The Flexibility of Healthcare Teams. A Mixed Methods Study of Doctors and Nurses in an Emergency Department.

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CERTIFICATE OF ORIGINAL AUTHORSHIP

I, Sarah Wise declare that this thesis, is submitted in fulfilment of the requirements for the award of Doctor of Philosophy, in the Health Faculty at the University of Technology Sydney.

This thesis is wholly my own work unless otherwise reference or acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

This document has not been submitted for qualifications at any other academic institution.

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ABSTRACT

Background

The slow pace of reform towards a more responsive, adaptable and efficient healthcare workforce is often blamed on the 'inflexibility' of the healthcare professions. However, the concept of workforce flexibility is as ambiguous as it is ubiquitous. The aim of the study was to define workforce flexibility in the healthcare context by taking a division of labour perspective on a team, measuring the distribution of tasks between roles and exploring the teamwork practices and organisational factors that promote or hinder flexibility.

Study Setting and Method

The emergency department (ED) was selected as a potential exemplar of workforce flexibility. EDs are at the forefront of redesigning professional roles to increase efficiency while the unpredictable and urgent workload makes for an environment where healthcare professionals must be flexible. An explanatory sequential mixed methods design was used. Phase 1 work observations involved a time study which collected 151 hours of quantitative data to compare tasks undertaken by doctors, nurse practitioners (NPs) registered nurses (RNs) and qualitative fieldnotes which captured everyday work practices and the organisational context. In Phase 2, 19 semi-structured interviews were conducted with doctors, NPs and RNs which sought to explain the Phase 1 findings.

Results

The time study is the first to quantify how professional healthcare roles can be occupationally specialised but sufficiently multiskilled to create some overlap in the tasks they perform. The fieldnotes and interviews also generated new knowledge, in describing the teamwork of back-up behaviour between doctors and nurses. Three forms of back-up behaviour that used the team's overlapping roles were identified: 'task back-up' where the team shared tasks based on the most efficient use of skills; 'autonomy back-up' to help a team member with less autonomy over focal medical tasks to ensure patients received timely medications and investigations; and 'knowledge back-up' to help teammates complete their tasks and develop as multiskilled professionals. Consistent with a growing body of evidence across healthcare settings, team members who worked together regularly were more willing and able to provide this back-up and were more effective in coordinating their specialised but overlapping roles.

Conclusion

The study's unique insight on the work of a healthcare team highlights that workforce flexibility must be defined and evaluated from the perspective of the whole team, its patients and the organisational context. Taking this perspective revealed that healthcare professionals are more flexible than is often supposed but that individual team members, with their contextual understanding of the team, the work and the workplace are less interchangeable than current staffing practices assume. What healthcare teams need to work flexibly is stable membership. Further, the study identified that the policies that enact workforce reforms may be hindering the inherent flexibility of multiskilled, autonomous professionals.

CHAPTER 1: INTRODUCTION

Healthcare Reform and Workforce Flexibility

The sustainable provision of healthcare is one of the most significant challenges facing governments in the twenty-first century, with increasing demand and rising costs threatening to undermine already stretched public finances (Buchan, O'May & Dussault 2013; Moffatt, Martin & Timmons 2014; Tsiachristas et al. 2015). Healthcare is a labour-intensive industry and, despite rising capital and pharmaceutical costs associated with advances in medical technology, the workforce accounts for the majority of healthcare expenditure (Hurst & Williams 2012; Nancarrow 2015). In New South Wales (NSW), Australia's most populous state, 59.6 per cent or $12.4 billion of expenditure incurred by the health department during 2015-16 was workforce-related (NSW Health 2017a).

'Healthcare and Social Assistance' is already the largest industry by employment in the Australian economy (ABS 2011), yet it is estimated that by 2030 there will be a shortfall of 123,000 registered nurses and 5,000 doctors (Health Workforce Australia 2014a, 2014b). Employers cannot rely on a significant increase in staff numbers to meet demand since, even if it were economically viable, the aging of the workforce means supply is severely constrained (Buchan, O'May & Dussault 2013; Tomblin Murphy et al. 2016). Moreover, it is becoming increasingly clear that current healthcare systems and workforce skills are not configured to cope with the increasing and more complex demands associated with population aging and the rise in chronic disease (Bodenheimer, Chen & Bennett 2009; Caley & Sidhu 2011; Tomblin Murphy et al. 2016). More of the same type of workers will not meet demand and ensure the long-term sustainability of healthcare systems (Campbell et al. 2013; NSW Health 2015; OECD 2016). Consequently, reforms of the healthcare workforce are being pursued to better match the supply of skills with changing patterns of demand and to achieve greater efficiency in the use of scarce resources (Campbell et al. 2013; OECD 2016; Productivity Commission 2015; Tsiachristas et al. 2015). Rigoli & Dussault (2003) note that although every country's healthcare reform process has distinctive features, the pursuit of greater efficiency is common to each. Berwick, Nolan & Whittington (2008) have described the efficiency goal in healthcare reform as a 'triple aim' of increasing the quality of the healthcare experience, improving health outcomes and saving costs, while Hurst & Williams (2012) simply describe it as 'doing more with less'.

In the search for greater efficiency, reforms have redistributed tasks through the workforce, creating new roles and altering the distribution of tasks between existing roles (Nancarrow & Borthwick 2005). Some reforms occur *within* occupations when existing tasks are redistributed within occupational sub-groups (for example from a specialist physician to a general practitioner) (Martin, Currie & Finn 2009), or when a new task or a novel approach to practice is adopted which has not previously been performed by a particular occupational group (Abbott 1988; Nancarrow & Borthwick 2005). However, most reforms occur when tasks are redistributed *between* occupations (for example from a doctor to a nurse), often referred to as 'substitution' in the literature (Dubois & Singh 2009; Duckett & Breadon 2014; Nancarrow & Borthwick 2005; Sibbald, Shen & McBride 2004). The rationale for substitution is one of technical efficiency, defined as maximising the output (access and quality of patient care) from the available inputs (workforce skills) (Hollingsworth 2008; Rigoli & Dussault 2003). It is claimed that highly skilled healthcare professionals add value to the patient journey through their higher-order skills of assessment, problem solving and planning and therefore, less complex tasks should be redistributed to professions or assistants lower down the skills hierarchy to reduce the cost of those tasks being performed, and to free up the higher skilled professionals (Duckett & Breadon 2014; Productivity Commission 2015).

Policy-makers and commentators in Australia and internationally often legitimise substitution strategies using the rhetoric of workforce flexibility (Addicott et al. 2015; Attorney-General 2010; Nancarrow 2015; Productivity Commission 2005, 2015). Flexibility in terms of who performs which tasks to improve efficiency and adapt to changing demand is one of the most sought-after reforms in the healthcare reform process (Abbott 1988; Bach 2000; Duckett & Breadon 2014; Nancarrow 2015). The most recent Australian government report on this topic argues that allowing clinical tasks to be performed by a wider range of occupations will *"…produce a more flexible and responsive workforce, while maintaining (or even improving) the quality and safety of care"* (Productivity Commission 2015, p. 46). Similarly, Dower, Moore and Langelier's (2013) analysis of the workforce reforms needed to deliver primary care programs in the United States concludes that regulations that restrict tasks to particular occupations means primary healthcare teams are not sufficiently flexible. In the United Kingdom workforce policy has focussed on building a more skilled, productive and flexible workforce to meet increasingly complex patient needs (Skills for Health 2017). To do this, Addicott et.al. (2015) claim that healthcare workers need to take on a greater range of tasks, to work in multidisciplinary teams and across a variety of care settings.

The notion that a flexible workforce is an efficient workforce has become so prevalent that it has become part of mainstream discourse (Bradley 2009; Skorstad 2009). Broadly defined, flexibility is an organisation's capacity to respond and adapt to changing demand, but within this sits a plethora of organisational, workforce and regulatory policies that makes the concept highly ambiguous (Kalleberg 2001; Mir & Mir 2015; Skorstad 2009; Vallas 1999). Over the years these definitional difficulties have

only multiplied with the emergence of numerous theoretical models of flexibility (Golden & Powell 2000; Mir & Mir 2015; Rose 2009; Vallas 1999). Moreover, as Skorstad (2009) argues, policy-makers and organisations persistently conflate the intention of flexibility and actual outcomes. In healthcare, the rhetoric of flexibility is widely employed to legitimise substitution strategies and other workforce reforms, but is never defined in terms of outcomes (Desombre et al. 2006; Nancarrow 2015; Wise et al. 2017). The ubiquitous yet ambiguous character of 'workforce flexibility' as it has been used in the context of healthcare reforms is the motivation for this study.

The Inflexibility of the Healthcare Division of Labour

It is often claimed that the healthcare workforce is particularly inflexible because of the way tasks are bound to particular occupations (Duckett & Breadon 2014; Nancarrow 2015; Productivity Commission 2015), and that these occupational demarcations have perpetuated the inefficient use of healthcare skills (Bach, Kessler & Heron 2012; Harvey 2011; Moffatt, Martin & Timmons 2014; Nancarrow 2015). That certain occupations perform certain tasks, and thus possess an associated set of knowledge and skills, is a characteristic of the organisation of work in every industrialised society, and is described by the concept of the division of labour (Allen & Pilnick 2005; Anteby, Chan & DiBenigno 2016; Hughes 1964/1994).

Freidson (2001) argues that the division of labour may be defined as both the distribution of tasks between occupations *and* the structure of social relationships that organise and coordinate the work of those occupations. Freidson (2001) describes three levels to the division of labour: how economic and other activity is divided into industries (e.g. healthcare); how those industries are divided into organisations (e.g. hospitals, primary care clinics); and how tasks are distributed between occupational roles within an organisation (e.g. doctors, nurses, administrators on a ward). The scope of inquiry for this study is the division of labour at the organisational level: the distribution of tasks between occupational roles in a workplace *and* the structure of social relationships that organise and coordinate the work of those roles.

Within any workplace, the existing distribution of knowledge and skills between occupations constrains employers' ability to redesign roles through the redistribution of tasks (Bacon, Blyton & Dastmalchian 2010). Knowledge is the information workers require to perform tasks while a skill is the physical dexterity and/or mental ability needed to perform tasks satisfactorily (Black, Hashimzade & Myles 2017). In healthcare, the division of labour is described by Freidson (2001, p. 55) as *"occupationally-controlled"*, that is, *"…each [occupation] controls the work for which it is competent, negotiates its boundaries with other [occupations], and by that method determines how the entire division of labour is organised and coordinated"*. Workforce reforms seek to disrupt the occupational division of labour by adding tasks to, or taking tasks away from established occupational roles (Willis 2006). In healthcare, the occupational division of labour is particularly resistant to reform because the workforce comprises a

high proportion of professionals. Nearly two-thirds (63%) of all hospital employees are classified as 'professional' compared to an Australian industry average of 21% (ABS 2011). Historically, professional status gave occupations greater control over their work, hence an enhanced ability to resist reforms to their roles (Abbott 1988; Freidson 1970; Larson 1977; Nancarrow & Borthwick 2005).

Governments and commentators often blame healthcare professions' resistance to reform for continued inefficiencies, accusing the professions of *being* inflexible (Bach, Kessler & Heron 2012; Duckett 2005; Nancarrow 2015; World Health Organisation 2006). Yet governments themselves control the regulations that maintain professional status and the occupational division of labour. Freidson's (1970) and Larson's (1977) influential analyses describe the systematic, collective effort of aspiring professions to 'close' the market for their work by convincing the state to regulate to make it illegal and/or financially unviable for other occupations to compete (Adams 2015; Muzio & Kirkpatrick 2011; Saks 2010). Professional closure strategies observed over the first part of the twentieth century included the professions' control over: the selection, education and professional development of its members; licencing of professional title and discipline; the payment system for work; and access to the technology required to perform certain tasks (e.g. prescription of medications). Thus, with the state's regulatory support, professions were able to create an occupational monopoly for their work while maintaining some autonomy to regulate their own affairs (Freidson 1970; Larson 1977; Muzio & Kirkpatrick 2011). The medical profession is regarded as the proto-typical profession because of its successful deployment of these closure strategies (Abbott 1988).

As Abbott (1988) states, the maintenance of an occupational monopoly requires not just the legal mandate of regulatory protection, but also an intellectual mandate. An intellectual mandate involves the possession and control of preeminent knowledge and skills deemed so esoteric or complex that it can be claimed that others cannot perform the work safely or satisfactorily (Abbott 1988; Freidson 2001; Hughes 1965/1994). There is broad agreement that the medical profession's intellectual mandate based on its connection with medical science explains its historically dominant position within the healthcare division of labour (Abbott 1988; Freidson 1970; Larkin 1983; Larson 1977). Through its control of its knowledge base, the medical profession gained the intellectual mandate and cultural hegemony to exclude others from their focal tasks of diagnosis and determining treatment and dispositions (Freidson 1970; Muzio & Kirkpatrick 2011). Thus, the division of labour in healthcare became both occupationally-controlled and hierarchical: the doctor's exclusive right to diagnose, perform invasive treatments and prescribe medications was the centre around which the work of many other healthcare occupations revolved (Freidson 1970).

Willis (2006) argues that the golden age of medicine's dominance lasted for the four decades from the 1930s to the 1970s, at the time when the sociological analysis of professional closure was also at its peak (Gorman 2010). Since the late twentieth century, medicine's dominant position in the healthcare division of labour and status as an autonomous, self-governing profession has been eroded both in absolute terms, and relative to other healthcare professions (Adams 2015; Evetts 2011). The decline in medical dominance has been attributed to calls for greater transparency and accountability (Flynn 2002), declining patient deference (Brown, Elston & Gabe 2015), the predominance of managerial values and pressure for greater efficiency (Evetts 2011; Thomas & Hewitt 2011), and demands for more democratic, less hierarchical forms of working (Finn, Learmonth & Reedy 2010; Schadewaldt et al. 2014). Crucially, workforce reforms that have redistributed tasks associated with medicine's focal activities of diagnosis and treatment to other healthcare professions have significantly altered the traditional division of labour (Dubois & Singh 2009; Nancarrow & Borthwick 2005).

This study of workforce flexibility focusses on medicine and nursing, the two dominant professions in the healthcare division of labour. Doctors remain in a powerful position by virtue of their legal and intellectual mandate (Adams 2015; Evetts 2011; Muzio & Kirkpatrick 2011) while registered nurses (RNs) are overwhelming numerically dominant: forty-one percent of hospital employees are RNs, compared to eight percent who are doctors (ABS 2011).

Despite much theoretical analysis of the healthcare division of labour, what constitutes medical tasks and nursing tasks is not clearly defined (Allen 2014; Currie & Carr-Hill 2013; Sullivan, Francis & Hegney 2008). This study examines this question empirically but for the purposes of subsequent chapters, 'medical tasks' or 'nursing tasks' are defined as any tasks traditionally performed by those respective professions, acknowledging that this varies between healthcare contexts and changes over time. The term 'focal medical tasks' refers to tasks related to reasoning about medical problems, that is the process of diagnosis and determining treatments, especially the prescription of medications. These tasks have been central to medicine's historical dominance with nurses traditionally assisting rather than acting autonomously in these tasks (Abbott 1988; Freidson 1970; Larkin 1983). Some of the most significant and widespread workforce reforms have redistributed such focal medical tasks to RNs, albeit with lower levels of autonomy over those tasks (Djukic & Kovner 2010; Hudson & Marshall 2008; Lowe et al. 2012). Further, the development of the nurse practitioner (NP) role has, for the first time, given nurses a legal mandate to autonomously diagnose and determine treatments (Kilpatrick, Lavoie-Tremblay, Ritchie, Lamothe & Doran 2012; Pulcini et al. 2010; Rashid 2010). While there is an abundance of literature evaluating such reforms, there has been no analysis of whether they increase the flexibility in the workforce.

The lack of evidence on workforce flexibility reflects not only a failure to define the desired outcomes for reforms, but also the narrow focus of evaluations which look at specific roles or tasks and rarely consider the impact of reforms on the whole team (Ilott et al. 2010; Rycroft-Malone et al. 2008). Even in the absence of reforms, surprisingly little is known about what doctors and nurses *do* in healthcare teams (Reeves, Lewin & Espin 2010; Weinberg et al. 2011; Xiao, Parker & Manser 2013). Observations made by Larkin (1983, p. vi) 35 years ago, that reforms of the healthcare workforce tend to be based on "… *a call for 'flexibility' and 'teamwork' … rather than any systematic analysis of the tensions of the resulting division and redivision of labour*" remain cogent today. This study addresses this gap by taking a division of labour perspective on flexibility in a healthcare workplace: describing how tasks are distributed within a healthcare team, inclusive of all tasks and roles, and exploring the structure of social relationships that organise and coordinate their work.

Study Aim and Objectives

The aim of the study is to define the concept of workforce flexibility in the healthcare context. The emergency department (ED) was selected as the setting for the study as a potential exemplar of flexibility within a healthcare team. Emergency departments in Australia and internationally have been at the forefront of reforms to redistribute medical tasks to nurses, including the widespread adoption of the NP role (Dinh et al. 2012; Lutze et al. 2014), and the ability of RNs to initiate medications and diagnostic investigations (Cabilan & Boyde 2017; Rowe et al. 2011). Furthermore, as an environment characterised by busyness, unpredictably and urgency, the ED is the type of workplace where healthcare professionals may be less likely to adhere to the occupational demarcations deemed a barrier to flexible working (Abbott 1988; Carmel 2006; Reeves, Lewin & Espin 2010). The study's objectives are:

Objective 1: To compare the tasks undertaken by doctors, NPs and RNs in an ED team, establishing how the roles are differentiated and where they overlap.

Objective 2: To explore the teamwork behaviours and organisational factors that promote or hinder flexibility in the team.

Objective 3: To understand if nursing roles designed to undertake focal medical tasks increase flexibility, and whether restrictions to their autonomy affect that flexibility.

Objective 4: To identify the nature of flexibility within a team of ED doctors and nurses.

Structure of the Thesis

The thesis is structured into ten chapters. Following this introductory chapter, **Chapter 2: Background** discusses the regulatory and historical factors that have shaped and maintained the occupational division of labour in healthcare, including the redistribution of tasks from medicine to nurses. The chapter also explains the reasons for selecting the ED Fast Track model of care as the clinical setting to examine the nature of flexibility in a healthcare team.

Chapter 3: Analytical Framework describes the framework developed to organise and guide each phase of the study, from the literature review through to the analysis. In the absence of an extant literature that defines workforce flexibility in the healthcare context, the constructs of the analytical framework were found in seminal work organisation theory. Two competing models of work organisation, Taylorism and functional flexibility are drawn together into an analytical framework using Weber's comparative analytical method of ideal types.

Chapter 4: Literature Review critically reviews the literature on the redistribution of medical tasks to nurses to evaluate the evidence for whether such reforms have produced a more flexible healthcare workforce. Guided by the analytical framework, the review addresses three questions: i) What is the evidence on the redistribution of medical tasks to nurses in terms of its impact on the range of skills clinicians use and tasks they undertake? ii) What is the evidence for whether the redistribution of tasks from medicine to nursing has produced more flexible healthcare teams? iii) What is the evidence that nursing roles designed to undertake focal medical tasks increase flexibility? The chapter concludes with a summary of the evidence, identifying the gaps in the literature the study will address.

Chapter 5: Methodology describes the methodology and process of study design. Mixed methods research was selected as the most appropriate methodology to address the study's aim and objectives, and to capture both elements of the division of labour: the distribution of tasks between occupational roles in the workplace and the structure of social relationships that organise and coordinate their work. The chapter details how the research objectives were linked to a qualitative or quantitative methodological approach, the reasons for selecting an explanatory sequential mixed methods design, and an overview of the type of methods best-suited to address the study's objectives.

Chapter 6: Methods specifies the methods used to execute the explanatory sequential mixed methods design, the choice of study site and the ethical considerations for the study. Details of the data collection tools, procedures and analysis methods for each of the two study phases are provided: Phase 1 work observations, consisting a quantitative time study and qualitative fieldnotes; and Phase 2, consisting semi-structured, face-to-face interviews. The methods used for drawing the meta-inferences, integrating the findings from Phase 1 and Phase 2, are also discussed.

Chapter 7: Work Observations Findings presents the findings from the Phase 1 work observations to establish the task distribution within the Fast Track team. The time study data addressed the first research objective: to compare the tasks undertaken by doctors, NPs and RNs in an ED team, establishing how the roles are differentiated and where they overlap. The fieldnotes captured teamwork behaviours, organisational factors and aspects of nurses' autonomy over focal medical tasks for exploration in Phase 2.

Chapter 8: Interview Findings discusses the findings from the thematic analysis of the semi-structured, face-to face interviews with doctors, NPs and RNs. Interviews explored perceptions of the teamwork behaviours and organisational factors that promote or hinder flexibility as well as attitudes to nurses' autonomy in focal medical tasks, addressing research objectives two and three.

Chapter 9: Discussion draws the meta-inferences from the analysis of the work observations (time study and fieldnotes) from Phase 1, and the interviews from Phase 2 and discusses them in the light of the existing literature. The purpose of the chapter is to address the study's final objective, to identify the nature of workforce flexibility in the team of ED doctors and nurses. The study's limitations are also discussed.

In the final **Chapter 10: Conclusions and Implications**, the insights from the ED team are used to define the concept of workforce flexibility for the broader healthcare context. The implications for the study's findings for the organisation, development and regulation of healthcare professionals needed to foster greater workforce flexibility are discussed, followed by reflections on the adequacy of the analytical framework in clarifying the concept of workforce flexibility.

CHAPTER 2: BACKGROUND

Introduction

This background chapter discusses the regulatory and historical context for the redistribution of tasks from medicine to nursing and describes the clinical setting selected for the study. It is divided into three sections. The first section examines how the regulation of the medical and nursing professions has shaped and maintained the occupational division of labour in healthcare. The second provides an historical perspective on redistribution of tasks from medicine to nurses, summarising these reforms as long-term trend. The final section describes the reasons for selecting the emergency department (ED) Fast Track model of care as the clinical setting to examine the nature of flexibility in a healthcare team.

The Regulation of Medicine and Nursing in Australia

The regulatory mechanisms that have shaped and maintained the occupational division of labour in Australian healthcare are professional licensing, the system of payments, legislation related to the prescription and supply of medications, and the regulation of scope of practice and professional education. An overview of each is provided here.

In the past, professional licencing sat under the control of autonomous professional bodies within each state but today it is regulated by an independent national registration and accreditation body called the Australian Health Practitioner Regulatory Agency (AHPRA), and the national boards for each of the 15 regulated health professions. The purpose of AHPRA and the national boards is to protect the health and safety of the public by ensuring that only suitably trained, competent and ethical health practitioners are licenced to practice under a protected professional title (AHPRA 2017). Protected titles include the mainstream titles of 'medical practitioner' (referred to as 'doctors' in this thesis), registered nurse (RN), enrolled nurse (EN), nurse practitioner (NP) and midwife, as well as allied health and complementary medicine practitioners such as osteopaths and acupuncturists. Protection of title maintains the occupational division of labour because, as Freidson (2001, p.56) explains, *"Should consumers or managers wish to have the tasks connected with those [professions] performed, they are not free to employ any willing worker, or to themselves train workers for the purpose. Instead they must use bone fide members of the [profession]"*. For example, a vacant position in a hospital that requires the position-holder to diagnose and determine treatments must be filled by a licenced doctor, or in some circumstances, an NP. An employer cannot employ and train an unlicensed person to fill the position.

Medicare, the universal healthcare system of payments in Australia, has also played a significant role in shaping and maintaining the occupational division of labour. Public hospitals are managed by the government of each state or territory to provide patients with comprehensive inpatient and emergency care, free at the point of care (AIHW 2016). In contrast, primary care and private hospitals operate Medicare on a fee-for-service basis (McDonald & Duckett 2017). Patients pay the service provider directly and claim back a scheduled fee determined by the Medicare Benefit Schedule (MBS) from the government, though the schedule fee is often less than the price charged by the provider (AIHW 2016). Patients can only claim back the scheduled fee if the service provider has an MBS provider number. Further, referrals to other service providers and for diagnostic investigations only qualify for a Medicare rebate if the referral was issued by a professional with an MBS provider number. Similarly, the Pharmaceutical Benefits Scheme (PBS) provides subsidised medicines for Medicare-eligible patients but only prescriptions written by healthcare providers with a PBS prescriber number are subsided (Department of Health 2018b). Historically, only doctors were issued with MBS provider and PBS prescriber numbers, thus maintaining the medical profession's monopoly over services to diagnosis and treat patients.

Nurse practitioners have a protected title regulated by AHPRA that requires a Master's degree and 5000 hours of advanced practice (NMBA 2011). They are distinguished from other nurses by their legal mandate to autonomously diagnose, prescribe and refer within their scope of practice, that is the patient conditions they are educated and competent to treat (Scanlon et al. 2016). However, when the first Australian NP was licenced and employed in outback New South Wales (NSW) in 2001, they were not permitted to obtain MBS provider or PBS prescriber numbers (Harvey 2011; Scanlon et al. 2016). Despite NPs' legal mandate their patients had to pay the full cost of fees, medications and any services they were referred to (Harvey 2011). The exclusion of NPs from the MBS and PBS has been attributed to vociferous opposition from the Australian Medical Association (AMA) (Cashin 2014; Harvey 2011; MacLellan, Higgins & Levett-Jones 2015). Legislative changes granted in 2010 mean NPs working in private practice can now obtain MBS provider and PBS prescriber numbers but they must be in a 'collaborative arrangement' with a named doctor (Schadewaldt et al. 2016). This concession was achieved by the AMA who state that the arrangements provide "*an overarching quality framework to preserve patient safety and ensure that medical practitioners are not left out of the loop*" (AMA 2010, p. 3). In the predominantly private practice environment of Australian primary care, a collaborative arrangement essentially means the NP must be employed by a General Practitioner (GP) (MacLellan, Higgins & Levett-Jones 2015; Schadewaldt et al. 2016). However, the fee-for-service funding model means there is no financial incentive for a GP to employ an autonomous NP. Many GPs employ a practice nurse who, under delegated medical authority, performs tasks such as pap smears, chronic disease management, immunisations and wound care (Merrick et al. 2012). In this delegation model, the GP collects the MBS fee for services provided by the practice nurse whereas an NP would collect the fee directly.

Using Larson's (1977) analysis, the collaborative arrangement concession achieved by the AMA might be viewed as medicine continuing to close the primary care market to competition from independent NPs. Internationally, it has been shown that the redistribution of tasks from doctors to other professionals is more difficult to achieve in fee-for-service models due to the direct financial disincentives for the medical profession (Greß, Delnoij & Groenewegen 2006; Niezen & Mathijssen 2014). In the United States, collaborative arrangements in themselves have been found to inhibit the growth of NP services compared to areas where NPs are permitted to operate independently (Xue et al. 2016). The system of payments and requirement for collaborative arrangements has certainly shaped the pattern of NP employment in Australia. Despite the potential for NPs to fill critical service gaps in primary care, especially in remote and rural Australia (Productivity Commission 2005), growth in this area has been slow (Harvey 2011; Schadewaldt et al. 2016). The most recent census of the NP workforce conducted by Middleton et al. (2011) found that just 5.8% of Australian NPs work in a community or primary care setting. In contrast, by far the largest group of NPs work in the public hospital environment of EDs (30.3%). Nurse practitioners' lack of MBS provider and PBS prescriber numbers has been less restrictive in public hospitals since patients' access medications, investigations and consultations from specialist doctors is free at the point of care. Nurse practitioners can now apply for a PBS prescriber number but in New South Wales they may not use that number to prescribe medications for patients discharged from a public hospital. This means NPs' patients cannot fill their prescriptions at their local pharmacy and receive subsidised medications (Department of Health 2018b). Furthermore, NPs working in public hospitals remain ineligible to apply for an MBS provider number, therefore if they refer patients to services outside the public hospital system those services are not eligible for the Medicare rebate (Department of Health 2018a).

Protection of title and the system of payments has continued to shape who may occupy healthcare roles and where they deliver services in Australia. In terms of the regulation of specific tasks, only those pertaining to the prescription and supply of pharmaceutical medicines are restricted under the law (Birks et al. 2016), in New South Wales by the Poisons and Therapeutic Goods Act 1966. Only doctors and NPs are permitted to independently prescribe medications but in some workplaces RNs can *initiate* medications for *immediate supply* (i.e. administration by the RN) under protocol (Wilkinson 2011). A similar form of nurse prescribing called Patient Group Directions is found in the UK where legislation was changed to allow RNs to initiate medications for immediate supply under their own authority, albeit within the restrictions of a protocol (Gielen et al. 2014; NICE 2013). To date, no legislative changes have been made in Australia, therefore RNs initiating medications do so under a 'standing order' where the authority to prescribe is delegated from a named doctor (Wilkinson 2011) and under the condition that they follow the decision-making process defined in a protocol.

In Australia, all other clinical tasks are regulated through the concept of scope of practice. Scope of practice determines which clinical tasks, other than medication-related tasks, an individual clinician performs (Birks et al. 2016). Scope of practice and other code of conduct matters are overseen by the national board for each profession, the Medical Board of Australia (MBA) for doctors and the Nursing and Midwifery Board of Australia (NMBA) for nurses and midwives. There is a distinction between the scope of practice for a profession and the scope of practice of an individual (NSW Health 2011). A profession's scope of practice is defined as the roles, functions, responsibilities, activities and decision-making capacities that members of that profession are generally educated, competent and authorised to perform (NSW Health 2011). The scope of practice of an individual is based on that person's experience and education, and the context in which they work. Rather than listing permissible tasks, the onus is on an individual doctor, NP or RN to judge which patients, conditions and tasks are within their scope of practice based on their education, knowledge, competency, experience and lawful authority (MBA 2014; NMBA 2008).

Unlike some jurisdictions in the United States and Canada where individual tasks are regulated and tied to specific roles (Dower, Moore & Langelier 2013), Australia's scope of practice approach (similar to that of the United Kingdom) should facilitate the redistribution of tasks through the workforce, allowing tasks to be undertaken by anyone who has gained the necessary education and experience. However, access to the education and experience needed to perform certain tasks is profession-specific and is an area where the medical profession has maintained a high degree of autonomy and control. Doctors' post-registration education and career structure is largely determined by the professionally-controlled specialist medical colleges. The colleges determine the entry criteria for post-registration doctors to become trainees or 'registrars' of the college, determine the content and deliver the training and, on successful completion of this training, bestow the title of 'specialist' in the college's area of medical practice, a title which is legally protected by AHPRA (MBA 2010). In contrast, while nursing has become increasingly specialised, and specialist nursing colleges exist, nurses cannot register as specialists, nor can they access the education provided by the specialist medical colleges (AHPRA 2018). Nurses also undertake specialist post-graduate education provided by universities, including those approved for registration as an NP. However, the training RNs receive, the skills and tasks they acquire and their career progression is largely determined by policy and practice within their workplace (Djukic & Kovner 2010). Organisational policy also plays a significant role in shaping NPs' scope of practice. Unlike either doctors or RNs, NPs in NSW have their scope of practice formally agreed with their employer. The formal scope of practice agreement does not detail every task an NP may undertake, rather it outlines the needs of the relevant patient population groups, the clinical context in which they work (e.g. the ED) and the broad types of tasks needed to meet patients' and service needs (NSW Health 2012b).

Protection of titles, the MBS and PBS system of payments and the medical profession's continued control over its knowledge shapes and maintains the occupational division of labour in the Australian healthcare workforce, and the dominant position of doctors within it. The claim made by government policy-makers that "*No one profession actually owns a skill or activity in and of itself*" (NSW Health 2011, p. 25) may be largely correct in a legal sense, but it underestimates formal and normative influence of the occupational division of labour (Dubois & Singh 2009; Muzio & Kirkpatrick 2011). That said, significant changes have occurred, aided by the scope of practice approach to professional regulation and legislative changes for NPs. As Abbott (1988) observes, each profession is bound to a set of tasks by regulatory and normative ties of occupation, but none of these ties is absolute or permanent. Nowhere in the healthcare division of labour is this more clearly demonstrated than in the long-term trend of the redistribution of medical tasks to nurses.

The Redistribution of Medical Tasks to Nurses – A Long-Term Trend

The redistribution of medical tasks to nurses is depicted as being at the forefront of the reforms needed for a modern, efficient workforce, but the practice is as old as the organisation of healthcare itself. In an early study of nurses' work in the United States of America, Hughes, MacGill Hughes & Deutscher (1958) observed that as medical science advances and demand for healthcare rises, doctors learn new techniques and continue to reorganise their work by delegating tasks to others, especially nurses. The authors described a constant and often unrecognised redistribution of tasks with nurses taking on more tasks traditionally undertaken by doctors. This trend has always been the subject of friction and debate within the nursing profession. From the earliest times, nursing sought to establish itself as a distinct profession, separate from and equal to medicine (Etzioni 1969; Freidson 1970; Larson 1977; MacDonald 2006). In establishing their own intellectual mandate, nursing's leaders were concerned the profession should not become a diluted version of medicine nor that it simply accumulate the tasks discarded by medicine, particularly in light of the historic gender segregation of nursing and medical roles (Davies 1996; Wicks 1999; Witz 1992). Contemporary nursing debates have focussed on whether the ability to undertake medical tasks should define 'advanced nursing practice' (Carryer et al. 2007; Thoun 2011). Allen (2007, 2014) argues that, despite the best efforts of the nursing profession to define the distinctiveness of nursing practice, nurses' numerical dominance and their central place in healthcare delivery means they work flexibly, taking on others' tasks to plug gaps in service provision. A similar observation is made by Coombs & Ersser (2004) who note that nurses perpetually take on tasks and responsibilities from doctors (and managers) because they are seen as a flexible workforce who will complete the tasks others leave behind (Chapman 1976). This view of nurses as the 'flexible workforce' within the health system is echoed by both Oelke et al. (2008) and Pearson (2003) who contend that historically nurses have always been relied upon to be multiskilled.

Evaluation studies confirm a trend of nurses undertaking increasingly complex medical tasks (Djukic & Kovner 2010). Administering oral medications prescribed by a doctor has long been part of the RN scope of practice (Chiarella 2002). Registered nurses are now trained to manage more complex pharmaceutical processes (Fatima et al. 2008; Zier et al. 2007) and in some workplaces initiate medications under protocol (Barksdale et al. 2016; Cabilan & Boyde 2017). Similarly, nurses have long been involved in wound care, but they are now undertaking laceration repair (Bonadio, Carney & Gustafson 1994; Middleton 2006). The insertion of catheters, cannulae and tubing into the body by nurses is also occurring in more complex situations. Once the reserve of doctors, venepuncture and the insertion and removal of peripheral and central venous access devices is increasingly part of everyday nursing practice (Dougherty & Lamb 2009; Fry, Romero & Berry 2016) while specially trained RNs are now performing diagnostic gastrointestinal endoscopy and flexible sigmoidoscopy (Day et al. 2014; Duffield et al. 2017). Crucially, the growth in the NP role has challenged medicine's long-standing monopoly over the right to diagnose and determine treatments (Pulcini et al. 2010; Rashid 2010). As Brook & Crouch (2004) comment, NPs' ability to manage a patient's entire journey through the ED without consulting a doctor represented a landmark change in the doctor-nurse division of labour.

Despite the occupational division of labour, the professions of nursing and medicine are highly interdependent and nursing has accumulated more, and more complex medical tasks over time (Allen 2004; Srivastava et al. 2008; Walby & Greenwell 1994). The drivers for the redistribution of medical tasks to nurses identified by Hughes, MacGill Hughes & Deutscher (1958), of advancing medical technology and increasing demand for healthcare, remain central today and have been bolstered by reforms aimed at creating a more efficient and flexible workforce (Bridges & Meyer 2007; de Bont et al. 2016; Srivastava et al. 2008). Nurses' increased involvement in medicine's focal tasks of diagnosing and determining treatments is frequently described as 'blurring' the boundaries between the two professions (See for example Dubois & Singh 2009; Hoskins 2012; Hudson & Marshall 2008; Swann et al. 2013). This imagery of blurred boundaries suggests that demarcations within the occupational division of labour deemed a barrier to flexibility are breaking down as their knowledge and skills increasingly overlap. Furthermore, sociologists have long observed that despite the emphasis on occupational distinctiveness and clear, if contested, professional boundaries in theory, in everyday clinical practice there is considerable ambiguity between the healthcare professions where their capacity to perform tasks overlaps (Abbott 1988; Freidson 2001; Hunter & Segrott 2014). It has also been suggested that professionals are less likely to strictly adhere to occupational demarcations in busy, unpredictable and complex clinical settings (Abbott 1988; Carmel 2006; Reeves, Lewin & Espin 2010). The emergency department was selected as a possible exemplar of where traditional occupational demarcations may be breaking down towards a more flexible form of working.

Emergency Departments

If any clinical environment requires healthcare professionals to *be* flexible, it is the Emergency department (ED). Emergency department work is volatile, unpredictable and complex: patients usually attend without notice, with a wide spectrum of presenting complaints, possible diagnoses and levels of acuity (Chong et al. 2010; Jones, Shaban & Creedy 2015). Staff must be responsive to high levels of fluctuation in the volume and nature of patient demand and adapt to competing demands (Crilly et al. 2017; Johnston et al. 2016). Emergency departments are also under pressure to continually improve organisational efficiency.

Over the past five years, demand for ED services in Australia has increased at an average rate of 2.6% per annum; there were nearly 7.8 million presentations in 2016-17, with 31% of those patients requiring admission to hospital (AIHW 2017). However, as Forero et al.'s (2010) analysis of hospital bed supply reveals, while ED presentations almost doubled between 1998 and 2007, the number of inpatient hospital beds available remained the same over the same period. This imbalance between the supply and demand for hospital beds creates 'access block', defined as "…*the situation where patients who have been admitted and need a hospital bed are delayed from leaving the Emergency Department because of lack of inpatient bed capacity"* (ACEM 2001, p. 1). When access block is combined with high numbers of patient presentations, patients cannot flow through the department, leading to increased length of stay (LOS) and department overcrowding. Overcrowding has been linked to a range of adverse patient outcomes, including delays in transfer to intensive care units, delays in pain treatment, increased numbers of patient who leave the ED without treatment, and increased mortality (Forero et al. 2010; Sun et al. 2013). This correlation between patient flow and patient outcomes means that, unlike many healthcare settings where clinical quality and organisational efficiency are often regarded as competing goals, in EDs organisational efficiency is a component of clinical quality (Nugus & Braithwaite 2010). The ability of an ED team to provide safe, high quality, timely care to critically ill patients, and to prevent the poor patient outcomes associated with overcrowding, relies on existing ED patients being efficiently treated and discharged to make space for the continuous flow of new patients (Forero et al. 2010; Hoot & Aronsky 2008; Lowthian et al. 2012).

The pressure to provide timely patient care to keep patients flowing through the ED is reinforced by the pervasive presence of time-based performance targets as the principle measure of ED efficiency (Moffatt, Timmons & Coffey 2016; Weber et al. 2011). Time-based performance targets are founded on the managerial principle that efficiency can be improved if performance is measured, targets set and departments benchmarked against each other (Ferlie et al. 1996; Singleton et al. 2009). Australian EDs have two time-based performance targets, one based on time to initial treatment, the other on ED LOS (AIHW 2017). Time to treatment is calculated as the time elapsed from the moment the patient arrives in the ED to the commencement of clinical care. Targets are based on the Australasian Triage Scale (ATS) which aims to ensure that the treatment of more acutely unwell patients is

commenced quickly than less urgent patients (Lutze et al. 2014). There are five time-to-treatment targets for each of the triage categories and are provided in Table 1.

Table 1 Australasian Triage Scale recommended treatment times

Triage Category	Examples	Time to Treatment
1 - Immediately Life Threatening	Cardiac arrest, immediate risk to airway	Immediate simultaneous assessment and treatment
2 - Emergency	Chest pain likely cardiac, severe respiratory distress	Within 10 minutes
3 - Urgent	Moderate blood loss, persistent vomiting with dehydration	Within 30 minutes
4 - Semi-urgent	Minor limb trauma, vomiting without dehydration	Within 60 minutes
5 - Non-urgent	Small cuts or abrasions	Within 120 minutes

Source: ACEM (2016)

The second time-based target, the Emergency Treatment Performance (ETP) target, was introduced into Australian hospitals in 2011 and stipulates that 81% of patients have an ED LOS of no more than four hours before being discharged, admitted to hospital or transferred (AIHW 2017). Achieving the ETP in the context of rising demand for ED services requires a whole-of-system approach, including the addressing inpatient bed capacity and the prevention of avoidable ED presentations through primary care strategies (ACEM 2010; CENA 2011; Crawford et al. 2014; Lowthian et al. 2012). In an analysis of Australian ED administrative data, Khanna et al. (2017) show that non-compliance with the ETP was more strongly correlated with departure delays caused by problems outside the ED (e.g. the lack of hospital or primary care capacity) than with delays in treatment within the ED. However, there is significant pressure on EDs to continually improve their organisational efficiency, to provide timely and equitable emergency care, to remove barriers in the patient journey and to maximise the utilisation of clinicians' skills (Fry 2008; NSW Health 2012a; Wylie et al. 2015).

