intern so basically... I'm the one who writes down in the hospital on the charts and then on discharge, I prescribe the discharge medications. I guess in a way my role too, because at discharge, would be just a review of the medications to make sure they those that need to be ceased are ceased and those that they need...sufficient supply for the next few days, so they're provided what they need.[JMO 1 PGY1]

The general lack of prominence placed by the junior doctors on this role may be associated with an attitude described by one registrar that many junior doctors don't rate writing discharge medication summaries as a responsibility, and by implication discharge prescriptions (since they are written simultaneously or in tandem with the summary). However, revealingly, she acquired greater respect for the process when asked as an intern to ring the GP for each patient being discharged and provide them with a verbal summary of medication changes:

And I think the interns and residents don't take responsibility for it [discharge summaries], when it's just something they write down and then it gets put away somewhere in a file. You take responsibility for what you're saying and doing, when you're actually talking to someone [phoning the patient's GP at time of discharge]. So it does actually make you learn. It makes you listen and take notice about what you're doing for the patients. [Registrar 4 advanced trainee]

Consequences. Despite some ambiguity over responsibilities associated with the task, all the junior doctors interviewed expressed an awareness of the consequences to patients of making a mistake whilst charting medicines. Some reflected that the challenge in transcribing was being able to sustain that awareness of risk. Because transcribing was often done away from the bedside and because execution of the task was effortless, “writing down on the slip of paper”, then it was easy not to give much thought to the action. For some, awareness of the dangers associated with making mistakes was so great that they devoted time at the beginning or the end of their working day, whilst their pager was turned off, to transcribe their patients’ charts for the week. For others, the risks were rationalised by their reliance on nurses and pharmacists to detect any errors that they might make:

I think a one-off because I tend to, because we have to write the medication on Tuesday, so I always take my time on medications. I always leave it to the end of the day, so nobody will page me or anything like that. I just do all my medications on Tuesday afternoon, at the end of the day because...I know when I, when we do it during the daytime you rush; you always tend to miss out things. I think when writing the medication, when we write it we should actually sit down and think, and so that's the way I try to do it. [JMO 3 PGY1]

I've mentioned before about the service [pharmacy] we have here, and it's a very good service, particularly because they pick up when you do do transcribing errors, which happens not infrequently. [JMO 6 PGY 2]

This sense of assurance among doctors that prescribing errors will be picked up was a common thread in accounts from pharmacists and nurses:

Well I often feel that the doctors don't really appreciate the sort of power that they've got with prescribing, because there are a lot of circumstances where you see things that are prescribed inappropriately or incorrect dosages. They're usually fairly blasé about it in that they probably think that it will be picked up somewhere along the line if it's...you know, when you mention it to them it's a case of, “Oh okay that's fine. I'll change it.” It

doesn't seem to always come across as the amount of power they've got actually in their prescribing. [Pharmacist 2]

I don't really think that much about them [dosage omissions on medication orders] cause they are routine I think, yeah, and I sort of think, " Oh, everyone's busy", "Slack and hopeless, but everyone's busy". So, yeah, you can't - and I think they're not as dangerous I don't think because none of them is going to - oh - no nurse is going to say, "Oh, I'm going to make that QID" and "Oh, I'm going to make that eighty milligrams." They will ask, so I suppose it's a less sort of an evil than if the frequency is incorrect or the dose is incorrect because that may be many days before it's picked up.[RN 7]

Pressures. There was also the issue of being asked to "chart" medications for patients they didn't know and hadn't assessed, which in some instances was related to the weekly rewrite of charts and at other times related to pressure placed by other medical and also nursing staff. This practice was widely understood by all respondents as being undesirable and dangerous, yet anecdotes revealed that it was not an uncommon event within hospitals where they had worked. Examples provided by doctors conveyed the suggestion that the staff placing pressure on the JMO did not feel they were requesting any great burden of responsibility, again harking back to an underlying assumption that rewriting charts was an administrative task:

Because often times the drugs will be written up by people who don't have as much knowledge as we would like. The interns are often re-writing drug charts and they're writing up medications that they've never heard of, you know, copying from writing that they can't read and they'll put the wrong spelling or the wrong name or the wrong dose.. [Registrar 4 advanced trainee]

For example as I remember as a junior doctor I got into trouble because the nurse said "Oh the patient is on atenolol not metoprolol" and they showed me the tablet and obviously it was atenolol and I saw it was metoprolol on the chart so I crossed out metoprolol and wrote atenolol. And the next minute I got myself in a whole lot of trouble, because the cardiology registrar wanted them on metoprolol. I really didn't understand

the situation... but often we don't think, I'm actually doing anything in that situation, I am not actually prescribing I am just actually charting, you know, but in fact that medication is active and the situation may not be appropriate for that patient to go back on that medication [Registrar 2 advanced trainee]

While I was an intern, I was an intern in [country town] and initially I had to write some chemotherapy drug for a patient coming in for chemotherapy and I didn't know anything about the drug, I just felt very uncomfortable about that and finally we actually got the consultant to do it, the registrar made the decision. [JMO 2 PGY3]

3.3.3.3. Communicator of prescribing decisions

The role of junior doctors in verbally communicating prescribing decisions to nursing staff was inferred from general comments by a number of respondents about patterns of communication:

...if we start a new medication we normally let them [the nurses] know because if you let them know... it will get to the patient faster. Otherwise, if you wait until they find it on the drug chart, there might be quite a bit of delay... if it's a stat dose order you need to let them know otherwise it probably won't be given. [JMO 2 PGY 3]

However, a number of nurses felt that verbal communication from junior doctors was sometimes inadequate:

...often we don't get told and then it's after hours, you notice the medication is ordered and you can't get it. Oh, it's very poor and it can be adverse because if the patient misses out on the medication when they should get it. So, in that way, it's not good for the health of the patient. I have to say doctors are just as busy as nurses though and it's hard to find someone to tell, but it's probably something that needs to have someone found and said, "New drug here". You know? [RN 7]

3.3.3.4. Decision-maker for symptom control and minor complaints

Junior doctors and particularly interns were perceived by all as making few independent prescribing decisions. The circumstances where they were called upon to prescribe using their own initiative were described by respondents as:

- management of pain, nausea, and bowel dysfunction
- management of intravenous fluids
- the treatment of minor complaints; eg, itchy skin, insomnia
- treatment of electrolyte imbalances or mineral deficiencies; eg, potassium, iron
- empiric treatment of some infections; ie, antibiotic prescribing for urinary tract infection
- treatment of infections based on culture sensitivity reports

This level of prescribing responsibility was widely accepted by all the doctor groups interviewed as being part of the medical apprenticeship and was an appropriate starting point for a steady progression in prescribing responsibility; although, as indicated previously, some concern was voiced by a number of junior doctors about their competency to prescribe opioid analgesics from the first day of internship:

I suppose the things that interns get in their first few months, have to face is, is the prescribing of opium analgesics, antiemetics, intravenous fluids, sedation, maybe antibiotics.[Consultant 2]

*If the patient's constipated, then the junior doctor will take care of that and the consultant may never hear about it... If there is some intercurrent problem, the patient gets an infection, it's urinary tract, it's simple and straightforward then the intern may well be taking responsibility for that prescribing. I think the system works in that way reasonably well, the doctors prescribe according to their level of experience or expertise.
[Consultant 7]*

I might suggest something or ask about something, but not so much decide. The only thing I would decide about would be probably on overtime shifts - little decisions about, you know, I don't know, starting antibiotics for someone, but even then I'd really talk to a registrar. Maybe aperients or something like Coloxyl and Senna^{xxiv} or something like that. Pain medications, morphine and sleeping tablets... Yeah, I think it's appropriate the consultant should be making most of the decisions or the registrar, and I shouldn't be making too many treatment-related decisions. [JMO 9 PGY1]

Junior doctors were also perceived to initiate a greater range and make more consequential prescribing decisions when they were on after-hours shifts or when they were on surgical or obstetric and gynaecology rotations. This was because in these situations, they received less on-hand registrar support than during work-day medical shifts:

[On who makes the majority of prescribing decisions in his surgical team] In a lot of ways me, I think it is hard to say because it is quite varied, um there's certain things that each consultants wants for every patients. Each patient gets a certain type of procedure done and they get a certain type of therapeutic regimen after their procedure. [JMO 4 PGY1]

I think most of the medical chart issues that come up, once they're [the patients] postnatal, goes with the resident. If there's a medication, they need something for break through pain, they'll speak to the resident on the ward, usually, rather than us. [Registrar 6 advanced trainee]

Furthermore, it was apparent that junior doctors in their second and third years of residency prescribed a greater range of medicines than interns and were more directly involved in prescribing decisions:

If it's something very simple - if it's just, say, Slow-K^{xxv} or just an electrolyte thing, you know, probably the resident would make the decision because if the potassium is low they need to have more. That's the resident's decision and then for some anti-

^{xxiv} Tradename for docusate sodium and senna

^{xxv} Tradename for potassium chloride

hypertensives, you need to change those if ... their blood pressure is going up and increase the dose. If they have hypotension you need to decrease the dose. So it's pretty much - sometimes you know it happens between the resident and the registrar and during the ward round...[JMO 2 PGY 3]

3.3.3.5. Trainee prescriber

Consistent with observation that junior doctors made a limited range of prescribing decisions, was the belief that their role was essentially about learning. Junior doctors were posted at the teaching hospitals for the purpose of developing and honing core clinical skills, one of which was prescribing:

They do know when someone should have a drug in general, but - and that is their role - but I suppose their role is to learn as well. If they have something that they're a little bit unsure about or someone, a senior nurse or anyone is saying, "This isn't right", their role is to find out. [Registered Nurse 7]

So, what prescribing skills did they arrive with and what did they learn about prescribing during their apprenticeship?

Undergraduate training. There was a range of opinion among the junior doctor cohort as to whether their undergraduate training in prescribing prepared them for internship. Most thought that they had sufficient orientation to the legal requirements and practicalities of prescription writing. Graduates from both University of Sydney and University of NSW cited experience in writing medication orders on hospital charts prior to internship. Also, most of the JMOs mentioned orientation sessions on prescription writing that they had received from pharmacists at the start of their intern year.

Divergence of opinion existed on the issue of drug and therapeutics knowledge. Whilst there was general consensus that a sound knowledge base was essential for good prescribing practice, there were three broad categories of opinion on the adequacy of knowledge acquired from university training. One group believed that their knowledge was sufficient for the type of limited prescribing required of interns. Another group thought that their knowledge was inadequate, but was as good as could be expected. They based this belief on the difficulty they perceived in retaining a useful level of detail from university training and their perception that this knowledge was best gained on the job. The third group were more critical of their undergraduate training and identified specific gaps, such as applying knowledge to complex cases and knowledge of the most clinically relevant drugs within a class. Four of the interns interviewed were graduates of the same university (University of Sydney), and this range of opinion was evident even in this subgroup, all of whom underwent an 8 week pre-internship at the end of their final year of university (Figure 14).

One of the graduates from UNSW commented on his use of the educational prescribing modules developed by the NPS during his last year of medical school. He felt that the patient scenarios were too simple and not typical of the clinical situations he encountered at the teaching hospital, where patients tended to be on more complex drug regimens. Although the modules provided alerts on drug interactions, he found that in practice, decisions were commonly made to keep patients on potentially interacting drugs because the overall benefits of the drug combinations were perceived to outweigh the risks.

Figure 14. Preparedness for intern prescribing responsibilities

As a student, you learn in the textbooks, that's the thing, and then we do lots of practice while we were students in the last year in the hospital... we would write it and then the doctor would actually sign it so we co signed it... I think that was very helpful. In the last year were basically working as an intern so you just don't have the prescribing right , you need a co signature but I think it is very, very useful, so that when you actually work, you have more confidence because you've done it before. [JMO 2 PGY 3]

I mean we were taught the general things about prescribing, how you consider the dose, consider the renal function, consider the liver function, the weight, and you know. But things like gentamicin prescribing, when you start out as an intern, you've got no idea and it's not something that's ever mentioned at uni... I don't know if it necessarily would improve matters if you were taught at uni that sort of thing. I don't know if you'd remember. [JMO 6 PGY 2]

To write in the boxes, that was fine. I could do that without any problems. To choose what drug to give, not very good at all. I knew I had gone through the drugs and I knew what classes of drugs there were. I guess the other big difference between university pharmacology and real prescribing pharmacology is that you're taught every single drug in every class, or... well you're taught a lot of drugs in every class, but when you get to hospital, they only use one or two of them in every class for whatever reason... So you don't actually need to know all of them...so you find yourself swimming in all these drugs you vaguely remember, not being able to get focussed. [JMO 8 PGY 1]

Probably in terms of knowledge, not particularly prepared, I mean I enjoyed medical school, but I really found the learning curve once we started working was really extremely steep... It almost seemed that what we learned in medical school didn't seem to apply in the practical world, the real world. That people never present as textbook problems and so there aren't really textbook solutions to what patients are presenting with, so I just think that when you really started working things seemed to change a lot. We just stepped out of medical school and we were sorely deluded once we got into it.[JMO 4 PGY 1]

Despite differences in satisfaction with undergraduate training, the junior doctor cohort broadly agreed that their internship was when they actually learnt to prescribe, when they signed medication orders for real patients, and when they were active participants in prescribing.

These views generally accorded with the perceptions of experienced prescribers in the other doctor cohorts who, like the nurse and pharmacist cohorts, did not have particularly high expectations of interns' prescribing competency at the start of internship. Some of the pharmacists had a variance in opinion to that of the junior doctor cohort regarding familiarity with the practical aspects of prescribing, and did not think that new interns had a good understanding of medication ordering skills. Their expectations of new interns in this respect were therefore also low:

I know they have none. So I wouldn't expect them to have more than they do. I guess because I have done a lot of the intern education and things and what we do in those sessions we give them a whole load of scripts and line up scenarios and ask them to you know what would you prescribe, what would you do? And the first few times I did it I was absolutely aghast... because they really... have no idea of even the legal aspects of writing S8 scripts, let alone the selection of drugs, just the very how you write up a drug on a drug chart and that you have to sign your prescription. Little things like that, they really don't know. [Pharmacist 5]

[On expectations of prescribing skills of new interns]...well one small thing that they write clearly on the chart. That they actually put their name and their pager number, so that's somewhere on the chart, so they're contactable [Pharmacist 4]

Nevertheless, respondents from the various cohorts cited a range of skills, which they considered were desirable for interns to have from day one of work. A collation of these is presented in Figure 15:

Figure 15. Important knowledge, skills and attitudes for interns starting to prescribe

- Basic drug knowledge of major drug groups, common side effects and common interactions
- Basic therapeutics knowledge, such as treatment options for common clinical conditions
- How to apply patient knowledge, such as why drug doses require modification in certain populations, what other drugs the patient is taking, allergies
- Prescription writing skills, particularly legible handwriting, familiarity with legal requirements of prescribing, familiarity of medication charts, use of generic drug names.
- Understanding of professional responsibility, such as communicating the purpose of the medicine to a patient.
- Safe prescribing practices, such as not prescribing a drug if you don't know how it works, being careful
- Self-criticism and awareness of knowledge limitations
- Readiness to ask if uncertain
- Knowledge of how and where to access drug information
- Willingness to work as part of a multidisciplinary team
- Competency in taking a medication history
- Knowledge of medicines management systems
- Communication skills

Of these skills, the salient piece of advice to new interns was to ask, ask, ask! This mantra was widely acknowledged as the most useful and safest attitude for junior doctors to adopt.

3.3.4. PHARMACIST

3.3.4.1. Checker of prescribing decisions and written orders

The primary responsibility of the pharmacist in prescribing at the teaching hospitals was widely seen as “picking up” errors and potential drug interactions by reviewing medication charts. However, there were differences in understanding of how far this role extended. In general, doctors and most nurses viewed this role purely in terms of preventing adverse effects, a safety net; whereas pharmacists also saw their role as a review on appropriateness (or suitability) of prescribing (Figure 16). In this regard (and also for the purpose of detecting drug interactions), pharmacists perceived that their unique responsibility was to review the entire medication list for each patient, contrasting their practice with that of doctors, whom they felt focused only on medications related to the patient’s admission:

I think it comes down to, I suppose, the pharmacist who directs it all, because we put it all together. Cause very often we find that the consultants come along three days later and they'll say "I didn't know that so and so was on this" or "They don't need to be on that, stop that."... [or] "How come they're not having it now?" I think it's really the pharmacist who has a handle on all those changes. [Pharmacist 7 specialist clinical pharmacist]

The pharmacists’ review of appropriateness also incorporated a check on compliance of prescribing decisions with hospital policies, such as the hospital formulary and antibiotic policies. This role was perceived negatively by some pharmacists, who felt they were policing the actions of doctors:

I had a case yesterday of someone with pneumonia and...they'd prescribed cipro^{xxvi}, Keflex^{xxvii} and Rulide^{xxviii} and I was like, "Why the three or why the Ciproxin?^{xxix}" to the

^{xxvi} Colloquial for ciprofloxacin

^{xxvii} Tradename for cephalexin

^{xxviii} Tradename for roxithromycin

^{xxix} Tradename for ciprofloxacin

registrar, "My consultant said so", and I thought well with cipro you need to get micro approval and all this. And the consultant came round and I wrote [had written] in the notes [about needing micro approval]. And he'd ceased the Keflex and kept the cipro because he thought it was better and then you have to explain to him that it's micro and sometimes you feel that you're just policing them the whole time. You comment about the antibiotics and they all raise their eyebrows [Pharmacist 10]

Malcontent with this regulatory role was also expressed by one of the registrars, whose only knowledge of pharmacy activities was related to notifications about drug use policies:

All I know is that we've got nasty letters from pharmacists saying that we're writing up PRN medications, don't put a range in the box, as opposed to say 10 or 20 mgs of temazepam. You've got to write either 10 or 20 and that's the only feedback I think we've had. And signing the nurse-initiated medications. And that's about the only feedback we've had on our medical charts. [Registrar 6 advanced trainee]

This view of the pharmacist's role, however, was the exception and overall medical and nursing respondents expressed appreciation for the chart reviewer role of pharmacists:

I've been pleasantly impressed by the high level of input that you get from the pharmacy, from the ward department pharmacist, and also the renal pharmacist also has a lot of input, you know I'll frequently be charting things and he'll then approach me and say, "Do you realise the dose that you've prescribed is for a patient with renal impairment, who therefor needs dose adjustment or do you realise that these two drugs interact? High level checks and balances in place. [JMO 7 PGY 1]

However, there were important resource limitations to the role of pharmacists as "catch alls":

Well I think they [doctors] are quite reliant and I think that's okay, so long as, you know, there's a pharmacist always around. And in terms of staffing and... lack of staffing, it's not always the case... I mean we only work Monday to Friday and a tiny bit on Saturday and then you come in on Monday and the things that have gone over the weekend, it's just horrendous. I mean it really is. [Pharmacist 1 specialist clinical pharmacist]

Figure 16. Perspectives on pharmacists as checkers

Well first of all...of course that they're getting the right medication that's been ordered in the first place, so a supply role basically. And that obviously it's safe for the patient that's getting it, so various concerns there regarding dosage and interactions and general safety for that particular patient, you know, renal function or liver function for example. But then I suppose there's the other side of whether it's actually appropriate for the condition that it's being used for.