To improve ED efficiency, models of care have been developed that group patients by the urgency, acuity, and complexity of their presenting condition and treat them in a clinical area appropriate to the immediacy and intensity of human and physical resources they require (NSW Health 2012a; Wylie et al. 2015). Each model of care operates as a functionally distinct clinical area in the ED, each with different staffing arrangements and physical resources. For example, a patient with a life-threatening condition requires immediate and concurrent treatment and assessment by multiple professionals and a bed space with continuous cardiac monitoring (e.g. a resuscitation area) while a patient with a non-urgent minor injury can be safely assessed and treated by one or two professionals and does not require a cardiac monitored bed (e.g. a Fast Track area). Appendix A provides a summary of the main models of care in NSW EDs, but major emergency departments usually have a resuscitation area, an

acute area, a Fast Track area and a short stay unit (NSW Health 2017b). To achieve the richness and depth of data required to addresses the study's objectives, the Fast Track model of care was selected to examine the nature of flexibility in a healthcare team.

Fast Track Model of Care

Fast Track models of care have been introduced to meet the rising demand in EDs from patients presenting with less urgent and less complex conditions (Crawford et al. 2014; Dinh et al. 2012; King, Ben-Tovim & Bassham 2006; Wylie et al. 2015). In 2015-16, 51.2% of presentations to Australian EDs were triaged as semi-urgent (category 4) or non-urgent (category 5) (AIHW 2017). If less urgent patients were to wait in the same queue as critically or acutely unwell patients they would experience long waiting times leading to an overcrowded and unsafe ED (Lutze et al. 2014). Drawing on the 'See and Treat' principle developed in the UK (NHS Modernisation Agency 2002), Fast Track patients are usually assessed and treated by one treating clinician, either a doctor or an NP (Lamont 2005). To be suitable for treatment in Fast Track, patients' presenting problems should be less urgent (often triage category 4 or 5), likely to be diagnosed and treated quickly and unlikely to require hospital admission (Ieraci et al. 2008; King, Ben-Tovim & Bassham 2006; Lutze et al. 2014). Fast Track models of care have been shown to reduce LOS for less urgent, lower-acuity patients without impacting the treatment of high-acuity and more urgent patients, thus reducing ED overcrowding overall (Crawford et al. 2014; Ieraci et al. 2008).

The reason for selecting Fast Track to examine flexibility in a healthcare team is that NPs and RNs undertaking focal medical tasks is fundamental to the model of care. The driving force for the expansion of NPs in EDs globally has been a focus on the treatment of less complex conditions to meet increased demand, to reduce waiting times for those patients and to free up doctors to assess and treat more urgent and complex patients (Brook & Crouch 2004; Hoskins 2011). In Australian EDs, NPs focus on less complex conditions means they mainly work in the Fast Track area (Dinh et al. 2012; Lutze et al. 2014). Registered nurses initiate medications and investigations under protocol to improve the timeliness of patient care in all areas of the ED (Cabilan & Boyde 2017; Rowe et al. 2011). However, because these protocols restrict RNs' autonomy to undertake these tasks to less complex patient conditions (Castner et al. 2013; Munroe et al. 2016; Weber et al. 2011) they are particularly important for improving the timely diagnosis and treatment of Fast Track patients, and for meeting the time-based performance targets for those patients. The redistribution of focal medical to NPs and RNs to meet the high and rising numbers of less complex patients presenting to EDs, coupled with the intrinsic urgency and variability of ED workload and pressures for efficiency makes the Fast Track model of care a potential exemplar of flexibility within a healthcare team.

Summary

This chapter has highlighted how regulatory mechanisms, the system of payments and the medical profession's continued control over its knowledge has shaped and maintained the occupational division of labour in Australian healthcare, and the dominant position of doctors within it. However, the scope of practice approach to the regulation of healthcare tasks and legislative changes for NPs mean significant changes have occurred. A long-term trend of increasingly complex medical tasks being redistributed to nurses is evident while it is often suggested that professions adhere less to occupational demarcations in practice, especially in busy workplaces. The ED Fast Track has been selected as a potential exemplar of such a workplace. The next chapter describes the analytical framework developed to guide the study.

CHAPTER 3: ANALYTICAL FRAMEWORK

Introduction

This chapter describes the analytical framework developed to organise and guide each phase of the study, from the literature review through to the analysis. Analytical frameworks help bring coherence and logic to complex, messy problems such as the ambiguous concept of workforce flexibility (Evans, Coon & Ume 2011). With much of the theory on healthcare professionals' work devoted to the issues of regulatory and hegemonic control, the constructs of the analytical framework to examine workforce flexibility were found in seminal work organisation theory.

The chapter is divided into three sections. The first takes an historical perspective on the organisation of work to elucidate how the concept of flexibility came to prominence. As Bradley (2009) observes, flexibility is now understood as both desirable and inevitable yet for most of the twentieth century the dominant belief was that work organisation should promote stability, exemplified by Taylor's scientific management movement (Taylor 1911). The second section explains Atkinson's concept of functional flexibility (Atkinson 1984, 1985; Atkinson & Meager 1986). Finally, the two competing models of work organisation, Taylorism and functional flexibility, are drawn together into an analytical framework using Weber's comparative analytical method of ideal types (Weber 1904/1949).

Before Flexibility: The Stability of Taylorism

To explain the emergence of flexibility as the dominant principle of work organisation today requires an understanding of the dominant ideas it deposed. From the late eighteenth century, manufacturing moved from craft-based to factory-based production resulting in the fragmentation and mechanisation of work (Watson 2012). Whole work processes previously the responsibility of an individual craftsman were divided between multiple workers operating specialised industrial machinery, described by Braverman (1974) as a shift from an occupational to a technical division of labour. The technical division of labour and mechanisation of work vastly increased manufacturing output but by the turn of the twentieth century there was growing concern about suboptimal efficiency and fractious labour relations (Witzel 2012). An influential group of American manufacturing engineers identified these problems as a failure in management, asserting that managers lacked the skills and tools to effectively plan and coordinate work, and to improve processes (Conti 2013; Grint & Nixon 2015; Witzel 2012). Their solution was to apply the principles of science and engineering to the human operators of industrial machinery, an approach known as *'scientific management'* (Watson 2012). The most influential advocate of this approach was Fredrick W Taylor (Taylor 1911), hence scientific management is frequently referred to as 'Taylorism' (Watson 2012).

Presented here is an overview of the methods of Taylorism directed at improving stability and technical efficiency through the scientific analysis and planning of work. Taylor's most significant legacy was to separate responsibility for the planning of work from its execution (Littler 1982; Watson 2012). This simultaneously created a discipline of Management and removed the 'thinking' from the 'doing' for ordinary workers (Conti 2013; Witzel 2012). Each production process was broken down into its component tasks and scientifically analysed using time-and-motion techniques developed within Taylor's scientific management circle (Wren 2005). These data allowed each task within the production process to be standardised to maximise efficiency, to reduce the variation associated with worker discretion, and to minimise training costs. Standard operating procedures specified the correct method and the expected minimum rate of work pacing for each task to stabilise production. Further, the division of labour was divided into more narrowly specialised roles so workers could achieve expert performance within a limited range of tasks (Conti 2013; Littler 1982; Watson 2012; Witzel 2012). Managers, and the technologies they controlled coordinated the work of these narrow, discrete roles into whole work processes. Roles were designed to entail the lowest possible level of skill to reduce costs, to minimise training times and to make workers more easily replaceable (Littler 1982; Watson 2012). In the context of early twentieth century manufacturing, this meant substituting lower-skilled workers in the preparation and handling of materials to allow more expensive, skilled production workers to spend a larger proportion of their time on higher-skill tasks. This is the logic of technical efficiency used for many substitution strategies in the healthcare workforce (Duckett & Breadon 2014; Productivity Commission 2015).

Taylorism emerged as a direct response to a crisis in efficiency and labour relations but debate continues over whether it resolved or exacerbated those issues (Witzel 2012). The most influential criticisms of Taylorism came from Braverman's (1974) Marxian labour process analysis which asserted that the increasingly technical division of labour and reduced autonomy deskilled and dehumanised workers (Braverman 1974; Littler 1982). Further, Braverman asserted that the primacy given to technical efficiency and management-driven work pacing resulted in unacceptable levels of work intensification (Braverman 1974; Littler 1982). As management historians Conti (2013) and Witzel (2012) point out, Taylor and his colleagues genuinely believed that appropriate minimum rates of work pacing would protect workers from work intensification since, rationally, it was not in management's interests to exhaust their workers. However, the cooperative labour relations envisaged by Taylor rarely materialised and resistance to, and sabotage of scientific management programs was rife (Wagner-Tsukamoto 2008; Witzel 2012). It is also claimed that the scientific management techniques prescribed by Taylor were rarely fully applied or sustained by individual organisations (Grint & Nixon 2015; Wood 1989). Grint and Nixon (2015) claim that even Braverman (1974) overstated their prevalence. Yet Taylor is still regarded as the most influential management thinker of the twentieth century (Conti 2013). The three core characteristics of Taylorism, the technical division of labour using narrowly skilled, specialised roles, the management coordination of

work and the minimisation of worker autonomy through the standardisation of tasks, has been identified across a wide range of industries including call centres (Batt 2000), fast food restaurants (Ritzer 1998), public administration (Carter et al. 2011; Carter et al. 2013) as well as healthcare (Berwick 2003; Wise et al. 2017).

Taylorism provides only part of the backdrop to pre-flexibility thinking. Another American engineer, Henry Ford, was also highly influential. Ford applied Taylorism within his car factories taking the technical division of labour and managerially controlled work pacing further by fixing workers on a moving assembly line (Dassbach 1991). According to Dassbach (1991), Ford recognised that his mass-production technology had the potential to vastly improve efficiency but also to damage labour relations by further deskilling and intensifying work. To overcome this problem, Ford doubled the standard rate of pay to compensate for the worsening quality of work and, as a consequence, low-cost mass-produced cars became affordable to his workers (Witzel 2012). 'Fordism' came to describe a mode of industrial organisation and employment policy which combined Taylorist mass production techniques with full-time, permanent employment at generous rates of pay for the level of skill involved (Mir & Mir 2015). Following the depression of the 1930s, Fordism was further supported by Keynesian economic policies aimed at full employment and the establishment of the welfare state to ensure citizens had the capacity to be both fit and healthy producers and avid consumers (Piore & Sabel 1984; Watson 2012). To further promote stability, collective bargaining was institutionalised and trade unions sought to maximise pay and employment conditions in exchange for conceding to Taylorist production methods (Mir & Mir 2015). In the 25 years from the end of the Second World War capitalist economies thrived under Fordism, especially the United States. However, this model of stable macro-economic growth was only viable as long as the 'virtuous circle' of mass production and mass consumption was maintained (Graham 1992). By the 1970s Fordism had begun to unravel (Mir & Mir 2015).

The factors that caused the crisis in Fordism are varied and complex and their relative influence is still the subject of debate (Mir & Mir 2015; Vallas 1999). Broadly speaking, the main cause has been characterised as one of 'over-accumulation' (i.e. a glut of commodities, excessive inventories and idle capacity) as international competition in manufacturing increased and the market for niche, specialised products grew faster than the market mass-produced products (Proctor 2005; Watson 2012). There was also a problem of 'under-consumption' brought about by rising unemployment and faltering welfare support systems as employers and governments cut costs in response to falling productivity (Proctor 2005; Watson 2012). Critics of Taylorism and Fordism pointed to the *rigidities* within industries and organisations that failed to respond to changing economic conditions and more complex patterns of demand (Piore & Sabel 1984). With the problem cast as one of rigidity, proposed solutions centred on increasing *flexibility* (Mir & Mir 2015; Vallas 1999; Wood 1989).

A number of models bearing the 'flexibility' label emerged during the 1980s and 1990s (Rose 2009; Vallas 1999), and as globalisation and competition have accelerated and intensified, they continue to be debated today (Farjoun 2010; Graetz & Smith 2008; Schreyögg & Sydow 2010). As Mir & Mir (2015) highlight, flexibility is a multi-dimensional idea which operates at various levels, each with a model or theory attached. Flexibility is described at the level of the economy found in the theory of *flexible accumulation* (Harvey 1989), at the industry level through the inter-firm strategies such as *flexible specialisation* (Piore & Sabel 1984) and within the production process in the form of *flexible manufacturing systems* (Golden & Powell 2000; Zammuto & O'Connor 1992). Flexibility has also been described at the level of the organisation in models of *organisational flexibility* (Sopelana, Kunc & Hernáez 2014; Volberda 1996; Volberda 1999) and increasingly of hyper-flexible, boundaryless organisations (Schreyögg & Sydow 2010). Finally, flexibility has been applied at the level of the workforce in the form of *the flexible firm* (Atkinson 1984, 1985; Atkinson & Meager 1986).

All these models have workforce components that seek to reverse the rigidities of Taylorism. However, Atkinson's model of the flexible firm (Atkinson 1984, 1985; Atkinson & Meager 1986) has been selected to analyse flexibility in the healthcare workforce because of its specific focus on the workforce, its generality to any industry and its conceptual clarity in delineating between the two main dimensions of workforce flexibility: numerical flexibility and functional flexibility (Kalleberg 2001; Proctor 2005; Wood 1989).

Atkinson's Functional Flexibility

Atkinson's concept of functional flexibility is part of his flexible firm model developed in the 1980s at the Institute for Manpower Studies in the UK. The flexible firm describes the strategies pursued by employers to increase flexibility in employment and skills in response to economic recession, market stagnation, technological change and increased competition and uncertainty (Atkinson 1984, 1985; Atkinson & Meager 1986). The model differentiates between two main dimensions of workforce flexibility: numerical flexibility (addressing rigidities in employment numbers) and functional flexibility (addressing rigidities in skills). Atkinson also identified that employers were pursing pay flexibility strategies such as incentive schemes and market-sensitive pay structures (Atkinson 1984, 1985; Atkinson & Meager 1986) but this was intended to support numerical and functional flexibility rather than a dimension of flexibility in itself (Wood 1989). The flexible firm model integrated numerical and functional flexibility by segmenting the organisation into 'core' activities (where employees would be functionally flexible) and 'peripheral' activities (where numerical flexibility strategies would apply). There is limited evidence that employers implemented the flexible firm model in its full form (Kalleberg 2001; Proctor 2005) but Atkinson's analysis remains valuable for its clarity in delineating between numerical and functional flexibility (Kalleberg 2001; Proctor 2005; Wood 1989).

Numerical flexibility is defined as the ability of organisations to adjust the number of employees or hours worked to meet fluctuations in demand (Atkinson 1984, 1985; Atkinson & Meager 1986; Wood 1989). Numerical flexibility seeks alternatives to traditional full-time, permanent employment such as part-time, temporary and flexible hours contracts as well as reducing the number of direct employees by using agency staff, subcontractors or contracting out whole elements of the organisation's activities (Atkinson 1984, 1985; Atkinson & Meager 1986). Employers' implementation of numerical flexibility has been supported by post-Fordist regulation marked by a reduction in state intervention in labour markets and a decline in trade union power which has permitted more varied employment relationships (Bradley 2009; Watson et al. 2003; Watson 2012).

In healthcare, the numerical flexibility strategy of distancing was aggressively pursued under the cost-cutting managerial agenda of the 1980s and 1990s through the outsourcing of peripheral services such as cleaning, pathology and food production (Germov 2005; McCoppin 2008; Young 2005), though Australian healthcare organisations have since brought some of these services back under internal control (Young & Macinati 2012). Hospitals have also traditionally used agency and casual staff to manage short-term workforce shortages, especially in nursing (Massey, Esain & Wallis 2009). Numerical flexibility strategies have undoubtedly shaped healthcare employment in Australia and internationally but the current discourse on workforce flexibility focuses on how tasks are distributed and skills utilised to improve service delivery (Dubois & Singh 2009; Nancarrow 2015; Nancarrow & Borthwick 2005; Sibbald, Shen & McBride 2004). Workforce reform in healthcare is therefore more closely associated with Atkinson's concept of functional flexibility which aims to increase flexibility in skills (Desombre et al. 2006; Nancarrow 2015).

Functional flexibility refers to an organisation's ability to deploy the skills of its employees to adapt to changes in workload, processes or technology (Atkinson 1984, 1985; Atkinson & Meager 1986). This is achieved by increasing workers' range of skills (multiskilling), the reorganisation of work into teams and enhancing levels of worker autonomy (Atkinson 1984, 1985; Atkinson & Meager 1986). These methods of work organisation have been advocated as an alternative to Taylorism long before the concept of functional flexibility came to the fore (Guest 1957; Hackman & Oldham 1976). That said, functional flexibility exemplifies a post-Taylorist approach to work organisation that aims to increase responsiveness and adaptability, and to manage more complex and unpredictable work. The three features of multiskilling, the organisation of work into teams and enhanced autonomy can be traced from Atkinson's original 'Flexible Firm' model (Atkinson 1984), through subsequent management trends such as High Performance Work Systems and Human Resource Management (Appelbaum et al. 2000; Menezes & Wood 2006; Wood et al. 2012) as well as Lean Production (Womack & Jones 2010; Womack, Jones & Roos 2008). The following subsections define each of these three features of functional flexibility and discusses their relevance to workforce flexibility in the healthcare context.

Multiskilling

Multiskilling reverses the narrow specialisation of Taylorism by increasing the range of skills utilised by the employee (Bacon, Blyton & Dastmalchian 2010; Cordery 1989; Wood & Wall 2007). The greater task variety which results from multiskilling has been advocated since the 1950s to improve job satisfaction and motivation, overcoming the boredom associated with the narrow, repetitive tasks of Taylorism (Cordery 1989; Parker & Wall 1998; Walker 1950). The efficiency of multiskilling comes from an increased ability to respond to changing demand (Bacon, Blyton & Dastmalchian 2010; Carvalho & Cabral-Cardoso 2008). Atkinson's vision for functionally flexible teams was that multiskilled workers would be fully interchangeable and internally mobile, that is able to be redeployed within the team or to another part of the organisation according to demand (Atkinson & Meager 1986; Fraser & Hvolby 2010; Skorstad 2009). In reality, most teams comprise specialist roles but are sufficiently multiskilled for there to be an overlap in the tasks they can perform (Mueller, Procter & Buchanan 2000; Salas, Sims & Burke 2005). Using this role overlap to share tasks in response to changing workload is central to how multiskilling increases responsiveness (Atkinson & Meager 1986; Fraser & Hvolby 2010; Skorstad 2009). Further, because multiskilled workers can complete more tasks of the whole work process, transaction costs (e.g. communication, errors and delays) and idle time (i.e. when a worker has no tasks to complete) are thought to be reduced (Bacon, Blyton & Dastmalchian 2010; Kalleberg 2001).

It has been suggested that high levels of fluctuation in demand makes multiskilling an attractive strategy in healthcare (Desombre et al. 2006), particularly where resources and access to specialist services are limited (Parker et al. 2013; Roots & Li 2013). Concordant with this view, Dubois & Singh (2009, p. 8) describe the aspiration for healthcare workforce reform as "*using multiskilled workers that can switch from one role to another while employing various skills as required. A multiskilled workforce capable of doing different jobs and delivering a wide range of services to clients results from increasing the breadth and depth of work*". However, multiskilling strategies are often contentious in healthcare since any reform that redistributes tasks through the workforce runs counter to the occupationally-controlled division of labour (Bach, Kessler & Heron 2012; Harvey 2011; Moffatt, Martin & Timmons 2014). Taken to its final conclusion, generic multiskilled workers would replace the specialist occupations of nursing, medicine and other healthcare professions (McNeil, Mitchell & Parker 2013; Nancarrow 2015). That said, a significant redistribution of medical tasks to nurses has occurred aimed at increasing workforce flexibility (Bridges & Meyer 2007; de Bont et al. 2016; Srivastava et al. 2008). Whether this aim has been achieved requires an understanding of the range of skills professions use, and whether any resultant overlap between professional roles is used to share tasks in response to changing workload demand.

Teams

The second core feature of functional flexibility is the organisation of work into teams. Under Taylorism tasks were divided between discrete roles and their work coordinated by management. Team-based organisation gives responsibility for completing a whole process to a team who coordinate their work through teamwork (Baker, Day & Salas 2006; Gallie et al. 2012). The concept of 'a team' covers a wide range of possible organisational arrangements (Salas, Sims & Burke 2005; Wageman, Gardner & Mortensen 2012). One highly cited definition by Salas et al. (1992, p. 4) is that teams are *"a distinguishable set of two or more people who interact, dynamically, interdependently, and adaptively toward a common and valued goal*". The concept of 'teamwork' incorporates the skills, behaviours and attitudes that allow team members interact dynamically, interdependently, and adaptively toward a common goal (Baker, Day & Salas 2006; Salas, Sims & Burke 2005). Teams have been promoted as an alternative to Taylorism since the 1930s but gained increasing popularity from the 1980s as part of the broader flexibility agenda (Batt & Doellgast 2005). Proponents assert that teams are needed to cope with increasing work complexity and offer greater adaptability, productivity and creativity than can any one individual (Lyubovnikova et al. 2015; Salas, Sims & Burke 2005). Teams are now the dominant organisational form while teamwork has, rather like flexibility, become embedded within society as something inherently positive (Finn 2008; Reeves, Lewin & Espin 2010).

In healthcare, most work processes are too large and complex to be performed by individuals and require the collective effort of a team (Lyubovnikova et al. 2015; Mitchell, Parker & Giles 2011; Salas, Cooke & Rosen 2008). The high level of task interdependency between healthcare professionals makes teamwork essential for achieving outcomes (Burtscher & Manser 2012; Finn 2008). For example, in most situations, doctors cannot complete their tasks without nurses completing theirs, and vice versa. Despite the inherent logic for teams in healthcare, the reality is fraught with problems that are often attributed to the occupational division of labour (Braithwaite et al. 2013; Hall 2005; McNeil, Mitchell & Parker 2013; Nugus et al. 2010). The traditional approach to the organisation of healthcare teams has been of hierarchical and discrete roles, with medicine at the top subordinating the other healthcare occupations rather that working in a coordinated and interdependent way (Freidson 1970; Larson 1977; Willis 1989). More recent studies have found healthcare teams continue to be organised this way (Braithwaite et al. 2013; Hall 2005; McNeil, Mitchell & Parker 2013; Nugus et al. 2010). Further, the basic feature of a common goal is often absent in healthcare teams as different professional groups assert competing views that define the patient, their needs and the services they require (Finn 2008; Salhani & Coulter 2009). The question for workforce flexibility is whether the redistribution of tasks within healthcare teams has had any impact on their coordination and interdependence.

Autonomy

The final feature of work design for functional flexibility is that employees are given enhanced autonomy to manage more complex and indeterminate work (Atkinson 1984, 1985; Atkinson & Meager 1986). Enhanced autonomy aims to improve skills utilisation and to encourage employees to display adaptive and proactive behaviours, improving organisational responsiveness (Beltrán-Martín & Roca-Puig 2013; Wood et al. 2012) and harnessing employees' intrinsic motivation, creativity and problem solving (Wood et al. 2012; Wood & Wall 2007). The idea that employees should be empowered to initiate tasks, exercise discretion and participate in decisions regarding their work came to prominence in the seminal 1970s literature on job design (Hackman & Lawler 1971; Hackman & Oldham 1975, 1976) and now forms part of mainstream management thinking (Avgar, Pandey & Kwon 2012; Godard 2004). That employees require autonomy to decide how best to carry out their work is the antithesis of Taylorism which advocated the separation of thinking from doing, and the minimisation of employee discretion through the standardisation of tasks (Wood & Wall 2007).

Autonomy and the use of discretion following expert judgement have long been considered a defining feature of professional work (Carr-Saunders & Wilson 1933; Jamous & Pelouille 1970; Larson 1977). The concept of 'autonomy' is used to describe a variety of phenomena in relation to the professions, in particular their declining independence in the face of increased managerialism and limits to self-regulation (Cheraghi-Sohi & Calnan 2013; Flynn 2002). The type of autonomy of interest to workforce flexibility is the ability to perform tasks to respond and adapt to patients' needs. Jamous & Pelouille's (1970) influential analysis of professional work in French hospitals asserts that all work comprises both indeterminate (higher complexity) and technical (lower complexity) aspects. They argue that because professional healthcare work is complex and has a high proportion of indeterminate aspects, decision-making must be based on expert judgement rather than a set of standardised, technical rules.

Despite this complexity, the last two decades have seen a rapid increase in the standardisation of healthcare work (Berg 1997; Greenhalgh, Howick & Maskrey 2014; Spyridonidis & Calnan 2011). Following the principles of Taylorism, standardised approaches to care such as care pathways, protocols and algorithms aim to reduce unacceptable variations in outcomes associated with clinicians using their individual clinical judgement (Berg 1997; Ilott et al. 2010). There has been much debate about the impact of standardisation, with critics arguing that an over emphasis on following algorithmic rules (technicality) leads to a corresponding decline in clinical judgement based on patient-centred principals (indeterminacy) (Greenhalgh, Howick & Maskrey 2014; Timmermans & Almeling 2009). This debate has run in parallel to the workforce reform literature, yet standardised approaches to care have played a major role, especially in allowing nurses to undertake focal medical tasks of diagnosis and prescription (Hunter & Segrott 2014; Ilott et al. 2010; Rycroft-Malone et al.

2008). From a workforce flexibility point of view, the question is how such Taylorist methods are able to respond and adapt to patients' needs.

The foregoing discussion encapsulates the key dimensions in the organisation of work contested in the literature over the past century: the range of skills workers possess and tasks they perform; how work is coordinated; and the level of autonomy afforded to the workers. The discussion has also highlighted the dualism in the stability and technical efficiency offered by Taylorism, and the responsiveness and adaptability offered by functional flexibility, and are central to this study's approach to defining workforce flexibility in the healthcare context.

Ideal Types of Taylorism and Functional Flexibility

An analytical framework was developed to contrast the essential features of Taylorist work organisation with those aimed at promoting functional flexibility using the 'ideal type' method of comparative analysis advocated by Weber (Weber 1904/1949). The framework in Table 2 is structured by three key dimensions of work organisation: skills and tasks; the coordination of work; and autonomy. The division of labour is reflected in these dimensions, with 'Skills and Tasks' capturing how tasks are distributed between occupational roles while the 'Coordination of Work' and 'Autonomy' capture aspects of the structure of social relationships relevant to the concept of workforce flexibility.

Table 2 Analytical Framework – Ideal Types of Taylorism and Functional Flexibility

	Taylorism	**Functional Flexibility**
Skills and Tasks	Worker is narrowly skilled Roles are discrete	Worker is multiskilled Roles overlap
Coordination of Work	Managers coordinate the tasks of individual workers into a whole process.	A team has responsibility for a whole process and team members use teamwork to coordinate their work.
Autonomy	Worker is responsible for task performance only Worker performs task according to standardised method	Worker may autonomously initiate and perform tasks Worker has discretion to select between alternative methods

An ideal type is a simplification and exaggeration of an ambiguous social construct, such as workforce flexibility (Coser 1977; Morrison 2006). The purpose of an ideal type is not to categorise or describe the real world, rather it serves as a standard of comparison for a concrete case to enable us to see reality in a clearer, more systematic way (Johnson 2000). The organisation of work is never purely

Taylorist or purely functionally flexible since a worker may be multiskilled but have limited autonomy, or work in a team but in a narrowly specialised role (Batt & Doellgast 2005; Watson 2012). Ideal types enable us to explore where reality is congruent or discordant with the analytical construct, and hypothesise the causes and consequences that follow from such congruence or deviation (Coser 1977). Thus, as an analytical device, an ideal type does not claim validity in its ability to reproduce or correspond with reality, rather in its adequacy in providing the points of comparison from which to illuminate reality (Kim 2012). The adequacy of the analytical framework in this study will be in its ability to clarify the concept of workforce flexibility through its application to the concrete case of the ED Fast Track team, and will be considered in Chapter 10. In this study, rather than holding up the concrete case of the division of labour in an ED Fast Track team against one ideal type, it is examined within the dualism of Taylorism and functional flexibility. This method and the dimensions of work organisation within the framework were used throughout the study: to guide the literature review, the study design and the process of analysis and inference.

Summary

This chapter has provided the historical context for the rise of flexibility as a leading principle in the organisation of work. The dualism outlined in the ideal types of Taylorism and functional flexibility between multiskilling and narrowly specialised roles, autonomy and standardisation, and management control and team-based integration of tasks have been debated since the eighteenth century and continue to shape the organisation of work into the twenty-first century. In the next chapter the analytical framework is used to frame a critique of the literature to examine the evidence for whether the redistribution of medical tasks to nurses have produced a more flexible healthcare workforce.

CHAPTER 4: LITERATURE REVIEW

Introduction

This chapter critically reviews the literature on the redistribution of medical tasks to nurses to evaluate the evidence for whether such reforms have produced a more flexible healthcare workforce. As described in Chapter 2, there is a long-term trend of nurses' roles being reformed to undertake more, and more complex medical tasks. While 'flexibility' is frequently used in relation to these reforms, to date no empirical studies have defined the concept, therefore the analytical framework was used to frame the review. Following an explanation of this method, the chapter is structured using the three key dimensions of work organisation in the analytical framework: skills and tasks; teamwork in healthcare; and nurses' autonomy in medicine's focal tasks. The chapter concludes with a summary of the evidence, identifying the gaps in the literature the study will address.

Literature Review Method

The aim of the study is to define the concept of workforce flexibility in the healthcare context. An initial scoping review found just two articles to directly examine this issue: a discussion paper by Nancarrow (2015) which also employed Atkinson's flexible firm model to describe reforms to the healthcare workforce; and a case study of functional flexibility among hospital ancillary workers by Desombre (2006) in the United Kingdom (UK). To date, there are no empirical studies of flexibility within teams of healthcare professionals nor is there an accepted definition of workforce flexibility in the healthcare context. In the absence of extant literature, the analytical framework was used to establish the state of the evidence for workforce flexibility in healthcare. The following questions guided the search of the literature according to the dimensions of i.) skills and tasks; ii.) teamwork in healthcare; and iii.) nurses' autonomy in medicine's focal tasks:

i.) What is the evidence on the redistribution of medical tasks to nurses in terms of its impact on the range of skills clinicians use and tasks they undertake? Have such reforms resulted in role overlap between doctors and nurses?

ii.) What is the evidence for whether the redistribution of tasks from medicine to nursing has produced more flexible healthcare teams? Do doctors and nurses use any resultant overlap in their skills to share tasks in response to changing demand in line with the principles of functional flexibility?

iii.) What is the evidence that nursing roles designed to undertake focal medical tasks increase flexibility? Do any restrictions on their autonomy affect that flexibility?

Few studies directly examined these questions therefore the review sought *prima facie* evidence in those that addressed related issues. Given the breadth of the topics covered and the paucity of studies specifically addressing the questions of the review, a traditional, critical review was used to capture the diversity of literature required to establish the state of the evidence on workforce flexibility. Table 3 provides a summary of the type of literature included and disciplines covered for each of the chapter sections.

Table 3 Summary of literature included in the review

Chapter Section	Literature Types	Disciplines
Skills and Tasks	Qualitative studies of new/existing nursing roles (focus groups, interviews, case studies) Quantitative studies of new/existing nursing roles (survey, observational, cost/benefit analysis, randomised controlled trials) Systematic reviews of the impact of new nursing roles Theory/discussion of workforce reforms	Nursing Medicine Healthcare Management Sociology
Teamwork in Healthcare	Qualitative studies of teamwork (focus groups, interviews, ethnography) Quantitative study of teamwork (survey) Experimental psychology studies Narrative and systematic reviews of teamwork interventions Theory/discussion of teamwork in healthcare	Nursing Medicine Healthcare Management Psychology Interprofessional Practice & Education Team Training
Nurses' Autonomy in Medicine's Focal Tasks	Quantitative studies of nurse-initiated medications and investigations in EDs (analysis of medical records) Quantitative studies of ED NPs in EDs (analysis of medical records, survey) Qualitative studies of NP roles (case studies, focus groups, interviews) Narrative and systematic reviews of nurse-initiated medications and investigations, and NPs Theory/discussion of autonomy in healthcare	Nursing Medicine Sociology

The cross disciplinary nature of the review meant the combined databases of Academic Search Complete (EBSCO), Medline, Science Direct, ProQuest, Web of Science and Google Scholar were the most useful resources. However, a high degree of inconsistency in terminology and keywords meant that hand searching the bibliographies of relevant papers and the "cited by" section of databases proved to be a more effective method of locating literature pertinent to the review's questions. The journal articles presented in the review are peer-reviewed, though some grey literature including seminal work in books and edited collections were also included. As shown in Table 3, the literature included empirical studies (quantitative, qualitative and mixed methods), systematic reviews as well as theoretical papers. The variety of methodologies included in the review meant that different criteria, appropriate to each methodology, were used to evaluate quality of each publication and the generalisability of the findings to the review's questions (Jesson, Matheson & Lacey 2011). The review was limited to English-language papers and evidence drawn from countries with comparable healthcare systems to Australia including Canada, USA, New Zealand and the UK. Given the few number of studies addressing the review's questions no time limit was placed on the literature search, but priority was given to detailing the most recent available evidence.

Skills and Tasks

This section examines the literature on the redistribution of medical tasks to nurses in terms of its impact on the range of skills clinicians use and tasks they undertake. The evidence is considered within the dualism of Taylorism, where roles are narrowly skilled and discrete, and functional flexibility, where roles are multiskilled and overlapping. The literature on two types of reforms is examined in turn: when a new nursing role is created to undertake a whole medical procedure or episode of patient care; and when medical tasks formerly performed by doctors are added to existing nursing roles.

Creating New Nursing Roles

Evidence from the literature evaluating new nursing roles created to undertake medical tasks suggests two possible outcomes in the range of skills. In a case-based comparative study of 48 new professional roles across eight European countries, de Bont et al. (2016) found that roles introduced in a range of clinical settings followed a pattern of being either specialised or generic. The authors define specialised roles as occupying a narrowly defined area of expertise, concentrating on the medical-technical aspects of clinical treatment, for example a specific medical procedure. Generic roles are defined as having a broader scope to cover more of the whole episode of patient care. This contrast between specialist and generic roles identified by de Bont et al. (2016) follows that between the narrow specialisation of Taylorism and the multiskilling of functional flexibility.

New nursing roles specialised in a specific medical procedure are often introduced to meet rising demand for those procedures, for example endoscopy (Day et al. 2014; Duffield et al. 2017). In a

systematic review and meta-analysis of evaluations of endoscopies performed by non-medical clinicians, Day et al. (2014) found, of the nine studies that directly compared the performance of nurses (or physician's assistant) and doctors, there were no significant differences in patient outcomes and adverse events. Such roles also have their autonomy limited to less complex patients and to operate under standardised protocols (de Bont et al. 2016; Duffield et al. 2017). Thus, while often labelled as a measure to increase workforce flexibility (Duckett & Breadon 2014; Nancarrow 2015), they actually follow the logic of Taylorism. The RN specialising in a medical procedure is more narrowly skilled (to gain expert performance) and has less autonomy (to reduce variation in performance) than the doctor they substitute for who undertakes diagnosis and performs the procedure using expert judgement.

This substitution strategy seeks technical efficiency through reduced training times and lower wages. However, another systematic review of nurse endoscopy by Stephens et al. (2015) which, unlike Day et al. (2014), incorporated the outcome of cost-effectiveness, casts doubt on whether these efficiency gains are achieved over the long term. When measured on a short-term cost-per-procedure basis, nurse endoscopies are less expensive than those performed by a doctor due to lower wage costs (Massl et al. 2014). However, in the only study to compare longer-term costs, Richardson et al. (2009) found that, when calculated over a year, nurse endoscopies were more expensive due to higher rates of subsequent endoscopies, specialist and primary care follow-up. As Stephens et al. (2015) argue, the opportunity costs of substituting multiskilled, autonomous doctors are rarely incorporated into evaluations. Moreover, specialised nursing roles do not fully replace doctors, rather patients' care is divided between more providers. No evaluation studies could be located that incorporated the potential transaction costs of additional communication and coordination associated with this fragmentation of patient care. This failure to calculate, or even anticipate the transaction costs of adding new roles to healthcare teams has been noted by commentators in the healthcare management field (Bohmer & Imison 2013; Ricketts & Fraher 2013).

In contrast, when a new nursing role undertakes responsibility for more of an episode of patient care, evidence points to an expansion in skills in line with the multiskilling of functional flexibility. An example of such expansion is the nurse practitioner (NP) role. In Australia, NPs have a legal authority to undertake the focal medical tasks of diagnosing, determining treatments and referring patients for specialist care, as well as any nursing tasks they are competent to perform (Scanlon et al. 2016). Two qualitative studies sought NPs' perceptions of the range of tasks they perform. Carryer et al. (2007) interviewed 15 NPs from a range of practice setting in Australia and New Zealand. These NPs perceived that, by combining their medical and nursing skills, they reduced the fragmentation of patient care and saved the transaction costs of tasks being delegated from, or referred to a doctor. Similarly 17 hospital-based Canadian NPs interviewed by Hurlock-Chorostecki et al. (2014) perceived that their legal authority to change treatment plans without having to refer to a doctor increased the

responsiveness of the team to patients' needs. Focus groups with the nursing, medical and other professional colleagues of these NPs (n=210) were reported by Hurlock-Chorostecki et al. (2013). Doctors and RNs perceived that the NP on their team was less busy and could use their role overlap to unburden other team members, reduce service gaps and enhance the continuity of patients' care. Thus, NPs were perceived to increase responsiveness through their multiskilled role that overlapped with doctors, and because they were more available at the bedside (Hurlock-Chorostecki et al. 2013).

Two studies to measure the range of tasks undertaken by NPs using quantitative work observation methods provide some support for the multiskilling reported in the qualitative studies. Gardener et al. (2010) conducted a work sampling study of 30 Australian NPs in 15 different practice settings. The study included NPs from a wide variety of clinical and geographical locations (from paediatric intensive care to remote community healthcare), therefore the data provides an indication of the range of tasks an NP *may* undertake. On this basis, the study shows that NPs undertook focal medical tasks such as taking a history (5.9% of NPs' work activities), requesting (1.8%) and analysing (2.0%) diagnostic tests and prescribing medications (1.5%), as well as nursing tasks, such as administering medications (1.4%), and coordinating patients' care (10.8%) (Gardner et al. 2010). Likewise, a time study of NPs in two hospital cardiology units in Canada conducted by Kilpatrick et al. (2012) found that NPs undertook medical tasks such a prescribing medications, ordering investigations and intravenous procedures (15.5% of NPs' time in Case 1, 21% in Case 2) and what the authors define as 'expanded nursing tasks' focussed on therapeutic and supportive communication with patients and relatives (Case 1=5.1%, Case 2=3.4%). These findings highlight that even between two very similar clinical settings, the proportion of time NPs spend on medical tasks can vary. However, the time study tool used by Kilpatrick et al. (2012) only measured those tasks specifically associated with the medical and expanded nursing aspects of the NP role. Any traditional nursing tasks such as medication administration or wound care the NPs may have performed, or generic tasks such as professional communication with their colleagues, were not captured by the tool (Kilpatrick 2011). From the point of view of understanding the relative range of skills within healthcare teams, a further limitation of both the Gardener et al. (2010) and Kilpatrick et al. (2012) studies is that they only measured NPs' work, therefore whether they undertook a wider range of tasks than their nursing and medical colleagues is not known.

The limited qualitative and quantitative evidence available on the range of tasks NPs undertake suggests they do utilise both medical and nursing skills. There is also a well-established body of evidence in the evaluation of NP roles in emergency departments (ED) to show that a key differentiator between NP and usual medical care is their engagement in medical tasks while retaining their core nursing values of holistic, patient-centred care (Chattopadhyay, Zangaro & White 2015; Jennings et al. 2015). In an early randomised controlled trial by Powers, Jalowiec & Reichelt (1984), 74% of patients seen by an NP in one US emergency department were completely satisfied with their

care compared to 48% of those seen by doctor. Dinh et al.'s (2012) more recent Australian survey of 236 Fast Track patients randomised to either NP or medical care found similar differences in satisfaction rates: 68% of the NPs' patient group rated their care as excellent, compared with 50% of the doctors' patient group. These findings are in line with a survey study of Australian ED patients by Jennings and colleagues (2009). The authors of all three studies attribute higher levels of patient satisfaction to NPs' values of patient-centred care, providing more in-depth health education and being more available to discuss patients' concerns (Dinh et al. 2012; Jennings et al. 2009; Powers, Jalowiec & Reichelt 1984). However, none of the studies controlled for the wide range of clinical experience of doctors providing patient care in EDs which, as Dinh et al.'s (2012) description of their sample reveals, ranges from newly qualified junior doctors to specialist emergency physicians. Taking more time over patient communication and education may also reduce NPs' efficiency. Carter & Chochinov's (2007) systematic review found one study to suggest that NPs see fewer patients per hour than emergency physicians, while NPs' wage costs are higher than those for junior doctors. However, subsequent systematic reviews by Woo et al. (2017) and Jennings et al. (2015) conclude that the comparative cost of NP care in EDs remains unclear. That NPs are consistently found to lower waiting times for ED patients suggests they do contribute to ED efficiency (Jennings et al. 2015; Woo, Lee & Tam 2017).

The limited evidence available on the range of skills new nursing roles utilise and the tasks they undertake suggests that those specialising in a medical procedure are specifically designed to capture the benefits of Taylorism while those designed to undertake more of the whole episode of care, such as the NP role, are multiskilled in line with functional flexibility. However, no studies have measured the range of tasks undertaken by new roles compared to their medical and nursing colleagues and whether any role overlap exists. Furthermore, there is an absence of studies considering the opportunity costs and transaction costs of adding new nursing roles to healthcare teams.

Adding Medical Tasks to Existing Nursing Roles

The long-term trend of adding medical tasks to existing nursing roles is evidenced in debates over the last sixty years about the nursing profession and its status relative to medicine (Allen 2014; Chapman 1976; Hughes, MacGill Hughes & Deutscher 1958; Wicks 1999). However, there is limited direct evidence on what the trend of adding medical tasks to nursing roles means for the flexibility of the workforce. Under functional flexibility doctors would continue to perform the tasks to increase responsiveness to patient care through *task sharing* using their overlapping roles. Alternatively, doctors could cease to perform the task resulting in *task shifting* and a realignment in the division of labour based on discrete roles.

The history of task movements from medicine to nursing suggests a pattern of task shifting since many everyday clinical tasks once exclusively performed by doctors are now exclusively performed by nurses (Hughes, MacGill Hughes & Deutscher 1958). For example, taking a blood pressure has

become routine in nursing practice, now often delegated to a nursing assistant (Duffield et al. 2014), but when the technology was first introduced, only doctors were permitted to perform this task (Hughes, MacGill Hughes & Deutscher 1958). Similarly, the preparation and administration of intravenous medications has been a normal part of nursing work for many decades but formerly only doctors were permitted to use intravenous equipment (Jones 2003; Wright 1995). Indeed, if the purpose of adding the task to nurses is the cost saving of substitution then it *should* be fully shifted to the lower paid role (Bohmer & Imison 2013). Two early studies argued that this logic is problematic because it assumes that nurses have the time to carry out the tasks, and that it is acceptable to save medical time at the expense of nursing time (Calpin-Davies & Akehurst 1999; Rushforth & Glasper 1999).

A small number of qualitative studies among UK hospital RNs explored nurses' perceptions when medical tasks were added to their role. Two of these studies, conducted in the 2000s, examined the impact of government policy to manage a reduction in junior doctors' working hours by increasing the number of nurses who could perform everyday medical tasks such as venepuncture, recording electrocardiograms and administering intravenous medication (Jones 2003; Pearcey 2008). In four focus groups involving 24 front-line RNs, Jones (2003) found the overwhelming majority of participants perceived that task shifting had occurred since doctors would automatically delegate those procedures rather than perform it themselves. The RNs noted that responsibility for the procedures could be a source of conflict between doctors and nurses in the team but they also perceived that the reforms had improved medical-nursing relations since the doctors were less stressed from excessive hours and high workloads, and had a growing respect for nurses' skills. Similarly, 25 hospital RNs interviewed by Pearcey (2008) perceived that certain medical tasks, including venepuncture and intravenous medication administration, had been shifted to RNs, reporting that doctors always delegated which caused conflict over who was ultimately responsible for these tasks. The authors of both the Jones (2003) and Pearcey (2008) studies concluded that adding everyday, frequently encountered medical tasks to RNs' roles did improve responsiveness to patient care. However, the pattern of task shifting suggests that if responsiveness was improved it was because RNs were more available at the bedside to perform the tasks than doctors. Further, the literature is not clear whether the accretion of medical tasks resulted in RNs utilising a broader range of skills or whether it meant nursing tasks were not completed or were completed by another role. The RNs in both the Jones (2003) and Pearcey (2008) studies perceived that as medical tasks were shifted from junior doctors to RNs there was a corresponding shift in nursing tasks to assistants, a consequence noted by others (Bach, Kessler & Heron 2012; Doherty 2009).

More recently, Bray, Sanders & Flynn (2010) evaluated a program to train all RNs working in the children's wards of two hospitals in the catheterisation of paediatric patients. While small in scale (focus groups n=10; questionnaire survey n=34, 88% response rate) the study provides some insight

into the inefficiency of adding certain tasks to nursing roles. Despite rating the quality of training program positively, only 42% of participants said they were willing to perform the procedure on a patient. The focus groups revealed that the reason for RNs' lack of confidence in their newly acquired skills was because paediatric catheterisation was a relatively infrequently performed procedure thus participants had limited opportunity observe the procedure or to practice their skills. These findings highlight that multiskilling is most needed for everyday, frequently encountered tasks while infrequently performed procedures may be more efficiently performed by a specialist role (Bray, Sanders & Flynn 2010).

Overall studies that have examined medical tasks added to existing nursing roles suggest a pattern of task shifting where the occupational division of labour based on discrete roles is realigned. There was no evidence in this literature of task sharing between overlapping roles in line with functional flexibility. However, a methodological limitation for our understanding of workforce flexibility is that all the studies only examined nurses' perceptions. The impact on doctors' skills and tasks and their perceptions of the changes were not considered. The following section looks at what the literature on teamwork in healthcare can contribute to our understanding of overlapping roles and task sharing within teams.

Teamwork in Healthcare

This section examines the literature on teamwork in healthcare for evidence of whether the redistribution of tasks from medicine to nursing has produced more flexible teams. Specifically, whether doctors and nurses use any resultant overlap in their skills to share tasks in response to changing demand in line with the principles of functional flexibility (Atkinson & Meager 1986; Fraser & Hvolby 2010; Skorstad 2009). This form of teamwork, where multiskilled team members help each other complete their tasks is described by psychologists as 'back-up behaviour' (Porter et al. 2003; Salas, Sims & Burke 2005). Back-up behaviour is needed when workload distribution within a team becomes uneven due to the unique task demands experienced by each role. If a workload distribution problem is anticipated or identified by the team, 'back-up' can be provided to over-burdened team members to prevent or remove blockages in workflow (Baker, Day & Salas 2006; Porter et al. 2003; Salas, Sims & Burke 2005).

Porter et.al. (2003) were the first to clarify and empirically test the concept of back-up behaviour in laboratory experiments with undergraduate psychology students. They observed in their experiment of four-person teams performing a computerised tactical task that back-up behaviour can occur in response to a specific request for help and through the spontaneous, discretionary effort on the part of the back-up provider. In another psychology experiment where three-person teams used a flight simulator, Marks and Panzer (2004) identified three forms of back-up behaviour: completing a task for a team member, helping a team member to complete a task, and providing advice or coaching so

a team member can complete a task. To engage in these back-up behaviours, team members must understand others' roles, be aware of relative workloads within the team and be both able and willing to provide and seek assistance when needed (Kalisch, Weaver & Salas 2009; Marks & Panzer 2004; Porter et al. 2003).

There is some limited evidence that back-up behaviour occurs within healthcare teams. Two related studies exploring perceptions of teamwork within nursing teams in US hospital settings specifically included the concept of back-up behaviour. In the first study, Kalisch, Weaver & Salas (2009) conducted 34 focus groups with a total of 150 participants with separate groups for RNs, licensed practical nurses (LPN) and nursing assistants. The nursing assistants reported in their focus groups that RNs often failed to provide assistants with back-up when it was needed. This perception was corroborated by views expressed by RNs who acknowledged that they had the skills to help assistants complete their tasks, but did see it as their job to do so. Despite being legally and professionally responsible for all nursing care, the RNs in Kalisch, Weaver and Salas' (2009) focus groups viewed their role responsibilities as discrete from, rather than overlapping with the assistants, and therefore did not provide back-up when it was needed. In the second study, Kalisch and Lee (2010) surveyed 2,216 nursing staff (RNs, LPNs and nursing assistants) using validated instruments to measure respondents' perceptions teamwork behaviour and reported episodes of missed nursing care. An inverse correlation between positive teamwork behaviours and the number of episodes of missed nursing care reported by respondents was found overall ($r=-.37$, $p<.01$) and for the measures of back-up behaviour specifically ($r=-.31$, $p<0.1$). The more nursing staff perceived their team practised back-up behaviour, the fewer episodes of missed nursing care were reported. The authors of these studies argue that the *ability* of the RNs, LPNs and nursing assistants to provide each other with back-up comes from their overlapping skills, while their *willingness* to provide that back-up requires an attitude that responsibility for each role completing its tasks is shared by the nursing team, rather than the sole responsibility of individual team members or specific roles (Kalisch & Lee 2010; Kalisch, Weaver & Salas 2009).

Two interview studies by Flowerdew et al. (2012) and Grover, Porter & Morphet (2017) have noted back-up behaviour to be a feature of teamwork in EDs to manage the urgent and unpredictable workload. Flowerdew et al. (2012) interviewed 16 doctors and 6 nurses in one UK ED about the causes of work pressure and their team's response to those pressures. Over half of participants ($n=12$) reported that team members failing to demonstrate back-up behaviour to help others with their workload caused tension within the team. Grover, Porter & Morphet's (2017) interviews with 12 RNs from one Australian ED also explored perceptions of the nature of teamwork in emergency. Corroborating the findings of both Flowerdew et al. (2012) and Kalish and Lee (2010), participants perceived that back-up behaviour was important for managing workloads and reducing episodes of missed care. However, in addition to the limitations of a small sample size, Grover and colleague's

study did not clarify whether the nurses interviewed were commenting on back-up behaviour within the nursing team or the wider interprofessional team in the ED. Indeed, three out of the four studies of back-up behaviour in healthcare teams were monoprofessional, while Flowerdew et al.'s (2012) study had an imbalance in nursing and medical participants that was not explained by the authors.

No empirical studies were found on the teamwork practice of back-up behaviour to demonstrate that teams of doctors and nurses use any role overlap to share tasks in response to changing patient demand. However, the body of literature on interprofessional practice, also referred to as interprofessional collaboration, has discussed the increasing overlap between professional roles (Hall 2005). Using a sociological perspective, researchers and educators in this field identify that poor teamwork practice in healthcare arises from the occupational division of labour, specifically the 'professional silos' created by each professions' distinct identities and the dominant position of medicine in particular (D'Amour et al. 2005; Hall 2005; Nugus et al. 2010). The redistribution of tasks from medicine to nursing that has resulted in role overlap, or 'role blurring' as it is often described, is linked to conflict between professionals over task responsibility (Hall 2005; McNeil, Mitchell & Parker 2013; Reeves, Lewin & Espin 2010).

The psychology literature on teamwork defines misunderstandings or disagreements over how tasks and responsibilities are divided among team members as 'process conflict' (Jehn & Mannix 2001; Salas et al. 2015). Process conflict is distinguished from task conflict (disagreements over the method of completing the teams' tasks) and relationship conflict (interpersonal differences between teammates), but all three are associated with errors and breakdowns in team performance (Salas et al. 2015). In addition to causing process conflict, discussion papers by Hall (2005) and McNeil, Mitchell and Parker (2013) argue that healthcare professionals themselves view overlapping roles in a negative light since any encroachment on their established role presents a threat to their professional identity and status. Furthermore, McNeil, Mitchell and Parker (2013) assert that the professions view overlapping roles as a threat to their very existence, since it represents a step towards being replaced with generic healthcare workers, though the empirical basis for this assertion is not clear. To avoid the problems of process conflict and threats to professional identity, researchers and practitioners in the interprofessional practice field emphasise the importance of clarifying roles and responsibilities within teams (Hudson et al. 2017; Nancarrow et al. 2013; Suter et al. 2009). Consequently, the interprofessional practice agenda maintains a somewhat contradictory argument. It calls for greater integration and shared responsibility within healthcare teams, while maintaining the status quo of occupational distinctiveness through role clarity (see for example Nancarrow et al. 2013; Reeves, Lewin & Espin 2010).

The interprofessional practice literature provides some insight into the potential problems of overlapping roles in the healthcare context, but not the extent to which any role overlap between doctors and nurses is used to work flexibly. One reason for this is that interprofessional practice, and

other approaches to teamwork research in healthcare do not focus on what teams *do*, or how they are organised in terms of who performs which tasks to deliver patient care (Rydenfält, Odenrick & Larsson 2017; Xiao, Parker & Manser 2013). Instead the literature is primarily concerned with the individual teamwork behaviours that directly impact on patient safety and quality of care, especially communication processes (Buljac-Samardzic et al. 2010; Dixon-Woods 2010; Manser 2009; Powell & Davies 2012). Finn's (2008) ethnographic study of a UK surgical team (250 hours of observations) found that clinicians and managers themselves constructed 'the problem' of teamwork as a failure of individual team members to display collaborative behaviours such as communication and shared decision making. This interpretation is reflected in widespread team training interventions in healthcare designed to improve individual teamwork behaviours, often based on models adapted from the aviation industry (Buljac-Samardzic et al. 2010; Marlow et al. 2017). A systematic review of healthcare team training by Marlow et al. (2017) confirms a focus on communication with 167 of the 197 evaluations included in the review (84.8%) designed to improve this behaviour through classroom or simulation training.

Interprofessional education interventions based on the same premise as interprofessional practice are also directed at individual teamwork behaviours, though indirectly. By educating different professionals together in a classroom or simulation environment, interprofessional education aims to break down the stereotypes and misunderstandings that arise from distinct professional identities leading more collaborative behaviours such as communication and shared decision-making (Reeves et al. 2013). This focus on individual teamwork behaviours and the use of classroom and simulation-based interventions to solve teamwork problems means the multiple organisational factors that impact a team's ability to coordinate their work such as the workload, staffing, the physical environment, and patients themselves, are poorly understood (Rydenfält, Odenrick & Larsson 2017; Xiao, Parker & Manser 2013). The limited accounting for the reality of healthcare work in the design and implementation of team training and interprofessional education has been acknowledged, but not yet addressed by leading proponents in these fields (Lemieux-Charles & McGuire 2006; Manser 2009; Reeves, Lewin & Espin 2010; Salas, Zajac & Marlow 2018).

Teams are the dominant organisational form in healthcare and their poor track record of teamwork is well documented, yet surprisingly little is known about who performs which tasks in healthcare teams, or how the organisational context affects their ability to coordinate their work. Consequently, any teamwork behaviours that demonstrate flexibility in healthcare teams is also poorly understood. There is some limited evidence that back-up behaviour does occur within healthcare teams and may be a feature of teamwork in the ED. However, no studies have examined whether role overlap between doctors and nurses is used to share tasks in response to changing demand.

Nurses' Autonomy in Medicine's Focal Tasks

This section explores the literature on reforms that have allowed nurses to undertake focal medical tasks related to the diagnosis and treatment patients' conditions such as prescribing medications, ordering investigations and referring patients to other health professionals. That medicine formally had exclusive jurisdiction over these tasks means such reforms are at the forefront of breaking down the occupational boundaries deemed a barrier to workforce flexibility (Dubois & Singh 2009; Nancarrow & Borthwick 2005). However, the legislative and organisational mechanisms used to redistribute focal medical tasks mean nurses rarely enjoy the same level of autonomy as doctors (Djukic & Kovner 2010; Hudson & Marshall 2008). The following examines the evidence for whether nursing roles designed to undertake focal medical tasks increase flexibility and whether any restrictions on their autonomy affect that flexibility. The focus is on nursing roles in the ED environment looking first at protocols for RNs and then at the restrictions placed on NPs' autonomy at the workplace level.

Protocols for Registered Nurses

A search of the Australian and international literature reveals that the Taylorist method of standardised protocols is a key mechanism for moving focal medical tasks to RNs. For example, in an integrative review of the implementation of protocol-based care in the UK, Ilott et al. (2010) found 49% (n=16) of the protocols reported in the literature were designed to facilitate nurses' role expansion or nurse-led services, with ten directed at allowing nurses to prescribe medications. Case study evaluations of protocol-based care by Rycroft-Malone et al. (2008) in five UK primary and acute care settings found that, after quality improvement, the main reason for implementing protocols was to allow nurses to undertake focal medical tasks including prescribing, diagnosing, ordering tests and making referrals. In Australia and internationally, nurse protocols have also become a key feature in ED services to increase responsiveness to patients' needs (Castner et al. 2013; Considine et al. 2012; deForest & Thompson 2012; Fry et al. 2012; Robinson 2013).

Registered nurses are usually the first to assess patients arriving at the ED. Allowing RNs to initiate medications and investigations means patients' symptoms are managed and the diagnostic process is started earlier than if they had to wait for a doctor or NP to perform these tasks. The protocols that facilitate this process are complaint-specific, for example 'chest pain', 'abdominal pain' or 'lower limb injury' (Castner et al. 2013; Considine et al. 2012; Hudson & Marshall 2008). As Considine et al. (2012) emphasise, protocols in Australian EDs do not enable RNs to independently manage, refer or make disposition decisions for these complaints. Instead they specify the appropriate clinical assessments, medications and other supportive treatments, investigations and any 'red flags' in the patient's condition that suggest they need more urgent assessment by a doctor (Castner et al. 2013). Protocols are based on a patient's potential diagnosis and the indeterminacy of diagnostic decision-making is managed by patient exclusion criteria that restrict the use of protocols to lower acuity, less

complex patients (Castner et al. 2013; Munroe et al. 2016; Weber et al. 2011). Protocols include a range of actions RNs may undertake for each complaint, but this review focusses on the focal medical tasks of initiating medications and investigations.

Nurse-initiated medication is used extensively in EDs and is defined as 'the initiation of [medication] by nursing staff, using a predefined protocol, prior to the patient being seen by a medical officer' (Kelly et al., 2005, p. 151), at triage (Fry, Ryan & Alexander 2004) or in the waiting room (Fry et al. 2012). In Australia RNs may not legally prescribe and can only initiate pre-determined medications for immediate administration through the delegated medical authority of a standing order (Wilkinson 2011), under the condition that they follow the decision-making criteria of the protocol (Cabilan & Boyde 2017). Nurse protocols in EDs include a range of medications for symptomatic relief and other supportive treatments (such as limb stabilisation) to aid patients' comfort while they wait to be assessed by a doctor or NP (Considine et al. 2013; Retezar et al. 2011). Analgesia is the most commonly initiated medication by RNs since pain is the most prevalent symptom for ED patients, yet is often under-treated (Berben et al. 2008; Doherty et al. 2013; Fry, Chenoweth & Arendts 2018). The Australian national standard for time to analgesia (TTA) is 30 minutes from the time the patient arrives at the ED (Hatherley, Jennings & Cross 2016). Nurse-initiated analgesia plays an important role in achieving this standard since there is often a considerable delay between a patient arriving at the ED and being assessed by a doctor or NP (Pierik et al. 2016).

Studies in Australia and overseas have shown that nurse-initiated analgesia protocols reduce TTA for ED patients. For example, Finn et al.'s (2012), before and after intervention study in an Australian ED describes the impact of a nurse-initiated analgesia protocol on TTA. The protocol was developed by medical, nursing and pharmacy staff and included an algorithmic flowchart to guide nurses' decision-making, a common tool in such protocols. The researchers found that after the nurse-initiated analgesia protocol was introduced, TTA reduced from a median of 98 minutes to 28 minutes ($p<0.001$). Another Australian study examined the impact on TTA of a nurse-initiated protocol for intravenous opioid analgesia specifically for painful renal or biliary colic (Kelly, Brumby & Barnes 2005). Again, the nurse-initiated protocol was found to significantly lower TTA from a median of 57 minutes for patients not receiving nurse-initiated analgesia to 31 minutes for those who did ($p<0.001$). Finally, a recent Dutch pre-post intervention study of ED patients with acute musculoskeletal pain by Pierik et al. (2016) found a flowchart-based pain protocol improved analgesic provision from 46.8% of patients to 68.0%. Median TTA reduced from 10 to 7 minutes ($p<0.05$) and time to opioid analgesia reduced from 37 to 15 minutes ($p<0.01$)(Pierik et al. 2016). Thus it may be argued that nurse-initiated analgesia is a multiskilling strategy to increase responsiveness by improving the timeliness and quality of patient care.

Timeliness is also the driver for the development of nurse-initiated investigations in the ED, especially to achieve time-based performance targets since waiting for investigation results can extend patients' length of stay (LOS) in the ED (Considine et al. 2013; Retezar et al. 2011; Rowe et al. 2011). Li et al.'s (2015) analysis of electronic patient record data in four Australian EDs found as the number of investigations ordered for a patient increased, so did the duration of their LOS ($p< 0.001$). Allowing RNs to order investigations soon after a patient arrives in ED starts the process of obtaining results earlier than waiting for a doctor or NP (Fry & Jones 2005; Retezar et al. 2011), allowing care decisions to be made more quickly (Crawford et al. 2014). In Australia, nurse-initiated investigations were first developed as part of the triage role, and have expanded to other RNs to support models of care such as Fast Track (Considine et al. 2013; Fry & Jones 2005). In other countries protocols have enabled RNs to both order and interpret investigations to manage a whole episode of patient care (Rycroft-Malone et al. 2008). In Australian EDs, protocols allow RNs to order investigations, but not to interpret the results.

Radiological investigations (X-rays) for orthopaedic trauma is the most well-established nurse-initiated investigation. The practice was first reported by Bliss, Decker & Sauthwick (1971) in the United States and has been commonplace in Australian EDs since the mid-1990s (Considine et al. 2013). Rowe et al.'s (2011) systematic review of 14 evaluations of the impact of nurse-initiated X-rays on ED LOS found that while the quality of evidence was weak, mean LOS was reduced in all but two studies. Retezar et al.'s (2011) retrospective cohort study in the US found that median LOS was 18% shorter when X-rays were ordered by a nurse (230 minutes) rather than a doctor (282 minutes).

Rowe et al.'s (2011) systematic review also found that the evidence on the *accuracy* of nurse-initiated investigations, was weak and only available for X-rays. Fry's (2001) prospective study of patients with distal limb injuries in an Australian ED found that nurse-initiated X-rays had a confirmed abnormality rate of 43%, compared with 33% for those ordered by doctors ($p<.001$). Likewise, Patel, Celenza & Watters (2012) compared outcomes for X-rays of isolated lower limb injuries ordered by a nurse with those ordered by emergency physicians. They found higher rates of confirmed abnormality for the nurse-ordered group (34.7% compared to 26.7%), though the difference was not significant ($p=0.300$). Evaluations of RN protocols for sepsis management in the ED have shown they improve compliance with clinical standards in terms of reducing delays in pathology being ordered, but do not examine whether the correct investigations were ordered (Bruce et al. 2015; Romero, Fry & Roche 2017; Tromp et al. 2010). Indeed, no studies evaluating the accuracy of nurse-initiated pathology, or its impact on ED LOS were found.

In line with the principles of Taylorism, protocols are used to save the cost of educating RNs in the knowledge needed to make autonomous decisions about medications and investigations based on expert judgement (Wise et al. 2017). Registered nurses receive workplace training to use the protocols but, as Rowe et al.'s (2011) systematic review found, it is usually brief, in most cases a one-hour

lecture. The lack of evaluations of RNs' ability to correctly order investigations using protocols means any costs in unnecessary or missed investigations that may be associated with this Taylorist approach are not known. Furthermore, patient exclusion criteria that limit RNs' autonomy to initiate medications and investigations mean, by design, protocols do not meet every patient's needs. No studies have addressed how teams respond to the needs of those patients not covered by the protocols. In Srivastava et al.'s (2008) review of RN protocols in the intensive care environment, the authors observe that the use of protocols results in team members having different levels of autonomy over the same task, but the implications of this phenomenon on everyday clinical practice are not known. Finally, protocols are designed to manage the risk of RNs undertaking focal medical tasks within their workplace (Bail et al. 2009; Hudson & Marshall 2008; Ilott et al. 2010; Rycroft-Malone et al. 2008). As such, RNs can only perform those tasks within their workplace and the knowledge and skills gained are not necessarily transferable to other environments (Djukic & Kovner 2010). This means any increase to flexibility such protocols achieve is both localised and temporary.

In summary, protocols that facilitate RNs to undertake focal medical tasks in the ED is a multiskilling strategy to increase responsiveness through more timely access to analgesia, and the early initiation of investigations. However, the Taylorist solution of protocols means they are not responsive to every patients' needs. Registered nurses' autonomy is restricted to less complex patients and their discretion over medications and investigations is limited since they are not educated in the knowledge needed to perform these complex tasks using expert judgement. These limits to RNs' knowledge and autonomy represent a potential countervailing force to flexibility that has not been explored to date. Specifically, how teams respond to the needs of patients who do not fit the inclusion criteria of protocols, or require a different medication or investigation is not known.

Workplace Restrictions on Nurse Practitioners' Autonomy

Nurse practitioners in Australia have a legal mandate to manage complete episodes of patient care and perform associated medical tasks for any patient conditions they are educated and competent to treat (Scanlon et al. 2016). However, the literature reveals that this lawful autonomy is restricted by employers at the workplace level, by formalising their scope of practice, and limiting their discretion over medications. Each of these restrictions on NPs' autonomy is addressed in turn.

In common with other jurisdictions, the more NPs are responsible for a whole episode of patient care, the more restricted their autonomy in terms of the complexity of patients they may treat (Niezen & Mathijssen 2014). Hence, NPs in Australian EDs (Dinh et al. 2012; Jennings et al. 2013; Lutze et al. 2014) and internationally (Hoskins 2011) have mainly focussed on managing less complex patient conditions, such as those seen in the Fast Track model of care. Evaluations of these roles suggest that by specialising in minor injuries and illnesses, emergency NPs have developed expertise that translates into high quality patient care. In a landmark randomised controlled trial, Sakr et al. (1999) found that NPs and junior doctors performed at the same level when compared to experienced ED

registrars, making the same number of clinically important errors (rate of 10%). No significant differences between the two groups were found in the accuracy of examination, adequacy of treatment, or request and interpretation of radiography. Since then, systematic reviews of the quality of patient care provided by emergency NPs have consistently found that rates of negative clinical outcomes for NPs' patients, such as missed injuries, the inappropriate management of patients, and unscheduled returns to EDs, are equivalent to, or lower than usual medical care (Carter & Chochinov 2007; Jennings et al. 2015; Wilson et al. 2009; Woo, Lee & Tam 2017).

Another benefit of NPs' specialisation consistently found in these systematic reviews is that the presence of NPs reduces waiting times and LOS for ED patients (Carter & Chochinov 2007; Jennings et al. 2015; Wilson et al. 2009; Woo, Lee & Tam 2017). Fry et al.'s (2011) study in one Fast Track unit where an NP role had been introduced found that patients treated by NPs had a waiting time and LOS that was equal to, or shorter than those in the same diagnostic group who were treated by a doctor. The study also found that in the year following the introduction of the NP role, the proportion of patients who did not wait for their treatment before departing the ED reduced from 8.1% to 4.5% ($p<.0001$).

Globally, emergency NPs' specialisation in minor injuries and illnesses has demonstrated a positive impact on a range of quality and time-based performance measures (Jennings et al. 2015; Woo, Lee & Tam 2017). Limiting NPs' autonomy in this way draws on the benefits of specialisation advocated by Taylor. As such, there are potential costs which are not accounted for in the evaluations of these roles. For example, emergency doctors and RNs treat the full range of ED patients and can therefore be assigned anywhere in the ED, whereas NPs are usually based in the Fast Track area (Dinh et al. 2012; Lutze et al. 2014). Nurse practitioners' lack of internal mobility will not be a problem if there is sufficient, sustained demand from their patient population to avoid the idle time associated with specialist roles, but to date this has never been examined.

A concern about NPs' specialisation reported by ED doctors is that it denies junior doctors the opportunity to diagnose and treat less complex ED patients, an important component of early medical training (Chong et al. 2010; Currie & Crouch 2008; Jones et al. 2013). Trainee doctors and NPs learn how to apply diagnostic knowledge acquired in formal education to a particular patient's condition by assessing the patient, then discussing their clinical findings with, and being advised by more experienced colleagues (Chong et al. 2010; Dent et al. 2006; Fry & Rogers 2009). To protect patient safety, novice clinicians begin by consulting with experienced colleagues for the simplest diagnostic problems before moving on to more complex conditions, thus increasing their autonomy over time. The concern reported by ED doctors is that if NPs treat all the patients with simple conditions, the first rung on junior doctors' diagnostic learning ladder is removed. While there is no empirical evidence that this occurs, it does highlight a difference in doctors' and NPs' learning

trajectory. In NPs' formal scope of practice agreement, employers define which patients they can autonomously treat, potentially curtailing their ability to move on to more complex conditions.

There is ample evidence on NPs' diagnostic abilities for minor injuries and illnesses (Jennings et al. 2015; Woo, Lee & Tam 2017) but just two studies have examined their performance for complex patient conditions. In Pirret, Neville & La Grow's (2015) study, New Zealand NPs from a variety of specialities were compared with more experienced doctors (registrars) in the diagnosis of patients with multiple potential diagnoses, co-morbidities, atypical signs and symptoms, and/or a rare condition. They found NPs compared favourably to registrars in terms of diagnostic accuracy, problems identified, and action plans made. Moreover, the NPs' level of accuracy increased with years of experience. In a small scale study by Roche, Gardner & Jack (2017) in Australian rural EDs, NPs were compared to normal medical care in the diagnosis and treatment of patients presenting to the ED with undifferentiated chest pain (NP patient group n=13, medical care patient group n=28). The study found that the NPs demonstrated significantly higher rates of adherence to clinical guidelines on recommended actions such as the administration of oxygen, the prescription of aspirin and repeat troponin testing. Roche and colleagues also found that NPs achieved a higher proportion of agreement (91.7%) than doctors (82.8%) for diagnostic accuracy of electrocardiograph interpretation, though the difference was not significance ($p=0.52$). While more studies are needed, these findings suggest that with clinical experience NPs can, and do, develop their diagnostic skills for more complex conditions. Like the exclusion criteria in RN protocols, by formalising NPs' scope of practice to less complex conditions, employers seek to mitigate the perceived risk of NPs managing whole episodes of patient care. From a flexibility point of view such workplace restrictions may prevent NPs from using the knowledge and skills they have acquired in clinical experience, and to move on to different and/or more complex patient conditions. To date no studies have examined the implications of these restrictions for the longer-term adaptability of the NP role to the changing needs of the patient population.

Similar workplace-level constraints can be observed for NPs' discretion over the medications they may prescribe. National regulation for endorsement as an NP places the prescription of medications within their scope of practice but authority to prescribe is conferred under the relevant drugs and poisons legislation which varies between states (Fong, Buckley & Cashin 2015; NMBA 2011). In NSW, NPs working in the public hospital system, including EDs, may prescribe from a broad, but pre-determined formulary (Fong, Buckley & Cashin 2015). These workplace restrictions on the discretion of Australian NPs reflect those found for independent nurse prescribers in other jurisdictions (Bowskill, Timmons & James 2013; Niezen & Mathijssen 2014). For example, in the UK there is a tertiary education and endorsement process for independent nurse prescribers and, once endorsed, they may legally prescribe from the full formulary of medications as would doctors (Bowskill, Timmons & James 2013). However, in case studies involving interviews and observations

of 26 independent nurse prescribers working in hospital and primary care settings, Bowskill, Timmons & James (2013) identified their legal authority to prescribe from the full formulary was curtailed at the workplace level. In primary care settings NPs were limited to medications relevant to the patient population defined in collaborative agreements with the GPs in their workplace. In hospital settings, governance committees sought to manage the perceived risk of nurses prescribing by restricting their discretion to a limited formulary, like the NPs in NSW. The implications of NPs' constrained discretion over medications for their ability to respond to patients' needs have never been explored.

Nurse practitioners in Australia have a legal mandate to manage whole episodes of patient care on the same basis as doctors, judging those conditions they are educated and experienced to treat. However, limits are placed on this autonomy at the workplace level. This has led ED NPs to become experts in the treatment of less complex patient conditions, harnessing the benefits of Taylorism. However, the implications of constraints to NPs' autonomy such as their lack of internal mobility, on their longer term-adaptability in moving on to different and/or more complex patient conditions, and their curtailed discretion over medications have not been empirically studied.

Summary of the Evidence

This chapter has examined the extant literature for evidence of whether the redistribution of medical tasks to nurses has increased workforce flexibility. By comparing evidence against the ideal types of functional flexibility and Taylorism the review has demonstrated the utility of the analytical framework in illuminating the inherent contradictions in many workforce reforms. It has also exposed critical gaps in the evidence needed to understand the nature of any flexibility in healthcare teams.

Some reforms, such as RNs specialising in a single medical procedure, shift professional nursing work in a Taylorist direction, reducing their range of skills to gain expert performance. In contrast, the initiation of medications and investigations in EDs is a multiskilling strategy, expanding the range of tasks RNs perform to increase responsiveness to patient care. However, it is achieved through the Taylorist method of protocols that restrict RNs' autonomy to a narrower range of patients and control their decision-making. It is not clear from the existing literature how teams meets the needs of patients who do not fit the protocols' inclusion criteria. Likewise, there is some evidence to suggest that NPs are multiskilled across medical and nursing domains, but their autonomy is often constrained to lower complexity patients and their discretion over medications is rarely equivalent to doctors'. Evaluations of the emergency NP role suggest that their specialisation in less complex conditions translates into quality patient care outcomes, but neither the potential costs of idle time associated with their relative lack of internal mobility, nor the limitations on their longer-term adaptability to the changing needs of the patient population have previously been considered.

All the reforms outlined in this review of the literature have been described as measures to increase workforce flexibility, regardless of their impact on the range of skills used and on the autonomy needed to manage complex and indeterminate healthcare work. These contradictions underscore the need for greater clarity in what workforce flexibility means in the healthcare context.

The analytical framework has also exposed critical gaps in the evidence about whether nurses' increasing involvement in medical tasks has resulted in more functionally flexible healthcare teams. In the case of RNs undertaking everyday medical tasks, such as venepuncture, the limited evidence available points to a pattern of *task shifting* where tasks are redistributed between discrete occupational roles, rather than the flexibility of *task sharing* where roles overlap. The sharing of tasks and other forms of back-up behaviour are considered a key feature of effective teams, but these have rarely been examined in healthcare teams, and never between doctors and nurses. The literature has instead focused on the individual teamwork behaviours important for safe patient outcomes, and it is widely acknowledged that this has been at the expense of understanding the work of the healthcare teams in their organisational context. Not enough is known about how tasks are distributed and coordinated within healthcare teams to ascertain whether doctors' and nurses' roles overlap and whether they use this overlap to work flexibly in response to changing demand.

The reason for these gaps in our understanding of workforce flexibility in healthcare is methodological. To date, studies have focussed on one aspect of the division of labour. Studies of teamwork do not consider how tasks are distributed between roles, while studies of roles or tasks do not evaluate the impact on the wider team. Further, with the focus often on focal medical tasks, studies rarely consider the everyday clinical tasks that comprise the majority of healthcare work.

This study overcomes the methodological limitations of previous studies taking an holistic division of labour perspective on the work of a healthcare team: describing how tasks are distributed between medical and nursing roles in an ED team, and exploring the structure of social relationships that organise and coordinate their work. Aspects of the structure of social relationships addressed are the teamwork behaviours and organisational factors that may promote and hinder flexibility, and nurses' autonomy over focal medical tasks. A division of labour perspective that encompasses both a description of the task distribution itself and an exploration of the social relationships that organise and coordinate that distribution requires a mixed methods approach, which will be described over the following two chapters, beginning with the methodology and study design.

CHAPTER 5: METHODOLOGY AND STUDY DESIGN

Introduction

This chapter describes the methodology and process of study design. A mixed methods research methodology was selected as the most appropriate methodology to address the study's aim and objectives. Quality in mixed methods research design is achieved through the careful and transparent linking of the research objectives, study design and methods (Gorard 2010; Greene 2008; Newman et al. 2003; O'Cathain 2010a). The chapter details the three stages of linking undertaken in the study design process. First, the research objectives were linked to a qualitative or quantitative methodological approach (Greene 2007; Johnson & Onwuegbuzie 2004; Plano Clark & Badiee 2010). Second, an appropriate mixed methods study design was selected to meet the study's aim and objectives (Greene, Caracelli & Graham 1989; Morse 1991; Teddlie & Tashakkori 2009). Finally, the type of methods best-suited to address the study's objectives were selected.

The Methodological Approach

Mixed methods research methodology combines quantitative and qualitative approaches for a richer understanding of complex, multidimensional phenomenon than either approach in isolation (Creswell & Plano Clark 2017; Greene 2008; Johnson, Onwuegbuzie & Turner 2007). Mixed methods research is particularly prevalent in applied social sciences, including health services research, where research problems are often complex and comprise multiple objectives that require a different methodological approach (Andrew & Halcomb 2011; O'Cathain, Murphy & Nicholl 2007).

Complexity in health services research is driven by increased rates of chronic disease, comorbidities, aging and the need for healthcare teams to better manage the social, economic and personal contexts of individuals (Andrew & Halcomb 2011; O'Cathain, Murphy & Nicholl 2007). Historically health services researchers relied on quantitative methodology, emphasising randomised controlled trials and dismissing qualitative methods as poor science (Andrew & Halcomb 2011; O'Cathain, Murphy & Nicholl 2007). O'Cathain (2009) suggests that since the 1990s there has been a quiet revolution of mixed methods research as qualitative methodology has become accepted as a way of addressing questions and understanding processes that quantitative approaches fail to conceptualise, such as why some clinical interventions work and others do not (Pope & Mays 1995). Thus, mixed methods research is gaining momentum and repute in health services research (Andrew & Halcomb 2011; O'Cathain, Murphy & Nicholl 2007), including in the emergency department environment (Cooper, Porter & Endacott 2011; Mason et al. 2007).

Defining the concept of workforce flexibility in the healthcare context is an example of a complex, multidimensional research problem. Furthermore, the division of labour perspective adopted as the lens for the study necessitates a mixed methods research methodology since it comprises two distinct epistemological components. First, the division of labour can be understood as the distribution of tasks between occupational roles in a workplace team. This takes a positivist epistemological position associated with quantitative methodology (Williams & May 1996), that clinical work comprises tasks which can be objectively observed and measured, independent of clinicians' understanding of those tasks. Second, the division of labour can also be understood as the structure of social relationships that organise and coordinate the work of different occupations in a team (Freidson 2001). This takes a constructivist epistemological position associated with qualitative methodology (Williams & May 1996), that phenomenon such as teamwork and autonomy are socially constructed and context-dependent, and are best-understood through the subjective accounts of participants in that context. These two epistemological components were reconciled by taking the philosophical position of pragmatism.

Pragmatism has emerged as the foremost philosophical foundation of mixed methods research (Creswell & Plano Clark 2017; Johnson & Onwuegbuzie 2004; Johnson, Onwuegbuzie & Turner 2007; Teddlie & Tashakkori 2010). Ascribed to American theorists William James, Charles Pierce and John Dewey, pragmatism offers a distinctive approach to apparently unresolvable disputes, such as that between the epistemological positions of quantitative and qualitative methodology (Howe 1988; Williams & May 1996). It does this by working out the practical consequences of holding a concept (for example, an epistemological belief) to be true and treats it as true if it is useful and beneficial for it to be true (Johnson & Onwuegbuzie 2004; Williams & May 1996). Pragmatism has been described as an 'anti-philosophy' because it unseats ontological and epistemological considerations as the prime drivers in decisions about methodology (Johnson & Onwuegbuzie 2004; Williams & May 1996). However, pragmatism does not abandon philosophical considerations, rather it makes the research problem itself the driver for decisions and tries to find the most useful philosophical solution (Williams & May 1996).