[Pharmacist 2]

So you read the chart, make sure that all the orders are all legal, all appropriate to the patient in the terms of what their current diagnosis is, their diseases or conditions, make sure that the doses are all appropriate, and then annotate the chart so that to help ensure that nursing staff or any other staff involved with the medications to help ensure that the patient receives the right drug at the right time, in the right form. [Pharmacist 6]

The pharmacist does a regular review of patients' medications, and identified three drugs with anti-cholinergic action and predicted that if this wasn't critically reviewed the patient was at risk of certain problems, urinary dysfunction and before I had a chance to put into effect the changes, that person had urinary dysfunction and required catheterisation... so it just illustrates the potentially very important role of the critical appraisal, especially the multiple drug that so many of the patients are on, so I'm a huge believer of that. [Consultant 6]

Pharmacists are certainly influential but not in terms of what should be initiated I don't think, as much as just reviewing the medications...the interactions or the problems or 'Is it actually necessary?' You know, I have a good relationship with our ward pharmacist. We both believe in stopping medication so if she asks for that, I tend to scratch things out...[Consultant 5]

I see them as... a catch-fall.... I guess they've got time to look at the chart in a lot more detail, and they'd probably remember a few more interactions and they're able to plug things into the computer...I think that they're a safety net. [Registrar 7 advanced trainee]

If the pharmacy did have an influence, I don't think it would be to commence a drug as maybe to change one, so the side effect wouldn't be as severe as what they might be on now.[RN 5 Clinical Nurse Consultant]

3.3.4.2. Medication history taker

The pharmacist cohort also viewed obtaining a medication history from patients as one of their most important roles in effecting prescribing decisions. This contribution of pharmacists was acknowledged by a few registrars (one a former pharmacist) and one nurse; however, recognition of this role was not widespread and was not evoked by any junior doctors or consultants who were interviewed:

Well basically I see my role as really doing a medication history and essentially checking what history has been obtained by often a variety of prescribers. Sometimes it's just the... accident and emergency doctor, and sometimes it's the haematology RMO, who, you know, admits the patient and frequently they just miss things or get it wrong and the patient forgets to tell them things. So, you know, I would want to basically do a medication history on every patient, when I first see them preferably.[Pharmacist 1 specialist clinical pharmacist]

There's been a couple of cases recently, in one of the geriatrics and the drug was always "BD^{xxx}" and I couldn't find any evidence. I spoke to the registrar and they don't know why they've got it, just because their GP is doing it, so now I'm going to contact the drug company and say "Well have you got any information on it?" and things like that. [Pharmacist 10]

If I see the patient in emergency, checking thoroughly that their drugs are the right ones that their on. To be honest, I probably get a bit slack sometimes, if they're on the ward and it's already been done and that's with [name of pharmacist] checking - I rely on the pharmacist a bit for that, because I know that they do it. [Registrar 5]

As mentioned previously, pharmacists felt that they had a particular expertise in performing this function and that they performed it more competently than junior doctors. One pharmacist described how she was involved in developing a tool to assist pharmacists in taking accurate histories; however, she admitted that she had not attempted to share this resource with junior

^{xxx} BD abbreviation for "bis in die" (Latin) meaning twice daily

doctors. Her belief, and that of some other pharmacists, was that this activity was peripheral to junior doctor's responsibilities, and therefore pharmacists were better placed to perform it:

I don't think medication history taking is top of the list of priorities. I don't think it's a major priority for them. I suspect they've got time restraints. I mean, and the time restraints are getting the bloods done, making sure that the physiology is okay, potassium levels, sodium levels, whatever they are. Seem very good at monitoring things like that... And prescribing what they think they [patient] need then, not what they've been having. [Pharmacist 9 specialist clinical pharmacist]

3.3.4.3. Drug Information/ Knowledge source

Respondents' accounts highlighted four core areas in which pharmacists' knowledge about medicines was sought or proffered to shape prescribing decisions: dosage adjustments in special populations (eg, in renal impairment, and the elderly); drug interactions; drug administration (eg, compatibility of intravenous fluids); and drug availability. As indicated previously, there appeared to be limited opportunity for pharmacists to provide this information in a collaborative way at the time when prescribing decisions were made. According to respondents', this largely related to logistical difficulty for them to attend ward rounds as well as fulfil their other responsibilities. Pharmacists saw that their main chance to be proactively involved in prescribing decisions was at ward meetings, which a number mentioned attending. However, there were indications that whilst attendance at these meetings involved multiple disciplines, decisions were lead by the medical attendees. Furthermore, the focus of the meetings was more about explaining treatment plans and reviewing treatment decisions, rather than initiating treatment:

When - after the initial management plan then we have - I have ward rounds and also multi-discipline meetings, which I attend, where patients will be discussed with nursing or with other allied health and then based on their reports I may modify the medications according to what they've reported to me. [Consultant 1]

... we have a meeting once every week ... we might get the registrar coming in or the RMO and they will speak about each patient so you've got a clear understanding of background with that patient, then also because they're there at that time you can check and say, "Well, what were you thinking about doing this?" or [something] about the medication, you don't go into too much detail because there's other people there as well...[Pharmacist 10]

Otherwise, input of pharmacists into primary decisions relied on whether doctors chose to contact them. This was felt to depend upon the level of rapport established by the pharmacist. The overall impression from both doctors and pharmacists was that more typically, pharmacists provided drug information as part of their medication review, and so their influence was more to modify or revise prescribing decisions than to be involved in core decisions (Figure 17).

3.3.4.4. Treatment advisor

The pharmacist cohort felt that they had a minor role in providing treatment advice or suggestions. The circumstances where this was most common were when: they identified potential drug interactions and would provide alternatives; were familiar with particular protocols or treatment guidelines for a therapeutic area; or were asked for advice on treatments for minor ailments. This role was evoked by some of the medical respondents as well:

Sometimes in haematology, [the pharmacist], she was great at saying or often a patient with this picture is normally on this, have you considered that? So she'd often suggest or say why isn't this patient on this or she'd pick up interactions and saying, they shouldn't be on that. I think from that there is a role there. Probably more so any interactions they'd missed.[JMO 5 PGY3]

Figure 17. Drug information provided by pharmacists

The other thing that I would talk to the doctors about is availability. If they say, "I want to switch Mr Bloggs from cyclosporin to tacrolimus" well then I'm immediately thinking, "Well hang on you can't because it's not on Section 100 and you have to get permission from the committee and how am I going to get an ongoing supply?"[Pharmacist 1 specialist clinical pharmacist]

And then on one of the wards I am on at the moment I tend to link up with their ward rounds so that I am actually there when they are prescribing which is always useful. So that you can actually be there at the point of prescribing and that I guess you have a little bit more influence in being able to steer them towards something that we have rather than a drug that we don't have ... things like that. [Pharmacist 5]

I mean pharmacists sometimes they say, 'Oh look, this has a reaction with the other one. Are you sure you want to do this?' Sometimes we change it. You might forget that they're on sertraline and you give them tramadol, and they'll sort of say, 'Hang on a minute', and so you change it and that's, that can be quite useful. [JMO 6 PGY 2]

And often times, especially in the transplant population, they'll have renal impairment and so we'll write down a dose and then [the pharmacist] will call up and say 'Actually I figured out the creatinine clearance and they should be on this dose.' So often times, not so much what medication you put them on, but the dosage, or those sorts of things - the pharmacist has a large role to play.[Registrar 4 advanced trainee]

I don't know that they make a prescribing decision in saying, 'Use this drug', like up front when the person's in A and E or something, but you're relying on them to come around and look at the charts after they're written up and ring and say, 'You used that drug, maybe you should have used this one' or 'Did you know that this one's interacting with that one?'[Consultant 5]

3.3.4.5. Educator and trainer of new prescribers

The prevailing view among the pharmacist cohort was that they had a strong influence on the way in which junior doctors learnt to prescribe. Whilst a few of the pharmacists had run formal

education sessions on prescribing skills for interns, their greater impact was perceived to be from the individual feedback they provided to junior doctors on their prescribing practices. This feedback was inherent to the advice pharmacists gave to junior doctors to modify medication orders due to errors or inappropriate prescribing. Some pharmacists therefore saw their responsibility to train junior doctors as a side benefit of their responsibility to ensure safe prescribing and quality of patient care. Others perceived the responsibility to be part of working in a teaching hospital or part of sharing knowledge and expertise within a healthcare team. There was general consensus among the pharmacists that their greatest influence was in the legal aspects of prescribing, but several other influences were cited, such as raising awareness of guidelines and policies, drug interactions, and the value of comprehensively reviewing a patient's medication:

...the responsibility [to train junior doctors in prescribing] is there for me but it's usually triggered by an incident or something that, where the prescribing is inappropriate and then you have to intervene. And when that happens, we're all, we're all human. And I guess that's more where the trigger is, but it's definitely a responsibility [Pharmacist 11 specialist clinical pharmacist]

I think you [pharmacists] have a big influence actually. In terms of probably, I mean their drug selection coming from often their medical team..., but in terms of legalities of prescribing, and like even getting them to be a bit more aware of interactions and things like that, rather than just looking at what they're prescribing. I think your feedback to them as they're learning to prescribe can be pretty valuable. You know, and I think that's something that we do relatively well now, but that's more the reason for feeding back the errors, which you know interacted with something that was up here on another chart and just getting them into the habit of looking at everything, like the patient as a whole, rather than looking at each drug prescription as a separate identity that doesn't impact anything else. So I think, yeah, you do, you can sort of develop good habits in them particularly in the first year. [Pharmacist 5]

The junior doctor cohort predominately believed that pharmacists had a role in teaching them the practicalities of prescribing, such as legalities and prescription writing. Some viewed this as an indirect role of pharmacists. They did not perceive a role for pharmacists in teaching them what to prescribe or how to select drugs, which they felt were the responsibilities of their registrars and consultants:

...in terms of prescribing as in actually what to fill out on the chart, [pharmacist's name], the pharmacist ...she was the first one that I worked with in the ward and I just found that she was really the person that hammered into us how, even just the little things like what different symbols mean and you sort of don't pay attention to that...Yeah I think she made a big difference in knowing how to prescribe and knowing the little tricks almost to prescribing. [JMO 4 PGY 1]

3.3.4.6. Educator of patients

Education of patients was not a role in prescribing that was strongly evoked by pharmacists themselves. However, accounts from other respondents suggested that this was an important and valued role of pharmacists. The reason why it was not strongly conveyed by the pharmacist cohort may have been because it was viewed as a separate medicines management responsibility; ie, patient education was not part of prescribing:

...if there are lots of changes to the patient's normal medications then they need some counselling to go through that, you don't want to just send them home with all these new meds without knowing what the hell they're using them for. [Pharmacist 8]

I have a superb relationship with the ward pharmacist at [a smaller public hospital], where she is part of the medical team. Every patient gets a pharmacy review on admission and the discharge. They do a pharmacy discharge summary, which looks at which medications were discontinued and why, which ones were initiated and why and this is then fed back to the GP or the team. [Consultant 7]

3.3.5. NURSES

3.3.5.1. Medication chart reviewer

Nurses felt that one of their main roles in prescribing was checking the legality of medication orders through their scrutiny of medication charts. In particular, they described reviewing the legibility of the order, dosing, allergy history relevant to what was prescribed, availability of the drug, and in some cases, the appropriateness of treatment selection or whether what they heard on ward rounds was correctly prescribed. Their primary focus in performing this task was on patient safety, and they liked to review the chart well before medications were due to be administered so that any unclear orders could be amended:

I do a lot of medications for patients on the afternoon shift...and before five o'clock, we have to check all our medication charts: one, to see all the prescriptions are followed through, our doctors do walk in and order medications without telling anyone else, so we pick it up as we check the charts and then order it from pharmacy. Because I've worked in nursing for a long time, I pick up whether the dosage is right or wrong, much quicker than the new nurses. [RN 6]

3.3.5.2. Treatment advisor

Many of the nurse respondents felt they had an influential role in making treatment suggestions most typically based upon their assessment of the patient's symptoms. Their most common suggestions were perceived to be for analgesics, bowel preparations, antiemetics, and intravenous fluids. However, in some specialised areas, their suggestions related to standard or common regimens of medicines given for a particular condition, where was described as "pointing them in the right direction" or "drawing their attention to it". For example, a nurse working in a neurology ward prompted doctors to prescribe statins and ACE inhibitors for stroke patients; and the nurse working in the psychiatric unit provided doctors with suggestions for "prn"

antipsychotics. There was variation in how the nurses obtained the information to support their suggestion: some based their advice on established protocols or guidelines, whereas others based it on their experience of working in the area:

Because well, there was one, like Bactrim^{xxxii}, I said, 'Well I've seen say like, two ampoules given or three ampoules' and the doctor said, 'Well I'd better look to see,' you know, so he looked it up - he was making an assessment on the infection and the degree [severity of infection], so it wasn't really my call, but I just put him in the right position to be able to make that decision... [RN 2]

I believe my role is very much advice to, particularly to junior medical staff and also consultation with senior medical staff as in discussion on, for example, what do you think would be the best pain management strategy for this person. I'll give you an example... a junior anaesthetic registrar on an acute pain round was going to prescribe a patient's PRN MS Contin and I said perhaps you might like to use an immediate release preparation rather than a sustained release preparation. So advising on what would be the best course of action. [RN 4 Clinical Nurse Consultant]

3.3.5.3. Patient knowledge source

Several of the nurses also mentioned their role in providing doctors with information on the patient's condition, which acted as a trigger for doctors to assess patients and therefore, commonly make prescribing decisions.

I mean I can only as a nurse, it's not for me to diagnose, I feel. If I've identified - if I'm not happy - I have made an assessment of the patient, who is not nursing well, I'm not happy and they have all those signs that make me feel unhappy with them... I just feel it's my role to at least alert the doctors and it's up to them. [RN 2]

Nurses were not generally viewed by any of the doctors as having a major role in prescribing (although nurses working in private hospitals were seen to have a greater role because they

^{xxxii} Tradename for sulphamethoxazole and trimethoprim

assumed some of the duties taken on by JMOs in the public hospital). However, the role of providing intimate knowledge of the patient's condition was acknowledged:

For example, if the nursing staff tell me that a patient can't swallow any more, then I would direct the registrar... that the patient's routes of administration be changed to the subcutaneous route. [Consultant 1]

And the nurse in the bedside to tell us how, what the patient's like. Part of - makes part of that clinical picture... So I always ask the nurse before I go, "How are they going?" Yeah I do take their comments onboard. [Consultant 8]

3.3.5.4. Trainer of new prescribers

In general, the nurse cohort did not perceive that they had an official role in teaching junior doctors to prescribe, but recognised that they had a responsibility to ensure safe prescribing practices and therefore provide advice when appropriate and feedback when doctors made errors. The type of influence they felt they had varied from offering advice on how to write up medicines correctly to giving assistance with prescribing fluids and PRN medications:

They ask us more about intravenous fluids for example, what should I prescribe someone that needs IV therapy? What do you think I should prescribe, over how long? They're not used to that for example PRN medications, we often, they might not know which is the better antiemetic or the best pain relief for a person and they'll often ask for a nurse's opinion [RN 5 Clinical Nurse Consultant]

Nurses were not mentioned by the junior doctor cohort as having an influence on how they learnt to prescribe, but a number of senior doctor respondents felt nurses had an influence at the beginning of their internship:

Well the nurses are a very important part of JMO learning because often on the overtime shifts it's just you and the nursing staff against the world and 30 patients on a ward and lot of things to do and they actually hold your hand and take you through it and they're pretty good. There can be sometimes errors because of their influence but mostly it's actually pretty safe. They're very experienced clinicians. [Consultant 2]

I mean when you physically first came to write a chart or write up something, they [the nurses] were the only ones that told you what to do. They would say, 'Give this dose' and 'You would write that there' and 'This goes in this box' [Consultant 5]

3.4. RESPONSIBILITIES

3.4.1. Notion of shared responsibility

The central opinion of the entire study sample was that the medical team along with pharmacists had the chief responsibility for safe and appropriate prescribing for patients at the hospitals.

Whilst some doctors implied that pharmacists had a lesser professional responsibility than the medical teams, generally, both professions were considered to shoulder the bulk of responsibility. Nurses were generally perceived to have a lesser responsibility for this particular element of medicines management. Responsibility was conceptualised by many as a “team”, “collective”, “group” or “shared” notion, but with differing levels of responsibility associated with professional categories, particular processes, or organisational units (Figure 18).

3.4.2. Individual responsibilities

Consultants. A recurrent theme of the consultant cohort was that the ultimate responsibility for safe and appropriate prescribing for patients admitted under their name lay with them. This view was also reiterated by several members of the other cohorts. As alluded to earlier, this responsibility was exercised in their review of the medication chart and also underlined their “constant” questioning of their medical team:

The senior physician, surgeon or consultant under who's care the patient is nominally admitted and that's the way it is in Law. There's absolutely no doubt that the buck stops there. [Consultant 6]

I suppose, the ultimate responsibility must lie with the VMO really. The doctor that the patient comes in on. They must have overall responsibility for patient's care. [Pharmacist 4]

Figure 18. Shared responsibilities for prescribing

I think that it's a collaborative thing... I think a lot of people have to be vigilant about it. Obviously prescribers themselves, the medical officers, whether they're interns or consultants should make sure that what they're prescribing is appropriate and correct and obviously the pharmacists - we're there to check the orders and make sure that it's all appropriate that's one of our main roles. And the nursing staff who are following those orders that are on the medical charts have to make sure that the drugs are signed correct and, you know, have been written up in an appropriate way...[Pharmacist 6]

Yes, I think it is really a collective responsibility for really most of the people here [Consultant 5]

The doctors are the primary responsible person. And the pharmacist makes sure that the person prescribed properly. Nurses make sure that it's been charted and that it's in the appropriate place, and whether it's legible enough for them to dispense the medication. [Registrar 3 advanced trainee]

It is, like I think it's teamwork. You can't do it all by yourself. It would be unrealistic to expect me to take on the role of a pharmacist because I'm not qualified to be a pharmacist. And vice versa for a pharmacist to take on my role, or a doctor. We have each other, you know, we still have our distinct roles I think, but we still complement each other as well. [RN 2]

The doctors, who are actually charting it in terms of overseeing patients, combination of the medical team and pharmacists. [JMO 5 PGY 3]

There were limits on how far consultants considered their responsibility to extend. As the tangible tool of communication, the written medication order appeared to represent a line (but not a cut off point) between responsibility for prescribing and responsibilities for dispensing and administration. If a medication order was considered to be written correctly and based on an appropriate prescribing decision, then the responsibility for communicating the decision was considered to have been met. There was an assumption or trust that the recipient of that information would not implement the instruction unless they understood it, in which case they would contact a member of the medical team for clarification:

So I guess there are a number of steps after me although I don't see myself as being responsible for their jobs [pharmacists and nurses], in a sense - only that what we've decided is going to be prescribed is being prescribed. [Consultant 5]

So the team is wider than just a few doctors hovering around the end of a bed, and we acknowledge that, just writing in the treatment orders book what new treatment implies that part of the team will implement that. Pharmacy will look at the interactions and if the patient's on that prescription then the nurse will give it.[Consultant 7]

Although, there was no suggestion that communication lines were closed between professionals involved in managing medicines, these views do reveal conceptualisation of prescribing more as a sequence of individual responsibilities than as a shared singular responsibility of professions working within the one system. The great trust that was placed on the medication chart as the primary tool for communication represented this underlying assumption.

Prescription writer. Many respondents from a range of the cohorts thought that whoever puts pen to paper must accept responsibility:

I mean the junior medical people - under the registrars - I would see as probably being more responsible for ensuring that it's written correctly and transcribed correctly and that

we look, and if there's something anomalous that we're worried about, talk to the registrar about it. [JMO 6 PGY 2]

Furthermore, one consultant felt that a team responsibility did not preclude the personal accountability of the prescription writer, who could not use the defence of “I was told to do it.”