For mixed methods research design, pragmatism means evaluating the practical consequences of alternative ontological and epistemological approaches to address particular research objectives and selects that which is likely to provide the best understanding of the phenomenon (Johnson & Onwuegbuzie 2004). To do this, Newman et al. (2003) suggest that the researcher interrogate the underlying purpose of the research objectives, that is *why* the question is being asked. In this study, the purpose of the first objective (to compare the tasks undertaken by doctors, NPs and RNs in a team) is to predict. The objective seeks to establish the correlation between occupational roles and the types of tasks they perform, to predict a task distribution that may be generalisable to other contexts, limitations permitting. Prediction lends itself to a quantitative methodological approach.

The purpose of the second (to explore teamwork behaviours and organisational factors) and the third objective (to understand nurses' autonomy over focal medical tasks) is to understand why tasks are distributed between roles in the way they are, which lends itself to a qualitative approach. The final research objective, to identify the nature of flexibility within a team of ED doctors and nurses, can only be addressed having pragmatically adopted both quantitative and qualitative methodologies.

Selecting a Mixed Methods Design

With the research objectives linked to a quantitative or qualitative approach, a suitable mixed methods design was selected from Creswell and Plano Clark's typology (2011, 2017). Their original typology of seven mixed methods designs (Creswell & Plano Clark 2011) guided the study but their more recent, simplified iteration (Creswell & Plano Clark 2017) is used here for discussion. The 2017 typology has just three 'core' mixed methods designs (explanatory sequential, exploratory sequential and convergent) to emphasis the two fundamental dimensions of mixed methods designs: the primary reason for collecting both qualitative and quantitative data (explanatory or exploratory); and the sequencing of the qualitative and quantitative strands (sequential or convergent) (Creswell & Plano Clark 2017).

In this study, the primary reason for collecting both types of data is that qualitative data are needed to explain and interpret the quantitative data. In both versions of Creswell & Plano Clark's (2011, 2017) typology, the most appropriate design is *explanatory sequential* where a quantitative phase is followed sequentially by a qualitative phase. In an explanatory sequential mixed methods design, the two types of data are interactive, that is the collection of the qualitative data relies on the results of the quantitative data (Tashakkori & Teddlie 2008). According to Creswell & Plano Clark (2017), explanatory sequential design is most useful when the researcher wants to assess trends and relationships between quantitative data (e.g. comparing the tasks undertaken by doctors, NPs and RNs in a team), but also be able to explain the mechanisms or reasons behind those trends (e.g. teamwork behaviours and organisational factors). In common with other mixed methods designs, the final phase of an explanatory sequential design involves integrating the quantitative and qualitative findings to draw the meta-inferences of the study (Creswell & Plano Clark 2011). In this study, the meta-inferences address the final research objective (to identify the nature of flexibility in the ED team) and the overall aim (to define the concept of workforce flexibility in the healthcare context).

Another consideration for mixed methods study design is the priority or weight given to the quantitative and qualitative data. It is often assumed that in an explanatory sequential design, priority is given to the quantitative phase (Creswell & Plano Clark 2011; O'Cathain 2010b). However, in this study equal priority was afforded to the quantitative and qualitative phases, since the division of labour perspective embedded in the study's design recognises that both methodological approaches are needed to identify the nature of flexibility in a healthcare team. Affording equal priority to the

quantitative and qualitative phases ensures that, when used in combination, the combined effect of the two methodological approaches was greater than the sum of their individual effects (Hall & Howard 2008).

Methods within the Explanatory Sequential Design

The study design process was completed by selecting the type of methods best suited to address the research objectives within the explanatory sequential mixed methods design. This section discusses the rationale for choosing the methods of work observations and interviews with details of the data collection procedures provided in Chapter 6. The explanatory sequential design can be summarised as (QUAN + qual) ⟶ QUAL. The capitalisation of QUAN and QUAL indicates the equal priority afforded to the predominantly quantitative Phase 1 (with a concurrent qualitative component) and the qualitative Phase 2.

Phase 1: Work Observations (QUAN + qual)

Work observation methods were selected for Phase 1. Observation involves collecting data through a visual examination of the social setting and is the oldest research method in the social and behavioural sciences (McKechnie 2012). Observations are useful to describe and understand the reality of routine, everyday practice practices (Silverman 2010). As Allen (2004) notes, observing healthcare work *in situ* reveals what clinicians actually do, rather than what they think they do. Observations of a social setting may be recorded using a structured method, with pre-specified units of measurement to produce quantitative data, or an unstructured method to capture qualitative data (McKechnie 2012). In Phase 1, structured and unstructured observation methods were used concurrently, a recognised practice in mixed methods research (Brannen & Halcomb 2009; Tashakkori & Teddlie 2009). Priority was afforded to the collection of quantitative data to ensure the first research objective was achieved, hence QUAN+qual.

The structured observation method of time study was selected to measure and compare the tasks undertaken by doctors, NPs and RNs. Time study involves breaking down work processes into predetermined task categories and recording the time staff spend performing those tasks to produce a quantitative measure of task distribution. Time study is resource intensive because it requires continuous, one-to-one observations, but has been shown to yield more accurate data than other structured observation methods such as work sampling (Finkler et al. 1993) or the self-reporting methods of work diaries or questionnaires (Ampt et al. 2007; Bratt et al. 1999; Burke et al. 2000). As noted in Chapter 3, time study originated in the scientific management movement promulgated by Taylor (1911) where it was used to measure and improve the efficiency of work processes (Wren 2005). It is perhaps ironic that a method developed in the scientific management tradition of Taylor should be used in a study to define workforce flexibility, but time study is the most accurate method to establish how each role is differentiated and where they overlap.

The unstructured observation method of fieldnotes was used concurrently with the structured time study method, to add richness to the quantitative data and to understand the taken-for-granted, everyday working practices that cannot be measured quantitatively (Brodsky 2012; Schadewaldt et al. 2014; Williamson et al. 2012). The inclusion of fieldnotes allowed the researcher to take advantage of being present in the workplace surrounded by naturally occurring data (Silverman 2015). This qualitative component to the work observations helped address research objectives two and three: capturing teamwork behaviours such as the nature and tone of staff interactions, the organisational factors that impacted on the team's work, and how differences in autonomy between the three roles were managed by the team. The findings from the time study and the fieldnotes informed the development of the interview guide for Phase 2.

Phase 2: Interviews (QUAL)

Within explanatory sequential mixed methods design, the qualitative method of interviews commonly follows a quantitative phase to gain a deeper understanding and explanation of the quantitative findings through the perspectives of those with experience of the phenomenon (Brannen & Halcomb 2009; Schadewaldt et al. 2014; Williamson et al. 2012). The equal priority afforded to Phase 2 emphasises that the qualitative interviews played more than an illustrative or supportive role for the Phase 1 findings, they were used to gain additional insights into the work of the team, which were not accessible from observation alone (Foss & Ellefsen 2002; Giddings 2006; Taylor, Bogdan & DeVault 2015). The interviews sought to understand the cognitive processes and attitudes behind what was observed in the workplace setting. The interviews addressed research objectives two and three: gaining clinicians' perspectives on the teamwork behaviour and organisational factors that promoted or hindered flexibility, and attitudes to nurses' autonomy over focal medical tasks.

As with observational techniques, interviews range from a highly structured, scripted format, designed to collect quantitative data, through to unstructured, conversational interviews seeking narrative data (Berg & Lune 2004; Brinkmann 2008; Kelly 2010). This study used a semi-structured format to address the topics arising from Phase 1 and the research objectives, while allowing for interviewees' spontaneous descriptions and narratives (Brinkmann 2008; King & Horrocks 2010).

Summary

This chapter has described the mixed methods research methodological approach for the study and the choice of an explanatory sequential design consisting two phases: Phase 1, work observations using time study and fieldnote methods, followed by Phase 2, semi-structured interviews. The following chapter provides the details of these methods.

CHAPTER 6: METHODS

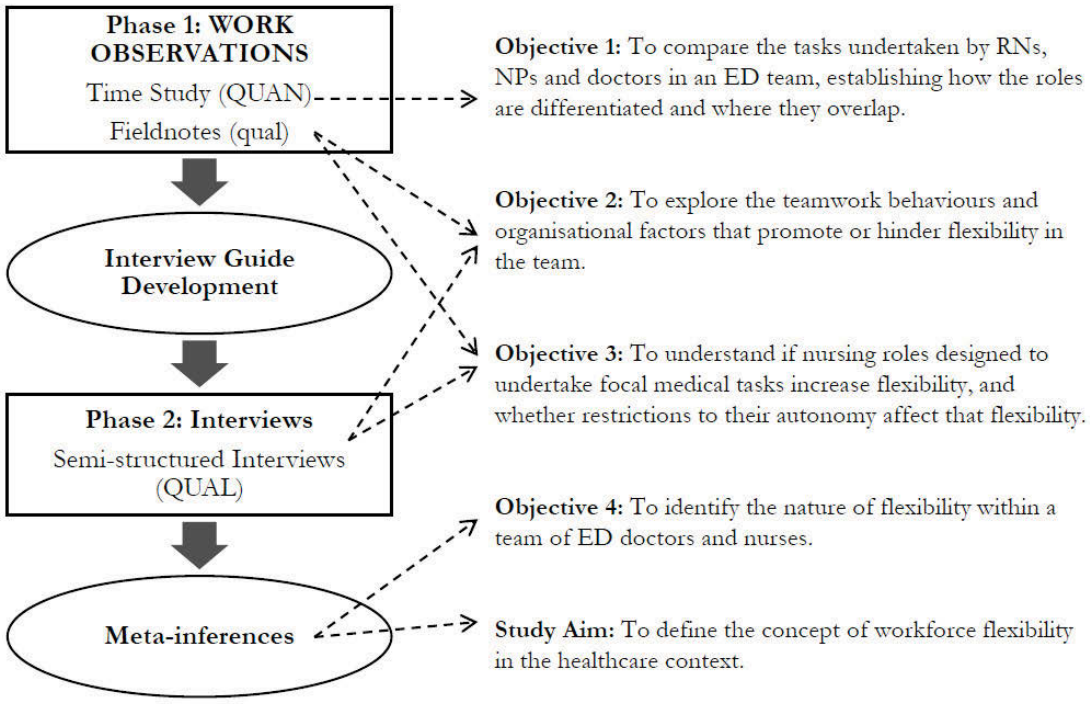
Introduction

This chapter describes the methods used within the explanatory sequential mixed methods design and is divided into six sections. The first summarises the study design and the second explains the choice of study site. The third and fourth follow with details of the data collection tools, procedures and analysis methods for each of the two study phases: Phase 1 Work Observations and Phase 2 Interviews. The fifth section discusses the methods for drawing the meta-inferences, integrating the findings from Phase 1 and Phase 2. The chapter concludes with the ethical considerations of the study.

Study Design

The study design is summarised in Figure 1. Following the guidelines for mixed methods diagrams recommended by Ivanakova, Creswell & Stick (2006), the oblong boxes indicate a data collection phase, the ovals represents a point where qualitative and quantitative data are integrated and the arrows indicate the sequencing.

Figure 1 Summary of the Study Design



The research commenced in March 2015 and concluded with the final interviews in February 2016.

Study Site

The emergency department (ED) was chosen to identify the nature of flexibility in a healthcare team because professionals may be less likely to adhere to occupational demarcations in a busy, unpredictable and urgent clinical environment (Abbott 1988; Carmel 2006; Reeves, Lewin & Espin 2010). Emergency departments operate multiple models of care, each with their own organisational and staffing arrangements. The study focussed on ED Fast Track model of care to achieve an in-depth view of a workplace division of labour in its organisational context. Fast Track was chosen as the ED model of care most likely to demonstrate an overlap between nursing and medical roles. Emergency NPs work extensively in Fast Track, and RN-initiated medications and investigations are crucial for achieving the timely diagnosis and treatment of Fast Track patients.

The site selected was a metropolitan, tertiary referral ED in Sydney, Australia with a well-established Fast Track model of care staffed by doctors, NPs and RNs (referred to collectively as 'clinicians'). The ED provides emergency care for adult and paediatric patients, with an annual presentation rate of approximately 75,000 patients and is one of three major trauma centres in NSW (NSW Health 2017b).

Before fieldwork commenced, the researcher met with senior clinicians and managers to become familiar with the workplace, its staffing and geographical layout. Relevant policies and guidelines relating to ED clinical roles and models of care were obtained, including the RN protocols and NPs' formal scope of practice. At the time of the research, the nurse staffing allocation was 146 full-time equivalent (FTE) nurses, including four NPs. The ED did not employ enrolled nurses or assistants in nursing. The medical staffing allocation was 64.5 FTE doctors. As a public teaching hospital, 44% of this allocation was accounted for by junior doctors on rotation through the hospital (28.5 FTE doctors). In addition to the waiting room and ambulance bays, the ED was split into five geographically and functionally distinct models of care. Resuscitation (three rooms), Acute (31 monitored beds plus two safe assessment rooms), Paediatric (9 beds plus procedure room), ED Short Stay Unit (10 beds) and Fast Track, the clinical area selected for the study. The study was conducted in one site to achieve the richness and depth of data needed to address the research objectives, but was typical of other tertiary referral EDs in terms of the range of patient presentations, models of care, staffing and clinical roles (NSW Health 2017b).

Phase 1 Work Observations

Phase 1 work observations included a quantitative time study and qualitative fieldnotes, and its primary purpose was to address Objective: to compare the tasks undertaken by doctors, NPs and RNs in the Fast Track team, establishing how the roles are differentiated and where they overlap. Observations took place between 19th March 2015 and 24th May 2015. The tools, sampling and data collection procedures used for the time study and fieldnotes are described, followed by the analysis method for each.

Time Study Tool

In the past, time study tools were a stopwatch and a clipboard, with workers' tasks timed and manually recorded against a framework of task categories. Such paper-based methods were cumbersome, especially in complex settings such as healthcare where workers frequently switch between tasks, and often conduct two or more tasks concurrently (Westbrook et al. 2011). Developments in software and tablet computers have allowed researchers to conduct time studies in healthcare settings more easily, and with a higher degree of accuracy (Kee et al. 2012; Ogunfiditimi et al. 2013; Zheng, Guo & Hanauer 2011).

In this study, clinicians' work was timed on a tablet running a time study software called 'Work Observation Method by Activity Timing' or WOMBAT (Westbrook & Ampt 2009). Developed in the Australian healthcare environment, WOMBAT was validated with 250 hours of observations of hospital ward nurses (Westbrook & Ampt 2009) and 151 hours of ward doctors (Westbrook et al. 2008). It has since been used to measure the work of doctors, nurses, respiratory therapists and unit clerks in a critical care setting in the United States (Ballerman et al. 2011), in a longitudinal study of nurses' tasks in an Australian hospital (Westbrook et al. 2011), and doctors and nurses in surgical teams (Bellandi et al. 2017). Crucially, WOMBAT has also been used in an Australian ED to examine the impact of interruptions on task completion of ED doctors (Westbrook et al. 2010) and to compare the workload management strategies of ED doctors, ward doctors and ward nurses (Walter et al. 2014). These studies demonstrate that WOMBAT is a robust tool for measuring the distribution of tasks within an ED Fast Track team.

Time studies measure how much time workers spend on tasks, but wide range of tasks that comprise everyday clinical work means these tasks must be aggregated into task categories. In creating task categories, a balance must be struck between gaining sufficient detail for meaningful findings, and measurability. Measurability is determined by the number of task categories. A large number of task categories impacts the usability of the tool and the practicalities of fieldwork, since finer grained task categories require more hours of observation to detect statistically significant differences between groups. Task categories must also be mutually exclusive.

The task categories used in previous WOMBAT studies were first piloted in Fast Track in paper format without timing. For eight hours over three days, Fast Track doctors, NPs and RNs were observed performing their work and their tasks noted against the task categories. WOMBAT is a flexible data collection tool and the categories may be changed to meet the needs of the study. Following the paper-based pilot, the top-level task categories were retained, but the subtasks were refined to ensure the tool's suitability for the specific features of Fast Track work, and to achieve the level of detail required to address the research objectives. To strengthen the internal validity of Phase 1, and to test the usability of the tool, the refined task categories were programmed into the software and piloted again using a tablet. Four hours of pilot observations were undertaken in Fast Track.

A summary of the task categories used for the time study data collection is in Table 4. There were ten top-level task categories (capitalised in the table) with four of these categories broken down into subtasks (italicised in the table).

Table 4 Task categories used for time study data collection

DIRECT CARE *Patient assessment* *Vital signs* *Perform test or procedure* *Patient communication* *Patient comfort - food or water, physical comfort, hygiene needs, escorting* *Privacy requested*	**INDIRECT CARE** *Order test or procedure* *Prepare test or procedure* *Diagnosis - checking results & consulting colleagues* *Locate - notes, patients, forms, colleagues* *Electronic waiting list* *Tidy – maintaining the care environment*	**MEDICATION** *Prescribe medications* *Prepare medications* *Administer medications* *IV management* *Discuss medications with patients or colleagues* *Chart and check medications* *Research medications*
SUPERVISION *Supervisor where the participant is providing supervision or education to another clinician* *Supervisee where the participant is being supervised/educated*	**DOCUMENTATION** **PROFESSIONAL COMMUNICATION** **UNIT ADMINISTRATION**	**IN TRANSIT** **SOCIAL** **WAITING**

Direct Care incorporated all patient care tasks conducted at the bedside, excluding those related to medications. The category comprised five subtasks: the assessment or physical examination of patients, the taking of vital signs (e.g. temperature, blood pressure, respiratory rate), performing a test or procedure on a patient (e.g. cannulation, suturing), communicating with patients or relatives about their care, and ensuring patients' comfort (e.g. providing food or water, adjusting bed, escorting patient within the ED). A sixth code was used for times when privacy was requested by the clinician or a patient and the researcher left the room.

The Indirect Care category included tasks related to patient care but not conducted directly with the patient. The category comprised six subtasks: tasks related to the preparation of tests or procedures including tidying up after a procedure, ordering tests and procedures verbally or by computer, tasks directed at forming a diagnosis (e.g. consulting a colleague, checking test results), tidying the clinical environment (e.g. preparing cubicles), working with the electronic waiting list, and locating patients, forms or colleagues in the ED.

The Medication category comprised seven subtasks and incorporated all medication-related activities and included the researching, prescribing, preparing, administering and charting of medications as well as discussing medication with patients or colleagues. The use of the intravenous management equipment was recorded as a separate medication task. When an RN initiated a medication under protocol it was recorded and reported as "prescribing".

The Supervision category covered all supervision or education related to patient care conducted between colleagues on-the-job and comprised two subtasks: where the participant was instructing (Supervisor) or being instructed (Supervisee) by a colleague in the appropriate course of action for a patient's care and/or educating them in aspects of a condition, procedure or treatment. The Documentation category included writing in patients' clinical notes (paper and electronic), referral and discharge letters, admission forms, wristbands and stickers, and observation charts but excluded medication charts (Medication – Chart). A task was coded as 'electronic waiting list' when the clinician entered patient information required to maintain the electronic waiting list and was switched to Documentation once they clicked through to enter information into the patient's clinical notes.

The Professional Communication category was defined as all communication regarding patient care excluding that related to medications (Medication - Discussion), patients' test results and possible diagnosis (Indirect Care - Diagnosis) and asking another clinician to perform a test or procedure (Indirect Care – Order).

The Unit Administration category incorporated tasks and conversations that concerned issues such as staffing, stores, and hospital systems. The In Transit category was used when the clinician was moving between patients and tasks, while the Waiting category was used when the ED was quiet, and the clinician had completed all possible tasks. Social tasks included all non-work-related conversations and activities as well as personal breaks taken during the observation session. Appendix B contains a comprehensive definition of the task categories used for data collection.

The inclusion of subtasks provided more meaningful data than the top-level categories alone, but greater detail was needed for certain tasks to properly address the research objectives. Additional task details were recorded during the work observations in a spreadsheet running concurrently to the WOMBAT software. Task details were recorded for five categories: performing tests and procedures (e.g. venepuncture, ECG, suturing), ordering tests and procedures (e.g. X-ray, pathology), diagnosis activity (e.g. looking at test result, consulting a colleague), professional communication (i.e. the topic of communication between colleagues), and unit administration (e.g. giving advice on hospital systems, restocking medication store). The inclusion of the task detail spread sheet achieved a richness of data without adding more subtasks that would comprise measurability of the time study. Appendix B provides an example of the type of data recorded in the task details spreadsheet.

The WOMBAT software allows the collection of up to four layers of data related to the task being observed: what is being done (the task); with whom (colleagues or patients); where (geographical location) and with what (the information technology used to perform the task e.g. computer). Only the first two of these layers were used in the study, since the observations were limited to one geographical area and the use of information technology was not a focus for the study. The "with" function had four categories (nurse, doctor, phone and other) and was only used for three task categories where it was pertinent to the research objectives: Diagnosis, Supervision, and Professional Communication. One aspect of the WOMBAT's 'with' function not identified during the pilot stage was the conflation of RNs and NPs into a 'Nurse' category, rather than the recording of separate data. This was addressed during data collection by recording this information in the fieldnotes and task details spread sheet.

Appendix B provides an example of the WOMBAT software's interface for collecting time study data.

Time Study Sample

The units of analysis in a time study are the tasks that comprise a work process. Sample size is determined by the frequency of tasks observed and is articulated as a number of observation hours. Previous WOMBAT studies have not established relevant effect sizes, so an estimated meaningful difference was used to calculate the sample size. A difference of 50% in the amount of time each role spent performing tasks in the top-level task categories was considered to represent a meaningful difference in the distribution of tasks within the team. Based on this medium effect size, a power calculation indicated that a minimum sample size of 134 observation hours was required (two-tailed, Wilcoxon-Mann-Whitney test with a significance of 0.05 and a power of 0.8; GPower 3.1). Previous WOMBAT studies suggest that around 50 hours for every occupational group observed is required to detect meaningful differences between groups. Drawing on both prior use of the WOMBAT tool and the power calculation, the study aimed to obtain a sample of 150 hours of observations, 50 hours each for doctors, NPs and RNs.

The study sought to measure the task distribution between doctors, NPs and RNs over the course of an average working day. To achieve this, the timing of work observations was randomised to avoid any bias associated with shift patterns or work routines. Workload is highly variable and unpredictable in EDs, therefore this type of bias is less likely than on an average hospital ward, where work routines are more dependent on the time of day. Nonetheless, randomisation was achieved by conducting observations with the three groups across week days and weekends and at various times of the day. Data were collected between the peak hours of 9am and 9pm, when the NPs were rostered on duty.

Time Study Participants and Enrolment

A purposive sampling strategy was used to enrol participants to the time study and was stratified into three groups which are the basis for comparison: doctors (medical officers – MO), NPs and RNs. Only staff working in Fast Track with a patient load were included in the time study, this excluded emergency physicians and the nurse coordinator (an RN) who performed consultative and oversight roles. In line with a requirement of ethical approval for the study, only staff directly employed in the ED were invited to participate in the study. The inclusion and exclusion criteria for time study is given in Table 5 below.

Table 5 Inclusion and exclusion criteria for time study participants

Role	Included	Excluded
MO	Registrars (Trainees of the Australasian College of Emergency Medicine) SRMOs (Senior resident medical officers – third year after registration) RMOs (Resident medical officers – second year after registration).	Emergency Physicians (Fellows of the Australasian College of Emergency Medicine). Interns (first year after registration) VMOs (Visiting Medical Officers) Medical students on clinical placement
NP	All NPs	
RN	All RNs	RN coordinating the Fast Track Area Agency RNs Casual RNs Nursing students on clinical placement

Potential participants were informed about Phase 1's objectives and methods via email, and posters were placed in staff areas. Participants were invited to enrol in the study while on duty in the Fast Track area throughout the fieldwork period. The focus on tasks as the unit of analysis means that time study participants may be observed more than once. However, as many participants as possible were enrolled to minimise any possible bias associated with individual practice, and to avoid over-burdening individual clinicians. The researcher provided potential participants with a study information sheet, allowed them time to read this information and answered any questions they had. If the participant agreed to enrol in the study, they then signed a consent form. Before commencing an observation session, the researcher verbally confirmed the participant's consent, that it was a convenient time and offered to explain the study again and to answer any additional questions. It was made clear to participants that they could stop the observation session at any time.

Time Study Data Collection

The time study data collection procedure was based on previous studies that have used the WOMBAT tool (Ballerman et al. 2011; Walter et al. 2014; Westbrook & Ampt 2009). Before commencing an observation session, the researcher administered a short demographic questionnaire confirming job classification, years of experience, and for RNs the level of workplace training they had completed (see Appendix B). Participants were shadowed at a discrete distance (1 to 3 metres) with all the tasks they performed coded into a tablet running the WOMBAT software. Observation sessions lasted between 25 minutes and 2.5 hours, with an average of 89 minutes. The risk of observer fatigue was managed by the researcher taking a break of 20 to 30 minutes between each session. Coding notes were kept in the fieldnotes for ambiguous or unusual tasks to ensure consistency in future coding. Any known coding errors were also noted in the fieldnotes and were amended in the dataset. The time study data was uploaded and stored in a secure, password-protected university server at the end of each fieldwork day.

Fieldnotes Data Collection

The qualitative observation method of fieldnotes was used concurrently with the quantitative time study method to add richness to the quantitative data and to capture the everyday working practices that cannot be measured quantitatively (Brodsky 2012). The piloting phase of the time study provided the opportunity for the researcher to get to know the setting and the people within it, to judge how the work observations could be conducted unobtrusively, and to set the team at ease with their presence (Taylor, Bogdan & DeVault 2015).

The fieldnotes were handwritten in a notebook, between and after time study sessions and transcribed into Microsoft Word at the end of each day. Following the suggestion of Fetterman (1998), the fieldnotes were separated into two sections: observations and speculative-personal reflections. Observations included notes on the organisational context, such as the operation of the Fast Track model of care and its place in the ED and wider health system, descriptions of patient demand and staffing, and any significant organisational problems that impacted on the work of the team (e.g. the computer systems not working). Such descriptions were intended both to overcome the limitations of previous studies of healthcare teams that have not considered the organisational context (Rydenfält, Odenrick & Larsson 2017; Xiao, Parker & Manser 2013), and to help the reader decide the extent to which the findings are transferable to other settings (Lincoln & Guba 1985; Tashakkori & Teddlie 2009). Observations of everyday work practices recorded in the fieldnotes were framed by the study's analytical framework: skills and tasks (e.g. clinicians undertaking non-traditional tasks), the coordination of work (e.g. the teamwork practices that appeared to promote or hinder flexibility), and autonomy (e.g. if, and how the team managed limits to RNs' discretion over medications). Many of the everyday practices recorded in the fieldnotes concerned the content and tone of interactions

between staff (e.g. conflict or cooperation between team members) and opportune conversations between the researcher and staff members.

The section on speculative-personal reflections included thoughts on any bias or ambiguities the researcher was aware of, and speculations about how the observations may relate to the research aim and objectives (Brodsky 2012; McKechnie 2012). In terms of observer bias, the researcher has a background in social research therefore share a professional identity with the participants, a common concern when professionals research their own culture and practice (Allen 2010). However, the researcher was aware that as an 'outsider' there was a potential to misunderstand aspects of the complex working practices observed, including medical and organisational jargon (Allen 2010). This was managed by recording any ambiguous practices in the fieldnotes and clarifying their meaning with senior clinicians at the research site (clinical nurse consultants or the deputy medical director), and through regular debriefing with a supervisor, also an ED clinician. Furthermore, a prolonged presence in the field (175 hours over three months) allowed the researcher to develop a rich understanding of the Fast Track working environment.

Another potential source of bias was for the researcher to interpret behaviour and events through the lens of the analytical framework, ignoring other evidence and alternative interpretations (Lockyer 2012). To avoid the fieldnotes being too narrowly focussed on the dimensions of the analytical framework, the researcher was mindful to record any other practices or contextual information that might confirm or refute flexibility in the team, and any alterative interpretations. One benefit of the explanatory sequential mixed methods design was the opportunity to triangulate interpretations of the work practices observed through the interviews (Lockyer 2012). Potential topics to explore in the Phase 2 interviews were posited in the fieldnotes, particularly the cognitive process behind workplace practices that were not directly observable (McKechnie 2012). An example extract from the fieldnotes is provided in Appendix B.

The Role of the Researcher as Observer

The role of the researcher as an observer in the social setting must be considered for all observation methods, quantitative and qualitative. Observation methods vary by the extent to which the observer participate in the setting, and the level of interaction with participants (McKechnie 2012; Platt 2004). In this study, the researcher undertook a role that was more observer than participant. There was limited interaction with participants during the time study observation sessions to minimise any impact on their behaviour. However, there were interactions between the researcher and the staff between these sessions, especially in the staff station during quiet periods, and those conversations were recorded in the fieldnotes. The researcher also interacted with patients where it was courteous and appropriate to do so (e.g. a greeting and answering any questions about the study) but directed them towards a suitable clinician if they had questions about their care. To develop a rapport with the team, the researcher also engaged in informal social interactions and occasionally helped clinicians

with their tasks if asked (Taylor, Bogdan & DeVault 2015). The researcher provided this help when it did not it did not interfere with data collection and it was appropriate to do so (e.g. passing non-sterile equipment such as a box of gloves), and declined when it was not (e.g. countersigning a pathology form).

A common concern with observation methods is that participants may alter their behaviour because they are aware of being observed, known as the Hawthorne effect. One aspect of the Hawthorne effect is that participants may increase their efficiency when they feel under surveillance, for example performing tasks more diligently, concealing negative behaviour from the observer or reducing social interactions with colleagues (Jones 1992; Levitt & List 2011). The study that first described the Hawthorne effect in the 1950s has long been criticised for over-stating the influence of observation on behaviour (Adair 1984; Jones 1992; Levitt & List 2011). Indeed, studies in healthcare environments have found any influence of observation on clinicians' behaviour to be minimal (Ampt et al. 2007; Schnelle, Ouslander & Simmons 2006). The presence of the researcher in Fast Track over a three-month period, and the busyness of the clinical environment makes it unlikely there were any significant or sustained behavioural changes. During the enrolment process, some potential participants did express concern that the time study was a form of management surveillance intended to measure their individual efficiency. Given time study's Taylorist origins (Conti 2013; Witzel 2012; Wren 2005), these concerns were understandable. The researcher reassured these potential participants that measuring individual efficiency was not the purpose of the time study, and that the data would remain confidential.

Time Study Data Analysis

The time study data analysis process began by cleaning the dataset. Observation sessions that were commenced in error and contained no data (six times) were removed, as were sessions shorter than ten minutes because the participant was called away. A drawback of the WOMBAT software is that it was possible for a researcher to code a single task under more than one task category. Double coding was found in some early observation sessions for ten tasks and those tasks were removed from the dataset. The Privacy task category was only used twice, in both instances while a doctor or NP was assessing a patient and the researcher judged that the patient appeared uncomfortable with their presence. In both cases, the researcher confirmed with the participant that the assessment had continued, and the Privacy task was recoded as Patient Assessment in the dataset. The cleaned time study dataset was analysed using IBM SPSS Statistics v22. The main outputs and statistical tests used are given in Table 6.

Table 6 Time Study Data Analysis Methods

Output	Measure	Statistics
Task frequency	Number and proportion of all tasks observed	Pearson Chi-square (all 3 groups)
Mean time on task	Average task duration in minutes & seconds	ANOVA (all 3 groups) Bonferroni Post-Hoc (pair-wise)
Proportion of task time	Proportion of total task time	Kruskal Wallis (all 3 groups) Mann-Whitney U (pair-wise)

The 'task frequency' measures consist of a count of the task observed *between* the roles, and the proportion of times the task was observed *within* a role (i.e. the frequency a task was observed as a percentage of all tasks observed for that role). The 'mean time on task' measure is the average duration of a task in minutes and seconds. The 'proportion of task time' measure gives a picture of how each group spends their time. It was calculated by aggregating the data to each observation session and calculating the proportion of time spent on tasks within the total task time for that session. Probability values were considered significant at $p<.05$.

All these measures contribute to the picture of task distribution within the team but there are two aspects in the way WOMBAT captures data which are important for interpreting the results. The first relates to the counting of tasks which affects the task frequency and mean time on task measures. If the clinician stopped a task, then returned to this task later, it was recorded in WOMBAT as two separate tasks. The interruption function in WOMBAT gets around this problem by pausing the existing task and restarting the timing when the clinician returns to the task. The interruption function was used when the clinician was obviously interrupted by someone, but it was more common for clinicians to move back and forth between tasks without being interrupted. For example, a clinician collects equipment to take bloods (Procedure-related), starts the process of taking blood (Procedure) but realises they have forgotten a piece of equipment which they retrieve (Procedure-related) before returning to take the blood (Procedure). The one incident of taking blood is recorded in WOMBAT as two cases of Procedure and therefore over-estimates the number of procedures and under-estimates the mean time taken for the procedure. This type of data is therefore reported as the number of 'procedure tasks observed' rather than the number of procedures.

The second aspect of data interpretation relates to the proportion of time on task. The multitasking function in WOMBAT allows two or more concurrent tasks to be recorded, but each is recorded as a separate task in the dataset. When task times are added together, the total task time in the dataset is longer than real time elapsed. The denominator for calculating the proportion of time spent on tasks is the total task time. To capture all the tasks in clinicians' workload, this measure is used in preference

to the alternative of selecting a primary task for each incident of multiskilling and only counting this in the dataset. An illustration of how WOMBAT captures multiskilling data is given in Appendix B.

The time study data were analysed using the methods described above and tables of results compiled. Reflecting on those results, it was determined that the task categories used in WOMBAT did not provide a picture of task distribution that would address the research objectives since the majority of tasks were grouped into the top-level task categories of Direct Care and Indirect Care. These categories are a health services research norm and reflect efficiency concerns about the amount of time clinicians spent on patient care tasks (direct and indirect) relative to other tasks, since this impacts on patient outcomes (Aiken et al. 2002; Westbrook et al. 2011). The current study has a greater focus on the nature of the tasks than previous WOMBAT studies and this detail was obscured by the top-level task categories. For example, splitting the whole process of undertaking a procedure between Direct Care (performing the procedure with the patient) and Indirect Care (preparing for, and cleaning up after the procedure) does not measure the total time that procedures consume. To overcome this problem, tasks were regrouped into new top-level categories that better reflected the nature of the tasks performed. Regrouping rather than recoding tasks means the definitions of the subtasks remained the same, therefore the integrity of the data collected was maintained. The revised task categories used in the analysis and presented in the findings are summarised in Table 7.

Table 7 Revised task categories used for data analysis

ASSESSMENT AND DIAGNOSIS	**TESTS AND PROCEDURES**	**MEDICATION**
Patient assessment	*Order tests and procedures*	*Prescribe medications*
Vital signs (blood pressure, temperature etc.)	*Prepare tests and procedures*	*Administer medications*
Diagnosis - checking results & consulting colleagues	*Perform tests and procedures*	*Discuss medications*
Supervision (Supervisor/Supervisee)		
Documentation		
PATIENT COMMUNICATION AND COMFORT	**ORGANISATION OF CARE**	**OFF TASK**
Patient communication	*Electronic waiting list*	*Locate - notes, patients, forms, colleagues*
Patient comfort - food or water, physical comfort, hygiene needs, escorting	*Professional communication*	*In transit*
	Unit administration	*Social*
	Tidy – maintaining the care environment	*Waiting*

The revised task categories reduced the number of top-level task categories from ten to six. Assessment and Diagnosis grouped together those tasks directed at forming a diagnosis, monitoring patients' conditions, documenting care, and deciding a treatment plan and disposition. The Tests

and Procedures category incorporated all tasks related to the ordering, preparing and performing of diagnostic tests and treatment procedures. The Medication category was the only original top-level category to remain, with the seven medication subtasks coded during data collection aggregated into three areas of medication activity for analysis: Prescribe activities (prescribing and researching medications); Administer activities (preparing medications, administering medications, intravenous (IV) management and charting/checking medications); Discuss medications (unchanged). Patient Communication and Comfort comprised communicating with patients about their care, and tasks attending to their physical comfort. The Organisation of Care category encompassed tasks related to the management of patient flow, the coordination of the work of the team, and the general smooth running of the department. Finally, the category of Off Task was created to measure the time clinicians spent on the non-productive activities that form part of a normal working day. The data were analysed again using the new task categories and tables of results compiled.

The next stage was to analyse the additional task details data. The spread sheet containing the task details for each observation session was imported from the secure, password-protected university server into Microsoft Excel and separated into worksheets according to the top-level task categories described in the table above. Task details were read repeatedly and aggregated where appropriate (e.g. Plaster of Paris, strapping and fitting a boot were aggregated together as 'musculoskeletal procedures'). Pivot tables were created in Excel to indicate the type and frequency of tasks observed. The additional task details are structured, qualitative data to enrich the quantitative time study data therefore only count data is reported in the findings, no statistical tests were performed.

Fieldnotes Data Analysis

The method of template analysis was selected to analyse the fieldnotes to integrate these data with the time study findings. Template analysis is a deductive approach to analysing qualitative data through the use of *a priori* themes (King 2004; King & Horrocks 2010). The *a priori* themes used for the initial coding of the fieldnote data were the revised task categories derived from the quantitative data analysis, a recognised practice for integrating quantitative and qualitative data in mixed methods research (Hesse-Biber 2016; Nielsen, Randall & Christensen 2017). The task categories are descriptive, mutually exclusive themes that allowed the fieldnote data to be quickly, and consistently organised and analysed (King 2004). The primary purpose of the Phase 1 work observations was to compare the tasks undertaken by doctors, NPs and RNs therefore the Phase 1 findings were structured by the top-level task categories, with evidence from the time study and fieldnotes for each category presented alongside each other.

The fieldnotes were read several times to allow the researcher to become immersed in the data and were then imported into the qualitative data management program NVivo v11. The task categories were created as codes in NVivo (known as 'nodes') and relevant passages from the fieldnotes encoded to those nodes. Template analysis allows for parallel coding (King 2004), and where the observation

in the fieldnote concerned more than one task category, it was coded to all that applied. For example, a fieldnote describing an RN being shown how to apply Plaster of Paris by an NP was coded to Supervision and Procedure. Extracts from the fieldnotes are provided in the findings to explain and enrich the quantitative time study findings for each of the task categories. These extracts were edited for readability and confidentiality (Brinkmann 2008).

Fieldnotes were included in the study design not only to enrich the time study data, but also to explore the organisational context and other factors that may impact on the team's ability to work flexibly which the time study could not capture. After deductively coding the fieldnotes to the *a priori* themes, the analysis of the fieldnotes proceeded inductively, identifying themes in the observations and reflections that cut across, or were not captured by the task categories (Hesse-Biber 2016; King 2004). More details of the inductive approach to thematic analysis is given in the section on interview data analysis. The purpose of this second stage of fieldnote analysis was to connect Phase 1 and Phase 2 by identifying the topics arising from the work observations to be followed up in interviews. The inductively derived themes are not reported as findings but are described as part of interview guide development in Chapter 8.

Phase 2 Interviews

In Phase 2, semi-structured, face-to-face interviews were used to explain the team's task distribution and everyday working practices observed in Phase 1, through the perspectives of those with personal experience or working in the team (Taylor, Bogdan & DeVault 2015). Interviews with doctors, NPs and RNs took place between 17th December 2015 and 5th February 2016. This section describes the structure of the interview guide, followed by a description of the sampling and enrolment process for the interviews, the data collection procedure and the analysis method.

Semi-structured Interview Guide

A semi-structured interview guide was used for Phase 2 to allow the topics arising from the Phase 1 work observations and the research objectives to be addressed while allowing room for the interviewees' more spontaneous descriptions and narratives (Brinkmann 2008; King & Horrocks 2010). The same questions were asked of each interviewee to permit comparison across interviews but there was flexibility in the open-ended format of the questions, the order in which they were asked, and in the opportunity to pursue topics initiated by the interviewee (Berg & Lune 2004; Kelly 2010). Prompts were used where required, to clarify the kind of information being sought. Some of these prompts were anticipated and included in the interview guide, while others were spontaneous when the interviewee displayed uncertainty about what was being asked (King & Horrocks 2010). Follow-up questions were used to encourage an interviewee to elaborate on an initial answer, for clarification where the interviewee did not fully understand the answer, and to seek completion of a thought or explanation (Berg & Lune 2004; King & Horrocks 2010).

Within the explanatory sequential mixed methods design, the Phase 2 interview guide was developed following the analysis of the Phase 1 data to connect the two phases of the study. It did this by seeking clinicians' views to confirm/disconfirm and explain aspects of the Phase 1 work observations findings, as well as being informed by the study's aim and objectives and the analytical framework (Kelly 2010). The guide covered four topics that emerged from the Phase 1 findings: the process of task delegation within the team; the challenges the team faces in coordinating their work; attitudes to RNs' autonomy over the initiation of medications and investigations; and perceptions of NPs' specialisation in minor injuries, and their capacity to expand their scope. Details of these topics addressed in the interviews are given in Chapter 8, and the guide itself is in Appendix C. Provided here is the general structure of the interview guide.

According to Patton (1990), there are six types of interview question: background and demographic questions, experience/behaviour questions, opinions/values questions, feeling questions, knowledge questions and sensory questions. The interview guide began with some simple background and demographic questions to help put interviewees at ease (Taylor, Bogdan & DeVault 2015). Other questions were either experience/behaviour questions or opinions/values questions. Experience/behaviour questions sought to explain teamwork behaviours observed in Phase 1. For example, interviewees were asked to explain their experience and decision-making process around the delegation of specific clinical tasks. Opinion/value questions asked interviewees' opinions about certain issues, and explored how these thoughts relate to their values, goals and intentions. For example, interviewees were asked their opinion about the NPs' contributed to service delivery. The interview guide was piloted with three participants, one from each role, and was reworded and restructured to improve clarity and flow (Berg & Lune 2004).

Interview Sampling and Enrolment

In mixed methods research, the relationship between the quantitative and qualitative samples must be considered (Collins, Onwuegbuzie & Jiao 2007). It is suggested that for explanatory sequential designs the participants in the qualitative phase be drawn from those who participated in the quantitative phase, since selecting new participants may cause inconsistencies in the inferences derived from each data strand (Ivankova 2014; Onwuegbuzie & Johnson 2006). In this study, the quantitative time study sample was based on the tasks that comprise the work process rather than individual participants therefore any ED clinician with experience of working in Fast Track could provide their insights. Table 8 gives the inclusion and exclusion criteria for the Phase 2 interviews.

Table 8 Inclusion and exclusion criteria for the interview sample

Role	Inclusion	Exclusion
RN	RNs who had completed the Fast Track course and had some experience of coordinating the Fast Track area	RN who had not completed the Fast Track course Agency RNs Casual RNs Nursing students on clinical placement
NP	All NPs	
MO	Emergency Physicians (Fellows of the Australasian College of Emergency Medicine) Registrars (Trainees of the Australasian College of Emergency Medicine)	SRMOs (Senior resident medical officers – third year after registration) RMOs (Resident medical officers – second year after registration) Interns (first year after registration) VMOs (Visiting Medical Officers) Medical students on clinical placement

The criteria were modified from Phase 1 since the topics covered in the interviews required the perspective of more experienced ED clinicians. Only RNs able to initiate medications and investigations, and those with experience in the coordinator role were included, since these activities were a key focus of the interviews. For the doctors, only ED registrars and emergency physicians were included in the interview population. All four of the NPs employed in the ED were invited to participate in an interview.

Interview participant enrolment and data collection procedures for Phase 2 were agreed with the clinical nurse consultants and deputy medical director at the study site. The enrolment of Phase 2 interviewees was achieved with the assistance of 'insiders' in the organisation (King & Horrocks 2010), that is senior nursing (a clinical nurse educator) and medical staff (the deputy medical director). In addition to posters displayed in staff areas, the insiders emailed an invitation letter and participant information sheet to all ED staff who met the inclusion criteria and asked those interested to email to the insiders, or the researcher. The insiders helped the researcher identify volunteers on the staff roster available at the times allotted for interviews and were purposively selected and stratified by role to capture a range of clinical experience.

It was anticipated that between 15 and 20 interviews would be conducted. Sample adequacy was achieved through data saturation, signalled by replication or redundancy in the insights provided by interviewees (Bowen 2008; Kelly 2010; O'Reilly & Parker 2013). The point of data saturation is relatively clear when interviews are part of an explanatory sequential study using a semi-structured guide, since the parameters are well-defined compared to more exploratory, narrative interview methods (O'Reilly & Parker 2013). Data saturation was reached at around 15 interviews when replication and redundancy was evident in interviewees' responses. Three further interviews were

conducted, one from each role, to confirm no new insights would be obtained (Taylor, Bogdan & DeVault 2015).

Interview Data Collection

Interviews took place in a private office in the ED to allow the interviewees to speak freely and be at ease in their surroundings (Taylor, Bogdan & DeVault 2015). They were conducted at times which minimised the impact on ED operations. For doctors and NPs, this was the time normally allocated for administrative duties, and for RNs the time allocated for training. Interviews lasted between 20 and 50 minutes, with an average of 35 minutes. Before commencing the interview, the researcher explained the study, answered any of the interviewees' questions and obtained signed consent. Interviews were audio-recorded to ensure accuracy, to allow the researcher to remain engaged with the interviewee, and to focus on the prompts and probes needed to achieve a full explication of the topics (Kelly 2010). The audio recordings were sent to a professional transcription service at the end of each week to be transcribed verbatim. Both the transcripts and the audio-recordings were stored in a secure, password-protected university server and were anonymised by assigning each interviewee an identification code according to their role (i.e., NP1, NP2…RN1, RN2…MO1, MO2...).

Interview Data Analysis

Interview transcripts were managed and analysed using NVivo v11. The first phase of data analysis involved listening to the audio tapes and checking them against the transcriptions for accuracy. The transcripts were then analysed thematically. Thematic analysis is a method for identifying, analysing and reporting patterns (themes) in the data (Braun & Clarke 2006). King & Horrocks (2010) define a theme as a recurrent and distinctive feature of participants' accounts, characterising perceptions or experiences which the researcher sees as relevant to the research objectives. The six-step process of thematic analysis outlined by Braun and Clark (2006) guided the qualitative analysis (Table 9). A description of each of these steps is provided in turn but thematic analysis is an iterative and reflexive process, and the researcher moved back and forth between the steps gaining a deeper understanding of the data with each iteration (Fereday & Muir-Cochrane 2006; Taylor, Bogdan & DeVault 2015).

Table 9 Six-step process of thematic analysis adapted from Braun and Clark (2006)

Phase	Description of the process
1. Familiarisation with the data	Transcripts are read and re-read, noting down initial ideas.
2. Generating initial codes	Interesting features of the data are coded in a systematic fashion across the entire data set, collating data relevant to each code.
3. Searching for themes	Codes are collated into potential themes, gathering all data relevant to each potential theme.
4. Reviewing themes	Themes are checked to ensure they work in relation to coded extracts and the entire data set, generating a thematic 'map' of the analysis.
5. Defining and naming themes	Each theme is refined to reflect the overall story the analysis tells, generating clear definitions and names for each theme.
6. Producing the report	Vivid and compelling extract examples are selected, relating back to the research question and literature to produce a scholarly report of the analysis.

In the first of the six steps, the researcher became familiar with the data by reading and re-reading the transcripts. This first step also involved open coding. Notes were made on all potential codes and ideas as they arose from reading the transcripts (Taylor, Bogdan & DeVault 2015). Frequently recurring phrases, ideas and perceptions were noted in the margins of hard copy transcripts and possible themes and interpretations were recorded in a notebook (Taylor, Bogdan & DeVault 2015). This data-driven, inductive approach of open coding, was complemented by a deductive approach, using themes derived from the analytical framework (i.e. skills and tasks, coordination of work, and autonomy). This balanced inductive and deductive approach aimed to achieve coherence and theoretical rigour across the study, while allowing concepts and interpretations not originally envisaged to arise from the data (Fereday & Muir-Cochrane 2006).

In the second step, transcripts were imported into NVivo, the initial set of inductively and deductively derived codes were programmed as nodes, and relevant passages in the transcripts encoded to these nodes. The third step involved collapsing multiple nodes into meaningful, mutually exclusive themes, moving the analysis from descriptive to interpretive. The credibility of these interpretations was enhanced by the researchers' prolonged engagement in the setting during the work observation phase, which provided a deep understanding of the context of the interviewees' perspectives (Creswell & Miller 2000). In the fourth step, the visualisation tool of mind mapping was used to review the themes and illuminate how they were connected across the data set. Once the themes were reviewed, a conformability audit was conducted (Lincoln & Guba 1985). A random selection of transcripts was recoded by one of the research supervisors to test for the clarity and consistency of the coding framework. In the fifth step, themes were clustered into overarching themes and given detailed

definitions that captured the overall story of the analysis (Fereday & Muir-Cochrane 2006). Finally, the overarching themes were reported (Chapter 8), supported by illustrative quotations that have been edited for readability and confidentiality (Brinkmann & Kvale 2015). Missing words have been replaced with '…' and any words changed or added from the original verbatim transcript are indicated by square parentheses. Quotations are attributed according to the identification codes used to anonymise respondents.

Meta-inferences

In the final phase of the explanatory sequential mixed methods study, the findings from Phase 1 and Phase 2 were integrated into coherent and meaningful meta-inferences (Onwuegbuzie & Combs 2010). The meta-inferences addressed the final research objective, to identify the nature of flexibility in the ED Fast Track team. The meta-inference process involved moving inductively and deductively between the empirical findings from Phase 1 and Phase 2, and the theoretical constructs of the analytical framework (Bergman 2008; Ertzberger & Kelle 2003; Williams & May 1996). This meant identifying where the findings were congruent or discordant with the ideal types of Taylorism and functional flexibility, and the consequences of this for the concept of workforce flexibility in the healthcare context (Coser 1977). During this process it became clear that additional theoretical perspectives not included in the analytical framework were needed to support the development of the meta-inferences and so analysis proceeded abductively (Ertzberger & Kelle 2003; Weeldon 2010). Abductive inference is an open and flexible form of logical inference that allows the researcher to draw on theory beyond the original theoretical framework to arrive at the best explanation for the findings (Ertzberger & Kelle 2003; Weeldon 2010).

The process of drawing meta-inferences was managed through NVivo. The findings for Phase 1 and Phase 2, including tables of results, the thematic analysis of the fieldnotes and interviews, as well as completed findings chapters were combined into a single NVivo project, and analysed thematically using the inductive and deductive method described above. Onwuegbuzie & Combs (2010) describe this approach as cross-over mixed analysis, whether the findings of multiple study strands are synthesised into a coherent whole by using an analysis technique associated with one methodology (i.e. thematic analysis) to analyse data from different methodologies. The meta-inferences are discussed in the light of the existing literature in Chapter 9. These meta-inferences form the basis for the concluding chapter, Chapter 10, which takes the insights from the exemplar of the ED team to define workforce flexibility for the broader healthcare context.

Ethical Considerations

Ethical approval was granted by the hospital's Human Research Ethics Committee (HREC) (South Eastern Sydney Local Health District HREC Reference 14/144) and was ratified by the University of Technology Sydney HREC (Reference 2014000719). Electronic data were stored in a password-protected, encrypted university server while paper-based consent forms were stored in a locked cupboard in the faculty. The anonymity of the participants was protected by de-identifying both the time study and interview data. As Saunders, Kitzinger & Kitzinger (2014) discuss, the idealised view of anonymity that a research participant will never be traceable from the qualitative data presented about them is an unachievable goal. The authors call for greater acknowledgement of the challenges that researchers face in making compromises between the anonymity of the participants and the integrity and completeness of the data reported. In this study, the anonymity for participants was maximised by associating data only with their role (doctor, NP or RN) since this was central to the research question. All other personal information such as gender, age or years of experience was not included in the presentation of the data.

No patient information was collected during the research. To ensure the privacy, confidentiality and comfort of the patient during the work observations, the clinician being observed explained the study and sought their verbal consent to proceed. The researcher did not enter a closed treatment space (i.e. closed by curtain or door) without the clinician first obtaining the patient's verbal consent. Further, if the clinician, or researcher, decided that the presence of the researcher was not appropriate for clinical or privacy reasons, the researcher either waited outside the closed area and coded the activity as 'privacy' or suspended the observation session. It was also made clear to patients that they may ask the observation to cease at any time.

Summary

The study employed a two-phase explanatory sequential mixed methods design. In Phase 1 work observations, a quantitative time study and qualitative fieldnotes were conducted concurrently. The time study collected data using the WOMBAT software to measure the time each role spent on tasks. These data were enriched with the task details data which described the precise nature of tasks undertaken for key task categories. Qualitative, unstructured fieldnotes also added richness to the quantitative data as well as capturing the taken-for-granted, everyday working practices that cannot be measured quantitatively. The fieldnotes were analysed using the template method, using the task categories as themes to integrate the qualitative with the quantitative data for Phase 1. The fieldnotes were also analysed inductively to identify themes in the observations and reflections that, when taken with the findings from the time study, would be followed up in the interviews, connecting Phase 1 with Phase 2.

Phase 2 interviews were semi-structured to allow the topics arising from Phase 1 and the research objectives to be addressed while allowing room for new topics or perspectives from the interviewees to arise. Interview data were analysed using both the data-driven, inductive approach of open coding, and a deductive approach, using themes derived the analytical framework. Finally, meta-inferences were drawn, through a cross-over mixed analysis, where the multiple data sources from each of the study strands were synthesised with thematic analysis. These meta-inferences were considered within the constructs of the analytical framework, identifying where they were congruent and discordant with the ideal types of Taylorism and functional flexibility. This process allowed the nature of flexibility in the ED Fast Track team to be identified, and the concept of workforce flexibility in the healthcare context defined.

CHAPTER 7: WORK OBSERVATION FINDINGS

Introduction

This chapter presents the findings from the work observations, Phase 1 of the two-phase sequential explanatory mixed methods design. A time study quantitatively measured the tasks of the Fast Track team to identify how the work of doctors (MO), nurse practitioners (NP) and registered nurses (RN) roles was differentiated, and where they overlapped. Areas of role differentiation were identified by a statistically significant difference in the proportion of time each role spent on tasks. Details of the tasks performed and extracts from the fieldnotes contextualise and enrich the quantitative time study data and are integrated throughout the chapter.

The chapter is structured by the task categories used for the analysis. The overall task distribution based on the top-level task categories is provided first followed by the detailed results for each category: Assessment and Diagnosis; Investigations and Procedures; Medication; Patient Communication and Comfort; Organisation of Care; and Off Task. The chapter concludes with a summary of the task distribution by role. Before presenting these findings, this introduction continues by describing the staffing arrangements within the Fast Track model of care followed by a description of the time study sample and participants.

Fast Track Model of Care and Staffing

Before fieldwork commenced, details of the Fast Track model of care, its geographical layout and staffing arrangements were clarified with senior clinicians and managers. The Fast Track area comprised a small waiting room, six consulting rooms and six unmonitored beds as well as a procedure room, a sexual assault room and an eye room. Patient presentation data provided by the ED show that 39% of patients were triaged as category four (semi-urgent) and 7% as category five (non-urgent). The majority of these patients were treated in Fast Track, except those aged under 16 years who were allocated to the paediatric area. Nursing management at the site estimated that 40% of patient presentations to the ED were treated in the Fast Track area.

Responsibility for patient care in Fast Track was broadly divided into two role functions: 'treating clinicians' (doctors and NPs), and RNs. Fast Track is a 'see-and-treat' model of care which means only one treating clinician, a doctor or NP, was usually involved in a patient's care although they consulted with more experienced ED colleagues and hospital specialists when required. There were four NPs employed at the site with two rostered on per day, covering the hours of 8am to 9pm. Doctors were rostered on three shifts to cover the full 24 hours. Medical staffing in Fast Track comprised one registrar (a trainee of the Australasian College of Emergency Medicine) and one junior doctor (intern, resident medical officer or senior resident medical officer) with an overlap between the morning and afternoon shifts to cover the busiest period. An emergency physician had oversight

of the Fast Track and Short Stay Unit (SSU) areas but was mainly based in the SSU and so the most senior doctor in Fast Track was often a registrar. Treating clinicians (a doctor or an NP) selected patients from the electronic waiting list by triage category (most urgent first) and length of stay (those who had been waiting the longest). They performed a clinical assessment, ordered any investigations not previously ordered by an RN, reviewed results, consulted colleagues including hospital specialists, prescribed medications and performed any required procedures. Treating clinicians then determined the disposition of the patient: to discharge (home, refer to specialist or further investigations, or primary care) or admit to a hospital inpatient ward or the SSU.

The NPs' formal scope of practice allowed them to manage a range of patient conditions in consultation with a senior doctor but could manage less complex conditions autonomously. Such patients were usually allocated triage category four and five and accounted for the majority of conditions treated in Fast Track. The conditions listed in NPs' formal scope of practice included limb trauma, minor burns, lacerations and wounds, renal colic, cellulitis, asthma, minor head trauma, diarrhoea and vomiting, and first trimester bleeding. Unlike doctors and RNs, NPs were permanently rostered in Fast Track although they also treated patients with less complex conditions under 16 years in the paediatric area.

Registered nurses rostered to the Fast Track area were responsible for patients in the main ED waiting room, the Fast Track waiting room, the consultation rooms and the unmonitored beds. Nurse staffing comprised three RNs and a coordinator. The coordinator was an experienced RN that coordinated work of the RNs, updated the electronic waiting list, monitored patients' progress through the ED with a focus on the time-based performance targets, liaised with the rest of the ED and the hospital, and controlled the use of space in the Fast Track area. Unlike the acute area of the ED, RNs in Fast Track were not allocated to specific bed spaces but were assigned to an area and had to be familiar with the condition and progress of multiple patients. Usual staffing practice was to assign a less experienced RN to the unmonitored beds and two more experienced RNs, who had completed the Fast Track course, to the waiting room and consultation rooms to perform the patient assessments.

Fast Track patient assessments included the use of relevant protocols to order any investigations (e.g. X-ray, urinary analysis, pathology) and initiate medications and other supportive treatments to manage patients' symptoms. Following the Fast Track assessment, patients were logged as 'to be seen' on the electronic waiting list indicating they were ready to be assessed by a treating clinician. Registered nurses were also responsible for monitoring and communicating with all patients in the Fast Track area and main ED waiting room. In addition, RNs performed investigations or procedures delegated from doctors and NPs, administered medications, and undertook the process of admission to hospital inpatient wards.

Time Study Sample and Participants

A time study sample is described as the number of observation hours rather than the number of participants. Table 10 shows a total of 154.1 hours of observation data were collected over 104 observation sessions: 32 observation sessions were undertaken doctors, 34 with NPs and 38 with RNs. All four NPs employed by the ED agreed to participate in the study and were observed multiple times. Eight RNs and six doctors were observed twice.

Table 10 Time Study Sample

	MO	NP	RN	Total
Total observations in hours	49.5	51.6	51.6	**152.7**
Mean session time in minutes	95	92	82	**N/A**
Number of sessions	32	34	38	**104**
Number of tasks recorded	1594	1665	2700	**5959**

Demographic and work experience information about the time study participants are in Table 11.

Table 11 Demographic Time Study Participant Information

Gender	**n (%)**
Female	36 (60%)
Male	24 (40%)
Role	
Registered Nurse	30 (50%)
Doctor	26 (43%)
Nurse Practitioner	4 (7%)
RNs completed Fast Track course	
Yes	19 (63%)
No	11 (37%)
Grade	
Registered Nurse	26 (43%)
Registrar	13 (21%)
Resident Medical Officer	9 (15%)
Nurse Practitioner	4 (7%)
Senior Resident Medical Officer	4 (7%)
Clinical Nurse Specialist	4 (7%)
Mean Years Registered	**Years (*SD*)**
Nurse Practitioner	18.5 (*3.1*)
Registered Nurse	7.2 (*5.6*)
Doctor	4.7 (*3.8*)

The NPs had been registered as healthcare professionals for an average of 18.5 years and were the most experienced participants in the sample. The RN sample included nurses with a wide range of experience, including senior RNs with the grading clinical nurse specialist. Eleven of the RN participants had not completed the Fast Track course needed to initiate medications and investigations. Reflecting the ED's role in the post-registration training of junior doctors, the medical participants were less experienced and included senior resident medical officers (SRMOs) and resident medical officers (RMOs) on rotation through the hospital system, and ED registrars.

Task Distribution by Top-Level Category

This section details the findings for the proportion of time each of the three roles (MO, NP and RN) spent performing tasks within the top-level categories: Assessment and Diagnosis, Investigations and Procedures, Medication, Patient Communication and Comfort, Organisation of Care and Off Task. The results are provided in Table 12. The upper section of the table gives the mean proportion of time each role spent performing tasks in that category as a proportion of all task time. The lower section reports the results for the non-parametric tests of significance difference between the three roles. Statistical tests used were Mann-Whitney U for pairwise difference, and Kruskal-Wallis for the overall difference between the three roles. Significant probability values at $p<.05$ are in bold font.

Table 12 Mean proportion of time on top level task categories, with pairwise and overall significance

	Assessment and Diagnosis	Investigations and Procedures	Medication	Organisation of Care	Patient Com. and Comfort†	Off Task
MO*	51.1% (*12.4*)	9.7% (*12.7*)	7.2% (*5.9*)	12.2% (*6.4*)	9.2% (*4.4*)	10.5% (*11.6*)
NP*	38.1% (*15.8*)	14.9% (*12.1*)	6.9% (*8.8*)	14.6% (*10.4*)	14.3% (*8.6*)	11.3% (*10.8*)
RN*	22.4% (*11.3*)	13.6% (*10.6*)	14.4% (*11.4*)	27.6% (*13.5*)	8.1% (*4.7*)	14.0% (*15.8*)
MO/NP **	**≤.001** (*276.0*)	.078 (*406.5*)	.342 (*470.0*)	.546 (*497.0*)	**.013** (*350.0*)	.617 (*505.0*)
MO/RN **	**≤.001** (*67.0*)	.061 (*449.5*)	**.012** (*394.0*)	**≤.001** (*132.0*)	.203 (*500.0*)	.437 (*542.0*)
NP/RN **	**≤.001** (*280.0*)	.623 (*602.5*)	**.002** (*374.5*)	**≤.001** (*230.0*)	**≤.001** (*355.0*)	.778 (*621.0*)
Overall***	**≤.001** (*46.6*)	.108 (*4.6*)	**.003** (*11.3*)	**≤.001** (*36.8*)	**.002** (*12.5*)	.732 (*0.6*)

†Patient Communication and Comfort
* Mean total time on task - % (*SD*)
** Mann-Whitney U - p (*U*)
*** Kruskal Wallis - p (χ^2)
Significant results bolded at p<.05

Three key observations can be made about the proportion of time the three roles spent performing tasks within the six top-level categories. First, there were significant differences in all but two of the top-level task categories indicating that the roles were differentiated to some extent. That there were no significant differences between the roles in Investigation and Procedures suggests this is an area of role overlap. The second observation is that the RN role was differentiated from the doctors and NPs in the category that consumed the highest proportion of their time. Organisation of Care tasks consumed 27.6% of RNs' total time compared to 14.6% for NPs (U=230, p≤.001) and 12.2% for doctors (U=132, p≤.001). In contrast, Assessment and Diagnosis was the dominant task category for the treating clinicians accounting for 51.1% of doctors' and 38.1% of NPs' time, both significantly higher than the 22.4% spent by RNs (MO/RN U=67, p≤.001; NP/RN U=280, p≤.001). Finally, the findings demonstrate that the NPs' working pattern was more like that of the doctors than the RNs, but differences were evident. Nurse practitioners spent a significantly lower proportion of their time on Assessment and Diagnosis tasks (U=276, p≤.001) and a higher proportion of time on Patient Communication and Comfort tasks (U=350, p=.013) compared to doctors. With these three key findings in mind, Investigations and Procedures as a key area of task overlap, the differentiation between the RNs and doctors/NPs, and between the doctors and NPs, findings for each of the top-level task categories follows, beginning with Assessment and Diagnosis.

Assessment and Diagnosis

The Assessment and Diagnosis category comprises tasks directed at forming a diagnosis, monitoring patients' conditions, documenting care, and deciding a treatment plan and disposition. It also includes supervision in tasks related to the diagnosis and treatment of patients. Table 13 gives the mean proportion of time each role spent on the tasks that comprise the Assessment and Diagnosis category.

The Assessment and Diagnosis category was the largest task category for both doctors and NPs, which reflects their primary function in determining the diagnosis, treatment and disposition of Fast Track patients. Despite sharing this role function, NPs spent a significantly lower proportion of their time on Assessment and Diagnosis tasks than doctors (38.1% compared to 55.1%, U=276, p≤.001). Documentation consumed the highest proportion of time in this category for all three roles, and for doctors (26.5%) and NPs (22.8%) was the largest task category recorded in the time study. For the doctors and NPs, documentation tasks involved writing up patients' medical records with their presenting condition, investigations and treatments undertaken and the diagnosis and disposition decisions made, including referral letters for patients' ongoing care. At 10.2%, documentation was significantly less time-consuming for RNs than the treating clinicians (MO/RN U=154, p≤.001; NP/RN U=251, p≤.001) but still represented a significant proportion of their daily workload. Documentation tasks performed by RNs included the documentation of their patient assessment and care provided as well as the hospital admissions process.

Table 13 Mean proportion of time on Assessment and Diagnosis tasks with pairwise and overall significance

	Patient Assessment	Vital Signs	Diagnosis	Supervision	Documen-tation	Total
MO*	13.2% (*8.5*)	<0.1% (*0.1*)	9.0% (*6.2*)	2.4% (*3.0*)	26.5% (*12.3*)	51.1% (*12.4*)
NP*	7.5% (*5.9*)	0.2% (*0.4*)	5.2% (*5.3*)	2.4% (*3.4*)	22.8% (*12.9*)	38.1% (*15.8*)
RN*	6.4% (*5.4*)	2.8% (*2.8*)	0.5% (*1.1*)	2.5% (*5.2*)	10.2% (*8.1*)	22.4% (*11.3*)
MO/NP **	**.004** (*321.0*)	.052 (*463.0*)	**.007** (*335.0*)	.550 (*499.0*)	.158 (*434.0*)	**≤.001** (*276.0*)
MO/RN **	**≤.001** (*303.0*)	**≤.001** (*132.0*)	**≤.001** (*62.0*)	.087 (*472.0*)	**≤.001** (*154.0*)	**≤.001** (*67.0*)
NP/RN **	.470 (*582.0*)	**≤.001** (*168.0*)	**≤.001** (*247.0*)	.244 (*552.0*)	**≤.001** (*251.0*)	**≤.001** (*280.0*)
Overall***	**≤.001** (*14.3*)	**≤.001** (*57.4*)	**≤.001** (*48.1*)	.213 (*3.1*)	**≤.001** (*34.4*)	**≤.001** (*46.6*)

* Mean proportion of total time on task - % (*SD*)
** Mann-Whitney U - p (*U*)
*** Kruskal Wallis - p (χ^2)
Significant results bolded at p<.05

In the Fast Track model of care, RNs were the first to clinically assess the patient to identify any investigations to be ordered and were also responsible for the ongoing monitoring of patients during their ED stay. Patient Assessment accounted for 6.4% of RNs time, comparable to the NPs (7.5%, U=582, p=.470) but significantly lower than the doctors (13.2%, U=*303*, p≤.001). Patient assessments performed by RNs often incorporated the taking of vital signs which consumed 2.8% of RNs' time, significantly higher than the 0.2% for NPs (U=168, p≤.001) and <0.1% for doctors (U=168, p≤.001). Registered nurses performed 53 of the 60 vital signs observed (88%, Pearson χ^2=45.9, p≤.001, see Appendix D). The difference in the proportion of time doctors and NPs spent on performing vital signs was not significant (U=463, p=.052) though NPs obtained vital signs from patients six times compared with once for doctors.

Doctors spent a significantly higher proportion of time on patient assessments (13.2%) compared to NPs (7.5%, U=*321,* p=.004). Doctors also spent a significantly higher proportion of time on Diagnosis tasks (9%), compared to NPs (5.2%, U=335, p=.007). WOMBAT's 'with' function was used when coding a 'Diagnosis' task to differentiate where a clinician was examining results alone on the computer, over the phone with medical specialists or consulting a colleague in the ED (Table 14).

Table 14 Frequency of Diagnosis tasks performed WITH by role

	Alone	WITH Doctor	WITH Nurse	WITH Phone	WITH Other
MO*	45 (35%)	47 (34%)	20 (16%)	14 (11%)	5 (4%)
NP*	40 (43%)	34 (35%)	3 (3%)	14 (15%)	4 (4%)
RN*	7 (30%)	9 (39%)	5 (22%)	0	2 (9%)
Total*	**92 (38%)**	**86 (35%)**	**28 (11%)**	**28 (11%)**	**11 (5%)**
p** (χ^2)	.404 (*1.8*)	.563 (*1.2*)	n/a	n/a	n/a

* Frequency of diagnosis task performed with x role – n (%)
** Pearson – p (χ^2), n/a - cells have an expected value <5
Significant p values bolded at p<.05

The data demonstrate that NPs and doctors had a similar pattern in whom they performed diagnosis tasks with. Further, there was evidence in the task details data that doctors and NPs frequently consulted each other on patient conditions. Doctors were observed having a diagnosis discussion with NPs 20 times while NPs were observed having diagnosis discussions with doctors 34 times. Registered nurses engaged in Diagnosis tasks less frequently (n=23) but were observed checking investigation results alone seven times and engaged in discussions with doctors (n=9) and nurses (n=5) about patients' potential diagnosis. Discussions between RNs and their medical and nursing colleagues often focussed on patient safety and occurred when the RN identified a concern during a patient assessment that suggested their condition may be more urgent than first thought, as this fieldnote extract illustrates:

> *After their initial assessment, an RN approached a doctor and said they worried that the patient's symptoms were more serious than the triage category suggested. The doctor agreed with the RN's assessment, the triage category was changed to a higher level of urgency and the patient was moved from the waiting room to the acute area. The patient was later diagnosed with appendicitis.* **Fieldnote 23/4/15**

Similar discussions instigated by the Fast Track coordinator were recorded in the fieldnotes. The coordinator was not allocated a patient load (hence were not included in the time study) but was responsible for monitoring all patients in the Fast Track area and the main ED waiting room. Consequently, they were often observed discussing patients' potential diagnosis and condition with their nursing and medical colleagues, escalating patients' care where required.

The coordinator is always scanning the electronic waiting list to make sure patients who may deteriorate are not left in the waiting room. For example, the coordinator asked an emergency physician "Are we happy with this patient sitting in the waiting room?" and read out the triage note, then went off the check on the patient's condition. **Fieldnote 24/4/15**

Where consultations coded as Diagnosis changed to the participant instructing, or being instructed by a colleague, the coding was switched to Supervision (Supervisor or Supervisee as appropriate). All three roles spent a similar proportion of time on Supervision tasks (RN 2.5%, NP 2.4% and MO 2.4%, χ^2=3.1, p=.213) but, as Table 15 identifies, there were differences in who each role supervised, and were supervised by.

Table 15 Frequency of participants being a Supervisor and Supervisee WITH another role

	WITH Doctor n (%)	**WITH Nurse n (%)**	**WITH Other n (%)**	**Overall n (%)**
Supervisor				
MO*	14 (64%)	6 (27%)	2 (9%)	**22 (22%)**
NP*	14 (38%)	15 (40%)	8 (22%)	**37 (37%)**
RN*	0	6 (15%)	35 (85%)	**41 (41%)**
p** (χ^2)	**≤.001** (*31.6*)	**.036** (*6.6*)	**≤.001** (*44.6*)	.119 (*4.3*)
Supervisee				
MO*	15 (88%)	1 (6%)	1 (6%)	**17 (74%)**
NP*	5 (100%)	0	0	**5 (22%)**
RN*	0	0	1 (100%)	**1 (4%)**
p** (χ^2)	n/a	n/a	n/a	**≤.001 (*28.0*)**

* Frequency of supervisor/supervisee task performed with another role – n (%)
** Pearson – p (χ^2), n/a – some cells had an expected size <5
Significant p values bolded at p<.05

Registered nurses (n=41) were observed being a supervisor more frequently than NPs (n=37) or doctors (n=22), though a Pearson Chi-square test found the difference between the three roles was not significant (χ^2=4.3, p=.119). RNs supervised 'others' more frequently (n=35) than NPs (n=8) or doctors (n=2), a difference that was statistically significant (χ^2=44.6, p≤.001). For RNs, 'others' were primarily student nurses but in one case recorded in the task details, a senior nurse supervised a medical student in suturing a laceration. Nurse practitioners were observed educating or guiding

colleagues more frequently than doctors and provided this supervision as often to doctors (n=14) as to RNs (n=14) as well as 'others' (n=9). For NPs 'others' were physiotherapists and paramedics who were expanding their scope of practice to autonomously manage minor injuries. Of the 22 times doctors were observed supervising colleagues, 14 were other doctors, six were nurses (4 NPs; 2 RNs), and two were 'others'. Doctors supervising NPs and vice versa consisted of the supervisor educating the supervisee on the patient's condition and/or advising them on an appropriate care plan. Reflecting the high proportion of junior doctors in the sample, doctors (n=17) were observed being supervised more frequently than either the NPs (n=5) or RNs (n=1), and the difference between the three roles was statistically significant (χ^2=28, p≤.001). Many of the diagnosis discusions and supervision consultations within the Fast Track team related to the ordering and performing of investigations and procedures and extracts of those fieldnotes are given in the next section.

The Assessment and Diagnosis category was the largest task category for doctors and NPs, though NPs spent a significantly lower proportion of their time on these tasks. There was evidence in the task details data and fieldnotes that doctors and NPs often consulted each other on patient conditions. Registered nurses also spent more than a fifth of their time on Assessment and Diagnosis tasks, they were the first to assess the patient and regularly monitored their condition to protect the safety of waiting patients.

Investigations and Procedures

The Investigations and Procedures category incorporated all tasks related to the ordering, preparing and performing of diagnostic investigations and treatment procedures. The proportion of time each role spent on tasks in the Investigations and Procedures category is given in Table 16.

Nurse practitioners spent a higher proportion of time on Investigations and Procedure tasks (14.9%) but this difference was not significant pair-wise with either RNs (13.6%, U=602.5, p=.623) or doctors (9.7%, U=406.5, p=.078) suggesting this was an area of overlap between the three roles. There were no significant differences between the three roles in the proportion of time they spent ordering investigations (χ^2=3.4, p=.186) indicating that RNs utilised their ability to order investigations through protocols. Registered nurses were observed ordering investigations on 24 occasions (23% of the 105 'order investigation' tasks observed) compared to 35 for NPs (33%) and 46 for doctors (44%, Pearson χ^2=24.6, p≤.001) (See Appendix D).

Table 16 Mean proportion of time on Investigations and Procedures tasks with pairwise and overall significance

	Order	Prepare/Perform	Total
MO*	1.9% (*2.1*)	7.8% (*12.2*)	9.7% (*12.7*)
NP*	1.8% (*3.0*)	13.0% (*12.2*)	14.9% (*12.1*)
RN*	1.4% (*2.5*)	12.2% (*10.6*)	13.6% (*10.6*)
MO/NP **	.427 (*484.0*)	**.041** (*386.0*)	.078 (*406.5*)
MO/RN **	.055 (*452.0*)	**.022** (*416.0*)	.061 (*449.5*)
NP/RN **	.405 (*577.0*)	.865 (*631.0*)	.623 (*602.5*)
Overall***	.186 (*3.4*)	**.046** (*6.2*)	.108 (*4.5*)

* Mean proportion of total time on task - % (*SD*)
** Mann-Whitney U - p (*U*)
*** Kruskal Wallis - p (χ^2)
Significant results bolded at p<.05

Details of the types of investigations and procedures *ordered* by participants recorded in the task details spreadsheet show that of the 85 investigations or procedures recorded, the most common was X-ray (n=26) followed by pathology (n=21) (See Appendix D). Doctors were observed to order pathology more often (n=11) than NPs (n=6) and RNs (n=4). The NPs' focus on minor injuries, was reflected in a higher count of ordering X-rays (n=15) to exclude bone injuries, compared to doctors (n=8) and RNs (n=3). Discussions between colleagues regarding the ordering of investigations were recorded in the fieldnotes and revealed that RNs consulted with doctors and NPs to ensure they ordered investigations correctly and where they needed verbal approval to order an investigation.

> *An RN could not order a shoulder X-ray without verbal approval from a doctor. The registrar that the RN approached was surprised they needed approval as it seemed obvious that it needed done. The registrar approved it without assessing the patient.* **Fieldnote 10/04/15**

It was also noted in the fieldnotes that the system did not allow NPs to provide verbal approval for RN-initiated investigations. Further, the fieldnotes show that, while NPs could autonomously order investigations within the hospital, their lack of a Medicare provider number meant that when referring patients for imaging or pathology services outside the hospital as part of follow-on care, they had to use the ED medical director's provider number (Fieldnote 2/4/15).

The difference in the proportion of time the three roles spent preparing and performing investigations and procedures was found to be significant (χ^2=6.2, p=.046). At 7.8%, doctors spent significantly less time preparing/performing investigations and procedures than NPs (13%, U=386, p=.041) and RNs (12.2%, U=416, p=.022). The difference between RNs and NPs was not significant (U=631, p=.865) suggesting the overlap was greater between these two roles. However, there were differences in the types of investigations and procedures the roles performed. Details were recorded for 139 procedures performed and were split between procedures related to investigations (n=70), and procedures that treated a patient's condition (n=69). Of the 70 investigation-related procedures, 44 were performed by RNs with the remaining split equally between doctors (n=13) and NPs (n=13) (Appendix D). The most common investigation-related procedure was venepuncture (n=36) which included the insertion (and removal) of a cannula for the purposes of phlebotomy and medication administration. Registered nurses performed more venepuncture procedures than any other role (n=17) since they could initiate pathology under their protocols but could also be delegated a venepuncture procedure from a doctor or NP. Interactions between team members recorded in the fieldnotes confirm that doctors and NPs sometimes chose to perform a venepuncture procedure themselves, and sometimes delegated that procedure to an RN. In the fieldnote extract below, the doctor appeared to decide to perform the procedure themselves when they thought the RN was too busy to complete it in a timely manner.

> *A doctor was looking for someone to take a patient's blood, they asked an RN "who's looking after the beds?" The RN misunderstood the question and pointed to the coordinator who was very busy at that moment. When the doctor saw how busy the coordinator was they said, "that's OK I'll do it myself."* **Fieldnote 2/4/15**

Of the 69 treatment-related procedures recorded in the task details spread sheet, 43 were performed by NPs compared to 17 for RNs and 9 for doctors (Appendix D). The most common type of treatment procedures observed in Fast Track was for wound management (n=42) such as suturing, gluing and applying steri-strips and dressings. Over half of wound treatments were performed by NPs (n=25) with some overlap with RNs (n=13), while doctors were observed undertaking wound treatments four times. Nurse practitioners also performed 14 out of the 19 musculoskeletal treatments including the application of stabilising devices such as limb strapping, Plaster of Paris and slings.

The time study and task details data on investigations and procedures confirmed that NPs focused on the treatment of patients with minor injuries, although doctors were observed treating wounds and musculoskeletal conditions. However, fieldnote entries indicated that the NPs felt constrained by the focus on minor injuries and were keen to manage more complex patients more often than they currently did. The following extracts illustrate that NPs resisted doctors' attempts to leave all the

minor injuries for them to treat. The extracts also reveal that some doctors and RNs were not aware that NPs could treat more complex patients in consultation with a senior doctor:

> *One of the NPs asked the coordinator which patient was next on the 'to be seen' list. The coordinator replied "It's [patient's name] but that's a headache, you don't see headaches do you?" The NP replied, "I can see anyone". The coordinator seemed surprised at this answer, stating "Really?" to which the NP replied "Yes, I'm allowed to but it comes at the expense of getting through the minor injuries".* **Fieldnote 23/4/15**

> *An NP commented that they would prefer to manage patients with more complex medical conditions and consult with a doctor when required rather than manage all the patients with musculoskeletal conditions. They were frustrated that the NPs were left with all the ankle sprains etc. Later in the shift the same NP had a discussion with a resident medical officer about who should see the next patient on the waiting list. The patient had an open finger fracture and the resident said "This is a [NP's name] case" to which the NP replied "Oh, no, no, no, you can do it" and instructed the resident how to assess and treat the finger, which specialist to refer to, and offered to help if they needed it.* **Fieldnote 24/5/15**

Before performing a procedure such as wound closure, team members were observed to ask less experienced colleagues if they would like an opportunity to practice the procedure under supervision to develop their skills. Furthermore, all three roles were observed asking their colleagues for advice and sharing their knowledge of procedures. Examples recorded in the fieldnotes include: an RN and an emergency physician debating the merits of flushing rather than reinserting a catheter (Fieldnote 13/5/15); a senior registrar supervising an NP in the aspiration of a shoulder joint, a procedure the NP had not performed before (Fieldnote 10/4/15); NPs advising medical and nursing colleagues on wound closure and dressing (Fieldnotes 27/3/15, 16/4/15, 7/5/15); a senior RN instructing a medical student how to suture a laceration on a patients' scalp, while simultaneously supervising a student nurse giving the patient a tetanus injection (Fieldnote 8/4/15).