Decision-maker. Other opinions focused more on those who made the prescribing decision and some felt that the decision-maker was more accountable than the transcriber. One registrar gave an example of prescribing a dose of cyclosporin for a patient with renal impairment. She stated that although she would feel concern for transcribing the order correctly, she would not feel a hundred per cent responsible, because her consultant was advising her. However, as alluded to previously (under the role of junior doctors in prescribing), there was uncertainty expressed as to the respective levels of responsibility associated with making a prescribing decision versus transcribing that decision:

Well, I think the person who's writing the script is responsible but I know that my actions as an intern - I'm under supervision of a registrar who's under the supervision of a consultant - so I mean if there is a prescribing error, then ultimately the consultant is responsible. However, I'm sure that... I would have to accept partial blame for something like that [JMO 9 PGY 1]

... as junior doctors we are not really responsible for much prescribing, in fact, we are often, or we often think that charting, we often don't see charting as prescribing. So we will write whatever the registrar says. You know, whether it's understood or not understood, you know, often we won't query what the registrar because he knows and I don't really know either, so I write, so while my name might be on the medication chart, you know, I am taking it from what the boss said on the round or, you know, what the registrar said on the round. [reflecting on his experience as an intern, Registrar 2 advanced trainee]

I mean I think they [doctors who make a prescribing decision] do have a big responsibility for it, but from a legal point of view and every other point of view when push comes to shove it looks like they're not involved. I mean in my opinion yes, they do have a very big role, but they pass that on and I guess than the responsibility then does go onto the person who is going to write it because they are finalising and making that decision concrete and in doing so they can be the one who ends up making an error that is going to affect the patient [Pharmacist 5]

There were also uncertainties about responsibilities for prescribing when two or more medical teams were involved in patient care. Several accountability issues were identified by respondents regarding prescribing decisions made by the primary (or managing) team versus the consulting team. Primary teams, who allowed the consulting team to manage all aspects of management for which the consultation had been sought, were perceived to absolve themselves of responsibility. Primary teams, who chose to reject some or all of the consulting team's inputs, were perceived to shoulder full responsibility themselves. Lastly, primary teams who worked more collaboratively with the consulting team were perceived to share responsibilities:

Sometimes we've had some difficulty in the past... for example, sometimes the pain consultants will be a little bit cross when they've made a recommendation and commence some analgesic at the request of the parent team, who will then come in and say, "No we don't want them to have that and cancel it all". So for example, the boys have often said, "Why are they asking us to come and see a patient if they cancel or delete what we actually prescribe?" So I think sometimes there's a bit of a, pardon the expression, a bit of a turf war. I believe the managing doctor is what I call parent team, is overall responsible for the patient, but from an analgesia referral prospective, I believe if [the pain management team has] been asked to consult in regards to pain management, then [that]... recommendation should be fine. [RN 4 Clinical Nurse Consultant]

Pharmacists were consistently viewed as having a specific responsibility for detecting errors, checking doses and vetting potential drug interactions. In this regard, pharmacists were perceived by some respondents as having a very great responsibility to the extent that some

prescribers felt diminution of responsibility knowing that pharmacists would detect any errors they had made:

And obviously as the prescriber you have the greatest responsibility because you've put your name against that drug. So, I think obviously the prescriber has the greatest responsibility, but I think in practice, I think the pharmacists play the greater role in picking up mistakes that have been made. [Registrar 4 advanced trainee]

I think there's systemic, how can I put it, there are things in place that often catch a lot of the things that go wrong with prescribing. And I think that often we as doctors rely on that. [Registrar 2 advanced trainee]

I mean the actual prescriber, the person putting pen to paper should be but unfortunately, you know, it's not often the case. I think a lot of the doctors write out something and expect that it's going to be checked, you know? I think a pharmacist has a large degree of that responsibility, to check that it is the right stuff, but it's a shared responsibility I guess. [Pharmacist 1 specialist clinical pharmacist]

One junior doctor, however, was unclear about the responsibilities that pharmacists had for prescribing and therefore did not display the same level of trust:

And I'm not sure about the obligation of the pharmacists is in terms of checking medication. I know they do check them but I don't know if they're obliged to check them, or if they're obliged to highlight problems with them. I know they often do, and I appreciate that because they're more expert at it, it's their field and as I said, part of their job's, often doctors get busy doing other things... I don't know if it's actually their responsibility. I don't know if that's their job description or not. [JMO 8 PGY 1]

The dominant view among the medical cohort was that pharmacists were not responsible for *what* was prescribed. Therefore, other than checking for interactions, they were not seen to have responsibility for the appropriateness of prescribing:

...how medications are used correctly is what I see the pharmacist's role as. I'm not sure but I don't think most pharmacists get a chance to read too many histories. They'd have to go out to the main notes. Certainly not in our area because the pharmacist is just flat out. So they don't have intimate knowledge of that patient's history. [RN1 Clinical Nurse Consultant]

I think that they're a safety net. But they're not the ones who are ultimately responsible for prescription of the drugs. [Registrar 7 advanced trainee]

These views were substantiated by an example of a medication incident provided by a pharmacist involving a patient who inadvertently received a dose of enoxaparin whilst awaiting a lumbar puncture. The pharmacist explained that without knowledge of the planned procedure, which was not documented in the notes, she did not have any reason to question the order, which was written correctly with the correct dose. The case illustrates a type of error that the system was not able to readily detect because of reliance on the medication chart as the primary tool of communication.

However, as indicated previously, pharmacists themselves generally did perceive that they had a role in verifying appropriateness where possible. For example, several pharmacists described their practice of matching drugs to a patient's medical conditions as part of taking a medication history. However, it was obvious from both nurses' and pharmacists' accounts that pharmacist appraisal of a patient's changing clinical state was not possible for every medication that was ordered:

I look at all the medications that they're on and try and piece it together as to why they're on every single medication that they're on. And check as to the suitability, that there is an indication for everything that they're on, that the doses are suitable. I also check with the patient just to make sure what they're on corresponds to what's been ordered. And

basically explain to them if there are any differences, try and find out why there are any differences. [Pharmacist 7 specialist clinical pharmacist]

We're seeing a decline in that in the hospital in a big way and they [pharmacists] do not have time to check every chart every day, but they often write little messages when they feel the prescription is incorrect or when they've have the chance to check up the drug history of the patient, you know, "This patient is usually on this, you haven't put them on it". All that sort of thing. They have that role but they don't get a chance to follow through because they're too busy. [RN 7]

Nurses were generally considered to have a lesser responsibility for what was prescribed, but were responsible for knowing what they were administering, picking up errors, and seeking medical review if there was a change in the patient's condition. There was some debate about whether nurses were responsible for verifying doses and several respondents felt that nurses lacked the necessary training to do so:

Yes it is our responsibility, but I can't know all the medications, so I tend to find myself - if I obviously saw something and it was incorrect or I was worried about it, well then yes I would query it. [RN 2]

I think the nurses less so, look at what the actual drugs are, unless there's some simple errors, but they don't tend to review what has been prescribed as much, except with the exception of when they check the observations and someone's bradycardic, they'll withhold the digoxin or question should they be on it?[Consultant 2]

I don't think they have an obligation to do it. The feeling I get from nursing staff is their role is to put it into the mouth whatever is written. I appreciate, I think they are generally quite good at picking up mistakes and things, and I think that's something they do beyond what is actually expected of them. [JMO 8 PGY 1]

I'm not... convinced they have enough training in that area to say that they should be responsible for prescribing. I think that in the area, in which they're working, they should

have some idea of what the appropriate doses are and I guess they should have a certain training in the way they approach reading a prescription, that'll hopefully trigger something if it's not quite right...it's more the process I think that they should be responsible for, rather than the prescribing itself. [Pharmacist 7 specialist clinical pharmacist]

One pharmacist also felt that because enrolled nurses (unregistered nurses with 1 year of training) were now able to administer medicines, the responsibility of nursing staff to verify the safety of medication order had probably been reduced.

An alternative view expressed by one nurse was that nurses should be auditing medication charts for safe and appropriate prescribing as they are the ones administering the medications:

I think normally a ward should have a nurse who audits these things, the charts, pick up the chart and see if they're prescribing... But then you see the school [medical school, University] says to us, it's not your job so where do we go from there? [RN 6]

3.4.3. Organisational responsibility.

Predominately, medical respondents conceptualised responsibility for their patients as a professional rather than an organisational responsibility. This interpretation was based upon the fact that respondents rarely mentioned the responsibility of the hospital or its organisational units without the question of organisational responsibility being posed. This was also illuminated by one consultant.

But if you're asking, 'Do they [the Drug Committee and other bodies] have a responsibility for what is prescribed?' No, I think I do. I believe people are my patients and my name at the end of the beds and therefore I'm responsible. Therefore if something goes wrong, I'm not going to sort of say, 'Well they let me prescribe it'... So I don't see that they have a role in checking that I'm doing the right thing. [Consultant 2]

Another consultant indicated concern for over-reliance on organisational responsibility stating that the more people there are involved (in prescribing), the less personal responsibility individuals take. For this reason, he did not think that prescribing in hospitals “worked all that well.”

When prompted, consultants cited the hospital’s Drug Committee, the pharmacy department, and the microbiology department as responsible for determining the availability of medicines in the hospital (via the formulary), developing policies on appropriate use, and containing the cost of medicines. Medication Incident Committees and Patient Safety Committees were mentioned as being responsible for reporting errors, although few expanded on how these reports improved prescribing safety for their patients:

Well I mean there are choices that are made within the hospital as to what drugs are available within the hospital pharmacy and we sometimes communicate with that committee if we feel that there are things that should be available or should be changed and sometimes they even listen to us, but not always. [Consultant 3]

In general, registrars and junior doctors were less aware of the functions and responsibilities of organisational bodies within the hospital concerned with medications. Awareness was greater for the incident reporting committees than for the Drug Committee; and none of the junior doctors cited the Drug Committee by name.

Overall, pharmacists and nurses expressed a far greater awareness of organisational responsibility than the medical cohorts. Nurses, in general, focused on incident reporting systems; whereas pharmacists cast the widest net on organisational bodies which they felt shared some responsibility for prescribing in the hospital:

...you've got things like Medication Incident Committees... where they pick up on incidents in the hospital and can...put together strategies and ways of minimising medication incidents through prescribing errors, so they're also like a body, like an official body involved for the hospital to promote rational prescribing... the Drug Committee for appropriate prescribing, you know, in terms of protocols and what drugs are on formulary, first line, second line and that sort of thing. And then that would also come down to I think the clinical teams and I guess each department developing their own protocols for prescribing for certain conditions like the clinical pathways...[Pharmacist 6]

3.5. VALUES

A series of questions were used to explore respondents' beliefs about what prescribing involves and what they felt they were trying to achieve when prescribing. The foundation questions were definitions of prescribing, goals of prescribing, and skills required for good prescribing. The main findings were that prescribing was commonly conceptualised in simple schemas, but paradoxically, was widely acknowledged to require a complex variety of skills to perform it well. Whilst a similar spectrum of skills was evoked by each respondent cohort, there were indications that some groups placed greater value on some skills than others. Few of the respondents demonstrated awareness or full engagement with literature on prescribing principles; for most, the goals of prescribing were seen purely in terms of desired efficacy or outcome. Some respondents included side effect minimisation as a goal, and fewer respondents again, incorporated cost considerations. Very few combined patients' choices into their goals of prescribing. A detailed description of the main themes, which lead to these interpretations, is presented below.

3.5.1. Definition of prescribing.

Most respondents took this question at face value and attempted to encapsulate their meaning in a concise phrase. Predominately, this was done in one of two ways: by defining prescribing as a risks/benefits analysis or as an act of writing or communicating the content of a prescription.

There were a couple of notable exceptions. A few respondents provided a more global definition, encompassing both decision-making and prescription communication activities, such as stating that prescribing was instituting a therapeutic intervention. Some saw prescribing as a derivative of treatment planning, and therefore saw it as implementation of a decision than involving decision-making itself. A very small number provided comprehensive definitions; two examples are shown below:

Certainly means more than just the filling out of the prescription. It's the institution of the management program that involves more than drugs. It's how to treat this condition and it covers the education of how to use the treatment modalities, how to take the drugs, how to avoid problems with the drugs and having fallbacks - so if problems arise, this is what we do, and that's part of the education. An education of the patient, an education of the person who has to do the next prescription. [Consultant 7]

Oh, it's so incredibly complex process isn't it from making appropriate diagnosis, identifying appropriate therapeutic interventions in, you know, what class of therapeutic agent or medicine you want to use, looking at co-morbidities, looking at side effect profile of the medicines that you want to use, looking at interactions with other medicines, looking at likely compliance issues,... ensuring that they understand why they're getting the medicine, like the side effects they're going to have and I guess empowering them to be involved in the prescribing decision-making process as well, not as a sort of legal cop out but as a sort of enhancing efficacy and compliance. So I think that's all part of the prescribing process. [Registrar 8]

These more considered definitions may have emanated from reflection of actual practices, or alternatively, from experiences in teaching prescribing, which would have sensitised the respondents to established principles of the activity. Nevertheless, these definitions were meaningful in that they shared an appreciation for the complexity of prescribing and the need for patient engagement or education (as opposed to “advising the patient”); facets of prescribing

which were seldom incorporated into the bulk of respondents' definitions or seen as goals of prescribing.

3.5.2. Skills required for good prescribing

The various respondent groups tended to evoke similar sorts of skills, which they felt were required to prescribe appropriately and safely. Differences lay in the recurrence or emphasis placed on some of these skills by the various cohorts. The types of skills (which also included knowledge and attitudes) cited by the entire sample are categorised in Figure 19.

The main differences noted across the cohorts were: the strong emphasis on drug and patient knowledge evoked by registrars; the emphasis on communication to staff as well as patients evoked by both pharmacists and nurses; the complete failure of any of the junior doctors to mention communication skills (although a few mentioned that these as important in response to other questions); and the emphasis on adopting appropriate attitudes evoked by nurses.

The lack of prominence placed on communication skills by junior doctors was particularly meaningful, because in earlier questioning, they did not cite education or communication to patients as one of their roles.

Figure 19. Knowledge, skills and attitudes required for good prescribing

Knowledge

- drug: dose; metabolism; drug interactions; side effects; administration; availability
- patient: medical history; patient's "wavelength" to enable engagement
- awareness of resources and how to access them
- knowledge of prescribing principles

Skills

- diagnostic and clinical assessment skills
- clear writing
- communication skills (to others involved and to the patient)
- skills in education
- frequent medication review
- medication history taking
- monitoring and follow up
- generic use of drug names
- time management skills
- cost minimisation

Attitudes

- awareness of limitations and not fearful of asking for advice
- awareness that you can make mistakes
- awareness of the implications of what you are doing and why you are prescribing
- flexibility if strategies don't work
- being meticulous, checking your work, checking resources

3.5.3. Goals of prescribing

Overwhelmingly, the goals of prescribing were described in terms of improving health outcomes or maximising efficacy. For many, this aim was enough; others also considered the unintended effects of medicine use and spoke of minimising side effects. A few respondents also included a goal of containing costs (although on prompting, many more thought that cost was an important influence on prescribing.) As noted previously, very few evoked patient involvement or patient acceptance of treatment as a goal:

You try to treat their condition, whatever they're condition is, with the least possible side effects or complications from them, if possible, because sometimes there's going to be complications and you can't avoid them, so you have to allow for them. [Registrar 1]

Well the goal is to be able to communicate about that particular tablet or medication, a particular dose, a particular frequency for duration of time and to have that legibly written. [Registrar 7]

That you're choosing a medication that's appropriate, that's the best available medication for that condition, it's not going to interact with other things, it's unlikely to cause side effects, have a good side effect profile, and I guess convenience for the patient. How many times a day they need to take it, administration cost. [JMO 7 PGY 1]

One respondent had a more pragmatic perspective:

To try and get the patient out of hospital basically. To treat condition that brought them into hospital in the first place, to try improve, or to treat that condition. And also to prevent complications, secondary to whatever disease they've got. [Pharmacist 7specialist clinical pharmacist]

3.6. ATTITUDES ABOUT PRESCRIBING

3.6.1. Attitudes explored

Attitudes surrounding several facets of prescribing were explored in this study, such as roles, relationships, responsibilities, influences, errors, and communication. The primary means of exploration was through implicit questioning about these facets of prescribing at the hospitals, which revealed a number of commonly held attitudes. These have been described under the themes that they shape. However, in order to gain a clear understanding of respondents' association of risk with prescribing, a direct question was put to the participants, which was analysed along with responses to other questions.

3.6.2. Perceptions of risk

Range of attitudes. In each of the five respondent cohorts, there was a diversity of attitudes about risk associated with prescribing. At one end of the spectrum, respondents used terms such as “small risk”, “not being fearful”, “not particularly stressful”, “being careful rather than anxious” to the other end of the spectrum, “high risk”, “huge risk”, “fear”, “scared” and “frightened”.

These views were fairly evenly distributed among the consultant and registrar groups; but in the junior doctor cohort, there was less of a spectrum of views and more of a dichotomy. One group perceived a low risk, which they consistently attributed to their sense of security in the system of checks on their practice:

Because we've got like the consultant, the pharmacist, there's all this communication before we actually write pen on paper on prescriptions, so I think, what I'm trying to say is the safety net - it's pretty safe - I mean relatively. [JMO 3 PGY1]

Because of my position I guess, I don't feel any responsibility really. On overtime I do, ... but I guess the way the system is set up, a junior medical officer doesn't have that much responsibility in their day-to-day job. We sort of do and we sort of don't. But on overtime particularly, you know you worry more about what you're prescribing, and check more that they're not going to interact, because normally [during the day] you think, 'Oh the registrar will know.'[JMO 6 PGY2]

The other smaller group of junior doctors were keen to express their awareness of drugs as poisons and respect for the risks involved:

Well yeah it is inherently risky, cause it doesn't take much, a fairly small error can be potentially lethal. When you are dealing in numbers it is not hard to misplace a decimal point or to write something that the person actually giving out the medication doesn't understand and gives out the wrong dose in milligrams instead of micrograms. Or gives the wrong drug cause the writing isn't legible. No it is very, very easy to make lethal mistakes.[JMO 4 PGY1]

In the nurse and pharmacist cohorts, the dominant view was that prescribing carried great responsibility and was risky; furthermore, a recurrent belief of pharmacists was that junior doctors did not have a full appreciation of this risk. However, there were also divergent opinions in these groups:

[On whether prescribing was a risky activity] I think so. You prescribe the wrong dose it could kill someone.[RN 6]

I mean I often think like for the junior doctors that it is very risky because I feel like they often prescribe things that they have no idea what they are and I guess that comes across when they phonetically spell the drug that they are meant to be prescribing and it is nothing like the actual. [Pharmacist 5]

Probably, I don't even think about it which is very bad, even if it's an intravenous drug, probably don't even think about it. [I don't think about it] because hospitals are so drug oriented. I mean people come here to have medications or surgery or both, in a way, and that's what we do.[RN 7]

Concepts. Although seldom differentiated explicitly by respondents, there appeared to be two ways of conceptualising risk with prescribing: as the potential for adverse drug reactions (ie, intrinsic risks of drug) or as the potential for errors that might be made by the prescriber or those involved in carrying out the prescription. Whilst many expressed an awareness of both, some respondents focused on one of these risks. For example, many doctors mentioned how they rationalised fear in the same way that they would for any intervention, by weighing up the risks and benefits of the drug therapy, but it was unclear as to whether this analysis incorporated the risk of error:

I think you always feel that something could go wrong with the prescription or that it doesn't get taken correctly [Registrar 7 advanced trainee]

I'd have to say that it's a risk. I'd consider it a risk just like any other intervention so, you know, if you're thinking about doing an angiogram or surgery on a patient, you have to look at the risks versus the benefits if you're considering an investigation. An X-ray, you have to weigh up the risks and benefits and I guess to an extent probably try and be as scientifically rigorous as you possible can in terms of looking at risks and benefits of any intervention. [Registrar 8]

Arguably, risk of error was a more dominant theme in pharmacist and nurse accounts; however, the way in which each respondent expressed risk appeared to also relate to the types of drugs within their therapeutic area. Chemotherapy prescribing in particular was strongly connected to fear of error:

Yes, I think it is a high risk procedure - the bottom line. I think it is. Yes, that is how I feel when I prescribe things. Do I still feel nervous when I'm writing out scripts for chemotherapy drugs? Often is the answer! Yes, I'm often triple checking noughts and ones, because the difference is...I mean I'm much more nervous prescribing chemotherapy drugs than I am prescribing normal drugs because there is less margin for a big mistake to be causing a big problem. So yes, I am, I feel generally, yes, cautious when I'm prescribing. I hate being rushed to write up chemotherapy drugs and, you know, thousands of people talking to me and that's usually what's happening. So, yes, I feel like I'm in a very vulnerable 'highly-likely- to- make- a- mistake' position when I am writing up chemotherapy drugs.[Consultant 5]

Circumstances. A number of doctors felt that familiarity and clinical practice lessened their sense of risk, and consequently risk was more acutely felt for less routine prescribing. One consultant felt greater risk and responsibility for prescribing decisions that fell outside the manufacturer's recommendations. Some doctors apportioned greater risk with making global patient management decisions, such as whether to treat or not rather than with drug selection; others felt increased risk when prescribing for patients with complex medical histories. One registrar felt greatest risk when prescribing for patients who were being discharged from hospital because the immediate effects of the drug were not being monitored:

So sometimes I'm more scared of new antibiotics that I haven't heard of than old chemotherapy drugs that I've prescribed many times. But we've got a huge learning curve as new drugs come in [Consultant 8]

Anticoagulants in the elderly are the things I think that I would worry the most about. Both for and against, you know, the issue of well should I actually use the anticoagulant prophylaxis or should I not? [Consultant 2]

3.7. CONTRIBUTORS TO ERROR

Respondents were asked to describe a prescribing error from their experience of working in the hospital (not necessarily a mistake they had made personally) and then to bring to mind possible contributors to that error. Examples could also include instances where they considered the order to be correct, but for some reason, it was misunderstood.

3.7.1. Perceptions of frequency

Few respondents provided an example of an error they had made, yet there was widespread acceptance that errors occurred frequently at the hospitals and that “everyone makes errors”:

I mean I think it happens all the time. You mean the patient gets the wrong drug? I mean it happens. [Consultant 4]

I sure have - everybody does, most of the time you just mis-write something accidentally. I haven't done anything that hasn't been pointed out that I know of, but I have mis-written things they couldn't understand whether it was micrograms or milligrams or something like that. [Registrar 1]

Part of the acceptance of errors as being commonplace appeared to arise from the view that most errors are intercepted by the checking system:

Prescribing errors happen all the time, which is unfortunate, but mostly they're picked up before they actually happen. [JMO 7 PGY 1]

Well, in every occasion that I can remember, the nurse or the pharmacy has kind of, sort of done their normal job, and been coming around fixing up my mistakes. So fortunately they have always picked those things up as far as I can recall and it's never been executed. [Consultant 5]

This sense of security in the system, particularly among the junior doctors, may possibly have been enhanced by lack of awareness of errors that go undetected. Of interest, three junior doctors stated that they had never seen a report on incidents at their hospital, but others working at the same hospitals stated that they knew about incidents reported from various meetings and through bulletins.

3.7.2. Examples of prescribing errors

Various types of errors were identified in respondents' accounts. Errors associated with: illegible handwriting (eg, transcribing Aropax^{xxxii} instead of Aurorix^{xxxiii}); omission or unclear decimal points in doses (eg, diazepam 25 mg prescribed instead of 2.5mg); drug interactions (eg, tramadol and an selective serotonin reuptake inhibitor [SSRI]); incorrect choice of dose (eg, chemotherapy dose not adjusted for ideal body weight in a patient with obesity); incorrect route of administration (eg, intramuscular instead of subcutaneous administration charted for Aranesp^{xxxiv}); duplicate orders; plus others.

3.7.3. Individual factors

Lack of skills and knowledge were commonly evoked contributors to error. Dominant themes were: poor skills in taking medication histories, illegible handwriting, and poor knowledge of doses. As well as problems with prescriber knowledge, deficits in nurses' knowledge were identified, in particular ability to check and interpret complex medication orders (eg, insulin):

I think the ones [errors] most commonly [seen] are patients who come in on SSRI and tramadol ...it might be written and charted in an emergency because that's just what they've been on and no-one' sort of reviewed it actively down in emergency. And so you see them on the ward and change it to something else. [JMO 5 PGY 3]

^{xxxii} Tradename for paroxetine

^{xxxiii} Tradename for moclobemide

^{xxxiv} Tradename for darbepoetin

I have had problems before where you have made an order in the notes about a certain medication and it is not heeded or they [nurses] don't pay attention. Or you tick the box with the trough level and the trough level is just not taken and the medication is just given. So I mean again maybe more nurse training as well. [JMO 4 PGY 1]

Experience of working in a particular therapeutic area and familiarity with systems were also indicated in a number of responses:

I know we all hate changeover time [when JMOs begin their 10 week rotation into an area] because there are so many errors. [Pharmacist 5]

A large number of factors specifically relating to the workplace environment and practices of the teaching hospitals were cited:

Physical Health. Tiredness was the main physical health factor mentioned, which tended to be given as an all purpose explanation for errors on overtime. Of interest, stress was rarely mentioned by any of the doctors interviewed, although some pharmacists attributed some errors to junior doctors' stress:

And also, a level of tiredness, trying to work out the maths, obviously my brain wasn't working at the time. Overtime shift and I was tired at the time.[JMO 7 PGY 1]

And I think they know it too [know that they are not devoting enough time to prescribing] because they seem very, very stressed out, junior medical officers on the wards. And I think part of that stress is associated with the fact that they're going a million miles an hour and they will often say I didn't have time to look it up [Pharmacist 5]

Attitudes. Several attitudinal factors were identified, the dominant ones being "laziness" and lack of care. According to the respondents, these attitudes were either associated with the

failure of an individual to understand the consequences of their actions or more generally with an underlying workplace sentiment that placed prescribing as a low priority. As previously mentioned, several pharmacists associated this attitude with transcribing errors made by junior doctors; also, in one pharmacist's opinion, less care was taken by doctors when prescribing medicines unrelated to the reason for admission:

*Because there - to me - there didn't seem to be any care behind it. The fact that they really honestly weren't a hundred percent sure of what they should be prescribing.
[Pharmacist 11 specialist clinical pharmacist]*

I think maybe because she's not in for that condition, she's probably been prescribed it for ages by the renal team and it's just a drug that actually has nothing to do with what they're treating at the moment. [Pharmacist 10]

Communication. Communication between doctors and nurses was commonly evoked as a contributor to errors involving non-routine or complicated medication orders. Several doctors thought that the transience of some nursing staff contributed to these errors, whilst others (nurses and doctors) put these problems down to poor planning, documentation and/or communication by the medical team:

*You know, in a morning and an afternoon, you will see two different nurses that you'll never see again in your entire life, so you might make it clear about how the dose should be given, even if you're correct, it might be executed by the first person and not the second person, ditto with the medical workforce who are moving around. But the nursing workforce in particular are incredibly transient, there's a lot of part-time people.
[Consultant 5]*

... the team responsible for the patient, I think, has to have ownership for appropriate communication with after hours staff. It's part of ownership of the patient, you know, part of the strategic direction we have. [Registrar 8]

[Referring to treatment plans documented in a patient's notes] I felt that didn't make - that isn't a kind of statement, that's just educated guesswork. I mean I could have written that. You need something clearer. [RN 2]

One nurse perceived a particular communication problem associated with doctors who walked away before checking to see that their instruction was understood:

That's another big problem too is that the doctors will rush up to nurses and tell them... see we've got a lot of new grads, you know, the first year out from uni. They're a bit frightened of questioning doctors, even the JMO's so they'll just pretend that they know what they're talking about and come and get me, then I'll have to go and re transcribe... or find the JMO and ask him exactly what he meant... and if I wasn't there, I often worry what would happen. [RN 1 Clinical Nurse Educator]

3.7.4. Environmental factors.

Interruptions, distractions, and multi-tasking were recurrent themes associated with prescribing errors and particularly transcribing errors. For example, one registrar commented about the need to “find headspace” when prescribing and found the constant paging from nursing staff she experienced as a junior doctor intrusive. As commented previously, a consultant felt that interruptions whilst prescribing chemotherapy substantially increased her risk of error:

Similarly, workload (especially on overtime shifts), hurried workflow patterns (for example, rushed ward rounds and sudden decisions to discharge patients), and general busyness were repeatedly cited. Several pharmacists believed that a common source of errors was the lack of time given to junior doctors during ward rounds to transcribe verbal orders:

...you have to come in at six o'clock to do the med charts on a Tuesday before seven o'clock - because at seven o'clock you've got a ward round, at eight o'clock you're going to theatres and you know, the whole day's going to go by and it's going to be seven o'clock again and the med charts won't be rewritten. So there's a limited amount of time to write the med charts

and a limited amount of time for checking. So - and also you might get distracted during - while - you're writing and just leave off the last signature or whatever or the last number. It's just being really, really busy. [JMO 9 PGY 1]

I think probably the main one which I mean I think a lot of it gets down to the timing for the junior doctors...in that they will often go on a round and there will be so many things happening and they will be being told to write up this and write up that, and some of them do write it up on the ward rounds, but some of them come back and do a second round later, to sort of do all the things that they have been told to do and I do think that timing gap is quite a problem. [Pharmacist 5]

Insufficient time for accurate transcription and critical review of discharge prescriptions by junior doctors was also reported as a contributor to error by a range of respondents:

I guess the most common thing is to 'drop the drug' when you rechart the chart, like drop them out, or put the wrong dose. They're the most common things I've seen, and they're usually picked up by the ward pharmacist, sometimes by the nurses. And particularly up on the discharge chart, you know, you forget to write them in the summary or something, and the pharmacist picks it up when they do it. I think they're the most common things, wrong dose or drop it out. [JMO 6 PGY 2]

A patient was prescribed olanzapine on discharge and she was supposed to be on diazepam...It was only when we were discharging we asked them to send along the medication chart [because we saw that] the patient was on risperidone and so it was very unusual to have two antipsychotics, We looked at the chart and saw that it was diazepam and not olanzapine, and it had been written up by a relatively junior doctor on the discharge...Well the handwriting was one[factor], the other one was I think, there was rush, rush, rush and the other one was just her experience.. I think it was a combination of rushing, just the handwriting and, you know, her inexperience...[Pharmacist 4]

A further contributing factor specific to the hospital environment was the diminution of patient responsibility. Although some patients with chronic conditions were seen to be knowledgeable

about their medicines, this knowledge source did not appear to be proffered or tapped as a means of error prevention:

They come into hospital, and normally they'll do insulin well themselves, they come to hospital; they lose all responsibility for everything. I find they're very happy to sit back. They know that they're supposed to check their blood sugar, take their insulin and eat and somehow when they come to hospital, that whole routine, that whole thinking goes out the window. [Registrar 7]

3.8. INFLUENCES ON PRESCRIBING (DECISIONS)

3.8.1. Consultants

The strongest influences on the prescribing practices of the consultant cohort were considered to be scientific evidence and peer review.

3.8.1.1. Scientific evidence

Various terms were used by the cohort to describe this form of influence: “meta-analyses”, “randomised studies”, “controlled studies”, “evidence-based medicine”, “systematic review” or most commonly just “the evidence.” Scientific evidence was sourced by the consultant cohort in several ways. Predominately, it was identified through their own reading of medical literature: from subscribed journals, conference proceedings posted on the internet and literature searches. Many also utilised articles provided by drug representatives. In addition, the cohort also acquired knowledge about scientific evidence at scientific meetings or via referral to established protocols and guidelines. Whilst it was viewed as a dominant influence, limitations to its influence were widely acknowledged. Problems with extrapolating clinical trial outcomes (benefits and risks) to patients falling outside the trials inclusion criteria were cited; in particular, patients with other significant medical conditions.

Cardiologists are fantastic at doing evidence-based trials and putting people on five different medications, but they may not necessarily be reviewing the fact that it's making the person confused or falling, and so it's a balance between looking at the evidence for a medication, and in my patient population looking at the side effects that they may actually be causing. [Consultant 2]

Consider the evidence as to what works best in the context. It's not always the answer to prescribe the evidence-based best product, because it doesn't always suit all patients. [Consultant 6]

3.8.1.2. Peer review

Peer review of prescribing decisions occurred as part of medical team discussion or during patient management meetings. In the former sense, registrars were classed as peers. Peer review was highly valued by some as a means of improving the experiential rigour of particular prescribing decisions. To this end, it was used in various ways: to appraise management options; to canvass alternative interpretations of scientific evidence; to garner support for “off-label” indications; to get an opinion from colleagues viewed as having greater expertise in a particular subspecialty; or to gather opinions on rare patient presentations or adverse events. However, some physicians felt that overall, their specialist colleagues were not that influential on routine prescribing decisions that they made:

There are times when you can prefer to run with the evidence and with your agreement with the patient and override colleagues opinions, but there are times when the evidence is early or less, or you're prescribing off label, then you must take your peers with you.[Consultant 6]

...we have two weekly meetings where we discuss patient management, we have monthly journal club, where we are obliged to discuss modern trends, but it would be impertinent to go out on a limb and prescribe because you think this is the way it should be done, without peer review. [Consultant 7]

Other important influences for the consultant cohort included: personal experience, the patient, and the pharmaceutical industry.

3.8.1.3. Personal experience

Personal experience was articulated in several ways. Commonly it was described as drawing on knowledge built up through familiarity with a drug or situation. This was exemplified by a subgroup of consultants, who each described their most frequent prescribing decisions as removal of drugs or “deprescribing”:

And the other thing too is experience with a particular group of agents and, you know, I think I'm more likely to keep using things that I've used and feel comfortable with than using something that's new just because it's new. It's more likely to be the opposite. I'd be more likely to stay with something that I was comfortable with, rather than change to something that's new unless there was some specific advantage. [Consultant 3]

The reason for consultation is to get rid of some drugs and so removal of drugs is just as important a prescribing issue as the institution of new drugs. So removal of drugs doesn't require looking at a source of information. It requires use of an experience or base of knowledge of what's inappropriate. [Consultant 7]

The need to be self-critical about your own experience was also voiced:

There is this background and backlog of experience and information that you keep on building on, but one learns from all the surprises you get from meta-analyses not to, and from the large scale clinical trials, how you can be so wrong. We used to emphasise so much in osteoporosis prevention and treatment, the hormonal replacement therapy and in post-menopausal for women and all of the theoretical and the observational studies seem to support that and then came the Women's Health Initiative major studies, which really arrested that...[Consultant 6]

Another way in which this influence was expressed was when they were sensitised to a particular safety concern because of past experience:

...and it depends on how sensitised I've been about allergies. Like last week I had someone who had a disseminated rash and I suppose that raises your awareness at the time. [Consultant 2]

According to one of the pharmacists, this influence was sometimes enacted in a wholesale manner in what was termed the “N=1 experience”:

And that is the knee-jerk reaction: my nice patient nearly died because I didn't do something, even if that was evidence based that I shouldn't do it, I'm now going to do it because my last patient nearly died. [Pharmacist 1 specialist clinical pharmacist]

3.8.1.4. Patient's opinions

Patient's opinions about treatment options were actively sought according to most consultants, as they viewed this as a critical part of therapy selection. Many saw this as a means of maximising adherence to treatment. However, the practice most commonly articulated was that the consultant provided the evidence-based options to the patient for discussion, rather than the patient suggesting their own therapies. Nevertheless, there were circumstances where patients' treatment suggestions were viewed as influential, which had the effect of stimulating ethical stances among the doctors. Patient influences appeared to be viewed either benignly or critically. An example given of an appropriate influence was a patient undergoing chemotherapy who directs prescribing of anti-emetics and anti-diarrhoeals. A more critical view was taken of lobby groups or community influences, which were perceived as patients “pressuring” doctors:

Patients will often come in with cuttings from newspapers or a particular story they've heard on the TV, which they may have even taped so you can listen to it... The pressure

is not only [what] they put on you as individuals, but the pressure that they put on as a group. You know, as groups of lobby...groups of patients, so they are very agitated about particular types of treatment, so that's one powerful influence. [Consultant 5]

Patient influence was generally regarded as a relatively weak influence by the other respondents, and again there was a tendency to see patient influence as either good or bad. Some respondents felt that patients in hospitals were far less likely to influence decisions than patients in the community. In the hospitals, patients with chronic conditions were seen as more likely to influence prescribing decisions than patients with new or acute medical conditions, who may be too frightened to voice an opinion:

Most of the time, it depends if the patients have chronic illnesses, long term chronic illnesses, they might say up the dose or down the dose... but when we issue a new drug because they all come in with acute illnesses from geriatrics, so actually, yes [they] tend not to[influence]. [JMO 3 PGY1]

And they're [the patients] quite frightened. They don't really usually get involved because you wouldn't know the therapies and all that, so they're really, for want of a better word, just put their hands in the doctor's hands and just let him decide, which is fair enough I suppose. [RN 2]

Patients were also perceived to influence prescribing decisions by reporting side effects of medicines and also refusing to take medicines.

3.8.1.5. Pharmaceutical Industry

Influence from pharmaceutical industry was consistently viewed by the consultant cohort as problematic, however there was a range of opinion about industry generally and great variance in beliefs as to whether industry influenced consultants personally. For many, industry's supply of drug information in the form of emailed conference alerts and online access to journals was seen to be useful and they viewed this benignly. Industry sponsorship for conferences and for

continuing education activities was also viewed favourably by many. An alternative view expressed by some who did not engage with these activities (and also by a few that did) was that through these seemingly ethical information support services, industry was most likely having a substantial subliminal influence.

More broadly held criticism was expressed for what were viewed as the more blatant attempts to influence, such as the use of glossy brochures and visits by drug representatives. However, these did not necessarily dissuade consultants from seeing representatives or minimising their exposure to industry. The inference from their comments was that they felt they could detect attempts to influence and therefore outsmart industry; and some even seemed to derive satisfaction from doing this:

By and large I think the pharmaceutical industry does provide me with information about the medications and about the role of medications in the clinical conditions. But I still make my own decisions as to whether - whether this drug may ultimately benefit my patient. [Consultant 1]

We can see what's going on [at drug company sponsored meetings]. Half of the consultants have PhD's in pharmacology or drug-related clinical practice... It's a matter of recognising it [the influence]. The evidence still has to speak for itself. If the drug doesn't work, it doesn't work. [Consultant 7]

Opinions from the consultant cohort on whether industry influenced their prescribing behaviour varied widely and fell into four categories. One group believed they had no influence:

They don't influence mine and I am sure they do influence people. I mean you can tell by the way that how persuasive they are... for example the statin, atorvastatin, and it's only recently there's been objective randomised studies and yet it was the best-selling statin

and that was because it was promoted by the representatives and there's a way of promoting things [Consultant 4].

A second group believed they had a modest influence, tempered by perceived limited opportunities for influence in their specialty:

I guess I would feel that in my area of expertise they're probably not going to influence me particularly strongly. I wouldn't be so stupid as to say they can't influence you because of course they can. I mean even if it's just by communicating with someone and talking about something that will probably influence what you do. I think it's a fairly modest influence. [Consultant 3]

A third group believed they sometimes had influence, but that the influence of scientific evidence ultimately overrode this:

[My] prescribing...was a bit influenced or determined by pharmaceutical company giving samples and that sort of stuff, but eventually evidence has been taken over as the main determinant [Consultant 6]

The last group thought that industry was highly influential and as a result minimised their exposure by not seeing drug representatives and not participating in drug company sponsored activities. Despite minimising exposure, the invasiveness of industry's promotional efforts was observed:

I think they influence you largely just through their impact on their promotional material that they're sending around on a regular basis. Even if you're not reading it you see it. It's just constantly around you, patients are telling you about it, other colleagues are telling you about it. It's just actually, it's very subtle, because I don't go to any company meetings or propaganda, but yet still I sort of almost know what they're saying there anyway, so I must be hearing it even though I 'm not there.[Consultant 5]

Aside from the consultant cohort, the other respondents were very aware of the presence of pharmaceutical industry at the teaching hospitals. Nurses, pharmacists and JMOs cited drug-company sponsored meetings, lunches, and frequent visits by drug representatives to senior medical staff as evidence of industry's influence at each hospital. It appeared that a common method used by representatives to see registrars in particular, was to provide them with journal articles and a cup of coffee. However, respondents from the registrar cohort who met with drug representatives felt that industry did not influence their prescribing behaviour:

... if I'm not busy and a drug rep pages, I will often go and see them... I know to take it with a grain of salt...I like it because I can get the articles. Free coffee, is another reason to do it. I don't know. I just find at the moment, my time is so precious, if they can, and I do realise it's a one-sided point of view, but if they could provide a snapshot of 'this is what the drug does', 'this is why', and 'here's an article from a reputable journal'. It's useful. [Registrar 5]

Some respondents provided specific examples of switches in brands of drugs at the hospitals, which they attributed to the concentrated efforts of drug representatives:

We had been using Losec^{xxxv} and all of a sudden everyone started changing to Somac^{xxxvi}. And that was as a result of the rep being very active and he ... Somac pads and things and lectures and lunches and things. So they have an influence. [Pharmacist 5]

3.8.1.6. Other influences

Several other influences were nominated by the consultant cohort, mainly in response to prompts:

^{xxxv} Tradename for omeprazole

^{xxxvi} Tradename for pantoprazole

Pharmacists were perceived as influential through their detection of drug interactions and prescribing errors. These influences have been reviewed in more detail under their Role (3.3.4). Provision of drug bulletins from the pharmacy department was also mentioned as an influence.

Nurses were seen as influential through their knowledge of the patient's condition. This has also been reviewed previously under the Role of nurses (3.3.5).

Drug cost was perceived by some consultants to be influential; but for most other medical respondents, apart from prescribing high-cost drugs (such as chemotherapy) cost was not taken into consideration routinely. There appeared to be several reasons associated with this. Firstly, some felt they lacked ready access to drug cost information; secondly, some felt that it was too difficult to incorporate this information into their decision; and thirdly, some thought that cost consideration of medicines in the hospital were the domain of the Drug Committee and/or the pharmacy department. Although the self-reported knowledge of drug costs among the medical respondents was generally poor, consideration was given by some as to whether drugs initiated in the hospital were available on the Pharmaceutical Benefits Scheme (PBS).^{xxxvii} Cost was also considered by doctors when the information was presented to them in antibiotic sensitivity reports. One doctor mentioned difficulty in locating drug cost information for non-PBS items (Figure 20).

^{xxxvii} List of medicines subsidised by the Australian Government.