Overall, there were no significant differences in the proportion of time doctors, NPs and RNs spent on Investigations and Procedures tasks indicating this was an area of overlap between the three roles. There were no significant differences between the three roles in the proportion of time they spent ordering investigations but both RNs and NPs spent a significantly higher proportion of their time preparing and performing procedures than did doctors. Registered nurses performed more investigation-related procedures, including venepuncture. Nurse practitioners performed more procedures related to the treatment of minor injuries. Further, fieldnotes revealed there that the three roles shared their knowledge on both the ordering and performing of investigations and procedures.

Medication

The Medication category comprises all medication-related tasks that occurred throughout the patient's journey through Fast Track: after the RN's initial assessment to manage symptoms (e.g. analgesia), as part of a procedure (e.g. local anaesthetic), or as a treatment (e.g. intravenous antibiotics). The results for the proportion of time the three roles spent on the three areas of medication activity (prescribing, administering and discussing) are provided in Table 17.

Medication tasks accounted for 14.4% of RN's time, almost double that of doctors (7.2%, U=394, p=.012) and NPs (6.9%, U=374.5, p=.002). There were no significant differences between the three roles in the time spent on medication discussions with colleagues and patients (χ^2=2.4, p=.298) but there were significant differences in prescribing (χ^2=20.1, $p\leq.001$) and administering (χ^2=39, $p\leq.001$) activities.

Table 17 Mean proportion of time on Medication tasks with pairwise and overall significance

	Prescribe	Administer	Discussion	Total
MO*	2.8% (*3.3*)	0.4% (*0.9*)	4.0% (*3.7*)	7.2% (*5.9*)
NP*	1.9% (*3.8*)	2.4% (*6.9*)	2.7% (*2.1*)	6.9% (*8.8*)
RN*	0.4% (*0.7*)	10.1% (*9.4*)	3.9% (*3.5*)	14.4% (*11.4*)
MO/NP **	**.042** (*387.0*)	**.038** (*408.5*)	.218 (*448.0*)	.342 (*470.0*)
MO/RN **	**≤.001** (*248.0*)	**≤.001** (*151.5*)	.878 (*595.0*)	**.012** (*394.0*)
NP/RN **	**.009** (*427.0*)	**≤.001** (*262.5*)	.150 (*518.5*)	**.002** (*374.5*)
Overall***	**≤.001** (*20.1*)	**≤.001** (*39.0*)	.298 (*2.4*)	**.003** (*11.3*)

* Mean proportion of total time on task - % (*SD*)
** Mann-Whitney U - p (*U*)
*** Kruskal Wallis - p (χ^2)
Significant results bolded at p<.05

Doctors spent a significantly higher proportion of time on prescribing activities (2.8%) when compared to NPs (1.9%, U=387, p=.042) and RNs (0.4%, U=248, p≤.001). The frequency of prescribing-related tasks, provided in Table 18, shows that doctors were observed prescribing medications 53 times, more frequently than NPs (n=34) and RNs (n=26) (χ^2=30.3, $p\leq.001$), and researched medications (n=18) more frequently than NPs (n=8) and RNs (n=0) (χ^2=29.5, $p\leq.001$).

Table 18 Frequency of Prescribing-related Tasks by Role

	MO n (%)	NP n (%)	RN n (%)	Total n	p (χ^2)
Prescribe	53 (47%)	34 (30%)	26 (23%)	**113**	**≤.001** (*30.3*)
Research	18 (69%)	8 (31%)	0 (0%)	**26**	**≤.001** (*29.5*)
Total	71 (51%)	42 (30%)	26 (19%)	**139**	**≤.001** (*53.9*)

Pearson χ^2, zero cells have an expected value <5, significant results bolded at p<.05

Registered nurses performed prescribing-related activities less often than doctors and NPs, but the data do demonstrate that they initiated medications to manage patients' symptoms. Further, RNs were involved in doctors' prescribing decisions through activities coded as medication discussions with colleagues. Fieldnotes reveal that doctors sought RNs' advice on the suitability and dosage of medications for patients' conditions, and RNs were also observed to challenge doctors' prescribing decisions.

> *The coordinator and ED physician had a light-hearted discussion about what to give a patient for their pain. The physician suggested Endone, the coordinator replied "Gosh, you're generous!" After a pause the physician asked "2.5 [mg] or 5 do you reckon?"* **Fieldnote 23/4/15**

> *A junior doctor sitting with a patient's medication chart asked an RN for the correct dosage of a particular antibiotic. The RN replied instantly.* **Fieldnote 15/5/15**

> *The coordinator challenged a request from a junior doctor for IV fluids and a bed for a patient. There was a big experience gap between the two. The coordinator asked "Is she vomiting now? Has she vomited since she's been in here?" The doctor replied "No" to which the coordinator responded "IV fluids are uncomfortable, I wouldn't want it unless I absolutely needed it. She doesn't need it."* **Fieldnote 19/3/15**

Medication discussions also included interactions where RNs would ask a doctor or NP to 'chart' (i.e. prescribe) a medication for a patient rather than initiate it themselves. This occurred when the RN did not have a standing order for the medication required by the patient, if the RN was unsure whether the patient fit the inclusion criteria for the protocols, or if they believed there was an error or omission in the patient's medication chart. Fieldnotes identified that these interactions were marked by collegiality as the following extracts illustrate.

> *A senior RN described the findings of their patient assessment to a registrar stating that she thought the patient had cellulitis and asked the registrar to chart some IV antibiotics. The registrar asked the RN some questions then charted the antibiotic without assessing the patient.* **Fieldnote 1/5/15**

Looking at a patient's medication chart, an RN asked a registrar "Doesn't she have any regular medications? Do you maybe want to chart her some Endone or Nurofen or paracetamol?" **Fieldnote 23/4/15**

Also recorded in the fieldnotes were discussions between RNs about changes to the protocols that placed new constraints on their discretion over the opioid analgesic oxycodone. The RNs have previously had the discretion to give a maximum of 10mg of oxycodone over two 5mg doses, but this had been restricted to only one RN-initiated dose per patient with a requirement for more frequent vital signs to be documented. These new constraints and requirements only applied to patients who received RN-initiated opioid analgesia, not for those prescribed by a doctor or NP. In concluding a discussion with other RNs about these changes to the protocol, one RN commented "*I'll just get a doctor to chart something if that's the case"* (Fieldnote, 7/5/15). Limits to NPs' autonomy over medications were resolved in a similar manner. Fieldnote entries show medication discussions where NPs asked emergency physicians to chart medications not included in the NPs' formulary and to write an external prescription to ensure the patient received the PBS rebate.

Medication administration was the most time-consuming activity coded in the Medication category. At 10.1%, RNs spent a much higher proportion of their time administering medications compared to NPs (2.4%, U=262.5, $p\leq.001$) and doctors (0.4%, U=151.5, $p\leq.001$). As Table 19 shows, RNs performed most of the medication preparation (82%, χ^2=48.8, $p\leq.001$), administering medication to patients (oral, subcutaneous injections, and intravenous) (74%, χ^2=27.3, $p\leq.001$), recording and checking medication charts (82%, χ^2=63.9, $p\leq.001$) and all of the intravenous management tasks (100%, χ^2=43.7, $p\leq.001$).

Table 19 Frequency of Medication Administering tasks by role

	MO n (%)	**NP n (%)**	**RN n (%)**	**Total n**	**p (χ^2)**
Prepare	2 (2%)	14 (16%)	70 (82%)	**86**	**≤.001** (*48.8*)
Administer	4 (6%)	15 (20%)	54 (74%)	**73**	**≤.001** (*27.3*)
Intravenous Management	0	0	36 (100%)	**36**	**≤.001** (*43.7*)
Record/Check	6 (5%)	15 (13%)	94 (82%)	**115**	**≤.001** (*63.9*)
Assist Administration	1	0	1	**2**	n/a
Total	13 (4%)	44 (14%)	255 (82%)	**312**	**≤.001** (*181.7*)

Pearson χ^2, zero cells have an expected value <5 except Assist Administration, significant results bolded at p<.05

Intravenous management included all tasks related to the intravenous delivery machines, and this was the only task category collected in the time study where there was no overlap between the three roles. While medication administration was predominantly performed by RNs, there were also differences between doctors and NPs in these tasks. Administering medications accounted for 2.4% of NPs' time compared with 0.4% for doctors, a difference that was statistically significant (U=408.5, p=.038). Some of this difference may be attributed to NPs' greater involvement in patient treatment procedures that required the administration of a local anaesthetic, but NPs were also observed administering oral analgesics.

In the Medication task category, doctors spent a significantly higher proportion of time on prescribing activities than either RNs or NPs. The most time-consuming medication activity was administering medication, tasks that were predominantly performed by RNs. The three roles spent a similar proportion of time discussing medications and the fieldnotes show that some of these discussions involved RNs asking a doctor or NP to prescribe a medication for a patient.

Organisation of Care

The Organisation of Care category encompassed tasks related to the management of patient flow, the coordination of the work of the team, and the general smooth running of the department. The proportion of time the three roles spent on Organisation of Care tasks is provided in Table 20.

Table 20 Mean proportion of time on Organisation of Care tasks with pairwise and overall significance

	EWL†	Professional Communication	Tidying	Unit Administration	Total
MO*	2.6% (*5.3*)	9.0% (*2.3*)	0.2% (*0.5*)	0.8% (*1.2*)	12.2% (*6.4*)
NP*	2.4% (*5.7*)	7.8% (*3.5*)	0.3% (*0.8*)	4.1% (*7.4*)	14.6% (*10.4*)
RN*	7.1% (*8.3*)	16.0% (*7.0*)	1.0% (*2.9*)	3.3% (*7.5*)	27.6% (*13.5*)
MO/NP **	.173 (*438.5*)	.121 (*409.0*)	.490 (*513.5*)	**.003** (*318.0*)	.546 (*497.0*)
MO/RN **	**≤.001** (*330.5*)	**≤.001** (*222.0*)	**.004** (*419.0*)	**.002** (*354.0*)	**≤.001** (*132.0*)
NP/RN **	**≤.001** (*313.5*)	**≤.001** (*239.0*)	**.020** (*480.0*)	.777 (*621.0*)	**≤.001** (*230.0*)
Overall***	**≤.001** (*18.1*)	**≤.001** (*28.9*)	**≤.001** (*10.8*)	**.004** (*11.9*)	**.003** (*36.8*)

* Mean proportion of total time on task - % (*SD*)
** Mann-Whitney U - p (*U*)
*** Kruskal Wallis - p (χ^2)
†Electronic Waiting List Significant results bolded at p<.05

Organisation of Care was the dominant activity for RNs comprising 27.6% of their total time, significantly higher than both NPs (14.6%, *U*=230, $p \leq .001$) and doctors (12.2%, *U*=132, $p \leq .001$). Tidying was not a major component of any role, but RNs did spend a higher proportion of their time (1%) maintaining the physical environment than NPs (0.3%, *U*=480, *p*=.020) or doctors (0.2%, *U*=419, *p*=.004). Doctors and NPs undertook a similar level of Organisation of Care tasks, except in Unit Administration. Nurse practitioners spent 4.1% of their time on Unit Administration tasks, significantly higher than doctors (0.8%, *U*=318, *p*=.003), but similar to RNs (3.3%, *U*=621, *p*=.777).

Details recorded in the task details spreadsheet show that RNs and NPs maintained the medication and equipment stores in Fast Track and frequently engaged in Unit Administration-related discussions with colleagues. The subject of these conversations was recorded in the fieldnotes and suggest that junior doctors on rotation in the ED relied on RNs' and NPs' knowledge of Fast Track processes, the wider health system, and the process for referral to specialist services, as the extract below demonstrates.

> *Sitting in the staff station a doctor commented that the NPs were a good source of information about the health system and the referrals process. He explained that these arrangements change all the time and, unlike the medical staff, the NPs are here full time.* **Fieldnote 8/5/15**

During the observations it became evident that the junior doctors rotating through the ED were not fully aware of each role's function in the Fast Track model of care, especially NP role, as the following fieldnote extract illustrates.

> *A junior doctor asked the NP to perform a urinary analysis, the NP told the doctor to ask the coordinator. The NP just shrugged and said "some of them don't know who I am and ask me to do stuff. I will do it if I'm not busy".* **Fieldnote 2/4/15**

Professional Communication, the giving and receiving of instructions and information about patient care, accounted for 16.2% of RNs time, significantly higher than for doctors (9.0%, *U*=222, $p \leq .001$) and NPs (7.8%, *U*=239, $p \leq .001$). Table 21 identifies the proportion of time each role spent communicating with other roles as a proportion of all time on professional communication. Doctors (22%) and NPs (20%) spent a higher proportion of their professional communications over the phone compared with RNs (7%), though the difference was not significant (χ^2=1.3, p=.510). The task details data show that this usually involved doctors and NPs arranging patients' appointments with other parts of the health system. All three roles, RNs (65%), NPs (50%) and doctors (42%) spent more time on professional communication with 'nurses' than any other role ($\chi 2$=26.6, $p \leq .001$).

Table 21 Mean proportion of time on professional communication WITH other roles as a % of all professional communication

	WITH Doctor	WITH Nurse	WITH Phone	WITH Other	WITH Multiple
MO*	24% (*27.3*)	42% (*30.0*)	22% (*25.0*)	3% (*11.9*)	5% (*9.8*)
NP*	22% (*22.3*)	50% (*29.9*)	20% (*22.3*)	8% (*3.1*)	1% (*4.4*)
RN*	21% (*15.3*)	65% (*22.2*)	7% (*13.2*)	2% (*4.0*)	3% (*9.9*)
Overall*	**22%** (*21.7*)	**53%** (*28.8*)	**16%** (*21.3*)	**4%** (*10.4*)	**3%** (8.5)
p**	.259 (*2.7*)	**≤.001** (*26.6*)	.510 (*1.3*)	.064 (*5.4*)	.523 (*1.3*)

* Mean proportion of team communicating 'with' as a proportion of all professional communication - % (*SD*)
** Kruskal - p (χ^2)
Significant p values bolded at p<.05

The fieldnotes reveal that professional communication between RNs often occurred around the coordinator's computer going through the electronic waiting list to clarify where each patient was in the care process, and to prioritise tasks to be completed. These episodes of professional communication between RNs occurred throughout the day: when handing over to the next shift, before and after meal breaks and at any time during the shift when the coordinator identified a need to 'regroup'. These episodes were reflected in RNs spending a significantly higher proportion of their time working with the electronic waiting list (7.1%) than either doctors (2.6%, U=330.5, p≤.001) or NPs (2.4%, U=313.5, p≤.001).

There were two reasons professional communication and the electronic waiting list consumed such a high proportion of RNs' time. Firstly, RNs' work was more fragmented than that of the doctors and NPs therefore they required more explicit communication to coordinate their work. As Table 22 shows, over the course of the time study, RNs performed more tasks (n=2,700) of significantly shorter average duration (1 minute, 9 seconds) (p≤.001, F=67.5) than the NPs (1 minute 52 second) and the doctors (1 minute 54 seconds). This translated into a higher task rate for RNs who completed an average of 52 tasks per hour compared to 32 per hour for NPs and 31 for doctors.

Table 22 Overall task duration and rate

	MO	NP	RN	ALL	p (*F*)
Total duration of all tasks observed in hours and minutes	50h 28m	51h 53m	51h 40m	**154h 1m**	
Total number of tasks observed	1594	1665	2700	**5959**	
Mean tasks per hour	31	32	52	**38**	
Mean task duration in minutes and seconds (*SD*)	1m 54s (*2m 59s*)	1m 52s (*2m 57s*)	1m 9s (*1m 34s*)	**1m 33s (*2m 28s*)**	**≤.001*** (*67.5*)

*One-way ANOVA

The second reason for the high proportion of time RNs spent on communication and the electronic waiting list was that they were responsible for the care and oversight of multiple patients. The fieldnotes show that doctors and NPs selected patients to be assessed from the 'to-be-seen' waiting list and worked through the process of assessment, diagnosis, treatment and disposition. As the task duration data in Table 22 demonstrate, the doctors and NPs were able to focus on tasks for longer durations than RNs. In contrast, RNs' workload was driven by the completion of discrete tasks as they arose for multiple patients spread across several geographical areas: the ED waiting room, the Fast Track consultation and treatment rooms, the Fast Track waiting room, the radiology imaging waiting room and the unmonitored beds. There were numerous entries in the fieldnotes of RN dissatisfaction with both the fragmented nature of Fast Track work, and the large number of patients they were responsible for at any one time.

> *RNs had a conversation in the staff station about how fragmented (or 'bitty') Fast Track work is. They also complained about having to do a handover for patients they hadn't assessed themselves. One RN commented "I prefer working in the acute halls because you have your allocated patients and can see them through".* **Fieldnote 18/5/15**

The design of the RN role in Fast Track, coupled with frequent handovers between breaks and shift changes were also observed to present challenges for the doctors and NPs. It was observed that it was sometimes difficult for them to locate the correct RN to delegate a task to, while one ED physician commented the frequency of RNs' handovers due to shift changes could cause error and delay (Fieldnote 1/4/15). The fieldnotes show the Fast Track coordinator played an important role in managing these challenges.

In addition to a surveillance role for the safety of waiting patients, a senior nurse described the coordinator role as one of *"prioritisation, coordination, and managing the queue*" (Fieldnote 16/4/15). This was observed to include managing the use of treatment spaces in the Fast Track area, ensuring tasks delegated to RNs were competed, chasing up all three roles for information about patient care to ensure the electronic waiting list and patients' medical record was up-to-date, as well as taking

decisions to ensure patient flow through the Fast Track area. The coordinator did not have a patient load and was supposed to have a hands-off coordination role. Observations captured in the fieldnotes suggest that that when the coordinator did undertake direct patient care it had a negative impact on patient flow.

> *Fast track appeared a bit chaotic today. The coordinator said "I don't like coordinating when I have to tell people what to do". They didn't stay at the station but flitted about the floor.* **Fieldnote 16/5/15**

In contrast, other coordinators were assertive in the prioritisation, coordination and management of the patient queue. On several occasions coordinators were observed to influence, challenge, and even overrode doctors' decisions perceived to be slowing patient flow.

> *During the observation of a junior ED doctor, the coordinator overrode the vascular residents' decision not to admit to the patient to hospital because the resident could not contact his boss (the vascular consultant) to confirm. The coordinator said "Stuff that! I'm admitting him, what they've ordered is not emergency care" The junior ED doctor found this funny "I love it when the nurses are the bosses - I'd be in so much trouble if I did that!".* **Fieldnote 2/4/15**

Organisation of Care activities, the management of patient flow, the coordination of the work of the team, and the general smooth running of the Fast track were predominantly performed by RNs, with the nurse coordinator playing a central role.

Patient Communication and Comfort

The Patient Communication and Comfort category comprised communication with patients and tasks attending to their physical comfort. Table 23 provides the results for this category. Nurse practitioners spent a significantly higher proportion of their time on Patient Communication and Comfort tasks (14.3%) than doctors (9.2%, U=350, p=.013) and RNs (8.1%, U=355, p≤.001).

Table 23 Mean proportion of time on Patient Communication and Comfort tasks with pairwise and overall significance

	Patient Communication	Patient Comfort	Total
MO*	8.7% (*4.5*)	0.6% (*0.8*)	9.2% (*4.4*)
NP*	13.4% (*8.6*)	0.9% (*1.1*)	14.3% (*8.6*)
RN*	6.8% (*4.1*)	1.3% (*1.7*)	8.1% (*4.7*)
MO/NP **	**.030** (*375.0*)	.151 (*435.5*)	**.013** (*350.0*)
MO/RN **	.073 (*456.0*)	.132 (*484.5*)	.203 (*500.0*)
NP/RN **	**≤.001** (*327.0*)	.787 (*622.5*)	**≤.001** (*355.0*)
Overall***	**≤.001** (*14.1*)	.240 (*2.9*)	**.002** (*12.5*)

* Mean proportion of total time on task - % (*SD*)
** Mann-Whitney U - p (*U*)
*** Kruskal Wallis - p (χ^2)
Significant results bolded at p<.05

All three roles spent a low proportion of their time on Patient Comfort tasks, and there were no significant differences between them in these tasks (χ^2=2.9, p=.240). The difference between the roles was accounted for by NPs spending a significantly higher proportion of their time communicating with patients (13.4%) compared to both RNs (6.8%, U=327, p≤.001) and doctors (8.7%, U=375, p=.030). The higher proportion of time NPs spent communicating with patients about their condition, treatment and care process was a key difference in their working pattern compared to that of the doctors.

Off Task

The Off Task category included all the non-productive activities that form part of a normal working day. The proportion of time the three roles spent 'Off Task' is given in Table 24.

Table 24 Mean proportion of time 'Off Task' with pairwise and overall significance

	Locating	In Transit	Social	Waiting	Total
MO*	2.6% (*2.2*)	0.4% (*0.8*)	2.6% (*3.7*)	4.9% (*9.9*)	10.5% (*11.6*)
NP*	1.6% (*2.8*)	0.5% (*0.9*)	2.6% (*2.6*)	6.7% (*10.4*)	11.3% (*10.5*)
RN*	3.0% (*3.1*)	0.6% (*1.0*)	1.9% (3.1)	8.5% (*14.7*)	14.0% (*15.8*)
MO/NP **	**.009** (*343.0*)	.695 (*516.5*)	.696 (*514.0*)	.682 (*512.5*)	.617 (*497.0*)
MO/RN **	.958 (*603.5*)	.671 (*574.5*)	.253 (*513.0*)	.404 (*538.0*)	.437 (*132.0*)
NP/RN **	**.006** (*405.0*)	.410 (*579.5*)	.218 (*540.0*)	.706 (*613.0*)	.778 (*230.0*)
Overall***	**.009** (*9.4*)	.708 (*0.7*)	.369 (*2.0*)	.713 (*0.7*)	.732 (*0.6*)

* Mean proportion of total time on task - % (*SD*)
** Mann-Whitney U - p (*U*)
*** Kruskal Wallis - p (χ^2)
Significant results bolded at p<.05

Registered nurses spent a higher proportion of their time on Off Task activities (14%) compared to NPs (11.3%) or doctors (10.5%) but these differences were not significant (χ^2=0.6, p=.732). For all three roles, Waiting consumed the highest proportion of Off Task time comprising 8.5% of RNs' time, 6.7% of NPs' and 4.9% of doctors' time (χ^2=0.7, p=.713). Locating (documents, patients, colleagues) was the only 'Off Task' activity where there was a significant difference between the three roles (χ^2=9.4, p=.009). Nurse practitioners spent significantly less time Locating (1.6%) than either RNs (3%, U=405, p=.006) or doctors (2.6%, U=343, p=.009). Overall, the three roles spent a similar proportion of their time on non-productive Off Task activities.

Task Distribution by Role

In the Phase 1 work observations, the time study measured the task distribution between the three Fast Track roles to identify how the roles were differentiated, and where they overlapped. Task details enriched this quantitative data while the fieldnotes assisted to contextualise and provided data that could not be measured quantitatively, such as the nature of staff interactions. The findings revealed significant differences between the three roles across all the task categories in the proportion of time those tasks consumed, and the frequency with which they were performed. The three roles were broadly differentiated within the model of care between the treating clinicians (doctors and NPs), and the RNs. The doctors and NPs spent the highest proportion of their time performing tasks in the Assessment and Diagnosis category, reflecting their primary function to determine the diagnosis, treatment plan and disposition of Fast Track patients. In contrast, the RNs spent the highest proportion of time on Organisation of Care activities, with biggest difference accounted for in professional communication. Thus, the three roles were occupationally specialised, but the data also show a high degree of overlap between them. There were few tasks that were exclusively, or even predominantly performed by one role. All three roles performed tasks predominantly in the domain of another, albeit at a lower rate. The following provides a summary of the key task distribution findings for each role indicating their specialised and overlapping features, beginning with the doctors.

Doctors

Doctors spent just over half their time performing tasks related to the assessment and diagnosis of patients, with Documentation comprising more than a quarter of their total task time. Despite having the same role function as NPs, doctors spent a significantly higher proportion of their time on Assessment and Diagnosis tasks. The time they spent on patient assessments was, on average, twice that of the NPs' and they spent more time on Diagnosis tasks, checking results and consulting with colleagues. In the absence of patient data, it is not possible to determine whether these differences are due to the doctors in the sample having less clinical experience than the NPs, whether the patients they treated were more complex, or a combination of both. That doctors spent a higher proportion of their time on prescribing and researching medications than NPs, and ordered pathology more frequently suggesting a greater focus on treating patients with medical conditions.

The data demonstrate that doctors and NPs consulted each other on patient conditions, as well as supervising and being supervised by each other. Doctors were also observed providing advice to RNs about the appropriate investigations to order. Reflecting the number of junior doctors in the sample doctors provided supervision to other team members less often and were themselves supervised more often than NPs or RNs. Moreover, when doctors did provide supervision to other team members, it was more often to a doctor than a nurse.

Nurse Practitioners

The time study data identified that, despite sharing a role function with doctors, NPs' work was differentiated from doctors in several ways. Nurse practitioners' specialisation in minor injuries was evident in the data. Compared to doctors, NPs spent a significantly higher proportion of their time preparing and performing investigations and procedures, especially treatment procedures for wounds and musculoskeletal conditions, ordered more X-rays and spent a significantly lower proportion of their time prescribing medications. Nurse practitioners were observed treating a range of patient conditions but fieldnote entries suggest they felt constrained by their focus on minor injuries and actively encouraged doctors to take on those patients deemed to be 'NP cases'. The sharing of knowledge and skills within and between all three roles was evident in both the time study and fieldnote data. However, NPs spent significantly more time supervising other team members and did so as often for their medical as their nursing colleagues. Nurse practitioners were identified by other team members as a source of knowledge on the treatment of minor injuries as well as the Fast Track processes, the wider health system, and the process for referral to specialist services.

The data also show a greater overlap between the NPs and RNs than between the doctors and RNs. Nurse practitioners spent a significantly higher proportion of time administering medications than doctors and performed vital signs more often. Indeed, junior doctors who were not aware of the NPs' role function in Fast Track were occasionally observed to delegate tasks to NPs. Finally, the higher proportion of time NPs' spent communicating with patients about their condition, treatment and care process was a key difference between their working pattern and that of the doctors.

Registered Nurses

Registered nurses' work was most clearly differentiated from the doctors and NPs by the high proportion time they spent on Organisation of Care tasks, especially in professional communication. They also spent significantly more time working with the electronic waiting list, often concurrently communicating with other RNs and the coordinator. These communication episodes were used to manage the oversight and care of multiple patients spread across different geographical areas, the fragmented nature of RN work and the multiple handovers caused by RNs' breaks and shift changes. Entries in the fieldnotes highlight that the nurse coordinator played a role in managing the challenges of RNs' work, in managing information flow, coordinating with doctors and NPs, and in making decisions to ensure patient flow through the Fast Track area.

Registered nurses also spent more than a fifth of their time on Assessment and Diagnosis tasks. They were the first to assess patients arriving at the ED and the proportion of time they spent on patient assessments was comparable to NPs. These initial assessments triggered the protocols and the data show that RNs initiated medications and ordered investigations. Registered nurses were also observed to engage in discussions with the nursing and medical colleagues about patients' potential diagnosis to safeguard the safety of waiting patients.

Fieldnotes on medication discussions revealed that RNs influenced the prescribing decisions of others. They were a source of knowledge on medications for doctors and challenged doctors' prescribing decisions if there was an error or omission. The team was also observed to engage in informal prescribing practices where RNs would ask a doctor or NP to prescribe a medication rather than initiate it themselves.

Some clinical tasks were predominantly performed by RNs including vital signs and investigation-related procedures such as urinary analysis and electrocardiograph. Registered nurses also performed most of the medication administration tasks. Indeed, the intravenous management performed by RNs was the only task recorded in the time study performed exclusively by one role. Registered nurses also performed half of the venepunctures, the most common procedure in Fast Track, because they could initiate this procedure, or have it delegated to them by a doctor or NP. Evidence from the fieldnotes suggests that doctors and NPs made decisions about whether to delegate a venepuncture task to an RN based on the likelihood of delay.

Summary

In Phase1, the time study established the distribution of tasks between the three Fast Track roles, identifying that they were occupationally specialised but they also overlapped. The fieldnotes have provided some insights into some of the teamwork behaviours and organisational factors that may promote or hinder flexibility, and issues related to nurses' autonomy over focal medical tasks. These findings provide the basis for the Phase 2 interviews described in the next chapter.

CHAPTER 8: INTERVIEW FINDINGS

Introduction

This chapter presents the findings from the Phase 2 interviews with doctors, NPs and RNs, referred to collectively as 'clinicians'. The interviews aimed to explain the task distribution measured in Phase 1, and to gain insights into the team's working practices not accessible through observation alone. Interviews focussed on clinicians' perceptions of the teamwork behaviours and organisational factors that promoted or hindered flexibility, and their attitudes to nurses' autonomy over focal medical tasks. The findings to emerge from the interview data are presented as four themes: Delegation as Task Sharing; Perceptions of Task Responsibility; The Impact of Staffing on Team Coordination; and Autonomy and Knowledge Sharing. Before discussing these themes, the chapter begins with a description of the interview participants and the interview guide developed from the Phase 1 findings.

Interview Participants

Nineteen face-to-face interviews were conducted with ED clinicians: eight with RNs, seven with doctors and four with NPs. Information about the interview participants is given in Table 25.

Table 25 Interview Participant Information

	n (%)	
Gender		
Female	13 (68%)	
Male	6 (32%)	
Role		**Mean Years Registered (*SD*)**
Registered Nurse	8 (42%)	18.5 (*3.1*)
Doctor	7 (37%)	14.0 (*9.7*)
Nurse Practitioner	4 (21%)	13.0 (*11.2*)

Of the seven doctors interviewed, four were emergency physicians and three were registrars. All four NPs employed at the ED agreed to take part in an interview. Interview participants were, on average, more experienced than the time study participants. The sample of doctors included emergency physicians and the RN sample included only those who had completed the Fast Track course and had some experience of coordinating the Fast Track area.

Interview Guide Development

Within the context of the explanatory sequential mixed methods design, the interview guide was developed following analysis of the Phase 1 work observation data, as well as being informed by the study's objectives and the analytical framework. Four topic areas emerged from the analysis of the Phase 1 data that warranted deeper exploration in the interviews. These fours topics were formulated into a semi-structured interview guide (see Appendix C).

The first topic was task delegation. In Phase 1, doctors and NPs appeared to perform a task themselves rather than delegate if the RNs were busy, suggestive of a form of task sharing which used the team's overlapping skills. The interviews explored this observation by asking doctors and NPs what they considered when delegating a task, and for RNs' perceptions from the other side of the delegation process. The two tasks used as discussion points to triangulate and explain the time study findings were venepuncture (a task historically performed by doctors performed more often by RNs), and medication administration (a task predominantly performed by RNs but also performed by NPs).

The second topic included in the interview guide focussed on the challenges the team faced in coordinating its specialised but overlapping roles to deliver whole episodes of patient care. It sought to explain why RNs spent a high proportion of their time on Organisation of Care tasks, and to explore the role of coordinator which appeared to play a key role in coordinating the team and managing patient flow in Fast Track. Clinicians were also asked why they thought some shifts ran more smoothly than others in terms of how the team coordinated its work.

The third topic explored attitudes to RNs' autonomy to initiate medications and investigations. This provided an opportunity to explain the informal prescribing practices observed in Phase 1 where a doctor or NP would prescribe a medication at the request of an RN. Registered nurses were asked why they made such requests while doctors and NPs were asked what they considered in response.

The final topic explored in the interviews concerned NPs' specialisation in minor injuries identified in the time study data. Clinicians were asked what they perceived were the costs and benefits of NPs' specialist knowledge and skills. The interviews sought to explain the lower proportion of time NPs spent on Assessment and Diagnosis tasks compared to doctors, and the higher proportion of time NPs spent supervising and educating others. The interviews also sought clinicians' attitudes to NPs treating more complex patient conditions.

Delegation as Task Sharing

The first theme to emerge from interview data focused on delegation as task sharing. Phase 1 work observations established that doctors and NPs sometimes performed a task themselves, and at other times would delegate that task to an RN, suggestive of a form of task sharing that used the overlapping skills of the team. Interviews provided an opportunity to explore clinicians' attitudes to the delegation of tasks from both sides of the process: doctors' and NPs' reasons to delegate, and RNs' reasons to accept or decline a delegated task. The reasoning described by all the doctors, NPs and RNs interviewed demonstrate that task delegation in the ED team was a negotiation that aimed to provide timely and quality patient care.

Doctors and NPs consistently reported two key factors that guided their decision whether to delegate a task, or to perform it themselves. The first was the nature of the task itself, that is how urgent or technically difficult. The second was the availability of an RN to delegate to, whether they had the requisite skills, and capacity to complete the task within an appropriate timeframe. The emergency physician quoted below illustrates how doctors and NPs weighed up these factors:

> *I guess you have to look at who you could delegate to and their availability, what other tasks you've got to complete and also how time-critical that particular, intervention or test is. For example, if someone needs venous access straight away because they're critically ill then I'll do it myself… So definitely there'd be reasons of expediency where I want to do things myself.* **MO6**

Like the example above (M06), all the doctors and NPs interviewed stated that they usually performed an urgent or technically difficult venepuncture procedure themselves to avoid potential errors or delays. Indeed, one emergency physician emphasised that *"knowing how to cannulate a difficult patient is one of the best skills you can acquire in your lifetime"* (M05). This sentiment was expressed by most of the doctors interviewed and that junior doctors should not delegate venepuncture to RNs until they had mastered their own skills. The need to master procedural skills was also reflected in views common to all three roles that more experienced clinicians had to delegate and supervise procedures so that less experienced clinicians could develop their skills. Highlighting the ED's function as a place of learning, all the interviewees understood that minimising errors and delays in tasks being completed had to be balanced with the educational needs of junior staff. Doctors, NPs and RNs commented on the challenges of providing these learning opportunities within the time constraints of a busy ED, but that it was necessary for increasing the number of staff able to perform procedures safely and independently.

> *… if it's a skill such as suturing or plastering, it may be a case of handing that over to a junior doctor for them to get practice so they are more independent at doing it in the future. I may not need to supervise them during the whole task, it may only be parts of the task that they need supervision … but it's a case of using that as a teaching and learning opportunity for them within the emergency department.* **M01**

The second factor in doctors' and NPs' decision to delegate a task was whether the RNs on duty had the capacity to complete the task within an appropriate timeframe. Confirming an observation recorded in the fieldnotes, all the doctors and NPs interviewed said they assessed their own workload relative to that of the RNs before delegating a task to avoid delays in the task being completed. These comments from a registrar and NP exemplify this approach:

> *If I've seen a patient and I think they need bloods then I'll tend to see if I can find one of the nurses to do it, but again, it depends on their workloads. If they're really busy you think, "Well, they've got all this other stuff to do and by the time they get around to doing it, there's going to be delay" then I'll go back and do it myself.* **MO7**

> *So, it's those tasks that overlap are the ones that you gauge - everyone else is super busy doing x, y and z, I'm not going to call a nurse out who's in the middle of putting in a catheter, to give my patient some Panadol. I can do that – or IV antibiotics. But if they're sitting around talking and I'm running, then – yeah, you give it.* **NP3**

As NP3's comment indicates, sometimes it was obvious that the RNs were not busy and *"sitting around talking"*, or were "*super busy doing x, y and z"*. However, interviewees from all three roles emphasised that the doctor or NP should clarify with the RN they were able to complete the task. Three of the doctors interviewed felt that tasks were sometimes delayed because the RN "…*may not say 'no' and allow themselves to get overloaded"* (MO6), particularly less experienced RNs. This perception was confirmed by the RNs interviewed who said that they did decline a delegated task when they were too busy, but that less experienced RNs found this negotiation with doctors more difficult. The quotes below are typical of RNs' point of view when declining a task delegated from a doctor or NP:

> *You know, often, it can be received with – "oh, well, I'll just do it myself then" or I say, "If you just give me 20 minutes, then I'll have time." And then they say, "Oh, well, I'll just do it myself if it's going to take that long."* **RN7**

> *Even if they say "Are you free?" and you say, "Not really," there's always one person that'll say, "Look, I'm happy to do it." There's never a huge disagreement. Someone will always get around to doing it.* **RN2**

Attitudes reported by doctors, NPs and RNs demonstrate that task delegation within the ED was a form of task sharing. It was a negotiation that aimed to find the best person to perform the task in the circumstances to minimise the risk of errors and delays in patients' care. Relative workloads within the team was an important consideration in the task delegation process for all the interviewees, and all agreed that RNs could, and should, decline a task if they were too busy. However, as the next theme reveals, the legitimacy of declining a delegated task depended on who was perceived to have primary responsibility for that task.

Perceptions of Task Responsibility

The second theme to emerge from the interview data focused on perceptions of task responsibility. Throughout descriptions of the delegation process, doctors, NPs and RNs conceptualised the responsibilities of each role as comprising 'core duties' and 'shared tasks'. Core duties were tasks perceived to be primarily the responsibility of a particular role, part of their occupational specialisation. A shared task was one that a doctor or NP could perform themselves, or delegate to an RN, a consequence of their overlapping roles. The emergency physician quoted below reflects a widely-held understanding of how these perceptions of task responsibility influenced the negotiation over delegated task, and the flexibility inherent in this process.

> *So there's things that a nurse would do when they are free. But when they are not free, they say, "This is not my core duty - can you do it? I don't have time to do it". So, it's that kind of duty that's outside their core duties, which overlaps with the duties of the doctors that is open to negotiation and some kind of flexible arrangement.* **MO3**

MO3's comment suggests that it was legitimate for an RN to decline a delegated task when they were busy if the task was not considered a core duty. Confirming this perception, all the doctors, NPs and RNs interviewed expressed the view that doctors and NPs should not delegate a shared task when the RNs had many core duties to complete. A common example of a core RN duty cited in the interviews was the patient admission process. The comments below illustrate how doctors and NPs considered RNs' core duties in their decision to delegate and highlight that they understood their roles to be interchangeable in some tasks but not others.

> *… there are things that the nurses do that we don't do and that should be their priority. So if they're busy getting admission papers sorted so that a patient can go to the ward and it means that my cannula is going be delayed whilst they're sorting that out, well, it makes more sense for me to do it myself.* **NP3**

> *At times I perform venepuncture myself, just for expediency. I really want to get things done quickly and I consider the nursing staff are run off their feet - they've got new patients they must put in a bed and do [vital signs]. These are really their primary responsibilities, I don't do that at all. So I can't replace them in doing that sort of thing, but I can replace them by taking the bloods.* **M03**

From the other side of the delegation process, RN interview data reveal a willingness among RNs to perform a delegated shared task when the doctors and NPs were overwhelmed with *their* core duties of assessing and diagnosing patients. Thus, interviewees on both sides regarded the prioritisation of core duties as a legitimate basis for determining who performed a shared task, especially in the context of heavy workloads. Prioritising the core duties of others demonstrates that the delegation process was more sophisticated than simply finding someone to complete a task quickly. Delegation also sought to prevent a particular role from becoming overloaded since this could slow the flow of

patients through the ED. This reasoning was consistent across the interviews, but the data were less clear about who was ultimately responsible for shared tasks. For example, the quotes below represent three contrasting views about which role was ultimately responsible for venepuncture: that it was primarily a core medical duty; that responsibility was shared; and that it was becoming part of RNs' core duties.