Figure 20. Perspectives on drug cost

Absolutely. If you have a situation and to my mind it's a bit of a no-brainer, if you have two drugs that you consider of comparable efficacy and there is a significant difference of cost, I'd be much more likely to use the one that's cheaper, but usually the differences in comparable drugs are fairly small because they know that it is going to play a role. [Consultant 3]

If I knew what were the cheapest ones, I would, but I don't know - I just don't get around to looking up the costs on PBS or anything.... it's not something that you think about and look down what's the cost of this drug, no -I don't actually do it. [Registrar 1]

It should but it doesn't. It's too hard to think of that as well. In a hospital setting, I think one just prescribes what we think is the best thing. I think it's...I mean it is vetted in a hospital. [Consultant 4]

I am not so aware of it...and I must be honest, that's probably working in a public hospital...I know that goes on in the senior level, the Drug Committee, but I don't think residents or registrars have any concept of the cost of drugs. [Registrar 5]

I think we try to prescribe things that the patient would be able to get on the PBS outside the hospital but, say they've got neuropathic pain or something, not all of them can get gabapentin outside the hospital, so you try not to use it inside, cause if it works, they're stuck. [JMO 6 PGY 2]

I find it [cost of drugs not available on the PBS] extremely difficult to understand in MIMs That's one of the things I find difficult to understand, and how perhaps it might be different in different chemists and how it would vary. I do find that particularly difficult to understand. Sometimes I have patients tell me what happens to them. That's when I realise how much things cost. [Registrar 7]

3.8.2. Registrars

As suggested under Roles (3.3.2), registrars predominately cited consultants as the strongest influences on their prescribing practice, but personal experience, protocols and/or scientific evidence were also major influences:

[On strongest influences on his prescribing] Staff specialist and the protocols, which are written down usually by the department which includes the staff specialist [Registrar 6]

As a registrar, we rely on the opinions of our consultant but more particularly the consultants of the respective fields. For example,...you might have three cardiologists here and they may have three different ways of initiating therapy for a post AMI victim, but...you might think this guy is a pretty good, or a much better cardiologist than the other two, so you might be influenced by that to start. [Registrar 2]

It would have to come from generally it would come from a combination of factors. It would come from the evidence in the literature about the medications, which is probably the number one, but there must be some underlying thing about what you've seen done and how it turned out. [Registrar 7]

Predominately, scientific evidence was drawn upon through their own reading of texts, published guidelines, journal articles (some provided by drug representatives), electronic databases (eg, UpToDate, Medline) or the internet. However, as one registrar pointed out, knowledge was also acquired by integrating other interpretations of evidence:

To get through physician training, generally you've built up a level of knowledge about things and the way people have presented things, particular things, which comes through their reading of journals. And you may have heard it from several different people who have presented the same evidence. And then general wider reading of journals...and journal clubs. Just talking to people on the ward, they'll talk about the evidence for such and such and then you have to believe them otherwise you'd be reading 50 million journals. So, it's a combination of what people tell you is the evidence and what you've

read yourself. And often you feel comfortable about something if it's been mentioned a couple of times. [Registrar 7]

3.8.3. Junior doctors

As indicated under Roles (3.3.3), the junior doctor cohort cited registrars and consultants as the strongest influences on their prescribing practice. Some registrars also cited the important influence of peers when they were interns. As mentioned previously, MIMS and the Therapeutic Guidelines were popular information resources for junior doctors, as was the Australian Medicines Handbook. Some junior doctors also mentioned using pharmacists as an information source, although pharmacists were not seen as a major influence on their prescribing decisions overall. Specialised nurses were mentioned as being influential by a few JMOs:

I think as an intern you learn from your registrar and as a registrar you learn from your consultant and it goes on [Registrar 4]

I think lower down the totem pole you go, so for residents and JMO I think you find that it is frequently more to do with what they have heard. So for example if I ask a registrar how do I treat this when I see a patient and he or she says this, this and this, well often I will adopt that as my way treating that patient, even though the books might, you know the textbooks might say something else. Even the therapeutic guidelines might say something different, but whoever told me initially how to treat that problem I will tend to adopt that as my mode of doing it. [JMO 4 PGY 1]

But generally, you look to your registrar for advice or for simpler things you might talk amongst yourselves So it's sort of group knowledge or peers and that that you respect, hopefully, then your registrar then maybe your consultant.[Registrar 2 advanced trainee]

So, at the junior level, there's a certain security about doing what authority figures say and do but it's not the best thing to do and so while you do need that for security and just for practicality and in the interest of your patients, increasingly as a junior resident you should ask why? Is that true? What's the evidence? [Consultant 6]

3.9. PRESCRIBING PROCESS IN THE TEACHING HOSPITALS

To contextualise the focal behaviours that were identified as being susceptible to socio-cultural influence at the hospitals, the core steps of the prescribing process were defined based on the analysis of respondents' accounts. The WHO stepped model for rational drug treatment was used as a template¹⁶, so that the steps identified in this research could be compared with the "one-prescriber" model (Figure 21). The model that was built from findings of this study is a representation only of how prescribing was perceived to occur at the hospitals. It is constrained by the design of this study, the themes evoked by the respondents, the interpretations of the researcher (MP), and the inherent difficulty of diagrammatically representing a complex and dynamic process. Acknowledging these limitations, the model serves to illustrate the complexity of the process in these settings. It demonstrates the intricate division of responsibilities, the system's reliance on human behaviours, and denotes the key practices susceptible to socio-cultural and environmental forces.

Figure 21. Representation of Prescribing Process*

	Decision/Action	Key Player(s)	Other Players
Step One	Diagnose	Registrar Consultant	JMO
Step Two MAKE PRIMARY DECISION(S)	Set treatment plan	Registrar Consultant	JMO
	Select treatment (ie, non-drug treatment; drug treatment; no treatment; consultation)	Registrar Consultant	JMO Patient
	Select drug efficacy, safety (main considerations) cost, patient acceptance (lesser considerations)	Registrar Consultant	JMO Patient
	Verify suitability of drug selection for patient	Registrar	JMO Pharmacist
Step Three DETERMINE DOSE VERIFY ORDER CHART ORDER	Give verbal order to JMO	Registrar	
	Select dose and dosing schedule (main considerations) Selection duration of therapy (lesser consideration)	JMO	Registrar
	Verify verbal order Check with registrar and/or check dosing using texts, pharmacist	JMO	
	Chart medication order Advise nurse about order so treatment can be started ? Advise patient about order	JMO	Registrar
Step Four CHECK AND REVIEW	Check order for errors, legibility, legal compliance, drug interactions, drug availability, dosing, and sometimes suitability	Pharmacist	
	Check order for errors, legibility, legal compliance, and sometimes dosing	Nurse	
	Check order for errors, dosing, interactions	Registrar	
	Check order Errors, dosing, interactions, missed doses	Consultant	
Step Four A IF NEEDED, REVISE DECISION	If necessary, revise primary prescribing decision and select different drug and/or dosing	Pharmacist JMO	Registrar
	If necessary, rechart medication order Advise nurse about revised order ? Advise patient about revised order	JMO	Registrar
Step Five EDUCATE PATIENT	Give instructions, advice, information to patient	Pharmacist ?JMO	Consultant Registrar
Step Six MONITOR AND REVIEW	Monitor results	Nurse JMO Registrar	
	Determine if further action required Stop; alter; continue drug treatment	Registrar Consultant	JMO

* Based on analysis of respondents accounts

4. CHAPTER FOUR: DISCUSSION

In this study, 43 health professionals working in two metropolitan teaching hospitals were interviewed to explore social and cultural factors influencing prescribing and the training of new prescribers at these sites. The study attempted to explore influences on behaviours of decision-makers and those involved in carrying out prescribing activities. The basis for this scope of enquiry was the WHO normative model¹⁶, which depicts prescribing as a series of decisions and actions. By examining the role of the key players in prescribing at the hospitals, from the perspectives of the various health professions involved, a representation was constructed of how prescribing takes place. Through exploration of respondents' perceptions of influences on prescribing and their belief systems associated with the process, an in-depth understanding of the socio-cultural forces affecting behaviours of the key players was developed, which is now discussed in relation to the literature.

Prescribing at the teaching hospitals was a complex process consisting of multiple steps undertaken by several different health professionals of varying levels of experience from three different health care disciplines. Key prescribing decisions associated with patient admissions were made, almost exclusively, by medical teams. Prescribing was therefore chiefly characterised by factors influencing the behaviours of each member of these teams, such as: what knowledge sources they used; how they interacted with one another to make prescribing decisions; how they communicated decisions to patients and other health professionals; and how they set in motion prescribing decisions. Behaviours of the doctors were influenced by factors relating to their individual characteristics (eg, knowledge, skills, experience); but also by a web of socio-cultural determinants inherent to the environment in which they worked. This is consistent with theories suggesting that prescribers are influenced by a range of factors external to consideration of clinical and drug factors.^{101, 117} The non-biomedical determinants identified in

this study fell into five broad categories: structural characteristics; communication patterns; underlying assumptions; knowledge characteristics; and the work environment.

4.1. STRUCTURAL CHARACTERISTICS

4.1.1. Intra-professional collaboration and medical dominance

Traditionally, research into determinants of prescribing in hospitals has assumed one decision-maker^{30, 32, 114} (ie, the same model for general practice), and there has been scant acknowledgement or exploration of the effect of the relationships within medical teams on prescribing. Furthermore, there has been little enquiry into the effect of their different identities on prescribing.^{113, 132 133}

The global characteristics of medical teams that shaped prescribing in the teaching hospitals were the closely tied values of intraprofessional collaboration and education. There were two very strong relationships that influenced prescribing: the relationship between registrars and consultants, which was underlined by the way in which consultants saw their role as a reviewer or a mentor rather than a supervisor; and the relationship between the junior doctors and their registrars, which was exemplified by the ease that was expressed by junior doctors in questioning their senior colleagues. This accords with other Australian studies of junior doctors, which have reported overall positive opinions of junior doctors toward their immediate seniors.^{132, 262} The relationship between junior doctors and consultants was not close; however, this was viewed neither critical to the operation of the team nor to the training of the junior doctor in prescribing. The two other relationships were the ones that were influential on prescribing because they determined what knowledge was used as the basis for decision-making, and how well the decision was carried out. Dartnell makes a similar observation about these relational determinants of prescribing in hospitals, “the decision that is made will be the result of how

tightly the consultant manages his or her team, and how strictly the team adheres to the consultant's framework."⁹¹

Due to competing work responsibilities, as voiced by the nurse and pharmacist cohorts, other health professions had little opportunity to be involved in shaping key decisions at the point of prescribing. The main opportunities for nurses and pharmacists to effect prescribing were in revising or optimising decisions, where they worked collaboratively with either the junior doctor or registrar. Whilst resource issues and staffing were cited by pharmacists and nurses as the main reasons for their lack of pro-active participation in prescribing decisions, there were few indications that inter-professional involvement in prescribing decisions was considered integral by doctors. The medical respondents' attitudes, however, did not appear to be based on any explicit desire to monopolise decision-making, indeed the value of multidisciplinary collaboration was strongly espoused by some, but related more to an underlying assumption by many that the active participation of non-medical professionals was not a fundamental part of prescribing practice. Prescribing was the domain of those who diagnose.

The control of many forms of health care delivery by the medical profession in Australia has long been recognised²⁶³, and the dominance of the medical profession in multidisciplinary discussions in hospitals has also been observed in the UK.²⁶⁴ Reasons put forward to explain medical dominance include the social power of the medical profession²⁶³ and perceptions of status differentials.²⁶⁴

In Australia, the potential for a professional power imbalance in prescribing is fuelled by doctors' exclusive independent authority to prescribe. In the UK, where the profile of pharmacists in prescribing is arguably higher than Australia (due to greater prescribing privileges²⁸), there has been the suggestion that pharmacists working in hospitals are conservative⁵⁴ and foster their

own low profile by giving verbal feedback to doctors rather than documenting their interventions in patient's notes.⁸⁹ This view of pharmacists is also apparent in US commentary, one medical observer labeling pharmacists as "unassuming colleagues", who perform a "crucial, unglamorous function."²⁶⁵ Conservatism of pharmacists' behaviour was not obvious from our data; overall, the pharmacist cohort appeared confident in approaching and challenging doctors about problematic medication orders. However, several pharmacists expressed underlying assumptions about the attitude of doctors toward their involvement in prescribing decisions; for example, one pharmacist felt that doctors saw the pharmacy service as dispensable; and another thought that they viewed pharmacists as police.

There are strong theoretical arguments for inter-professional collaboration in prescribing decisions in hospitals^{13, 266}, although, outside of consultative teams (such as pain management and Total Parenteral Nutrition), not a lot of evaluation of its relative merit. As our respondents indicated, good prescribing requires more than diagnostic skills; it requires drug knowledge, awareness of information resources, communication skills, engagement with the patient, monitoring skills, awareness of limitations, meticulousness and so on. These are all skills well recognised by clinical pharmacologists and educators in prescribing.^{14, 20, 202} Therefore, by utilising the strengths of several disciplines, prescribing outcomes might be optimised and error rates reduced. Such an effect was demonstrated by Leape et al who examined pharmacist participation on medical rounds in an intensive care unit and found that the pro-active role of a pharmacist resulted in a 66% drop in the rate of ordering ADEs, a drop which was not shown in a control unit.¹⁴⁹ In this study, pharmacists identified errors, provided drug use information, and recommended alternative therapy as part of their role during rounds.

An additional benefit of a pharmacist's active involvement in prescribing decisions is that they might act as a catalyst for more detailed discussion about proposed drug therapy and help to

raise the profile of dosing as a discussion point. Dosing errors are the most common types of prescribing errors reported in Australian hospitals³⁶⁻³⁸ and failure of checking systems to detect these errors in hospitals is one of the factors most commonly linked to adverse drug events in hospitals.⁴⁴ In our study, it was noted that there were limited weekend pharmacy services at the two hospitals. Arguably, this underlines the importance of discussing dosing at the time a prescribing decision is made and ensuring clear specification and systematic verification of dosing information. Routine participation of a pharmacist in ward rounds may help to legitimise detailed discussion about dose between doctors at other times. A counter argument to pharmacist involvement in decision-making is that it may remove pharmacists from their valued monitoring role.^{89, 170}

A further case for inter-professional decision-making is that nurses' participation in ward rounds might improve information transfer about treatment plans and drug therapies. Problems with communication of prescribing decisions between medical teams and nursing staff were noted in this study, and communication breakdowns in other studies have been linked to prescribing errors.³⁴ Also, through their more intimate knowledge of the patient, nurse involvement in decisions might be expected to broaden discussion about suitability of drug selection.

Of course, because teaching hospitals are acute care facilities, there are many circumstances where a joint discussion of drug treatment among disciplines is clearly inappropriate. In our study, several registrars gave examples of how their priority was the acute needs of the patient rather than medicines for longer term clinical conditions. However, the tendency in hospitals to focus on acute care and overlook chronic conditions has been linked to inappropriate prescribing.¹⁷¹ This has important negative ramifications. For example, the elderly are frequent users of acute care settings, and have the highest rate of hospitalisation due to ADEs⁴⁶, largely due to drugs used to treat chronic conditions. So there is a need to improve the model of

prescribing practice for chronic conditions in hospitals, and a further argument for widening the circle of those who make decisions about medicines.

One proactive attempt to improve inter-professional collaboration in hospitals has been to introduce inter-professional clinical education of medical and pharmacy students. In the UK, one method involved assigning interdisciplinary pairs of students clinical problems to solve.²¹³ This was measured to be a successful educational intervention by the researchers; however, whether such interventions translate to effective collaboration in the hospital environment appears not to have been addressed in the literature. As noted by the pharmacist cohort, this may depend upon a number of other facilitating factors, notably, staffing levels.

4.1.2. Medical hierarchy

In addition to dominance of the medical profession in prescribing, there were suggestions that some pharmacists and junior doctors altered the way in which they queried prescribing decisions according to their perceptions of the approachability of individual consultants. This appeared to be less of a problem among the nursing cohort, which may have been related to their greater average level of experience and confidence (although one of the nurses suggested that junior nursing staff sometimes had difficulty in questioning doctors about medication orders).

Hesitancy to communicate information to superiors, because of not wanting to offend those in power has been linked to medical mishaps⁸⁸, and not questioning the prescribing orders of superiors has been linked to prescribing errors.⁸⁹ Whilst there were few explicit accounts given in our study where perceptions of hierarchy affected safety of prescribing, consciousness about status was arguably cultivated throughout the hospitals by the use of the terms “bosses” and “chain of command.”

4.1.3. Parallel practices and differing notion of responsibility

The involvement of the three health professions in prescribing was characterised by parallel practices, which had implications for not only how prescribing decisions were made, but also in how they were enacted. Apart from ward meetings in some clinical areas, there was little coordination of prescribing-related activities among the professions. This picture is consistent with the empiric observations of others; as Avorn notes “hospital care has been seen as a series of separate and unrelated interactions between health care professionals and individual patients.”²⁶⁵

Although independent checks on complex medicines management systems are seen as a vital safeguard⁴⁴, a lack of organised interaction and coordination among health professionals has been suggested to make health care systems more prone to errors.¹⁷⁵ A lack of coordination and leadership was strongly conveyed in our study by respondents’ descriptions of how discharge prescriptions were handled. Junior doctors were often rushed to write the prescriptions, transcription errors were common, and pharmacists were “chasing their tails” trying to work out what medicines patients were meant to be taking at home. This depiction is consistent with high rates of pharmacists’ interventions for discharge prescriptions reported in Australian hospitals.^{66, 267} A further example of poor coordination of prescribing activities was patient education about medicines. Whilst the need for education was voiced among the registrar and JMO cohorts, there did not appear to be a strong sense of responsibility for it or the need to coordinate education with that of pharmacists. It was unclear whether the lack of ownership for this role was related to a perception that patient education was the domain of pharmacists. Findings from a survey in another Australian hospital found that doctors were unaware of the pharmacist’s role in patient counseling about medicines.¹⁶⁹

The separate nature of these prescribing activities undertaken by the three professions also appeared to feed into the conceptualisation by some respondents of discrete, but complementary professional responsibilities. This view was more dominant among doctors. For instance, a number of doctors felt that if a medication order was written correctly, then it was the nurses' professional responsibility to ensure that they understood it before administering the drug. A differing view was that the professions shared in a singular organisational responsibility, which was exemplified by the belief that communicators should check to see that their message has been understood. This view was implied more strongly in the nurse and pharmacist cohorts. As suggested, this conceptualisation saw greater accountability for communication. It was also characterised by a broader understanding of organisational units, which were responsible for different aspects of medicines management. A number of investigators have reported differences in attitudes of doctors and nurses to error reporting in hospitals. Nurses were found to have much greater awareness of error-reporting systems^{268, 269} and had greater confidence in the hospital system to handle reporting in a supportive manner.²⁶⁸

In theory, greater systems awareness might be expected to assist in the detection of errors and identification of potential causes, and the canvassing of possible solutions.^{265, 270} However, findings from our study showed that greater systems awareness did not necessarily help to circumvent some prescribing errors from occurring. Cumulative evidence from a range of respondents' (nurses, pharmacists and junior doctors) suggested that time constraints placed upon the junior doctor to write discharge prescriptions were a major source of error, yet the respondents appeared powerless to do anything about this. Whilst environmental and resource issues might have come into play (such as the increasing pressure on public hospitals to improve bed turnover) deductively, the situation also suggested a lack of leadership and recognition of the problem by those with power to do something about it. This dilemma has been signaled by Barber⁸⁹, who argues that structural issues in secondary care contribute to

prescribing errors. Because the power structure is created vertically by clinical area (the power being held by the medical profession), “there is rarely anybody with enough power or influence to lead on them [medicines] at a local level”.

The different notions of responsibility were further characterised by competing values of constant vigilance and fear of errors versus collegiality and trust. Although there were individuals in each cohort who conveyed a preoccupation with things “going wrong”, this theme was stronger and more consistent in the pharmacist and nurse cohorts. Perhaps because of the great reliance placed upon them to detect errors, the pharmacist cohort has the strongest awareness of human fallibility, and by implication, probably the greatest level of distrust of others. In particular, they cast a high index of suspicion over new interns; several pharmacists feeling (and also some junior doctors) that prescribing errors were more likely at the beginning of internship.

Within their teams, doctors placed a high reliance on trust. Senior doctors routinely gave junior doctors verbal medication orders, with the onus placed on the junior doctors to query if they didn't understand. There was an appreciation that new interns required more information than more experienced junior doctors; nevertheless, examples provided by pharmacists suggested that sometimes this judgment was flawed with too much trust being placed in junior doctors to hear and interpret the medication order correctly. Accounts of prescribing errors provided by some junior doctors highlighted the problem of not being aware of deficiencies in their own knowledge base and so therefore not knowing the right questions to ask. Absence or poor communication within medical teams has been identified by others as a cause of prescribing errors.³⁴ On this issue, the 2001 Audit Commission report into medicines management of publicly funded hospitals in the UK states that “no one can pre-specify their own ignorance” and recommends continual training and competency assessments for all involved in the prescription and administration of medicines.

Another way in which the value of collegiality and trust was implied in our study was the way in which consultants relied on information provided by their registrars over the phone to review or to make prescribing decisions. In private hospitals, this same trust was placed in nurses. This trust depended on their assessment of the individual with whom they were communicating, with greater trust placed on some people (for example, ward nurses known to them) than others (agency nurses). For those whom they doubted, they increased their vigilance.

High reliability organisations have a collective preoccupation with the possibility of failure and operate on the premise that humans are fallible. They also recognise human variability and compensate for it.⁸⁰ Human variability was appreciated by the senior doctor cohorts, which was implied by the way in which they adjusted their behaviour to cater for certain individuals. Nevertheless, arguably, this alone was not enough to safeguard against errors. This vulnerability was acknowledged by a number of consultants. One consultant felt that this was the only way the system could work; however, another argued that “outcome was better than processing”, that informal policies although flawed had benefits for patient care and were better than restrictive policies of prescribing, which might lead to delays in patients receiving therapy. These benefits, he argued were difficult to measure. An extension of this argument might be that one of the problems with perceiving roles and responsibilities as core components of a medicines management system is that the system places greater emphasis on identifying and safeguarding against errors than on promoting or facilitating optimal prescribing. The quality of prescribing in certain circumstances may be reliant on maintaining flexibilities within the system.

From a patient safety perspective, however, the variance in notions of responsibility point to two potential targets for improvement in prescribing practices. Firstly, examination of the mores of communication among medical staff; and secondly, greater awareness within this group of medicine management system failures and how they may occur. The first area does not appear

to have been addressed in the literature; however, there are two recent educational strategies which have been designed to heighten awareness of safety systems in hospitals. These include patient safety education, which has been integrated into the undergraduate curricula of all major health professions²¹¹; and for junior doctors, an online training module, which accompanies the National In-patient Medication Chart. In addition to providing instruction on how to use the chart, the module addresses patient harm that can result from problems in the prescribing process.²⁷¹

4.1.4. Lack of patient involvement in decisions

Overall, prescribing decisions at the hospitals were not shaped by the patient's opinion. Although the importance of involving patients in prescribing decisions was strongly recognised by the consultant cohort, this emphasis was not similarly conveyed by the other doctor cohorts. A patient-focused approach accords with recent thinking on best medicines use; for example, the QUM principles of the National Medicines Policy ("the primacy of the consumer"¹³), Barber's goals of prescribing ("respect patient's choices"¹⁹), and with UK prescribing curricula for non-doctors ("helping patients make informed decisions about treatment options"²⁸). The strongest case for including patients in decision-making about medicines is that ultimately, their view predominates anyway, because they can choose whether or not to take the medicine.^{19, 91} These values were strongly evoked by the consultant cohort, but why weren't they realised in the other medical cohorts? There may be several reasons.

Firstly, in an acute care facility, a detailed conversation with a patient about the relative merits of different medicines may be either inappropriate or impossible. Accounts from most of the registrar cohort suggested that the bulk of their work involved acute care management. In contrast, many of the consultants who were interviewed had predominately outpatient practices and managed chronic conditions. Therefore, it is possible these differing practice profiles may have accounted for the variation in the way the two groups made prescribing decisions.

However, it is also possible that hospital-based doctors make assumptions about the desire of patients to be involved in prescribing decisions; a paternalistic attitude towards elderly patients in regard to their involvement in decisions has been reported.¹⁷¹

Secondly, qualitative findings from a UK study suggest that consultants by virtue of their experience may have a greater ability than their junior colleagues to see the bigger picture when they prescribe, are better able to look outside the hospital context, and to appreciate the social context of the patient and the need for follow up. This insight was considered to explain why consultants in the study felt that patients should fully participate in prescribing decisions. In contrast, interns (pre-registration house officers) who were interviewed had more simplistic schemas of prescribing, which were narrowed to medical care in the hospital setting. They viewed patients as passive receptors of medicines and did not see them as active participants in prescribing decisions.¹¹³ The authors theorised that interns' simple schemas may represent a way of coping for these inexperienced prescribers. Findings of this study imply that incorporation of the bigger picture and therefore the patient's perspective may be a developmental step for prescribers and that it is unrealistic to expect interns to expand their schemas without the benefit of experience.

4.1.5. Competing interests of patient safety and supervision of junior doctors

The way in which prescribing plans were enacted was heavily dependent on the prescribing competency of junior doctors. Junior doctors played a pivotal role in prescribing at the hospitals because they were the principal prescription writers and were therefore responsible for setting in motion most prescribing decisions. However, as a number of respondents emphasised, the fundamental reason why junior doctors were performing this function was so that they could learn. This is an accepted model of medicines management systems in teaching hospitals in

Australia⁹, as well as the UK²⁰² and US⁷¹) whereby junior doctors are anticipated to gain prescribing skills by fulfilling this function in the system.

On face value, this is a huge responsibility for inexperienced prescribers, as patient safety may depend heavily on their actions. This weight was felt by some of the junior doctor cohort who were keen to express their respect for prescribing, and appreciation of medicines as poisons. Others were more influenced by the systems of checks on their prescribing practices and felt little risk or weight of responsibility. The literature, however, indicates that despite safety nets, inexperience is linked to errors.^{71, 87}

Data from our study showed that the interests of junior doctors and medication safety competed in several ways; firstly, by the marked diminution of supervision and checks on the practice of junior doctors working on weekends. Some medical respondents saw this as a learning opportunity for junior doctors; but several pharmacists voiced concerns about greater rates of error over this period, and one consultant also expressed reservations about the system of “rostered days off”, which at one hospital, allowed an even longer period for junior doctors to operate without high levels of checks and balances on their prescribing. A further illustration of competing needs was the pressure placed upon registrars to manage patient care whilst supervising an inexperienced prescriber. The acute needs of patients were by necessity the registrars’ priority, but this did have implications for the level of scrutiny they could give to medication chart review. Another example was the disclosure by several junior doctors of difficulty they experienced in adjusting doses of opiates and aminoglycoside antibiotics for patient specific factors. Of interest, these particular gaps in knowledge have been identified as contributors to error in UK and US studies.^{34, 74}

The challenges of dealing with these competing interests have been observed by others, as Tanna and Pitkin write, “How can consultant teams ensure a high standard of prescribing decision-making and care delivery to patients, despite the training phase that junior medical staff need to go through?”²⁷² The authors’ answer was to set up structured onsite training programs for junior doctors in the form of pharmacist-led medication management clinics operated with close liaison with consultant-led teams. A national effort to deal with this challenge is the new Australian Framework Curriculum for junior doctors, which among other competencies, sets out explicitly stated prescribing skills expected to be mastered by junior doctors. These include specific competencies related to medication safety.²¹⁷

4.2. COMMUNICATION PATTERNS

A number of communication patterns affecting transfer of information about prescribing decisions were identified in this research. Many have already been explored: reliance on verbal communication of prescribing decisions within medical teams; poor communication by doctors to nurses about treatment plans and new medication orders; and lack of communication and coordination between doctors and pharmacists about patient education of medicines. Numerous hospital systems rely on communication, and hence in addition to prescribing errors³⁴, communication failures have been linked to many forms of medical errors in hospitals.⁸² One US study set out to analyse the root causes for communications failures and found that many were due to complex reasons, such as hierarchical differences, concerns with upward influence, conflicting roles and role ambiguity, and interpersonal power and conflict.⁸⁸ In our study, as stated previously, hierarchy or power consciousness was not a particularly strong theme; but there were indications that uncertainties about roles and responsibilities were factors influencing communication between different professions. For example, a clinical nurse educator spoke about her problem of maintaining a high profile so that junior doctors knew to contact her first

when prescribing a drug with special drug administration requirements, so that she could then educate the ward nurses.

Another potential reason is the sense of priority. Health professionals working in hospitals have been shown to have very high communication loads (36.5 communication events per person per hour in one Australian Emergency Department²⁷³), so there are pressures on staff to work out what communication is necessary in order that they can work effectively. This comes down to a question of priority, which is discussed in further detail below.

4.3. UNDERLYING ASSUMPTIONS

Several common underlying assumptions pervaded the culture of prescribing at the hospitals. Firstly, there was the ever-present undercurrent that prescribing was a low priority task. This interpretation was based on a steady accumulation of themes: the lack of time allocated by medical teams during ward rounds to ensure accurate ordering of medicines at the time a decision was made; the absence of patient involvement in decisions and uncertainties about responsibilities to educate patients about new medicines; the confusion concerning responsibilities for transcribing and pressures brought to bear by junior doctors to prescribe for patients they didn't know; the mundane nature of transcribing making consciousness about the consequences of the task difficult to sustain; lack of discussion in medical teams about the specifics of medication orders, particularly dosage, indication for this patient, goals for this patient, duration of therapy and so on.

This pervasive assumption about prescribing in teaching hospitals has been observed by others⁸⁹, and has also been linked to prescribing errors in the UK.³⁴ Discussing teaching hospitals in the UK, Barber writes, "...the small amount of teaching in undergraduate courses and the absence of teaching of doses to house officers (junior doctors), all send a message that

these issues are not particularly important.”⁸⁹ Registrars interviewed in our study were aware that interns needed more specific information about dosage of drugs; but other data suggested that the dominant convention of prescribing at the hospitals was that junior doctors located dosage information. In summary, it appeared unlikely that dosage information was routinely discussed in any length or level of detail at the study hospitals, and that Barber’s comments were reflective of practice at the hospitals.

This highlights a second underlying assumption, which was if inexperienced people are uncertain, then they will ask. Ramifications on prescribing of this assumption have already been discussed under notions of responsibility. Encouraging people to ask, challenge and question was perceived to be a critical way of communicating, educating, honing critical evaluation skills, and ensuring accountability for decisions. One of the consultants also described this custom as being part of a research-based approach to prescribing. Nevertheless, as highlighted earlier, potential problems were identified when assumptions were made about the knowledge base of the receiver – that they would know what to ask. This suggests a basic imbalance in communication: that the governing mantra of urging junior or inexperienced people to ask wasn’t being equalised by questioning from the transmitters of information to see that messages were understood. The reason for this imbalance was suggested by one of the junior doctors, who indicated a reluctance of medical staff to appear condescending.

A third underlying assumption was that high rates of prescribing error were an acceptable part of prescribing in teaching hospitals, which emanated from a strong sense of security in the checking systems in the hospital. Others have reported a tendency for doctors to drop their guard when prescribing because of their reliance on error monitoring systems.³⁴ In some respects, this highlights a case where systems awareness may impede prescribing performance. One possible reason for this is that the systems awareness was only partial. Whilst most

respondents knew that intercepted incidents were common, many of the junior doctor cohort had never seen a collated report of incidents at their hospital and were therefore unaware of the rates and types of incidents that slip through the system.

4.4. KNOWLEDGE CHARACTERISTICS

Due to the trickle down effect noted by a number of respondents, the most influential form of knowledge on prescribing at the hospitals was that bestowed by consultants and conveyed to registrars. Therefore, day to day, a crucial determinant of prescribing decisions was the social knowledge acquired by registrars based on their consultant's knowledge base. Similarly, qualitative studies of hospital doctors in the UK and Ireland have found that social knowledge is the most common form of "evidence" used by non-consultant doctors.^{133 131} In one study, it was found to have an overriding effect on registrar's prescribing decisions, eclipsing other forms of knowledge, which they may have felt were more advantageous.¹³¹ In our study, little conflict was reported surrounding registrars' evaluation of different forms of knowledge. Predominately, most of the registrar cohort appeared confident of the legitimacy of their consultant's knowledge and held the belief that it was based on scientific evidence and their greater personal experience. Differences in prescribing patterns of consultants' working in the same field were attributed by some, to differences in interpretation of the scientific literature. Also, unlike the UK study, although consultants were seen to be the leading influence on prescribing, it seemed that registrars (in the main, the advanced trainees) felt a reasonable level of prescribing autonomy and confidence to use other information sources, if they were able to justify their use to their consultants.

In addition to the consultants' knowledge base, the registrar cohort also integrated knowledge acquired from protocols and guidelines, electronic databases, their own reading of the scientific literature, and personal experience. De Souza et al¹³³ found that hospital-based protocols and

formal guidelines had very little influence on the antimicrobial prescribing practices of non-consultant doctors; informal guidelines and personal experience were utilised preferentially. This was not apparent in our study, where both registrars and junior doctors commonly cited their use of hospital-based protocols and externally developed guidelines, which were used either to supplement information provided by consultants, or used as the primary source of information. In the case of hospital-based protocols, these were often developed or at least endorsed by their consultants anyway. Awareness of protocols was illustrated by the commonly used expression that prescribing in certain clinical areas was “protocol driven.”

In our study, junior doctors had a similar pattern of knowledge utilisation to registrars, in that the dominant influence on their prescribing was socially driven. For the few independent prescribing decisions that they made, their registrar’s knowledge was seen to be the most influential factor and took precedence over other forms of evidence they located, including guidelines. This finding marries with findings from another Australian study, which identified registrars as an important positive influence on interns’ prescribing practices.¹³² Despite this reliance on advice of registrars, as was the case for the registrar cohort, junior doctors had clear notions of the scientifically driven hierarchy of evidence and were keen to express their realisation of the scientific foundations for prescribing decisions.

The dominance of social knowledge as the basis for most prescribing decisions in hospitals has several potential implications for the acquisition of prescribing skills. Prosser and Walley¹³¹ argue that the grounding of scientific evidence in social processes is a legitimate means of making rational and appropriate prescribing decisions. They found that although decisions were based on informally and locally constructed knowledge that this did “not imply the process is unreflective.” However, they did conclude that because of the mode of knowledge acquisition, the way in which doctors initiated new drugs was “distinct in content and structure” from the

desired cognitive sequence promoted as the normative for evidence-based practice. Therefore, arguably, the dominance of social knowledge as the model for behaviour adoption of junior doctors may reinforce habitual patterns of prescribing rather than promote cognitive and systematic contemplation of the pros and cons of treatment options. Although habitual prescribing does not necessarily imply irrational prescribing¹¹², it is widely thought to leave prescribers vulnerable to influences which may cause inappropriate prescribing, such as pharmaceutical industry promotion.¹⁶

This highlights another cultural characteristic of prescribing at the hospitals, which was the breadth and depth of consciousness about pharmaceutical industry. Drug representatives appeared to have quite a high profile at both hospitals, particularly through their provision of journal articles to registrars and consultants, and their sponsorship of many meetings. Although junior doctors did not appear to meet with representatives, they were aware that their registrars and consultants did. Whilst many of the consultant cohort expressed self-awareness about the potential effect of industry on their behaviour; this was not apparent in the registrar cohort, who felt that they were immune to the effects. This naivety about the influence of industry has been reported by many others^{144, 145} and is potentially concerning given the apparent targeting by drug representatives of registrars at the hospitals.

4.5. WORK ENVIRONMENT

There were three main work environment factors identified that influenced prescribing at the teaching hospitals: interruptions, workload and stress. All of these have been linked to error.^{34, 175} Frequent interruption with paging has been found to interrupt patient care, and distraction caused by interruptions is considered an important cause for active error.¹⁷⁵ In our study, busyness or workload were the most commonly cited contributors to prescribing error. This is consistent with findings from other studies.^{34, 81}

Busyness, however, was also blamed for many other changes to the way in which prescribing activities were carried out in the hospitals. One nurse spoke about the way that the hospital has changed throughout her career, with higher rates of bed turnover and an increased emphasis on acute care. She ascribed this cause to the reason why pharmacists and nurses no longer had time to join doctors on ward rounds. This theme was repeated by others: a pharmacist spoke of the irony of spending more time dispensing discharge prescriptions than on reviewing medication charts, another pharmacist felt that there was no longer any forum where she could sort out medication problems with junior doctors due to busyness; and a consultant felt that there were too many pressures on public hospitals and therefore prescribing had to compete with many other workload responsibilities.

4.6. STUDY WEAKNESSES

Whilst prescribing is a core treatment option for many clinical conditions, doctors are more than prescribers. In this study we have purposely focused on one core element of their practice with no acknowledgement of the other essential roles doctors play in patient care in hospitals, many of which may be considered to have greater clinical urgency than making a prescribing decision or writing a medication order. We have also looked at prescribing somewhat in isolation from other core components of medicines management. Although prescribing is the chief function of doctors in the medicines management system, traditionally, the chief function of pharmacists is to dispense and supply medicines, and nurses' primary role is to administer the medicines. We have not addressed any of these functions, as our focus was on the ignition stage of the process. We did, however, purposely examine opinions about patient education of medicines, because this was recognised as a key step in the WHO normative model of prescribing, and as addressed earlier, there are strong arguments for incorporating patient's views in prescribing decisions and therefore commencing patient education at the time a decision is made.

A further limitation of the study design is that we did not incorporate the patient's perspective. Whilst analyses of organisational culture have traditionally focused on health professionals alone, it is argued that patients are inextricably part of hospital culture, much more so than consumers of services in other organisations.²⁷⁴ Furthermore, as has already been discussed, patients play a pivotal role in prescribing and are the ultimate determinate of prescribing decisions; their influence has only recently formed the focus of enquiry into prescribing practices in hospitals.¹⁷¹

Another weakness of this study is the potential bias of the researchers. As detailed in Chapter Two, the primary researcher is a pharmacist who has worked in hospitals, and theoretically may have a bias towards reporting the behaviours of other health professions in particular lights. Furthermore, there was no external validation of results by non-pharmacists. However, a counter argument to this charge is that the hospital environment consists of multiple systems and specialised processes. The practices, behaviours and interrelationships governing prescribing culture are complicated, and having some prior understanding of the environment might be advantageous to the depth of exploration.

The generalisability of the qualitative findings is keenly debated.²⁴³ In accordance with the views on of noted qualitative researchers²³⁸, it is the belief of this researcher that the core concepts identified in this study have transferability to other teaching hospitals. However, the extent of representation may be best tested using quantitative techniques.

4.7. AREAS FOR FUTURE RESEARCH

One of the potential applications of findings from this study is to use the socio-cultural drivers, which were identified, to optimise the design and implementation of future prescribing improvement strategies in teaching hospitals.¹⁴⁷ It is argued that this objective would be best

met by conducting a preliminary quantitative study at the proposed intervention site(s) to test the validity of factors from this study (ie, to see if the factors are representative of forces driving prescribing and prescriber education at other hospitals) and to assess their relative importance.

CONCLUSION

Prescribing at the teaching hospitals was shaped by a complex web of socio-cultural determinants inherent to the working environment. Both the decisions and actions of the health professionals involved in prescribing were influenced by these forces. These factors were predominately related to: the organisational structure of the prescribing process; the knowledge characteristics of the doctors; the communication patterns they used; the underlying assumptions they made about prescribing; and the hospital work environment itself.

Consideration of these factors may be important for the design and implementation of strategies to improve the quality use of medicines in the hospitals, and also educational programs in prescribing for junior doctors.

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APPENDIX A

Ethics Committees – Approval Letters



The University of Sydney

NSW 2006 Australia

Human Research Ethics Committee
<http://www.usyd.edu.au/ethics/human/>

Chairman:

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05 April 2004

Professor J A Brien
Faculty of Pharmacy
Pharmacy Building – A15
The University of Sydney

Dear Professor Brien

I am pleased to inform you that the Human Research Ethics Committee at its meeting on 22 March 2004 approved your protocol with following conditions. Please note that subject to annual monitoring returns, the approved protocol is valid for five years.

Title: *Exploring the influence of cultural and social factors in two teaching hospitals on the prescribing process and how doctors learn to prescribe*

Ref No.: 7365

Approval Period: *March 2004 – March 2005*

Authorised Personnel: *Professor J A Brien*

Ms M Page

Dr B Bajorek

Conditions:

Please provide the letters of approval from the Area Health Services for St Vincent's Hospital and Royal North Shore Hospital when these become available.

In order to comply with the *National Statement on Ethical Conduct in Research Involving Humans*, and in line with the Human Research Ethics Committee requirements the Chief Investigator's responsibility is to ensure that:

- (1) The individual researcher's protocol complies with the final and Committee approved protocol.
- (2) Modifications to the protocol cannot proceed until such approval is obtained in writing.