> *I see nursing staff doing cannulation stuff as a bonus otherwise it's part of medical management.* **MO5**

> *It's very much in the middle - whose job is it? It used to be, years ago, primarily the doctor's job and we'll be doing them a favour by doing it, but not anymore. It's very shared.* **RN8**

> *There's definitely a pattern now where I think it's more a nursing job because more nurses are capable of doing venepuncture or cannulation… it's now almost our responsibility to do that.* **RN2**

As MO5's and RN8's comments reveal, when venepuncture was not considered part of RNs' core duties it was perceived to be a 'bonus' or a 'favour' when they did perform it. In contrast, RN2 perceived that as more RNs acquire venepuncture skills, it had become part of their core duties. Six of the RNs reported that differing perceptions of responsibility for venepuncture, and other shared tasks, sometimes caused conflict with doctors. As the following remarks from RNs reveal, such conflict occurred when the doctor appeared not to consider relative workloads within the team.

> *And then there's the same doctors that you work with over and over again who never, ever do bloods on their patients, they're forever just handing you a form... I think that annoys you and makes you think, "You're currently sitting there on your mobile phone talking about your weekend. You could do it too."* **RN1**

> *…some [doctors] in the department are very willing to do all of their work and work very autonomously within the department. However, there have been some that just delegate everything and it gets a bit frustrating.* **RN4**

The RN interview data reveal a commonly-held perception that a minority of doctors were inclined to automatically delegate tasks rather than actively negotiate with RNs. Two emergency physicians explained the reason for such conflict between RNs and doctors was that some team members, from both roles, found the ambiguous, context-dependent nature of task sharing difficult to negotiate. The emergency physician quoted below specifically discussed the tension between the benefit of defining task responsibilities to reduce this conflict, and the flexibility needed in the ED environment:

> *Defining this concept of flexibility is helpful because on the one hand it's good to have [task responsibilities] more defined, but once you define them it becomes rigid, the boundary it set, you can't do anything beyond that.* **M03**

Conflict over task responsibility was reported to occur between RNs and doctors, but not between RNs and NPs. Nurse practitioners commented there was some conflict when their role was first introduced into the ED but such incidents were now rare. This was perhaps helped by a pattern identified in the work observations and confirmed in the interviews that *"NPs tend to do some of the nurses' jobs themselves"* (RN3). Nurse practitioners delegated less often to RNs because they viewed certain tasks as shared tasks that doctors regarded as core RN duties. The exemplar used in the interviews was medication administration. Nurse practitioners said they usually delegated medication administration to RNs but would do it themselves if there was a risk of delay or it was simply easier for them to do so.

> *Often you can just get the medication because you know what you want. That's the beauty of being a nurse practitioner, I'm not bound by some of the work practices of doctors … something as simple as two paracetamol for a patient, I can grab those and give them to the patient rather than waiting to find the nurse to tell them that it's okay, to tell them that they haven't got any allergies, so on and so forth.* **NP2**

All the doctors interviewed, except one, said they never administered routine medications such as simple analgesia, though two commented that they assisted RNs in time-critical situations to ensure that urgent medications were administered quickly. Doctors typically thought it safer for RNs to administer medications since, unlike the NPs, *"not a lot of senior doctors would necessarily know how to draw up a given drug and administer it"* (MO6). Further, organisational policy meant many medications had to be signed off and administered by two people and it was the RNs who oversaw this administrative process and the medication stores. One emergency physician commented there was generally no urgency for simple analgesia such as paracetamol therefore "*going to see another patient"* (M05) was a better use of their time. Indeed, the doctors and RNs interviewed agreed that, in most circumstances, the most senior ED doctors should delegate tasks.

The team prioritised senior doctors' core duties because their advanced diagnostic skills and decision-making authority was crucial for keeping patients flowing through the ED. The same reasoning did not apply to junior doctors whose skills and decision-making had less of an impact on patient flow. Further, two experienced ED doctors, a senior registrar (M07) and an emergency physician (MO4) spoke extensively about the need for junior doctors to acquire a wide range of skills, including those considered nursing skills, to respond to patients' needs in the fast-paced ED environment.

> *… in terms of drug administration and getting drugs out and hanging bags of fluid and that sort of thing. I say to [junior doctors], "If you really want something done, if someone's busy then the best way is to do it yourself or offer to do it yourself" … I've always believed that you should be able to hang fluids and get the oxygen and do all that sort of stuff rather than just expecting it to be done for you. Often I'm too busy to be doing that but if someone's really sick and no one's around and it's not been done then you have to be able to do it.* **MO4**

Both MO4 and MO7 perceived that the ability of doctors to perform some core RN duties not only increased responsiveness to patients' urgent care needs but also helped develop reciprocal working relationships with the RNs that, in turn, facilitated more task sharing within the team. MO4 continues:

> *I think this emergency is very much team-based emergency and always has been, but you've got to earn that right in the team. If you give, then you'll get back with people helping you out sometimes.* **MO4**

> *So, asking nurses to do something like "will you go and dip this urine" if you're a junior doctor, straight up they'll not like you for it. If you don't make any effort to say, "Well, doctors can do those jobs as well." You might not always have time to, but if you just do a few things like that to show them that those kinds of jobs aren't beneath you, so to speak … if you help them out, they'll help you out more.* **MO7**

Two of the RNs interviewed also spoke extensively about the reciprocal working relationships that were built within the team when doctors performed some core RN duties, or at least did not delegate shared tasks at every opportunity. The first quote from RN8, a nurse with over twelve years emergency nursing experience, highlights a sentiment that consistently ran through the interview data, that 'being flexible' in the ED meant not confining your tasks to your own role's core duties. Both these comments from RNs, and those of the two doctors above, illustrate that the goal of timely patient care drove the team's approach to task sharing or 'helping each other out':

> *… the doctors also do nursing stuff, they'll go and do a [urinary analysis] or a set of obs [vital signs] on the patient to get stuff done, but then you get doctors who are like, "No. I'm not doing that," so the nurses will say "Well I'm not doing your job". Things like that can happen and that's where it doesn't work - you get some people who have more obstructive personalities and other people are more flexible, willing to work together and help each other out. Whatever needs to be done, just do it. No matter if you're a doctor or a nurse, just get it done.* **RN8**

> *There are a few exceptions to the rule, but generally I find that, particularly in Fast Track, there's an attitude of helping each other and I think it's an understanding that we're doing similar roles. We're trying to achieve the same goal, which is to get [patients] out in four hours <laugh>* ... **RN6**

Four interviewees (two doctors and two RNs) explicitly described the reciprocity of task sharing within the team, but the sentiment was consistent throughout the interview data. Doctors, NPs and RNs reported an attitude of "*helping each other*" by performing tasks to allow others to prioritise their core duties. These data suggest that rather than taking an individual, or role-based view of task responsibility, responsibility for each role completing its tasks was perceived to be shared by the team because, in RN6's words "*we're trying to achieve the same goal*".

The task sharing found in the team was underpinned by a team-based view of task responsibility. It aimed to minimise the risks of errors and delays in tasks being completed and to prevent any one role from becoming overloaded, to ease the flow of patients through the ED. However, the flexibility of

task sharing required an ambiguity in which role was ultimately responsible for shared tasks and this could be a source of conflict within the team. Moreover, the coordination of the team's tasks that involved prioritising, and reprioritising each role's core duties in response to changing ED demand, was a complex and dynamic process that, as all the interviews acknowledged, did not always run smoothly.

The Impact of Staffing on Team Coordination

The third theme to emerge from interview data centred on the impact of staffing on the team's ability to coordinate their specialised yet overlapping roles to deliver whole episodes of patient care. Two main causes of failures in team coordination were present in the data: those caused by individual behaviours and those caused by staffing. Doctors, NPs and RNs cited these causes at similar rates. The individual behaviours thought to cause coordination problems were described as personality-based (e.g. individual clinicians' ability to cope with stress and interpersonal differences), cited by seven interviewees, or communication styles (e.g. curt or insufficient), cited by eight interviewees. However, the impact of staffing on team coordination, the focus of this theme, was much more prominent in the data, cited by all interviewees.

Many interviewees commented on the particular staffing challenges in Fast Track: the quick turnover of patients; patients spread across multiple geographical areas (consultation rooms, waiting rooms and beds); and the high number of patients per staff compared to other areas of the ED. NP4 summarised these staffing challenges in their comment that *"there's patients in beds, different patients going in and out of rooms, and a nurse is looking after 10 or 11 patients"* (NP4). Despite the lower acuity of the patients compared to other ED areas, interviewees noted that the workload in Fast Track could be very demanding. There was no limit to the number of patients waiting for assessment and treatment, as one senior registrar pointed out *"when the beds are full in the acute area, they're full. In Fast Track there's no 'full sign'"* (MO1). Interviewees perceived that it was often during periods of high workload demand that the team failed to coordinate its work effectively. The emergency physician below explains how, in this context, the task sharing normally used to ease the flow of patients through the ED, could become the source of task duplication and delay:

> *So, Fast Track it doesn't work, actually a lot of places don't work, when there's a critical mass of patient load and busyness; where it seems to spiral downwards, we can't get on top of it and people seem to be doing the same things. So, everyone's trying to help out, but you're not sure who's doing what. So, the communication isn't there and also you lose your structure of who's expected to do what … That's when you just think, "What' s going on?" It's just is not happening. The things that are being done are not helping, they're just creating more work.* **MO4**

Fifteen interviewees across all three roles commented that "*losing your structure of who's expected to do what*", a failure in implicit coordination, was *less* likely to occur with more experienced ED clinicians in the team. Furthermore, these interviewees reported that the explicit communication needed for effective coordination was better between team members with well-established working relationships. Interviewees attributed experienced clinicians' ability to implicitly and explicitly coordinate their work to a shared understanding of each other's roles and skills, hence an ability to anticipate what their teammates need to complete their tasks. The quotes below are typical responses to the question of why some shifts ran more smoothly than others in terms of how effectively the team coordinated its tasks.

> *Well, I think the more senior the person is, both medical and nursing, I suspect they work better in terms of integration and trying to help each other rather than working independently, or in effect duplicating the work. That would be one aspect, the experience of knowing or anticipating what the other person can do.* **MO3**

> *I think it's probably communication and those relationships that you've built up. I know I've had shifts, especially out in Fast Track, where it's been a breeze, it's been lovely. We're busy, but we've all worked with each other for some time. And then, you might get – it's a new registrar or it's a new something else doctor and everything's much slower, no communication, things just seem to break down. So, I think it's really based on everyone's ability to communicate, your trust in your colleagues and the relationships that you've built with them over a few years, I think makes a huge difference.* **RN1**

Many interviewees reported that, unlike inpatient hospital wards, the permanent presence of emergency physicians and NPs working side-by-side with the RNs in the ED, created a stability within the team that allowed working relationships and knowledge of other's roles and skills to develop. However, as RN1's comments reveal, it was difficult for the transient junior doctors to establish such relationships and knowledge. As one registrar commented *"…you may only work with a nurse once or twice in a three month emergency term"* (MO1). Interviewees from all three roles noted that instability in the junior doctor workforce also meant they had limited understanding of ED nursing roles (i.e. their core duties and shared tasks) and ED processes, especially the Fast Track model of care. Junior doctors' limited role and process awareness was reported to be, at times, a source of conflict and suboptimal coordination within the team, as these RNs explain:

> *I think the team works well when people know the processes well. If you've got doctors that haven't been in ED long and haven't worked much in Fast Track, they don't understand. I had a junior doctor recently, it might've been his first or second shift in Fast Track, and he picked up patient that hadn't been [assessed] by a nurse yet. He said, "Why doesn't this patient have any [vital signs] and why don't they have bloods done?" I said "Because we haven't assessed them yet"… but he obviously didn't understand.* **RN5**

When the team's not gelling… I think it's because some doctors are not really familiar with the nursing roles, maybe due to [the lack of] time spent in ED or because of their previous experience, they might've come from a different specialty and they're not used to nurses being able to initiate things. **RN6**

The experienced nurses interviewed also acknowledged that RN staffing arrangements in Fast Track were unusual and that junior nurses themselves struggled to understand their role. Both the RNs and NPs interviewed explained that Fast Track required RNs to be proactive, moving between areas in response to changing patient demand, and seeking tasks from their medical and nursing colleagues. However, this fluidity in the RN staffing often made it difficult for doctors and NPs to identify to whom to delegate tasks. This challenge was thought to be compounded by doctors, NPs and RNs being rostered on different shift patterns causing team composition to change multiple times throughout the day, as this NP explains:

Nursing staff have these certain breaks they have to go on, which frustrates medical staff because when they're trying to find the nurse, they can't find a nurse…or the nurse has changed over and then they don't know who's who ... so the medical staff go "I don't know who to tell." **NP4**

The transience of the medical workforce, the different shift patterns and the fluid RN staffing arrangements were all reported to generate staffing instability in the team that could result in the team 'losing its structure of who's expected to do what'. Confirming Phase 1 observations, all but one of the interviewees (an emergency physician) said the Fast Track coordinator role was vital in managing this instability. Reflecting the majority of interviewees, RN1 stated the coordinator role *"…is hugely important ... if that doesn't work, then nothing else is going to work that day"* (RN1). Many interviewees advocated the coordinator should act as an intermediary between the doctors/NPs and the RNs to manage the risk of errors or delays in task delegation and shift handovers, and because they had a better knowledge of individual RNs' skills.

So certain nurses will be able to do certain procedures where others won't and within each shift it's having that knowledge of what they can and can't do… In that instance, it's often better having that delegation go through the coordinator because they'll have a better knowledge of their staff for that day and what they can do ... **MO1**

You need someone who is really headstrong to say to the doctors beginning of the shift "I'm coordinating. Everything needs to come through me. You need to tell me what the patient needs. If they need any medications or anything, come and tell me, I'll delegate that." And I think that works a lot better because otherwise you have four nurses running around there and you don't know what the hell's going on, you can tell one nurse something and it doesn't get filtered back to the others. **NP4**

Interviewees from all three roles understood the coordinator's remit to be broader than the delegation of RNs' tasks to include the top-down coordination of the whole Fast Track team, and to maintain an overview of all the patients in the waiting rooms and Fast Track area. Many explained that a 'good coordinator' did not undertake direct clinical care tasks and were proactive in the role: chasing up their nursing and medical colleagues for information about patients' care, prompting them to complete tasks to move the care process forward, and expediting referrals and admissions that were perceived to be the principal source of patient delays in the ED. However, interviewees from all three roles noted that the coordinator role was not performed consistently. There was also uncertainty around whether the coordinator was the 'manager' of the Fast Track area and should therefore set priorities for the doctors and NPs. Some of the doctors interviewed supported this idea, one ED physician noting *"…if [the coordinator] says this person is more clinically relevant to be seen first, I'll respect that and I'll go and see the patient*" (M05). However, three of the RNs and one of the doctors interviewed commented that the coordinator did not have a clear mandate to prioritise doctors' work and some who had attempted it had *"…rubbed people up the wrong way"* (RN1).

Similarly, how the coordinator role operated vis-à-vis the doctor in-charge was unclear. Many interviewees perceived the doctor-in-charge role (the most senior doctor allocated to Fast Track) was also performed inconsistently. Some took control of patient flow from the coordinator, some focussed solely on direct clinical care, while others worked collegially with the coordinator. Like the coordination between clinicians providing direct clinical care, the implicit and explicit coordination of tasks at the team level and management of patient flow was thought to be easier when the coordinator and the doctor in-charge were experienced ED clinicians with a good working relationship. Emergency physician, MO3, again emphasises the ability of experienced clinicians to anticipate what other team members need to complete their tasks:

> *A good coordinator understands doctors' practice and nursing practice, and how the two dovetail each other… They can then direct the less experienced nurses to get certain tasks done knowing that this will facilitate the doctor downstream, rather than waiting for the doctor say "Can you do this"? So experienced coordinators anticipate what the patient will need and get things done prior to the doctor coming in.* **MO3**

Likewise, NP2 emphasised the importance of established working relationships between the nurse coordinator and doctor-in-charge for coordinating the team's work:

> *Good team coordination comes from stability in terms of experienced leadership. I think the seniority of the coordinator and the [doctor-in-charge] for Fast Track has enormous influence on that. If you've got a very pro-active, approachable emergency physician and when their relationship with the coordinator is a cordial and fantastic one, the flow of the department is so much better, even when it's super busy.* **NP2**

Staffing was thought by all interviewees to have a major impact on the ability of the team to effectively coordinate their work. All the interviewees reported that implicit and explicit coordination was more effective between experienced team members with well-established working relationships, even in the context of heavy workloads. The nurse coordinator was also identified as managing the coordination challenges caused by staffing instability within the team. Good coordinators were perceived to take on the role as an intermediary in task delegation between doctors/NPs and RNs, and in the top-down coordination of the tasks of the whole Fast Track team to ensure patients kept flowing through the ED.

Autonomy and Knowledge Sharing

The final theme, Autonomy and Knowledge Sharing, focusses on a key finding to emerge from the interview data, that the team shared its autonomy and knowledge to manage nurses' restricted autonomy over focal medical tasks to respond to patients' needs. It also emerged that the doctors and nurses shared their clinical and organisational knowledge to develop the team's skills in the longer-term, especially those of junior doctors. The theme is divided into two subthemes reflecting the different autonomy arrangements for RNs and NPs. The first subtheme addresses RN protocols and clinical judgement. The second subtheme looks at the costs and benefits of NPs' specialist knowledge.

RN Protocols and Clinical Judgement

All the interviewees perceived that the protocols for RN-initiated medications and investigations improved the quality and timeliness of patient care. Medications initiated by RNs early in patients' ED journey were regarded as a crucial component of quality emergency care, especially in reducing time to analgesia. The RNs and NPs interviewed were particularly concerned with managing patients' discomfort during their ED stay because "*it's more humane that they have access to those types of medications"* (RN6). For doctors and NPs, the early management of patients' pain and other symptoms by RNs meant the efficacy of those supportive treatments could be established before they assessed the patient, aiding the diagnostic process and potentially reducing length of stay. Registered nurses' autonomy in managing patients' symptoms was also perceived to reduce doctors' and NPs' workload in having to 'sign off' routine medications, as this emergency physician explains:

> … *there's orthopaedics, broken bones and renal colics and stuff which means that analgesia is a priority. And that can be done by [protocol], there's no reason why [RNs] can't do it. There's no side effect, they'll monitor. They're all experienced nurses. If I'm in resus, if the other doctors are busy, having to sign off all this analgesia, it takes time.* **MO5**

The main perceived benefit of RN-initiated investigations was reduced length of stay since it meant *"results come back sooner rather than later"* (MO1). Interviewees from all three roles commented that RN-initiated medications and investigations were sometimes all that was required to diagnose and treat

less complex patient conditions. In these circumstances, an NP or doctor just had to review the RN's work and discharge the patient. The comment below from a senior registrar reflects a commonly-held view that RNs' autonomy in focal medical tasks reduced doctors' and NPs' workload, and that this represented an efficient use of the team's skills.

> *If the nurses have taken the initiative and done bloods, they've got the urine, they've prescribed some pain medication. By the time you go and see [the patient], they feel a lot whole better. The bloods are normal. You literally can see them very quickly and say "Everything is back. Everything is fine. You're fine" … rather than see them twice essentially.* **MO7**

However, protocol restrictions meant RNs could not act autonomously to meet the full range of ED patients' symptomatic and investigation needs. To overcome protocol restrictions RNs sought doctors' and NPs' support to authorise the appropriate medications and investigations. In the case of medications, the interview data provided insight into the informal prescribing practices observed in Phase 1 where an RN would ask a doctor or NP to 'chart' (prescribe) a medication for a patient who did not fit a protocol's inclusion criteria or needed an alternative medication. All the interviewees confirmed they were familiar with, and had participated in this practice. The following remarks describe how the team worked around medication protocol restrictions from the RNs' point of view and are representative of all the RNs interviewed:

> *… there's certain protocols that we can follow to prescribe medications and then there's a limit to what we can do based on history and things … it's frustrating when you go to give medications but you can't because of their medical history and contraindications. You think, "Well, I can't do it now". So I have to go and ask doctor and interrupt their time to help this patient whereas I could have just done it myself… but those things are in place for a reason, you can't really change it.* **RN1**

> *… everything is obviously based around a business rule and there's certain criteria, contraindications. So, with the patients that we see, most of them are elderly, most of them have conditions where you can't give this, or you can't do that… so we'll get the doctor to chart something.* **RN2**

Like RN1 and RN2, most of the RNs interviewed found it frustrating when they could not autonomously manage patients' symptoms but many perceived that the protocol restrictions protected patient safety, and the RNs themselves *"as safety a net, to cover us"* (RN8). However, two of the more experienced RNs perceived that their discretion in managing patients' pain and nausea had decreased over time. They commented that the range of medications available under protocols had narrowed, especially the removal of codeine-based analgesics for moderate pain and alternatives to the one medication currently available for treating nausea. These experienced RNs commented that this meant they had to ask doctors' and NPs' help more often to manage patients' symptoms.

The interview data show that when faced with a request from an RN to prescribe a medication, the doctor or NP had to decide whether to do so based solely on the information provided by the RN, or to assess the patient themselves. Doctors and NPs consistently described this process as seeking out 'red flags' in the clinical information provided by the RN. Examples of red flags provided were: incompleteness in the history and symptoms provided by the RN, any potential contraindications, the risk of an adverse outcome, and the urgency of the patient's needs. All but one of the doctors/NPs interviewed said they also considered the experience of the RN making the request, and their level of trust in that RN's clinical judgement.

> *I mean you would often just prescribe it off the bat and say, "Yeah. Okay, if that's what you want, that's fine," because you have a degree of trust in that clinician…but if it was a junior staff member that came to me then I'll probably be prompted to ask more questions as to, "Why have we chosen this drug? Why do you want to give it?".* **NP4**

> *Look, I have to be watchful all the time, it depends who asks, their level of seniority. The whole ED works on interdependence. I cannot say, "I want to see everything, I want to check everything that you do." You can't do that… They're knowledgeable. They've got good clinical practice, good clinical ethics, and they won't ask for something that's out of their capacity.* **MO5**

Registered nurses' perceptions of why a doctor or NP might prescribe medications at their request also consistently emphasised the importance of established working relationships and trust in the RN's clinical judgement, as RN7's comment illustrates:

> *I have [asked a doctor to chart a medication] and it's probably been doctors that we've worked together for a long time and you've got some sort of trust, a rapport. I think this patient needs this. I can't prescribe it. Can we give it a go?* **RN7**

There was significant support among all interviewees for RN-initiated medications. It was widely-regarded to improve the timeliness and quality of patient care and as an efficient use of the team's skills. This support was founded in a respect for RNs' clinical knowledge and judgement in managing patients' symptoms, or as one emergency physician put it *"a nurse is probably better at telling if the patient needs pain relief than I am"* (M04). Consequently, the data identified a willingness by all doctors and NPs to work around protocols by 'sharing' their greater autonomy over the prescription of medications to ensure patients' needs were met.

The interview data show more qualified support for RN-initiated investigations, especially pathology. All the doctors and NPs interviewed perceived that gaps in RNs' knowledge meant they were not always able to exercise the necessary clinical judgement to differentiate between possible diagnoses. As a result, they thought that RNs sometimes over-order or under-order investigations. For example, ordering an X-ray for a suspected fracture that a doctor or NP might have ruled out by clinical

assessment, or missing a routine investigation, such as a pregnancy test for a female patient with abdominal pain. The doctors and NPs expressed concern that inaccurate ordering undermined the quality and efficiency of patient care, exposing patients to unnecessary procedures, increasing length of stay and generating costs for the department. While clear in these views, doctors and NPs also acknowledged that the prevalence of inaccurate ordering by RNs was not known, likely to be quite low, and that junior doctors were prone to similar errors. The RNs themselves were aware that inaccurate ordering occurred, though two explained that their initial patient assessment was brief and that clinically relevant information sometimes did not emerge until the doctor or NP obtained a more detailed medical history.

While doctors raised the problem of RNs' ordering inaccuracy, they made few suggestions about how to resolve it, other than expressing a general concern that RN-initiated investigations be limited to the simplest patient conditions. One doctor thought RNs' ordering accuracy could be improved through the protocols, but others felt the appropriate choice of investigations relied on clinical judgement based on individual knowledge and experience. Indeed, the importance of clinical judgement in tailoring investigations to the individual patient's condition was reflected in the design of the RN protocols. Unlike the medication protocols, the protocols for investigations were not based on restrictive algorithms and did afford RNs some discretion to tailor investigations. It was not clear from the data whether the RNs drew on the guidance provided in the protocols, or if the workplace training had provided adequate knowledge to use this discretion appropriately:

> *With the training, they do touch on [what to order] in the Fast Track course but I've found its more experience - "I had a patient like this before and this is what they ordered so I'll order that."* **RN5**

Unlike the doctors, all the NPs interviewed thought the solution to improving RNs' ordering accuracy was to develop their diagnostic knowledge. One NP was responsible for designing more comprehensive training to improve RNs' knowledge for ordering X-rays, while all four reported that they encouraged RNs to consult them on individual patients' condition to ensure investigations were properly tailored to a patient's condition. One NP commented that experienced RNs were actually more likely to seek such consultations than junior RNs since they were more aware of the complexity of the diagnostic process and the potential for over and under-ordering. Interviews with the RNs confirmed that NPs took the time to explain the diagnostic reasoning behind the choice of investigations, to support their decision making and to help them to develop their clinical judgement. In contrast, RNs perceived that when they consulted a doctor for advice on investigations, most would simply tell them what to order. RN6 speaks for the majority of when she compares the approach of the doctors and NPs:

With the NPs, I've definitely been able to get my clinical skills up. The NPs have helped me in getting my thoughts together about how to approach different cases, what to be looking for and how to look after Fast Track patients properly. Because protocols are all well and good, but the NPs really give you insight into why you're doing what you're doing and that helps me make better decisions in the future. While it's no one's fault, the doctors just say "order this and do this...", but the NPs will properly sit down and say "the reason we don't order that" or "the reason we order this"... **RN6**

Across the interview data there was a perception that the protocols that enabled RNs to initiate medications and investigations improved the timeliness and quality of patient care, but that individual clinical judgement based on knowledge and experience was still needed to safely and effectively perform these tasks. Registered nurses' autonomy was regarded as an efficient use of the team's skills but restrictions in the medication protocols and limitations in RNs' diagnostic knowledge in ordering investigations meant RNs often needed help from a doctor or NP to complete these tasks. Doctors and NPs both helped RNs overcome restrictions on autonomy by prescribing medications not covered in the protocol based on the clinical information provided by the RN, and their degree of trust in the RNs' clinical judgement.

When it came to helping RNs to overcome the limitations of their diagnostic knowledge in ordering investigations, doctors and NPs displayed different attitudes. Nurse practitioners shared their diagnostic knowledge to help RNs develop the clinical judgement needed to improve their ordering accuracy in the future, whereas doctors simply advised RNs which investigations to order. These contrasting attitudes to the sharing of diagnostic knowledge are further illustrated in the next subtheme.

Cost and Benefits of NPs' Specialist Knowledge

The second subtheme of the Autonomy and Knowledge Sharing theme to emerge from the interview findings focussed on the costs and benefits of NPs' specialist knowledge for the service, the team and the NPs themselves. There was universal agreement among the interviewees that NPs held specialist clinical and organisational knowledge in the treatment of minor injuries that meant they treated those conditions quicker and to a higher standard of care than other ED clinicians, as this emergency physician explains:

On a busy day in Fast Track, they're best placed to pick up patients that fall within their area of expertise … they can probably process those patients more rapidly with a higher level of care than anyone else in emergency, including ED physicians. **MO6**

Both M06, and one of the NPs interviewed clarified that it was difficult for doctors to keep up to date with the clinical and organisational knowledge needed to treat the wide range of patient conditions seen in the ED. Nurse practitioners were perceived to have "*filled a void*" (NP2) in the knowledge and skills for the minor injuries that were a significant component of ED workload. Nurse

practitioners' specialisation in minor injuries was regarded by all the interviewees, including the NPs themselves, as an efficient use of the team's skills since it allowed senior doctors to focus their advanced diagnostic skills on more complex and urgent patients.

The benefits of NPs' specialisation within the patient population for ED efficiency brought to the surface the question of whether their presence had a deskilling impact on the rest of the team. Six interviewees (3 doctors and 3 RNs) perceived that there was some deskilling effect on doctors' procedural skills such as plastering and suturing, and on RNs' knowledge for the treatment of burns. However, six interviewees (3 doctors, 1 RN and 2 NPs) perceived there were sufficient patients with minor injuries to minimise any deskilling effect. Indeed, NPs stated that they actively encouraged junior doctors to select patients with minor injuries from the waiting list because *"they need exposure to those conditions in their training"* (NP4). Furthermore, NPs' willingness to share their specialist knowledge, noted by all the doctors and RNs interviewed meant, overall, their presence was perceived to increase the team's skills.

Throughout the interviews, doctors and RNs consistently emphasised that they relied on NPs' knowledge in all aspects of the management of minor injuries. This included advice on diagnosis and treatment, supervising clinical procedures, and sharing their organisational knowledge of the hospital processes needed to appropriately treat Fast Track patients since *"NPs know exactly what form to fill in and who to refer to"* (MO7). Several doctors and NPs also commented that when there was no autonomous NP on duty, patients with minor injuries were primarily managed by junior doctors who required close supervision to ensure they provided safe, effective care. Thus, NPs' willingness to share their knowledge was recognised to both maintain a high standard of care in Fast Track, and to lighten the supervisory workload of other senior clinicians, as the following quotes illustrate:

> *[Nurse practitioners] are a source of knowledge that you just would not get anywhere else. You couldn't get that level of education unless you had an educator with you all the time. So you could choose as many in-services as you like, but they're the ones that teach you how to plaster. They're the ones that teach you how to clean a wound properly.* **RN6**

> *.. without the NPs, we have rotating junior doctors managing hands for the first time, for example. They ask [the emergency physicians] questions, or they think they know what they're doing but they neglect certain aspects, so we end up with complications and complaints…I much prefer to have the NPs who are stable, who know what they're doing for a set of conditions which, though minor, are important. There's a special skill set to manage those conditions and when the NPs are on I feel comfortable that they're the experts providing advice to the doctors.* **MO3**

As M03 points out, the NPs were a stable presence in the Fast Track area which meant they could set and maintain the expected standard of care for patient conditions as NP2 argued "*we take the peaks and troughs out of performance*". The NPs themselves regarded the education and supervision they

provided to their nursing and medical colleagues as part of their job, even the transient junior doctors whose skills would not be retained in the department.

> *We're a centralised workforce, so we're there all the time, so I think for the new junior medical staff and especially the different registrars that come through – you're a good resource for them because they don't treat as many of the patients as we do so you're often consulting them on X-rays or wounds or any cases that they aren't familiar with. You can do a lot of teaching with the medical staff, even with plastering and suturing, cannulating for new interns and even the processes of how things are done through the hospital - how to refer patients, how to organise community follow-up, all that kind of stuff.* **NP4**

> *I'm basically teaching all the interns, residents and even the registrars... this is part of my job, we have to keep doing it because the interns and residents change every three months. Unfortunately, educating the residents will continue to be time consuming but it's part of my job to teach them - it's collaborative, cooperative.* **NP1**

The benefits of NPs' specialist knowledge for the service and the team were clear in the data but, confirming the work observation findings, three out of the four NPs interviewed said they experienced some costs of this specialisation. These three reported their work in Fast Track could be repetitive and not sufficiently challenging and they wished to expand the range of patients they treated *and* to work in other areas of the ED. Two NPs commented that in the process of honing their diagnostic skills for less complex patients, they had deskilled in the critical care nursing skills for more complex and acute patients. Nurse practitioners also spoke of a need to develop their diagnostic knowledge to adapt to the increased complexity and aging of patients presenting to the ED, even within Fast Track. They further argued that the stability and expected standards of care they maintained in Fast Track could be applied to patient conditions seen in other areas of the ED.

Nurse practitioners understood that to expand the range of patient conditions they could treat safely and effectively "*needs adequate training, supervision and expertise to be acquired with a good governance framework*" (NP4). All the NPs reported that it was difficult to access training because they were *"separated from the nursing staff, but also separated from the medical staff"* (NP4) therefore did not fit into the education and training opportunities for either. They had previously attended the training provided for ED registrars, but the timing of these sessions had changed to coincide with Fast Track's busiest period and, unlike the registrars, no one was available to cover the NPs on shift so they could attend. They had also invited ED doctors and specialists from across the hospital to provide short training sessions and each NP had an emergency physician as a 'medical mentor'. Yet NPs reported that workload demands meant these sessions were frequently cancelled. Nurse practitioners therefore described their professional development as largely self-directed, keeping up-to-date through research and practice journals and attending the limited short courses available to them.

When it came to providing the consultations NPs required to treat patients beyond those conditions their formal scope of practice allowed them to manage autonomously, support from the doctors interviewed was weak. Just one doctor, a first-year registrar, thought the NPs could "*do what we do*" (MO2). Despite valuing NPs' knowledge and skills and acknowledging the significant contribution they made to the education and supervision of junior doctors, most of the doctors interviewed were reluctant to provide NPs with consultations on more complex patient conditions. The attitude expressed by the emergency physician below demonstrates sympathy for the NPs' situation but a belief that gaps in their diagnostic knowledge could not be overcome in the absence of a medical education.

> *I think professionally and personally for themselves, they'd like to expand. They get bored because they are all highly motivated, intelligent, educated people who get tired of treating those specific – yes, sprained ankles, broken bones, wounds and all those sorts of things. So, I think they want to expand, but in some way, they're still limited in what they can do because they're not doctors...* **MO4**

Doctors' reluctance to support NPs in treating more complex patients was primarily founded in a concern it did not represent the most efficient use of the team's skills. Nurse practitioners' autonomy to treat less complex conditions, without the need to consult a doctor, was central their perceived efficiency. This senior registrar's comments are typical of all but one of the doctors interviewed:

> *I think they've started to take on a little bit more, but I also think it's hard because what seems simple at first, can then become complicated … then it takes that nurse practitioner away from all the stuff that they would be able to see very quickly like the minor injuries and stuff, whereas the complicated stuff will take them a lot longer. When they run into barriers they then come to us and we have to go and review the patient.* **MO7**

The NPs reported they did manage more complex Fast Track patients as their experience and knowledge matured, and that some senior doctors were happy to provide them with the consultations that allowed them to do so. However, the NPs were aware that many of their medical colleagues were not enthusiastic about any further expansion to their scope. They also understood that their contribution to ED efficiency was a factor in these attitudes since "…*when you do something well, people naturally would like you to continue*" (NP4). NP3 also reflected on how their formal scope of practice had allowed them to develop their specialist knowledge and skills in less complex conditions but that their success in acquiring those expertise now restricted their practice:

> *While it was useful at the very beginning because it kept everything very safe, let's just get good at the narrow scope first… it has now become a bit of a restriction. I've said on several occasions that I want to move into different areas [of the ED] and see some more complex patients. But if I'm seeing eight or nine patients in Fast Track in a shift, they're not going to release me to see three in acute because that doesn't add up.* **NP3**

Nurse practitioners and their specialist knowledge and skills were highly valued by their nursing and medical colleagues for their contribution to ED efficiency and their stability in setting and maintaining standards of care for Fast Track patients, especially through their education and supervision of rotating junior doctors. For the doctors interviewed, NPs' autonomy in treating less complex patients was central this efficiency, and to lightening the supervisory burden of senior doctors. Consequently, doctors were reluctant to provide NPs with the consultations needed to treat more complex patient conditions. Thus, the NPs' themselves bore the costs of specialisation, in their experience of repetitive work and their confinement to the Fast Track area.

Summary

The interview data revealed some teamwork behaviours and organisational factors that point to flexibility within the team. The negotiation over delegated tasks was understood by all those interviewed as a form of task sharing that used the overlapping skills of the team. Further, interviewees universally understood that their roles were interchangeable in the performance of some tasks (shared tasks) more than others (core duties). 'Being flexible' in the ED meant not adhering rigidly your own role's core duties and to view responsibility for each role completing its tasks as being shared by the team. Staffing was perceived to have the biggest impact on the teams' ability to work flexibly and efficiently, coordinating their specialised but overlapping roles in response to changing workload demands. The interview data also explained how the team shared their autonomy over focal medical tasks, and their clinical and organisational knowledge to respond to patients' needs in the short term, and to develop their skills in the longer term.

Cutting across the interview findings was an overwhelming concern among doctors, NPs and RNs to provide timely and quality care, and to keep patients flowing through the ED. This was evident in all four themes: factors described in the delegation process to minimise errors and delays in tasks being completed; in their conceptualisation of task responsibility where the primary concern was the most efficient use of the team's skills; in the need for top-down coordination to avoid errors and delays and to maintain patient flow; and in both positive and negative attitudes to RNs and NPs undertaking medical tasks, all supported or criticised on their contribution to timeliness, quality and efficiency. In the next chapter this evidence from the Phase 2 interviews is integrated with that from Phase 1, drawing the meta-inferences for the study to identify the nature of flexibility in the ED team.

CHAPTER 9: DISCUSSION

Introduction

This chapter draws the meta-inferences from the analysis of the Phase 1 work observations (time study and fieldnotes) and the Phase 2 interviews and discusses them in the light of the existing literature. The purpose of the chapter is to address the study's final objective, to identify the nature of flexibility in the team of ED doctors and nurses. These meta-inferences form the basis for the concluding chapter, Chapter 10, which takes the insights from the exemplar of the ED team to define workforce flexibility for the broader healthcare context, and the implications for the organisation, development and regulation of healthcare professionals.

Throughout the discussion, the analytical framework is used to compare the meta-inferences against the ideal types of Taylorism and functional flexibility. As explained in Chapter 3, Taylorism aims to achieve technical efficiency in the use of skills through: workers performing a narrow range of tasks to attain expert performance and reduce training costs; the standardisation of work processes to minimise the variation associated with worker autonomy, and also to reduce training costs; and the top-down coordination of individuals' tasks into whole work processes by management. In contrast, functional flexibility aims to increase responsiveness and adaptability to changes in workload through: multiskilled workers who can perform a wide range of tasks and have overlapping roles; enhanced autonomy to handle more complex and indeterminate work; the organisation of work into teams where teamwork between team members coordinates their tasks into whole work processes.

The chapter presents the three key meta-inferences drawn from the Phase 1 and Phase 2 data. First, the ED team had a flexible occupational division of labour, where the tasks performed by doctors, NPs and RNs were differentiated according to traditional occupational roles but were also sufficiently multiskilled that they overlapped. Second, the teamwork practice of back-up behaviour described how the team used this flexible occupational division of labour to respond to patients' immediate needs and develop their skills in the long-term. Third, team stability was crucial for the team's ability to coordinate its specialised but overlapping roles, to work flexibly and efficiently in response to changing workload demands. These three meta-inferences, a flexible occupational division of labour, the flexibility of back-up behaviour and need for team stability for flexibility will be discussed in turn. The chapter concludes by summarising the nature of flexibility in the ED Fast Track team, what promoted and hindered that flexibility, and the study's limitations are discussed.

A Flexible Occupational Division of Labour

By comparing the tasks undertaken by doctors, NPs and RNs in an ED Fast Track team, and exploring the structure of social relationships that organised and coordinated their work, the study revealed that the team's tasks were distributed according to a flexible occupational division of labour. The quantitative time study data from Phase 1 identified that doctors', NPs' and RNs' roles were clearly differentiated by the proportion of time they spent on certain tasks. This pattern of differentiation reflected each role's function within the model of care and expected scopes of practice for their occupation. This task differentiation, associated with the occupational specialisation of each profession, is necessary for accomplishing large and complex processes such as healthcare because of the depth and breadth of knowledge required to deliver patient care (Allen & Pilnick 2005; Anteby, Chan & DiBenigno 2016; Hughes 1964/1994). As Zajac et al. (2013) argue, depth of knowledge comes from the specialist expertise embodied in each professional group while the breadth comes from the team's ability to effectively draw on those different specialisms within the team. However, task differentiation in the ED team did not take the form of the narrowly specialised, discrete roles of Taylorism. The time study data revealed that the range of tasks doctors, NPs and RNs undertook had more in common with the multiskilled and overlapping roles of functional flexibility (Atkinson & Meager 1986; Desombre et al. 2006; Fraser & Hvolby 2010).

Fast Track roles overlapped in two ways: where NPs and RNs undertook focal medical tasks; and where doctors, NPs and RNs shared everyday clinical tasks in response to changing patient demand. Both forms of overlap between medical and nursing roles are indicative of the high proportion of complex, indeterminate tasks within ED work. Patients arriving at the ED are undifferentiated and every patient must have their symptoms treated and a diagnosis formed quickly, hence the need for nurses to undertake focal medical tasks. Moreover, patients' short length of stay created a bias towards medical tasks within the team's workload. Tasks relating to patients' physical comfort, hygiene and nutrition, traditionally associated with nursing, were a very small component of the team's overall workload, even for RNs (1.3% of their total task time). That the team comprised only regulated professionals reflects the high proportion of complex, indeterminate tasks in ED work.