- (3) The confidentiality and anonymity of all research subjects is maintained at all times, except as required by law.
- (4) All research subjects are provided with a Participant Information Sheet and Consent Form, unless otherwise agreed by the Committee.
- (5) The Participant Information Sheet and Consent Form are to be on University of Sydney letterhead and include the full title of the research project and telephone contacts for the researchers, unless otherwise agreed by the Committee.
- (6) The following statement must appear on the bottom of the Participant Information Sheet. *Any person with concerns or complaints about the conduct of a research study can contact the Manager of Ethics Administration, University of Sydney, on (02) 9351 4811.*
- (7) The standard University policy concerning storage of data and tapes should be followed. While temporary storage of data or tapes at the researcher's home or an off-campus site is acceptable during the active transcription phase of the project, permanent storage should be at a secure, University controlled site for a minimum of five years.
- (8) A progress report should be provided by the end of each year. Failure to do so will lead to withdrawal of the approval of the research protocol and re-application to the Committee must occur before recommencing. **Your first report will be due on (date).**
- (9) A report and a copy of any published material should be provided at the completion of the Project.

Yours sincerely



Associate Professor Stewart Kellie
Chairman, Human Research Ethics Committee

Encl. Participant Consent Form
Participant Information Sheet
Questionnaire
Interview Schedule for registrars, consultants
Interview Schedule for interns, residents
Interviews Schedule for nurses and pharmacists

✓ cc: Ms M Page, Faculty of Pharmacy, Pharmacy Building – A15, The University of Sydney

Northern Sydney Health

better health: from the Harbour to the Hawkesbury

ROYAL NORTH SHORE HOSPITAL
ST LEONARDS NSW AUSTRALIA 2065

June 16, 2004

Professor J Brien
Faculty of Pharmacy, Pharmacy Building (A15)
University of Sydney
Sydney NSW 2006

RESEARCH OFFICE
Level 4, Vindin House
Telephone: (02) 9926 8106
Facsimile: (02) 9926 6179

Dear Professor Brien,

Re: Protocol 0405-109M(Q) - J Brien, M Page, B Bajorek
Exploring the influence of cultural and social factors in two teaching hospitals on the prescribing process and how doctors learn to prescribe

Thank you for providing a revised documentation, as requested by the Northern Sydney Health Human Research Ethics Committee (HREC) at its meeting held Monday, 7th June 2004. I am pleased to inform you that your protocol on the above study has now been approved. The approved version of the Information Sheet and Consent Form is dated 22nd March 2004. In addition, the approval includes:

- Interview Schedule for nurses and pharmacists – June 2004
- Interview Schedule for interns, residents – May 2004
- Interview Schedule for registrars, consultants – May 2004
- Questionnaire for Research Study – 22nd March 2004

The HREC recommends that you consult with your Medical Defence Union to ensure that you are adequately covered for the purpose of conducting this clinical trial.

In order to comply with the *Guidelines for Good Clinical Research Practice (GCRP) in Australia*, and in line with NSH HREC policy, may I remind you that it is the chief investigator's responsibility to ensure that:

1. You notify the HREC at the completion of the study at this site and submit a final report (including final results) when available.
2. The HREC is notified as soon as possible of any changes to the protocol. All changes must be approved by the HREC before continuation of the research project. This includes notifying the HREC of any changes to the staff involved with the protocol.
3. All serious and unexpected adverse events are reported to the HREC within 15 working days.
4. The HREC is notified of the outcome of all submissions of this protocol to other Ethics Committees.

HREC approval is valid for four (4) years from the date of the approval letter. **Your approval will therefore expire on the 16th June 2008.** Investigators are requested to submit a progress report annually. **Your first progress report is due on the 16th June 2005.**

Yours sincerely



Dr Liz Newton
Deputy Chairperson
Human Research Ethics Committee



02 SEP 2004

→MP file
Northern Sydney Health

better health: from the Harbour to the Hawkesbury

ROYAL NORTH SHORE HOSPITAL
ST LEONARDS NSW AUSTRALIA 2065

August 27, 2004

Professor J Brien
Faculty of Pharmacy, Pharmacy Building (A15)
University of Sydney
Sydney NSW 2006

RESEARCH OFFICE
Level 4, Vindin House
Telephone: (02) 9926 8106
Facsimile: (02) 9926 6179

Dear Professor Brien,

Re: Protocol 0405-109M(Q) - J Brien, M Page, B Bajorek
Exploring the influence of cultural and social factors in two teaching hospitals on the prescribing process and how doctors learn to prescribe

Thank you for your application dated 27th August 2004 requesting approval for an amendment from the Northern Sydney Health Human Research Ethics Committee (HREC). I am pleased to inform you that your amendment to the protocol on the above study has now been approved.

The amendment involves an advertisement to encourage doctors to participate:

- Advertisement and Advertisement/Letter – August 2004

The HREC recommends that you consult with your Medical Defence Union to ensure that you are adequately covered for the purpose of conducting this clinical trial.

In order to comply with the *Guidelines For Good Clinical Research Practice (GCRP) in Australia*, and in line with NSH HREC policy, may I remind you that it is the Chief Investigator's responsibility and a condition of approval, to ensure that:

1. You notify the HREC of the completion of the study at this site and submit a final report (including final results) when available.
2. The HREC is notified as soon as possible of any changes to the protocol. All changes must be approved by the HREC before continuation of the research project. This includes notifying the HREC of any changes to the staff involved with the protocol.
3. All serious and unexpected adverse events are reported to the HREC within 15 working days.
4. The HREC is notified of the outcome of all submissions of this protocol to other Ethics Committees.

As at 18th May 2004, HREC approval is now valid for four (4) years from the date of the approval letter. Investigators are requested to submit a progress report annually from the date of your approval letter.

Yours sincerely

Ms Trisha Brisley
Chairperson
Human Research Ethics Committee

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A facility of the Northern Sydney Area Health Service and teaching hospital of the University of Sydney and University of Technology, Sydney





ST VINCENT'S HOSPITAL SYDNEY LIMITED

A.B.N. 77 054 038 872

UNDER THE CARE OF THE SISTERS OF CHARITY

June 7 2004

Meredith Page
Faculty of Pharmacy, Pharmacy Building (A15)
University of Sydney
Sydney 2006

Dear Meredith

Re: Exploring the influence of cultural and social factors in two teaching hospitals on the prescribing process and how doctors learn to prescribe.
SVH Ref No. Q04/055

Your application was considered at the last meeting of the Human Research Ethics Committee.

I am pleased to inform you that approval has been given to commence this study. The St Vincent's Hospital Human Research Ethics Committee is constituted and operates in accordance with current NHMRC guidelines. The enclosed SVH& University of Sydney participant consent form was approved.

Under NO circumstances may you or your co-investigators depart from the approved protocol without the prior consent of the Committee.

Would you inform the Committee of any adverse effects or events occurring in association with your study.

Would you inform the Committee when the research is completed.

If you have any queries relating to the above, please contact me on 8382 2075.

Yours sincerely

Helen Fraser
Acting Executive Officer
Human Research Ethics Committee

cc Prof Jo-anne Brien

APPENDIX B

Steering Committee – Invitation Letter

DATE

NAME
Address
Address

Dear XXXX

Research study: Exploring influences on prescribing in two teaching hospitals

Chief Investigator: Prof Jo-anne Brien¹, Co-researchers: Dr Beata Bajorek² ; Meredith Page³

We are writing to invite you to be part of a Steering Committee for a qualitative study designed to explore social and cultural influences on prescribing. The study is being conducted by Meredith Page to meet the requirements for the degree of Masters of Pharmacy and will involve practitioners based at Royal North Shore Hospital and St Vincent's Hospital. We already have the involvement of Professor Gillian Shenfield and Professor Ric Day.

Background

The quality use of medicines is a key factor in achieving optimal health outcomes. Between two to three percent of all hospital admissions in Australia are related to problems with medicines⁴⁴, demonstrating the need for improved use of drugs in hospitals and the community. Whilst the proportion of admissions linked to prescribing practices in Australian hospitals is unknown, studies in UK and US hospitals indicate that prescribing problems are a major cause of preventable drug-related morbidity.^{57, 62} Prescribing drugs is a high-risk and complex activity. A thorough grounding in the evaluation of patient-related and drug-related factors is considered fundamental to prescriber training.¹⁶ Nevertheless, studies with experienced prescribers in the community have shown that the social environment can also have a substantive influence on prescribing practice.^{104, 118} Furthermore, recent studies in UK and US suggest that socio-cultural factors in hospitals may contribute to prescribing errors and other medical errors.^{34, 88} Currently, the impact of the social environment on prescribing practices in Australian teaching hospitals is unclear. In two related Australian studies, interns nominated senior medical staff, nurses and pharmacists as the primary influence on their prescribing practice^{116, 204}, yet little is known about the effect of attitudes, intended behaviours, values, and perceived influences of these professional stakeholders on prescribing practices. It is hoped that an improved understanding of these influences may be used to optimise the effectiveness of future educational strategies to improve prescribing in teaching hospitals.

Aim

The aim of this project is to identify social and cultural factors in two teaching hospitals that affect prescribing behaviour generally and the way in which junior doctors learn to prescribe.

Methods

- Participants from each of the following groups across the two hospitals will be invited to take part: 1) consultants in medical specialties; 2) registrars in medical specialties; 3) pharmacists in medical wards; 4) registered nurses in medical wards; 5) interns or residents who are currently working in or have completed at least one medical term.
- Participation in the study will involve semi-structured interviews of up to one-hour duration, and a short questionnaire to collate demographic data.
- Transcripts of interviews will be analysed for themes using qualitative research techniques.
- The study has been approved by the University of Sydney HREC and will be submitted to the St Vincent's Hospital and Northern Sydney Health HRECs.

¹ Professor of Clinical Pharmacy (St Vincent's Hospital), Faculty of Pharmacy, University of Sydney

² Lecturer in Pharmacy Practice, Faculty of Pharmacy, University Of Sydney; Research Associate, Departments of Aged Care & Rehabilitation, and Clinical Pharmacology, RNSH

³ Masters of Pharmacy candidate, Faculty of Pharmacy, University of Sydney

What we are requesting of you:

Interview schedules for the five groups of health professionals have been developed based upon a literature review. We wish to refine the interview schedules to ensure that the questions encompass current social, relational or cultural influences on prescribing at the two hospitals.

Therefore, we are asking if you would be:

- willing to provide comments via email on one or two of the interview schedules.
- interested in participating in a pilot interview (may take up to one hour).

If you are willing to be a part of our Steering Committee, please fax back this page to 8382 4219 or call Meredith Page on 8382 2053. We will also be calling all invitees to verify receipt of this information.

We appreciate your consideration of this invitation. If you have any questions regarding the study, please call Meredith Page on 8382 2053 or Jo-anne Brien on 8382 2605.

Yours sincerely

Professor Jo-anne Brien

Dr Beata Bajorek

Meredith Page

References

1. Australian Council for Safety and Quality in Health Care. Second National Report on Patient Safety Improving Medication Safety. Canberra: Australian Council for Safety and Quality in Health Care, 2002:1-96.
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7. Dean B, Schachter M, Vincent C, Barber N. Causes of prescribing errors in hospital inpatients: a prospective study. The Lancet 2002; 359:1373-8.
8. Sutcliffe KM, Lewton E, Rosenthal MM. Communication failures: an insidious contributor to medical mishaps. Academic Medicine 2004; 79:186-194.
9. Pearson S-A. Intern prescribing: evaluation of practice and an educational intervention. Faculty of Medicine & Health Sciences. Newcastle: The University of Newcastle, 1999:268.
10. Pearson S, Smith AJ, Rolfe IE, Moulds RFW, Shenfield GM. Intern Prescribing for Common Clinical Conditions. Advances in Health Sciences Education 2000; 5:141-150.

Yes, Iam willing to be on the Steering Committee for the research study 'Exploring influences on prescribing in two teaching hospitals'.

- I am willing to provide comments via email
- I am interested in participating in a pilot interview

My email address is:.....

My preferred contact number is:.....

Signed.....Date

Fax to 8382 4219 or call 8382 2053

APPENDIX C
Interview Topic Guides

Comments:

Interview Topic Guide: Consultants and Registrars

Research Objective 1

Improve understanding of workplace influences on prescribing in hospitals

Q1 How does prescribing take place?

1A Roles and relationships

⇒ I'm going to begin by asking you about your perceptions of how prescribing takes place in this hospital, and firstly, I'd like to ask you about roles..

- Tell me about your role in ensuring patients in your care receive appropriate drug therapy?

- Who else is involved?

- How would you describe your relationship with them?

- What do you see as being their roles?

- What is your opinion on what they do?

1B Communication Patterns

⇒ Now, I'd like to ask you about how you communicate with other people involved in managing drug therapy

- Day to day, what information is typically discussed with members of your team before a drug is prescribed?

- Who says what? Can you provide an example of how a conversation might take place?

- What information about prescribing a particular drug would you typically give to a JMO in order to communicate to them what you would like prescribed?

- Can you provide an example? How is the information conveyed?

1C Roles and responsibilities

⇒ Now, I'd like to focus on responsibilities you may associate with prescribing

- i) In this hospital, who do you feel makes the majority of the prescribing decisions for your patients?

- ii) In this hospital, who do you see as being responsible for ensuring that drugs are prescribed appropriately?

- iii) What about pharmacists, nurses, D & T committee members, admin ?

1D Information sources

⇒ Now, I'd like ask you about sources of information you use when prescribing in this hospital

- Day to day, what sources of information do you rely on the most for the majority of prescribing decisions that you make?

Personal experience? Colleagues/staff? Written or electronic resources?

- What is it about that source that you value?

- What is your opinion of access to this resource and other resources?

Q2 How is prescribing valued in the hospital?

⇒ Now, I'd like ask you about your attitudes and feelings about prescribing

- 2A How would you describe the type of risk you feel when you prescribe? What level of care?

- 2B How does this type of risk compare with other decisions you make regarding a patient's care?

- 2C What feelings are engendered?

- 2D What skills do you think are required to prescribe competently?

Q3 How is prescribing defined?

- 3A How would you define prescribing?
- 3B What are the goals of prescribing?
- 3C What activities do you consider constitute good prescribing?

Q4 What are the Influences on prescribing decisions?

⇒Now, I'd like to ask you about influences on the way in which you prescribe in this hospital.

- 4A In the hospital, who or what do you consider to be the strongest influence on the decisions that you make when prescribing?
- How would you describe the influence of:
 - 4B Medical Colleagues
 - 4C Nurses
 - 4D Pharmacists
 - 4E Pharmaceutical industry
 - 4F Patients
 - 4G Drug Cost

Q5 What are the influences on prescribing errors?

⇒Now, I'd like to ask you about influences on how well decisions that you may make are carried out

- 5A Ensuring that we get the best out of medicines is a challenge for everyone involved with managing medicines. Part of the challenge in hospitals is ensuring that the system for managing medications works. Despite best efforts, things do go wrong, which is widely acknowledged in the literature. Have you been in a situation where you prescribed a drug in good faith, but your patient did not receive the drug therapy as you intended due to perceived problems with your written prescription and instructions OR a misinterpretation of your prescription and instructions? Can you describe the experience?
- 5B Were there any (workplace) factors that you felt contributed to this episode?
- 5C What gaps in the system do you see that allow such errors to occur?
- 5D What do you think could be improved to reduce the likelihood of errors?
- 5E How well do you feel prescribing errors are handled in this hospital? How do you handle prescribing errors?

Research Objective 2

Improve understanding of workplace influences on training in prescribing in hospitals

Q6 What assumptions are made of prescribing skills of interns?

- 6A What skills in prescribing do you expect of an intern at the start of their internship?

- 6B How do you assess their competency to be confident that they are prescribing appropriately and safely?

Q7 Influences on JMO prescribing

- 7A Which people were influential in teaching you to prescribe?

- 7B What type of influence do you think you have on the way JMOs prescribe?

- 7C What is your role in ensuring JMOs develop good prescribing habits? (supervisor, coach, mentor)

- 7D What do you see as being your responsibilities regarding JMO training in prescribing?

- 7E I am an intern starting at this hospital tomorrow in your team and I have concerns about my ability to prescribe safely and appropriately. What advice about prescribing in this hospital would you provide?

Comments:

Interview Guide: Pharmacists and Nurses

Research Objective 1

Improve understanding of workplace influences on prescribing in hospitals

Q1 How does prescribing take place?

1A Roles and relationships

⇒ I'm going to begin by asking you about your perceptions of how prescribing takes place in this hospital, and firstly, I'd like to ask you about roles.

- Tell me about your current role in ensuring patients receive appropriate drug therapy in this hospital?
- Who else is involved?
- How would you describe your relationship with them?
- What do you see as being their roles?
- What is your opinion of what they do?

1B Communication Patterns

⇒ Now, I'd like to ask you about how you communicate with the other people involved in managing drug therapy

- Day to day, what information is typically discussed before a drug is prescribed?
- Who says what? Can you provide an example of how a conversation might take place?
- What information about prescribing a particular drug would you typically give to a JMO in order to communicate to them what you would like prescribed?
- Can you provide an example? How would you convey the information?

1C Roles and responsibilities

⇒ Now, I'd like to focus on responsibilities you may associate with prescribing

- In this hospital, who do you feel makes the majority of the prescribing decisions for patients in your care?
- In this hospital, who do you see as being responsible for ensuring that drugs are prescribed appropriately?
- What about D & T committee members, hospital administration?

1D Information sources

⇒ **Now, I'd like ask you about sources of information you use when you provide input into prescribing.**

- Day to day, what sources of information do you rely on the most for the majority of prescribing decisions or decisions about drug therapy that you make?

Personal experience? Colleagues/staff? Written or electronic resources?

- What is it about that source that you value?
- What is your opinion of access to this resource and other resources?

Q2 How is prescribing valued in the hospital?

⇒ **Now, I'd like ask you about your attitudes and feelings about prescribing**

- 2A How would you describe the type of risk associated with prescribing? What level of care?

- 2C What feelings are engendered?

- 2D What skills do you think are required to prescribe competently?

Q3 How is prescribing defined?

- 3A How would you define prescribing?

- 3B What are the goals of prescribing?

- 3C What activities do you consider constitute good prescribing?

Q4 What are the influences on prescribing decisions in the hospital?

⇒ **Now, I'd like to ask you about your perception of influences on prescribing behaviour in this hospital.**

- 4A In the hospital, who or what do you consider to be the strongest influence on prescribing behaviour?

- How would you describe the influence of:

- 4B Medical staff – who?

- 4C Nurses

- 4D Pharmacists

- 4E Pharmaceutical industry – what is your opinion about the

- 4F Patients

- 4G Drug Cost

Q5 What are the influences on prescribing errors?

⇒Now, I'd like to ask you about influences on how well decisions that you may make are carried out

- 5A Ensuring that we get the best out of medicines is a challenge for everyone involved with managing medicines. Part of the challenge in hospitals is ensuring that the system for managing medications works. Despite best efforts, things do go wrong, which is widely acknowledged in the literature. Have you been in a situation where a drug was prescribed in good faith, but your patient did not receive the drug therapy as intended due to perceived problems with the prescription OR a misinterpretation of the prescription? Can you describe the experience?

- 5B Were there any (workplace) factors that you felt contributed to this episode?

- 5C What gaps in the system do you see that allow such errors to occur?

- 5D What do you think could be improved to reduce the likelihood of errors?

- 5E How well do you feel prescribing errors are handled in this hospital? How do you handle prescribing errors?

Research Objective 2

Improve understanding of workplace influences on training of prescribing in hospitals

Q6 What assumptions are made of prescribing skills of interns?

- 6A What skills in prescribing do you expect of an intern at the start of their internship?

- 6B How do you assess their competency to be confident that they are prescribing safely?

Q7 Influences on JMO prescribing

- 7B What type of influence do you think you have on the way JMOs prescribe?
- 7C What is your role in ensuring JMOs develop good prescribing habits? (supervisor, coach, mentor)
- 7D What do you see as being your responsibilities regarding JMO training in prescribing?
- 7E I am an intern starting at this hospital tomorrow in your team and I have concerns about my ability to prescribe safely and appropriately. What advice about prescribing in this hospital would you provide?

Interview Guide: JMOs

Research Objective 1

Improve understanding of workplace influences on prescribing in hospitals

Q1 How does prescribing take place?

1A Roles and relationships

⇒ I'm going to begin by asking you about your perceptions of how prescribing takes place in this hospital, and firstly, I'd like to ask you about roles.

- Tell me about your current role in ensuring patients receive appropriate drug therapy in this hospital?

- Who else is involved and what are their roles?

- How would you describe your relationship with them?

- What is your opinion of what they do?

1B Communication Patterns

⇒ Now, I'd like to ask you about how you communicate with the other people involved in managing drug therapy

- Day to day, what information is typically discussed with members of your team before a drug is prescribed?
How are discussions resolved Who has the final say?

- Who says what? Can you provide an example of how a conversation might take place?

- What information about prescribing a particular drug would you typically receive from a registrar, consultant, nurse or pharmacist? How comfortable are you questioning consultants?

- Can you provide an example? How is the information conveyed?

1C Roles and responsibilities

⇒ Now, I'd like to focus on responsibilities you may associate with prescribing

- In this hospital, who do you feel makes the majority of the prescribing decisions for your patients?

- In this hospital, who do you see as being responsible for ensuring that drugs are prescribed appropriately?

- What about pharmacists, nurses, D & T committee members, hospital administration ?

1D Information sources

⇒ Now, I'd like ask you about sources of information you use when making decisions about whether to prescribe or what drug to prescribe for patients in this hospital

- Day to day, how do you typically make decisions about drug therapy? Who or what do you rely on the most for the majority of prescribing decisions that you make?

Personal experience? Colleagues/staff? Written or electronic resources?

- v) What is your opinion of access to resources?

Q2 How is prescribing valued in the hospital?

⇒ Now, I'd like ask you about your attitudes and feelings about prescribing

- 2A How would you describe the type of risk you feel when you prescribe? What level of care?

- 2B How does this type of risk compare with other decisions you make regarding a patient's care?

- 2C What feelings are engendered when you prescribe? Does this vary in situations when you are transcribing a chart or writing up medications for a patient who isn't yours?

- 2D What skills do you think are required to prescribe competently?

Q3 How is prescribing defined?

- 3A How would you define prescribing?

- 3B What are the goals of prescribing?

- 3C What activities do you consider constitute good prescribing?

Q4 What are the Influences on prescribing decisions?

⇒Now, I'd like to ask you about influences on the way in which you prescribe in this hospital.

- 4A In the hospital, who or what do you consider to be the strongest influence on the decisions that you make when prescribing?
- How would you describe the influence of:
 - 4B Medical Colleagues
 - 4C Nurses
 - 4D Pharmacists
 - 4E Pharmaceutical industry – what is your opinion about them?
 - 4F Patients
 - 4G Drug Cost

Do you receive advice from them on prescribing?

Q5 What are the influences on prescribing errors?

⇒Now, I'd like to ask you about influences on how well decisions that you may make are carried out

- 5A Ensuring that we get the best out of medicines is a challenge for everyone involved with managing medicines. Part of the challenge in hospitals is ensuring that the system for managing medications works. Despite best efforts, things do go wrong, which is widely acknowledged in the literature. Have you been in a situation where you prescribed a drug in good faith, but your patient did not receive the drug therapy as you intended due to perceived problems with the prescription OR a misinterpretation of the prescription? Can you describe the experience?
- 5B Were there any (workplace) factors that you felt contributed to this episode?
- 5C What gaps in the system do you see that allow such errors to occur?
- 5D What do you think could be improved to reduce the likelihood of errors?
- 5E How well do you feel prescribing errors are handled in this hospital? How do you handle prescribing errors?

Research Objective 2

Improve understanding of workplace influences on training of prescribing in hospitals

Q6 What assumptions are made of prescribing skills of interns?

- 6C What training did you receive in prescribing as a student?
- 6A What prescribing skills do you feel you need at the start of the year?
- 6D When you started working in this hospital, how prepared for prescribing did you feel?
- 6E How would you describe the fit between your preparedness in prescribing and people's assumptions of your skills?

Q7 Influences on JMO prescribing

- 7A Since starting work in this hospital, who or what has been influential in teaching you to prescribe?

- 7D Who do you see as being responsible for ensuring you receive training in prescribing?

- 7E I am an intern starting at this hospital tomorrow and I have concerns about my ability to prescribe safely and appropriately. What advice about prescribing in this hospital would you provide?

APPENDIX D

Demographic Questionnaire

**Questionnaire for research study:
Exploring influences on prescribing in two teaching hospitals.**

The purpose of this questionnaire is to provide a context for your perceptions on prescribing, which will be explored in a subsequent interview. The survey is expected to take approximately five minutes to complete. Your privacy whilst participating in this study will be maintained at all times. The information you provide in this survey will be identifiable via numerical code only. If you have any questions regarding this survey, please contact Meredith Page on 8382 2053 or Prof Jo-anne Brien on 8382 2605. *Please tick a box to indicate your response.*

Q1. Demographics

- | | |
|---|----------------------------|
| (a) Age | (b) Gender |
| <input type="checkbox"/> under 25 years | <input type="checkbox"/> F |
| <input type="checkbox"/> 25 to 34 | <input type="checkbox"/> M |
| <input type="checkbox"/> 35 to 44 | |
| <input type="checkbox"/> 45 to 60 | |
| <input type="checkbox"/> over 60 | |

Q2. Current Position

(a) Which of the following descriptions best fits your current position in the hospital?
Please tick one box

- | | |
|---|---|
| <input type="checkbox"/> registered nurse | <input type="checkbox"/> intern (PGY1) |
| <input type="checkbox"/> clinical nurse educator | <input type="checkbox"/> resident medical officer (PGY2) |
| <input type="checkbox"/> clinical nurse consultant | <input type="checkbox"/> senior resident medical officer |
| <input type="checkbox"/> ward pharmacist | <input type="checkbox"/> registrar |
| <input type="checkbox"/> specialist clinical pharmacist | <input type="checkbox"/> academic physician |
| | <input type="checkbox"/> visiting medical officer |
| | <input type="checkbox"/> visiting medical officer with academic affiliation |
| | <input type="checkbox"/> staff specialist |
| | <input type="checkbox"/> staff specialist with academic affiliation |
| <input type="checkbox"/> other <i>Please describe</i> | |

(b) Which of the following terms best fits your specialisation / current area of practice/ or current medical rotation in this hospital:

Please tick one box

- | | |
|--|--|
| <input type="checkbox"/> Cardiology | <input type="checkbox"/> Intensive Care |
| <input type="checkbox"/> Dermatology | <input type="checkbox"/> Neurology |
| <input type="checkbox"/> Endocrinology | <input type="checkbox"/> Oncology |
| <input type="checkbox"/> Gastroenterology | <input type="checkbox"/> Palliative Care |
| <input type="checkbox"/> General medicine | <input type="checkbox"/> Pharmacology |
| <input type="checkbox"/> Geriatrics | <input type="checkbox"/> Psychiatry |
| <input type="checkbox"/> Haematology | <input type="checkbox"/> Renal |
| <input type="checkbox"/> Immunology | <input type="checkbox"/> Respiratory |
| <input type="checkbox"/> Infectious Diseases | |

Other. *Please name*.....

Q3. Work Experience

(a) Number of years postgraduate:

- less than 2 years
- 3-8
- 9-20
- more than 20

(b) Number of years working in hospitals:

- less than 2 years
- 3-8
- 9-20
- more than 20

Q4. Involvement in drug use interventions

- (a) Have you ever been a member or held an advisory position in:
 - (i) a hospital drug and therapeutics committee? Yes No
 - (ii) a state or national therapeutic advisory committee (eg, NSWTAG, NPS) ? Yes No
 - (iii) an advisory committee set up by a pharmaceutical company? Yes No
 - (iv) other committee or organisation with a substantial focus on medicine use? Yes No

If yes, please name.....
- (b) Have you ever been involved in the development of:
 - (i) drug-related clinical practice guideline(s) or clinical pathway Yes No
 - (ii) drug-related hospital policy(ies) or protocol(s) Yes No
 - (iii) other guidelines/policies/ protocols related to drug use Yes No

If yes, please name.....
- (c) Have you ever been an investigator in a research project(s) involving:
 - (i) a drug-related clinical trial Yes No
 - (ii) a drug use evaluation project Yes No
 - (iii) adverse drug reaction monitoring Yes No
 - (iv) patient adherence/compliance project Yes No (v)
 - other research project related to drug use Yes No

If yes, please name.....

****Junior Medical Officers****→ Go to Q6

Q5. Involvement in education and training:

(a) In the last 12 months:

- (i) have you provided any lectures, tutorials or bedside training to **medical students**?
 Yes No → Go to Q5 (b).
- (ii) have you provided any such training in therapeutics, prescribing, drug administration or any other drug-related activity?
 Yes No → Go to Q5 (b)

(b) In the last 12 months:

- (i) have you provided any lectures, tutorials or bedside training to **junior medical officers (PGY1 or PGY2)**?
 Yes No→ Go to end of survey
- (ii) have you provided any such training in therapeutics, prescribing, drug administration or any other drug-related activity?
 Yes No→ Go to end of survey

Q6. For JMOs only: Which medical school did you attend?

.....

Thank you for your time and effort in completing this survey

Please return via internal mail in the envelope provided marked 'CONFIDENTIAL' to:
Meredith Page, Level 2, Xavier Building Therapeutics Centre, SVH **OR**
Meredith Page, Clinical Pharmacology, Level 11, Main Block, RNSH

APPENDIX E

Flier for recruiting junior doctors

Calling all JMOs – help needed please!

Dear Doctor

I am seeking your opinion about issues relating to medication prescribing as part of a study looking into factors that may influence prescribing in teaching hospitals.

I am a postgraduate research student with the University of Sydney and will be interviewing junior medical officers, registrars, consultants, nurses and pharmacists to explore experiences, perceptions, as well as attitudes towards prescribing.

What's involved? Participation will involve completing a questionnaire (less than 5 mins) and taking part in a one-to-one interview (45 mins).

When and where? Interviews will take place in September/October 2004 and you can choose the time and location. A room is also available for interviews on Level 11, Main Block, RNSH. Unfortunately, no remuneration can be provided, but refreshments, including lunch if desired will be made available.

Yes, I'd like to help. Please contact Meredith Page on 8382 2053 or XXXXXX or email mpage@student.usyd.edu.au before 29 October 2004. This study has been approved by the Northern Sydney Health Human Research Ethics Committee.

Thank you for your consideration of this invitation. I appreciate your time and help.

Yours sincerely

Meredith Page

APPENDIX F

Participant Consent Form

PARTICIPANT CONSENT FORM

RESEARCH STUDY INTO: EXPLORING INFLUENCES ON PRESCRIBING IN TWO TEACHING HOSPITALS

Chief Investigator: Prof Jo-anne Brien¹ ; Co-Researchers: Dr Beata Bajorek², Meredith Page³

I,
[name]

of
[address]

have read and understood the information for participants on the above named research study and have discussed it

.....
[signature]

I am aware of the procedures involved in the study, including any inconvenience, risk, discomfort or side effect, and of their implications.

I freely choose to participate in this study and understand that I can withdraw without compromise at any time.

I also understand that the research study is strictly confidential.

I hereby agree to participate in this research study.

Signature:.....

Name:

Date:.....

Signature of witness:.....

Name of witness:.....

If you would like to know more at any stage, please feel free to contact Meredith Page on 8382 2053 or Prof Jo-anne Brien on 8382 2605. **Any person with concerns or complaints about the conduct of a research study can contact the Manager for Ethics Administration, University of Sydney on (02) 9351 4811.**

¹ Pharmacia and Upjohn Chair in Clinical Pharmacy (Faculty of Pharmacy, University of Sydney, based at St Vincent's Hospital)

² Lecturer in Pharmacy Practice, Faculty of Pharmacy, University of Sydney

³ Masters in Pharmacy candidate, Faculty of Pharmacy, University of Sydney

APPENDIX G

Participant Information Sheet

RESEARCH STUDY INTO: EXPLORING INFLUENCES ON PRESCRIBING IN TWO TEACHING HOSPITALS

Chief Investigator: Prof Jo-anne Brien¹, Co-Researchers: Dr Beata Bajorek², Meredith Page³

PARTICIPANT INFORMATION SHEET

You are invited to take part in a research study into exploring influences on prescribing in two teaching hospitals (St Vincent's Hospital and Royal North Shore Hospital). The objective is to identify social and cultural factors that may influence the prescribing process and the way in which junior doctors learn to prescribe. In other words, to explore attitudes, intended behaviours and perceived influences of health professionals typically involved in prescribing or training in prescribing in two hospitals. It is hoped that findings from the study will improve understanding of the influence of hospital culture on prescribing and be used to optimise the effectiveness of educational interventions to improve prescribing in teaching hospitals. This study is being conducted by Meredith Page to meet the requirements for the degree of Masters in Pharmacy under the supervision of Professor Jo-anne Brien of the Faculty of Pharmacy at the University of Sydney.

If you agree to participate in this study, you will be requested to: 1) fill out a questionnaire, which will take approximately five minutes to complete; and to 2) participate in one semi-structured interview of up to one hour in duration. The interview will take place at a suitable location within the hospital that is convenient to you. The interview will be recorded using a digital sound recorder and field notes may be written. You will have the opportunity to withdraw or amend any information during or at the end of the interview. You will also be given the opportunity to preview the interview transcript before it is used, if desired.

All aspects of the study, including results, will be strictly confidential and only the investigator named above (ie, Meredith Page) will have access to information on participants except as required by law. Following collection, all data will be de-identified and coded numerically. All data will be stored on CD-ROMs in a secure location in the Pharmacy Building at the University of Sydney for seven years after completion of the study. A report of the study may be submitted for publication, but individual participants will not be identifiable in such a report.

While we intend that this research study furthers medical knowledge and may improve quality of prescribing and patient care in the future, it may not be of direct benefit to you.

Participation in this study is entirely voluntary: you are not obliged to participate and - if you do participate - you can withdraw at any time. There are no adverse consequences attached to not participating or withdrawing at any stage from the study.

When you have read this information, Meredith Page will discuss it with you further and answer any questions you may have. If you would like to know more at any stage, please feel free to contact Meredith Page (Master of Pharmacy candidate) on 8382 2053 or Prof Jo-anne Brien [Professor of Clinical Pharmacy (St Vincent's Hospital), University of Sydney] on 8382 2605. This information sheet is for you to keep.

Any person with concerns or complaints about the conduct of a research study can contact the Manager for Ethics Administration, University of Sydney on (02) 9351 4811.

¹ Professor of Clinical Pharmacy (St Vincent's Hospital), Faculty of Pharmacy, University of Sydney

² Lecturer in Pharmacy Practice, Faculty of Pharmacy, University of Sydney

³ Masters in Pharmacy candidate, Faculty of Pharmacy, University of Sydney

APPENDIX H

Interview: Introductory Preamble

Interview: Introductory Preamble

- I would like to introduce myself, my name is Meredith Page and I am a Masters research student at the University of Sydney.
- The purpose of this interview is to find out about:
 - your experiences of prescribing in this hospital
 - your attitudes towards prescribing generally
 - your perceptions of workplace influences on prescribing, and the training of prescribers in this hospital.
- The information that will be collected from your interview and others will hopefully improve understanding of social and cultural factors, which may influence prescribing behaviour in hospitals. We hope that this information may be used to assist strategies to improve prescribing in hospitals.
- The results of this study will form a thesis, which will be submitted as a Masters research project. The results may also be published in peer-review journals and presented at relevant conferences.
- All information that is collected either as part of this interview or from notes that I take will be de-identified and assigned a number. This will ensure that the confidentiality of your comments will be maintained. You will also have the opportunity to comment or withdraw any statements you wish at the end of the interview, after transcription of your interview and after collation of results.
- I would like to remind you that your participation is entirely voluntary and you can withdraw from the interview at any time.
- I would also like to emphasise that the purpose of this study is:
 - not to assess the way in which you prescribe, how well you make decisions or how well you do your job.
 - I'm interested in your experience of how prescribing takes place in this hospital, and your opinions and your perceptions.
- I am recording this interview because I won't be able to write quickly enough to get all your comments down. The recording is for the purposes of this research only.

Do you have any comments before we start?

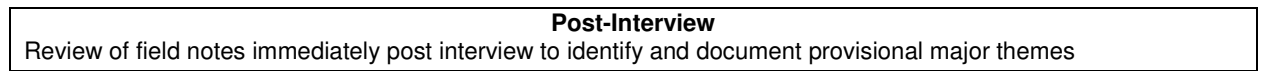
- There are two parts to the interview: firstly, questions will be focused around prescribing generally, and then we'll move onto questions about training new prescribers.

APPENDIX I

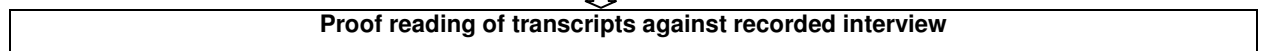
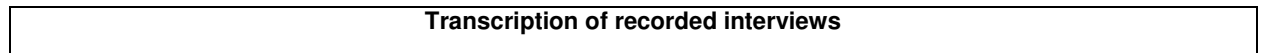
Data Handling Flow Chart

Data Handling Flow Chart

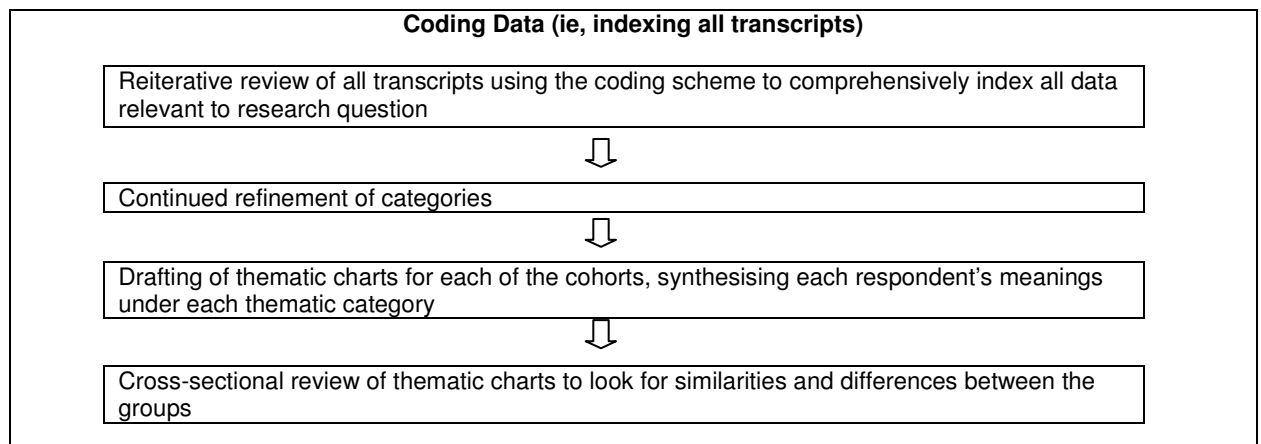
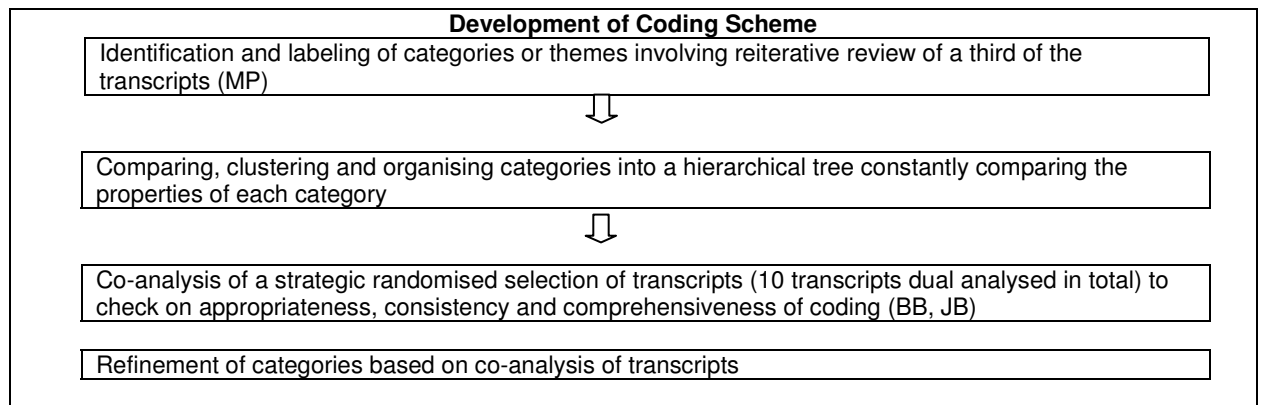
(I) PRELIMINARY DATA ANALYSIS



(II) DATA MANAGEMENT



(III) CONTENT ANALYSIS



(IV) DATA INTERPRETATION