The interviews revealed that ED clinicians understood their flexible occupational division of labour of specialised but overlapping roles in terms of "core duties" and "shared tasks", regardless of whether these were traditional tasks for their profession. Each will be discussed in turn.

Core Duties

Core duties were understood by interviewees to be those tasks primarily the responsibility of a particular role (doctor, NP or RN), part of their occupational specialisation. The core duties of doctors and NPs were easily identified in the Phase 1 data and reflected both roles' function within the Fast Track model of care: to determine the diagnosis, treatment and disposition of patients. Both

doctors and NPs spent the highest proportion of their time on tasks related to the assessment and diagnosis of patients, with the documentation of patients' clinical notes the most time-consuming individual task. However, doctors' and NPs' tasks were differentiated in two key ways. First, NPs spent a significantly higher proportion of time communicating with patients than did doctors: educating them about their condition and providing information and resources to support their ongoing care and treatment. This supports the findings of other studies of NPs' work that, while their core duties are the focal medical tasks of diagnosis and treatment, they retain the core nursing values of holistic, patient-centred care (Chattopadhyay, Zangaro & White 2015; Fisher, Steggal & Cox 2006; Jennings et al. 2015).

Second, doctors and NPs were differentiated by the range of patient conditions they predominantly treated. Nurse practitioners were specialists in the treatment of minor injuries, the result of their confinement to Fast Track and their formal scope of practice which stipulated the conditions they could treat autonomously. This specialisation was not exclusive. NPs were observed to treat other patients autonomously, and in consultation with senior doctors. Doctors were also observed treating minor injuries. However, NPs' specialisation was evident in the time study (spending a significantly higher proportion of time performing procedures, ordering more X-rays and spending a lower proportion of time on prescribing medications), and the interviews (where NPs' expertise in the treatment of minor injuries was widely acknowledged). These findings reflect scope of practice norms for NPs in Australian EDs (Dinh et al. 2012; Jennings et al. 2013; Lutze et al. 2014) and internationally (Hoskins 2011). Nurse practitioners spent significantly less time than doctors on patient assessment and diagnosis tasks and there was a widely-held perception among the doctors and RNs interviewed that NPs had developed specialist expertise that enabled them to treat patients with minor injuries more quickly, and to a higher standard of care than even the most senior doctors in the department.

Interviewees regarded NPs' specialisation within the ED patient population as an efficient use of the team's skills, allowing each role to focus on the conditions their education prepared them for (Hurlock-Chorostecki et al. 2013; Jones et al. 2013). While NPs were multiskilled across the medical and nursing domains, by gaining expert performance in a narrower range of patient conditions, they also drew on the benefits of Taylorism. To avoid the costs of 'idle time' that can be associated with specialist skills, there must be sufficient demand for those skills. Like the NPs in this study, specialised workers cannot be redeployed to meet demand in other areas (Bacon, Blyton & Dastmalchian 2010; Carvalho & Cabral-Cardoso 2008; Menezes & Wood 2006). Interviews confirmed there was high demand for NPs' specialist skills. Fast Track treated around 40 percent of ED patients, therefore NPs' specialisation and associated lack of internal mobility did not result in excessive idle time. The time study captured idle time in the Waiting task category, which was coded when the participant had completed all the tasks they could. Nurse practitioners did spend a higher proportion of their time Waiting than doctors (6.7% compared to 4.9%) but this difference was not statistically significant. In

the context of high patient demand, NPs' specialisation in minor injuries was perceived by interviewees from all three roles to reduce patients' waiting times in the ED. This finding concords with the drivers for the expansion of NPs in EDs globally (Hoskins 2011; Jennings et al. 2013; Wilson et al. 2009).

Identifying RNs' core duties in the Phase 1 and Phase 2 data was more challenging than for the doctors and NPs, a challenge that has vexed the nursing profession from the earliest debates (Etzioni 1969; Larson 1977) to the present day (Allen 2014; Currie & Carr-Hill 2013). Unlike NPs and doctors whose core duties clearly centred on their primary function to diagnose and treat patients, RNs' core duties were incredibly diverse and spanned traditional nursing and medical tasks. This pattern of task distribution echoes observations made by others, that the nursing profession has developed by working flexibly, taking on more, and more complex tasks from doctors over time (Allen 2014; Hughes, MacGill Hughes & Deutscher 1958; Oelke et al. 2008). Evidence from Phase 1 revealed RNs' core duties included the monitoring of waiting patients to safeguard their safety, performing patient assessments, initiating medications and investigations, as well as administering medications and performing test procedures.

However, RNs were most clearly differentiated from the doctors and NPs by the high proportion of time they spent performing tasks related to the organisation of care. Specifically, RNs spent a significantly higher proportion of their time on professional communication and all three roles spent more time communicating with nurses than any other role. This finding supports Allen's (2014) contention that nursing's unique contribution to healthcare centres on their role as an intermediary in the organisation of work, particularly as an information broker within the team. In line with similar roles in Australian EDs (Fry et al. 2013), RNs also undertook the role of information broker for waiting patients: communicating information about their care and progress, a key driver of patient satisfaction in EDs (Sørup & Jacobsen 2014). Related core RN duties observed in practice and discussed in the interviews were the oversight of patient flow through the department and driving the patient admission process, a function noted in other studies of emergency nursing work (Annandale, Clark & Allen 1999; Jones, Shaban & Creedy 2015; Nugus & Forero 2011). These duties were particularly evident in the nurse coordinator role discussed later in the chapter.

The oversight of patient flow was combined with RNs' clinical assessment and diagnosis skills in another core RN duty, the monitoring of waiting patients to protect their safety (Lambe, Currey & Considine 2017; Munroe et al. 2016; Sørup & Jacobsen 2014). Registered nurses were often observed discussing a patient's potential diagnosis with their medical and nursing colleagues, particularly when they believed the patient needed more urgent care. This practice demonstrates a point argued by Allen (1997) that the line between the 'nursing assessments' performed by RNs and those performed by doctors to form a diagnosis is difficult to sustain in everyday clinician practice. In Fast Track, the line between RNs' patient assessments and medical diagnosis was formally crossed when RNs

initiated medications and investigations (Castner et al. 2013; Munroe et al. 2016; Weber et al. 2011). The initiation of medications by RNs was universally regarded by interviewees as a crucial component of quality emergency care, especially in reducing time to analgesia, a perception borne out by literature (Barksdale et al. 2016; Bhakta & Marco 2014; Fry, Bennetts & Huckson 2011; Pierik et al. 2016). Investigations ordered by RNs early in the patient's journey commenced the diagnostic process and was perceived to reduce patients' length of stay in the ED, thus helping the team achieve the four-hour performance target. This perceived reduction in length of stay is consistent with evaluations of RN-initiated investigations in other EDs (Douma et al. 2016; Retezar et al. 2011; Rowe et al. 2011).

In RNs' core duties of monitoring of patients to protect their safety and initiating medications and investigations, they demonstrated that while responsibility for the formal diagnosis and treatment decision rested with a doctor or NP, the process of undertaking diagnosis and treatment was shared. Indeed, the interview data showed that the medications and investigations ordered by RNs were sometimes all Fast Track patients needed to diagnose and treat their condition. Echoing the principles of multiskilling advocated by functional flexibility (Atkinson 1984, 1985; Atkinson & Meager 1986), if the timeliness of patient care was increased it was because patients did not have to wait for a doctor or NP to have their symptoms managed and for the diagnostic process to begin.

Shared Tasks

Phase 1 identified there were everyday clinical tasks, particularly investigation and treatment-related procedures, that were shared because a doctor or NP could perform it themselves or delegate to an RN. The status of a task as a shared task or a core duty partly depended on when it was performed. For example, venepuncture was a core RN duty when initiated following their patient assessment. and a shared task when delegated from a doctor or NP. This explains why RNs were observed to perform more of these procedures. The Phase 2 interview data highlighted that whether a task was perceived to be a shared task or a core duty was important for the delegation process because it was acceptable for a busy RN to decline a delegated task if it was one they shared with the doctor or NP (e.g. venepuncture) but less so for a core RN duty (e.g. medication administration). There was a perception evident in the interview data that as more RNs acquired venepuncture skills, the more doctors regarded it as a core RN duty, thus weakening RNs' ability to decline a delegated venepuncture procedure if they were busy.

Together these findings provide insight into how everyday medical tasks gradually shift from doctors to RNs over time, a trend noted by others (Duffield et al. 2014; Hughes, MacGill Hughes & Deutscher 1958). Previous qualitative studies found that when RNs are trained to perform everyday medical tasks such as venepuncture, nurses perceived that those tasks are *shifted* (i.e. to become part of their core duties), rather than being *shared* with doctors (Allen 2000; Doherty 2009; Jones 2003; Pearcey 2008). Concordant with this perception, some of the procedures identified as core RN tasks in Phase 1 (vital signs, intravenous management, and echocardiograph) were once exclusively

performed by doctors (Duffield et al. 2014; Hughes, MacGill Hughes & Deutscher 1958; Jones 2003). All the doctors interviewed in the present study regarded venepuncture as a critical skill in emergency medicine therefore it may never be fully shifted to RNs in the ED environment. Nonetheless, conflicts over delegated venepuncture procedures did arise between RNs and doctors due to the ambiguity of who was ultimately responsible for this shared task.

The study also identified differences between NPs and doctors in the range of tasks they shared with RNs. Phase 1 found that NPs undertook core RN duties such as medication administration and test procedures more frequently than did doctors. Phase 2 confirmed a perception among RNs that NPs delegated tasks less often than doctors. These findings reflect those in other healthcare settings where NPs have been found to utilise their medical and nursing skills to increase responsiveness to patients' needs (Carryer et al. 2007; Gardner et al. 2010; Kilpatrick, Lavoie-Tremblay, Ritchie, Lamothe, Doran, et al. 2012). That said, contrary to Bourgeault & Mulvale's (2006) observation that doctors are rarely noted to undertake nursing tasks, the doctors in this study did assist with the administration of medications, and performed other core RN duties such as urinary analysis and vital signs, albeit at a lower rate than the NPs. Underscoring the importance of multiskilling in the busy ED environment, there was a commonly held view within the interview data that doctors should be able to perform or assist in some nursing tasks to respond to patients' urgent care needs.

The study is the first to measure task distribution between doctors, RNs and NPs in sufficient detail to empirically demonstrate that a healthcare team can comprise occupationally distinct roles with specialist skills, but also be sufficiently multiskilled to create some overlap in the tasks those roles perform. Role overlap occurred through ED models of care that gave nurses focal medical tasks as core duties and through everyday clinical tasks being shared through the delegation process. The following section discusses the teamwork behaviour that explains how the team used this flexible occupational division of labour to work flexibly in response to patients' needs, and to develop knowledge and skills within the team.

The Flexibility of Back-Up Behaviour

Under functional flexibility, multiskilled team members with overlapping roles have the capacity to help each other complete their tasks in response to changing demand. This teamwork practice, known as back-up behaviour, emerged from the Phase 1 and Phase 2 data as the best explanation for how the team used their overlapping roles to work flexibly. Unlike the typical characterisation of healthcare teams reported in the literature (Braithwaite et al. 2013; Casanova et al. 2007; Finn 2008; Hall 2005), the ED team understood their roles were interdependent and provided each other with back-up to achieve their shared goals. These goals were to deliver quality and timely patient care to keep patients flowing quickly through the ED, the same as those found in other studies of Australian EDs (Fry 2012; Nugus & Braithwaite 2010). As Nugus & Braithwaite (2010) argue, the combined goals of

clinical quality (safety, quality and timeliness) and organisational efficiency (maximising patient flow) reflect the realities of ED work, of meeting time-based performance targets and preventing the adverse outcomes associated with department overcrowding. This relies on existing patients being treated and discharged quickly to make space for a continuous flow of new patients (Forero et al. 2010; Hoot & Aronsky 2008; Lowthian et al. 2012). Two studies of ED teams by Flowerdew et al. (2012) and Grover, Porter & Morphet (2017) have suggested that back-up behaviour is a feature of teamwork in EDs. The present study is the first to empirically describe this teamwork practice of doctors and nurses.

Marks & Panzer (2004) define three forms of back-up behaviour as i) completing a task for a team member, ii) helping a team member to complete a task, and iii) providing advice or coaching so a team member can complete a task. All three forms of back-up behaviour were present in the Phase 1 and Phase 2 data and were shaped by the ED context, specifically: i) 'task back-up', where team members performed tasks to balance workload across the team; ii) 'autonomy back-up' where team members with greater autonomy over focal medical tasks helped those with less autonomy to complete their tasks; and iii) 'knowledge back-up', where team members shared their knowledge to help others complete their tasks.

Task Back-up

The teamwork behaviour of task back-up was observed in Phase 1 and emerged from the Phase 2 interviews and explains how the team used their multiskilled, overlapping roles to share tasks in response to changing workload demands. Task back-up was demonstrated through the task sharing of the delegation process. Good practice in task delegation is a two-way negotiation where the delegator is aware of the delegatee's skills and workload, and the delegatee accepts the task only if they have the capacity to complete it to an appropriate standard and within a reasonable timeframe (Mueller & Vogelsmeier 2013; Spilsbury et al. 2011). There was strong evidence in the interview data for this negotiated approach, to minimise the transaction costs of error and delay identified as risks in the task delegation process. Registered nurses declined a delegated task if they lacked the capacity to complete it to an appropriate standard and within an acceptable timeframe, while NPs and doctors would perform an urgent or technically difficult task themselves to minimise the risk of errors or delays. Nurse practitioners were able to provide task back-up for RNs more often since they had a greater overlap with RNs' skills than did doctors.

The team's approach to task delegation did more than minimise errors or delays in a particular task being completed, it also served to balance workload across the team. Team members would perform a shared task to allow an overloaded team member from another role to focus on their core duties. This sought to avoid blockages in patient flow caused by uneven workload distribution within the team, a key function of back-up behaviour described in the literature (Kalisch, Weaver & Salas 2009; Porter et al. 2003). Through the flexibility of task back-up the team prioritised and reprioritised each

roles' core duties to response to changing workload demands to keep patients flowing through the ED. This usually meant senior doctors' advanced diagnostic skills and decision-making authority were prioritised by the team since this had a major impact on patient flow, but not in every circumstance. It was evident in the Phase 1 and Phase 2 data that senior doctors performed shared tasks to allow RNs to focus on their core duties, especially the hospital admissions process, which also had a major impact on patient flow.

Task back-up behaviour demonstrates how the team drew on their specialised and overlapping skills to find the most efficient use of skills to meet the team's goals of timely and quality patient care (Salas, Sims & Burke 2005; Zajac et al. 2013). It also demonstrates that the ED team understood efficiency as context-dependent: each roles' specialist skills were prioritised and reprioritised according to patients' needs within the department at a particular moment in time. This approach stands in contrast to the technical efficiency of 'substitution' associated with Taylorism, and prevalent in the workforce reform literature (Duckett & Breadon 2014; Hollingsworth 2008; Rigoli & Dussault 2003), which assumes the highest paid workers' time should always be prioritised.

The team used task back-up to achieve their goals of timely and quality patient care, but this flexibility meant responsibility for who should perform a shared task was also context-dependent and could therefore be ambiguous. The ambiguity of shared tasks where roles overlap has been identified as a cause of process conflict within healthcare teams (Huang et al. 2016; Zajac et al. 2013). Process conflict is defined as a misunderstanding or disagreement over task responsibility (Jehn & Mannix 2001; Salas et al. 2015), for example where RNs complained that some doctors always delegated shared tasks without considering relative workloads. The interprofessional teamwork literature suggests the solution to process conflict associated with the ambiguity of shared tasks and overlapping roles is 'role clarity' (Hudson et al. 2017; Nancarrow et al. 2013; Reeves, Lewin & Espin 2010; Suter et al. 2009). Role clarity implies the explicit delineation of tasks between roles to eliminate any ambiguity in task responsibility.

For the first time this study has illustrated that the ambiguity of overlapping roles and shared tasks is a necessary cost of the flexibility of task back-up. Indeed, doctors, NPs and RNs made it clear that 'being flexible' in the ED meant <u>not</u> having a delineated view of role responsibility, a sentiment also described in Grover, Porter and Morphet's (2017) interviews with emergency nurses. For task back-up to occur, team members have to be multiskilled, able to negotiate the ambiguity of shared tasks, and be *willing* to perform those tasks. The willingness of team members to perform tasks so that others may complete their tasks is founded in a sense of shared responsibility for the team's tasks (Kalisch, Weaver & Salas 2009; Porter et al. 2003). In the only other study of task back-up in a healthcare setting, Kalisch & Lee (2010) found that RNs' lack of willingness to provide back-up to the nursing assistants in their team contributed to omissions and errors in nursing tasks being completed. The authors attributed this to RNs' maintaining an inflexible, delineated view of their

role, and the absence of shared responsibility for the whole nursing team completing its tasks. Evidence from the ED team supports Kalisch and Lee's (2010) findings as a contrary case where a team *was* willing to provide task back-up across roles due to a sense of shared responsibility for the team's tasks. An attitude evident throughout the Phase 1 and Phase 2 data was that the team could not achieve its goals of timely, quality patient care and keep patients flowing through the ED if team members only focussed on completing their own core duties.

Task back-up, enabled by multiskilled, overlapping roles and shared responsibility for the team's tasks was a clear example of how the team worked flexibly. Through task back-up, the Fast Track team ensured each role completed its core duties, balancing workload across the team to keep patients flowing through the ED. The team also demonstrated flexibility by helping each other complete their tasks through the teamwork of autonomy back-up.

Autonomy Back-up

Autonomy back-up describes how the team managed their differing levels of autonomy over focal medical tasks, a teamwork behaviour observed in Phase 1 which was confirmed in Phase 2 and has not previously been explored in the literature (Srivastava et al. 2008). Autonomy back-up involved a team member with a greater level of autonomy over a focal medical task helping a team member with less autonomy to complete that task to ensure patients received appropriate and timely care.

Registered nurses' ability to initiate medications and investigations was perceived by the team to increase the timeliness and quality of patient care, and regarded as an efficient use of the team's skills since it reduced doctors' and NPs' workload (Bradley & Nolan 2007). However, RNs often required autonomy back-up from doctors and NPs to respond to patients' needs because Taylorist protocols restricted their autonomy to less complex conditions and their discretion to a narrow range of medications and investigations (Djukic & Kovner 2010; Kroezen et al. 2013). Protocols, by design, do not meet every ED patients' needs and health conditions are inevitably more complex than can be expressed in an algorithm (Berg 1997; Timmermans & Almeling 2009). To meet the needs of those patients with conditions not covered by the protocols, the RNs sought autonomy back-up from doctors and NPs.

Autonomy back-up was mandated in the protocols for RN-initiated investigations since certain tests required verbal approval from a doctor (Douma et al. 2016). For medications, the Phase 1 and Phase 2 data illustrate that the team worked around protocol restrictions by RNs asking a doctor or NP to prescribe a medication they could not initiate themselves. To protect patient safety, doctors' and NPs' decision whether to prescribe the medication, or to assess the patient themselves considered any 'red flags' in the clinical picture provided by the RN. However, they also considered the experience of the RN making the request and their level of trust in that RN's clinical judgement. Doctors and NPs demonstrated a reliance on, and confidence in experienced RNs' knowledge and judgement in

managing patients' symptoms. The practice also highlights that RNs' influence over prescribing decisions was much greater than the 23% (n=26) of prescription tasks they undertook themselves. These findings support an observation made by Page, Bajorek & Brien (2008) that, despite being a regulated act that emphasises the individual responsibility of the licenced prescriber, prescribing decisions are made within a team. Professionals share their knowledge of the medication and the patient's condition to guide prescribers' decisions, yet surprisingly little is known about these social influences on prescribing behaviour (Jutel & Menkes 2010; Lewis & Tully 2009; Page, Bajorek & Brien 2008).

From a flexibility point of view, autonomy back-up increased the team's responsiveness to the needs of those patients with a symptom or condition not covered by the protocols. However, RNs seeking autonomy back-up from a doctor or NP consumed more of the team's time than had they initiated the medications themselves, and can therefore be understood as a transaction cost generated by the protocols' restrictions. Indeed, there was evidence in the Phase 1 and Phase 2 data that RNs' discretion over medications had become more restrictive over time necessitating more frequent requests for autonomy back-up. One reason organisations take a protocol approach to workforce reform is to save costs. Training RNs to follow an algorithm is much less expensive and time-consuming than educating them in the pharmacology knowledge needed to make safe, autonomous prescribing decisions (Wise et al. 2017). Yet there is no consideration of the transactions costs generated by the patient exclusion criteria and restrictions on discretion in the current body of literature on nurse protocols.

Another key reason organisations use protocols is to manage the risks and accountability of RNs performing focal medical tasks in their workplace (Djukic & Kovner 2010; Kroezen et al. 2013; Niezen & Mathijssen 2014). Healthcare organisations are vicariously liable for the nurses they employ, and, following the principles of Taylorism, protocols are used to minimise the risk of nurses' using their discretion (to patients and the organisation), and to hold them accountable when they do not follow protocol (Bail et al. 2009; Ilott et al. 2010). This concern with risk and accountability calls into question the use of standing orders, the legal mechanism organisations use to work around legislation that prohibits RNs from prescribing medications (Cashin et al. 2009; Wilkinson 2011). Standing orders are themselves a form of autonomy back-up since a doctor (in this case the ED medical director) delegates his legal authority to prescribe to RNs, allowing them to initiate medications. As Cashin et al.'s (2009) analysis of English and Australian case law illustrates, standing orders do not manage risk or accountability since doctors cannot be held liable for the actions of nurses.

Despite the fact that doctors are not legally accountable for nurses, the medical profession is often very influential in the process of developing the protocols that determine the level of autonomy and discretion nurses have over focal medical tasks (Currie et al. 2012; Scott 2008; Thomas & Hewitt 2011). As Nugus et al. (2010) argue, one reason for this is that doctors are socialised, in their

education, in their workplace and in regulatory, organisational and cultural structures to see themselves as the primary decision-makers in patients' care. Organisations' concern with controlling costs and managing the risk of nurses' actions are thus closely aligned with the medical profession's desire to retain their primary position in the diagnosis and treatment of patients (Currie et al. 2012). Meanwhile, given the opportunity to acquire coveted focal medical tasks, the nursing profession has actively participated in the protocol approach to reforms (Bail et al. 2009; Ilott et al. 2010; Rycroft-Malone et al. 2008). The growth in nurse-initiated medications and investigations across healthcare settings highlights that organisations, and the professions recognise the need to increase responsiveness to patients' needs. That the Taylorist solution of protocols is used to achieve this responsiveness, for a narrow range of patients and when the RN is employed in a particular workplace, reflects a compromise between organisational and professional interests that limits the long-term flexibility of the workforce.

Similar compromises are evident in the restrictions placed on NPs' lawful autonomy. Nurse practitioners' legal status meant they should not have to seek autonomy back-up from doctors to prescribe medications or order investigations, and largely they did not. However, their exclusion from the Medicare Benefit Schedule (MBS) payment system meant, when referring patients for investigations outside the hospital, they had to use the ED medical director's MBS number. Nurse practitioners were also observed asking a doctor to prescribe a medication not included in the formulary defined by their employer. They also asked doctors to write an external prescription for a patient to fill in their local pharmacy since they did not have a Pharmaceutical Benefit Scheme prescriber number. Further, NPs' formal scope of practice mandated they must consult a senior doctor to treat any condition not listed as one they may treat autonomously, another form of autonomy back-up.

Professional regulation and good clinical practice dictates that doctors and NPs only manage those patient conditions they are educated and competent to treat, and to consult colleagues when unsure of a diagnosis or treatment plan (MBA 2014; NMBA 2008; Schadewaldt et al. 2016). Schadewaldt et al.'s (2016) study of the consultation requirements imposed on NPs in Australian primary care argues that policies stipulating the conditions under which an NP *must* consult a doctor represent an unwarranted restriction on NPs' lawful autonomy. Like RNs, NPs are accountable for their own clinical practice, yet the medical profession has continued to constrain flexibility by influencing the conditions under which NPs may work (Jones et al. 2013; MacLellan, Higgins & Levett-Jones 2015; Schadewaldt et al. 2016). In the ED, NPs' formal scope of practice agreement that restricted their autonomous practice to minor injuries and illness had the effect of limiting flexibility, confining them to Fast Track and specialising in a narrower range patient conditions than either the doctors or the RNs.

Through autonomy back-up team members helped others with less autonomy over focal medical tasks to complete those tasks, especially to ensure patients received timely medications. Autonomy back-up can be considered a form of flexible teamwork that used the team's overlapping skills to meet patients' needs. However, autonomy back-up also represents a transaction cost of Taylorism, restricting RNs' and NPs' autonomy to control costs and manage the risks of nurses performing focal medical tasks. As the following section reveals, the team also had to provide back-up to manage different levels of knowledge over those tasks.

Knowledge Back-up

The teamwork behaviour of knowledge back-up describes the advice or coaching one team member provides another to help them complete a task (Marks & Panzer 2004). Knowledge back-up contributes to flexibility within teams in two ways. First, it increases responsiveness in the short term, helping team members complete their tasks in a timely manner and can also safeguard quality and safety (Porter, Gogus & Yu 2011; Smith-Jentsch et al. 2009). Second, knowledge back-up increases adaptability to the changing needs of the patient population in the long-term, as less experienced team members acquire the knowledge and skills they need to become multiskilled, autonomous professionals (Porter, Gogus & Yu 2011). For example, the senior clinicians in this study understood that the quality and timeliness of an experienced clinician performing a procedure themselves had to be balanced with providing knowledge back-up and supervision to novice clinicians so they could perform those procedures safely and independently in the future (Thorton & Hazell 2008).

There was evidence across the Phase 1 and Phase 2 data that the team's overlapping roles meant knowledge back-up was an interprofessional endeavour. Three types of interprofessional knowledge back-up were prominent in the data: the knowledge back-up RNs and NPs provided to support junior doctors; the knowledge back-up RNs needed to accurately order investigations; and the knowledge back-up NPs required to expand their scope of practice into more complex patient conditions.

Supporting Junior Doctors

Forty-four percent of the full-time equivalent medical staff in the ED were junior doctors (interns, residents and senior residents) rotating through the hospital system. Junior doctors require a lot of knowledge back-up since they have yet to acquire much of the clinical and organisational knowledge and skills necessary to complete their tasks and to work safely and effectively in a team (Curtis, Tzannes & Rudge 2011; Ursic et al. 2009). Junior doctors' demand for knowledge back-up was borne out in the time study data where doctors in Fast Track were observed being supervised significantly more frequently (88%) than the NPs (6%) or RNs (6%). Emergency physicians and senior registrars had formal responsibility for supporting and supervising junior doctors, and they were observed performing this role. However, as the medical education literature is coming to recognise (Burford et al. 2013; Varpio et al. 2014; Weller, Barrow & Gasquoine 2011), RNs and NPs also support junior

doctors through knowledge back-up, including helping them to complete their focal medical tasks safely and effectively.

New doctors received a formal orientation to the department, its model of care and administrative systems, and were guided by more experienced doctors. However, as Burford et al. (2013) also found in hospital wards, RNs played a critical, and often under-recognised role, in orientating junior doctors to their role. Given their dominance in the organisation of care, RNs were a source of organisational knowledge for junior doctors, such as the administrative processes, the electronic medical record system, and the location and storage of equipment, a role noted by others (Allen 2014; Gilmour et al. 2014; Weller, Barrow & Gasquoine 2011). Registered nurses also provided knowledge back-up to junior doctors to ensure they made safe and appropriate prescribing decisions, correcting errors and omissions. Research on junior doctors' prescribing errors suggests that medical students' pharmacology education emphasises theoretical knowledge, with less attention paid to the practical knowledge needed to safely prescribe medications to treat individual patient conditions (Lewis & Tully 2009; Pearson, Rolfe & Smith 2002; Ward & Wasson 2016). As Dearden et al.'s (2015) systematic review of junior doctors' prescribing skills suggests, junior doctors implicitly rely on RNs to check the accuracy of their prescriptions to compensate for this lack of knowledge. The administration of medications was a core RN duty and, in line with other studies of junior doctors' prescribing practice (Burford et al. 2013; Lewis & Tully 2009; Pearson, Rolfe & Smith 2002), the RNs were observed sharing their knowledge on the dose, frequency and route of medication administration.

Like all healthcare professionals, novice doctors learn to apply the theoretical clinical knowledge acquired in formal education by treating real patients under the guidance and supervision of more experienced colleagues (Chong et al. 2010; Dent et al. 2006; Fry & Rogers 2009). In a survey of Australian junior doctors' post-registration experiences, Dent et al. (2006) found that junior doctors regarded consultations with senior colleagues on individual patients' conditions as the most valuable component of their learning, a form of knowledge back-up. In the ED team, senior registrars and emergency physicians were formally responsible for providing junior doctors with these consultations, but NPs also performed this duty. The Phase 1 time study data highlighted that NPs provided supervision nearly twice as often to doctors than to RNs. In common with other healthcare settings, doctors and RNs in ED regarded NPs as a 'resource person' in the clinical and organisational knowledge needed to diagnose and treat the patients within their specialist area of expertise (Kilpatrick, Lavoie-Tremblay, Ritchie, Lamothe, Doran, et al. 2012; Kvarnström, Jangland & Abrandt Dahlgren 2017; Williamson et al. 2012). Doctors perceived that, through this knowledge back-up, NPs set and maintained the clinical standards for how minor injuries and illness should be managed by rotating junior doctors. The NPs themselves regarded the knowledge back-up they provided to support the development of junior doctors' as part of their job, despite their skills not being retained

in the team long-term. Thus, contrary to concerns reported in the literature that the presence of NPs in ED deskills juniors doctors in the treatment of minor injuries (Chong et al. 2010; Currie & Crouch 2008; Jones et al. 2013), the doctors in this study understood that the NPs upskilled junior doctors while also reducing the supervisory workload of senior doctors.

Improving RNs' Ordering Accuracy for Investigations

A key area of knowledge back-up provided by doctors and NPs to RNs was in the diagnostic knowledge needed to order investigations accurately. When ordered correctly, RN-initiated investigations were perceived to reduce patients' length of stay. However, doctors and NPs perceived that gaps in RNs' diagnostic knowledge meant they were prone to over and under-ordering investigations, and that this compromised the team's goals of quality and timely patient care. These perceptions reflect the state of the evidence on RN-initiated investigations more broadly: that their impact on reducing length of stay is reasonably well-established but there has been limited focus on RNs' ordering accuracy (Rowe et al. 2011), and only for X-rays (Considine et al. 2013; Patel, Celenza & Watters 2012).

There was a prevailing view among the doctors and NPs interviewed that investigations could only be tailored to a patient's specific condition through the exercise of clinical judgement based on the diagnostic knowledge and experience of the clinician (Greenhalgh, Howick & Maskrey 2014; Timmermans & Almeling 2009). The RNs themselves felt neither the workplace training nor the guidance in the protocols had given them adequate diagnostic knowledge to properly tailor investigations. This finding is in line with Rowe et al.'s (2011) systematic review of programs introducing RN-initiated investigations that, in most cases, the training is brief, often a one-hour lecture. Research on nurse-initiated X-rays by Considine and colleagues (2013) demonstrated that providing RNs with more extensive training can improve their ordering accuracy and that this training had a greater positive impact than the protocol introduced to support their decision making. Interview data show that nursing management had recognised the need to improve RNs' accuracy in ordering X-rays and had tasked an NP to provide them with additional training. However, at the time of this research, there was no similar plan to improve RNs' accuracy in the more complex area of pathology investigations.

In the absence of extensive training, RNs described a process of developing their diagnostic knowledge and clinical judgement through experience, similar to that of junior doctors. They assessed patients, gained experience of ordering investigations for similar conditions, and sought knowledge back-up from doctors and NPs when required. For any clinician, obtaining a second opinion from colleagues before ordering investigations can validate decision making and fill gaps in diagnostic knowledge (Pirret, Neville & La Grow 2015). Registered nurses perceived when they sought knowledge back-up from an NP, the NPs were approachable and explained the diagnostic reasoning behind the choice of investigations. Nurse practitioners themselves viewed this knowledge back-up

as a learning opportunity to help RNs order investigations more accurately and independently in the future, increasing their adaptability. These findings resonate with those of other studies, which have noted the role of NPs in RNs' learning (Li et al. 2013; Van Soeren, Hurlock-Chorostecki & Reeves 2011; Williamson et al. 2012). Phase 2 interview data revealed that doctors also provided knowledge back-up to RNs to ensure the correct investigations were ordered. However, they did not take this opportunity to share their diagnostic knowledge to improve RNs' ordering accuracy in the future. Instead, doctors expressed a general concern that RN-initiated investigations be restricted to the simplest patient conditions. Doctors displayed a similar reticence to providing NPs with the knowledge back-up they needed to expand their scope of practice into more complex patient conditions.

Expanding NPs' Scope of Practice

Nurse practitioners' formal scope of practice mandated that to treat more complex conditions they had to consult a senior doctor. Beyond compliance with this organisational requirement for autonomy back-up, the NPs understood that to expand the range of patients they could treat safely and effectively, they needed knowledge back-up from senior ED doctors in the workplace, as well as more formal training in diagnostic knowledge. Receiving knowledge back-up from doctors has been shown to be an essential element in the successful transition of newly qualified NPs to autonomous practice (Fleming & Carberry 2011; MacLellan, Higgins & Levett-Jones 2015). The NPs in this study were well-established and regarded as experts in minor injuries, therefore no longer required knowledge back-up from senior doctors for those conditions. However, three out of the four NPs reported that this specialisation and their confinement to the Fast Track area, had a negative effect on their job satisfaction. It is a well-known drawback of specialisation that once skills are mastered, employees can experience work as somewhat repetitive, particularly when the worker lacks internal mobility in the organisation as NPs did (Parker & Wall 1998; Walker 1950). These emergency NPs expressed a desire to expand their scope by treating more complex patients and to work in other areas of the ED, for their own job satisfaction, to meet the demands of an increasing complex patient population, and to help set and maintain clinical standards in the other areas of the ED as they did in Fast Track.

The interview data revealed that NPs' access to formal training in diagnostic knowledge was limited, since it was controlled by and designed for doctors, including the specialist medical college. This highlights that the medical profession continues to exercise formal control over its body of knowledge (Abbott 1988; Currie et al. 2012; Muzio & Kirkpatrick 2011). Further, normative control over medical knowledge was exercised by doctors in the workplace. Phase 1 and Phase 2 data identified that doctors did provide NPs with the knowledge back-up they required to treat more complex conditions. However, the interview data uncovered a reticence among doctors towards

providing this knowledge back-up and scepticism regarding any further expansion in the complexity of patients that NPs treat.

Across healthcare settings and jurisdictions, diagnostic complexity has been identified as a key factor in the medical profession's acceptance of NP roles: the less complex the patient, the more positive doctors' attitudes to NPs treating them (McMurray 2011; Niezen & Mathijssen 2014; van Offenbeek, Sorge & Knip 2009). There was evidence in the interview data of an attitude among doctors that gaps in NPs' formal education in diagnostic knowledge were too great to be overcome through knowledge back-up and clinical experience. These attitudes were also identified in McMurray's (2011) study of GPs' role in NPs' transition to practice, and in a systematic review of barriers to NP practice by Niezen & Mathijssen (2014). Yet NPs' efficacy in the diagnosis and treatment of minor injuries is now well-established (Carter & Chochinov 2007; Jennings et al. 2015; Wilson et al. 2009; Woo, Lee & Tam 2017). Moreover, two studies have found NPs' diagnostic accuracy for more complex conditions compares favourably to that of experienced doctors (Pirret, Neville & La Grow 2015; Roche, Gardner & Jack 2017). Further evaluations are needed, but these early studies suggest that NPs can, and do develop diagnostic knowledge and skills through clinical experience, despite their constrained access to formal training.

Currie et al. (2012) observe that, in arguing for doctors to retain control of all but the simplest patient conditions, the medical profession often presents itself as the arbiter of risk. In the present study, none of the doctors expressed their concerns about NPs' treating more complex patients in terms of risk to patient safety, rather they were primarily concerned that it did not represent an efficient use of the team's skills. Just as support for the NP role is higher when NPs treat less complex conditions, doctors' support for the NP role also increases when it reduces their workload (Hurlock-Chorostecki et al. 2013; Kilpatrick, Lavoie-Tremblay, Ritchie, Lamothe & Doran 2012; Schadewaldt et al. 2013). Nurse practitioners were primarily valued by ED doctors because, unlike the junior doctors who required knowledge back-up for every patient, NPs delivered fast, high quality care autonomously, *without* the need to consult senior doctors. Indeed, they further reduced senior doctors' supervisory workload by providing knowledge back-up to the junior doctors working in Fast Track.

The study is the first to describe how interprofessional knowledge back-up contributes to flexibility within healthcare teams, by helping team members complete their tasks in a timely and safe manner (increasing short-term responsiveness), and by developing team members' knowledge and skills to become multiskilled, autonomous professionals (enhancing long-term adaptability). However, the difference in outlook to knowledge back-up between NPs and the doctors was considerable. In common with other studies examining the impact of NPs in healthcare teams, NPs regarded interprofessional knowledge back-up as part of their job (Gilmour et al. 2014; Kilpatrick, Lavoie-Tremblay, Ritchie, Lamothe, Doran, et al. 2012; Kvarnström, Jangland & Abrandt Dahlgren 2017; Lutze et al. 2018; Williamson et al. 2012). Hurlock-Chorostecki et al. (2013, p. 503) describes NPs as

"*speaking legitimately in two worlds*", integrating medical science with nursing knowledge to create a bridge between the two domains of knowledge (Kvarnström, Jangland & Abrandt Dahlgren 2017; Van Soeren, Hurlock-Chorostecki & Reeves 2011; Williamson et al. 2012).

In contrast, while doctors did provide knowledge back-up to help RNs and NPs complete their tasks, it was clear that few regarded this as an opportunity to develop their nursing colleagues' diagnostic knowledge and skills. This normative control doctors exercised in the workplace is in line with medicine's intellectual mandate, that diagnostic knowledge is so complex that it cannot be safely or satisfactorily applied by nurses (Abbott 1988; Freidson 2001; Hughes 1965/1994). It was clear in doctors' attitudes to RN-initiated investigations, and to the expansion NPs' scope that they regarded nurses' intellectual mandate to perform these tasks as weak. These attitudes stand in contrast to doctors' willingness to provide RNs with autonomy back-up to work around the medication protocols. Doctors' trust in experienced RNs' clinical judgement suggests they perceived nurses did have an intellectual mandate to manage patients' symptoms. That said, doctors' overriding explicit concern about providing nurses with knowledge back-up was simply that it increased their workload. The study did not interview junior doctors to elicit their experiences of receiving knowledge back-up in the ED but, as Chong et al. (2010) comments, the medical profession often relies on the discretionary effort of a small number of senior doctors in emergency with an inclination to teach, rather knowledge back-up being recognised as an integral part of every doctors' workload.

All three forms of back-up behaviour utilised the teams' specialist skills and overlapping roles, working flexibly and interdependently to achieve the goals of timely and quality patient care and to keep patients flowing through the ED. As the following section explains, the ability of the team to coordinate its specialised but overlapping roles was greatly impacted by the organisational factor of team stability.

Team Stability for Flexibility

A key finding to emerge from the Phase 1 and Phase 2 data was that team stability was central to the team's ability to work flexibly, coordinating their specialist skills and overlapping roles to deliver whole episodes of patient care. On the dimension of the 'coordination of work' in the analytical framework, the ED team primarily used teamwork between team members to coordinate their work and, as such, was aligned with the ideal type of functional flexibility (Batt & Doellgast 2005; Gallie et al. 2012; Watson 2012). However, the team also required top-down coordination to keep patients flowing safely and quickly through the ED, a feature of Taylorism. Efficient coordination, top-down or through teamwork, is defined as the orchestration of a team's work in terms of the sequencing and timing of tasks to minimise delays, omissions and wasted effort (Kozlowski & Ilgen 2006; Wahr et al. 2013). Coordination may be implicit through team members performing their roles in synchronicity, or explicit through verbal or written communication (Wahr et al. 2013).

A review of the literature on healthcare teams revealed that the impact of organisational factors on a team's ability to coordinate their work efficiently is rarely examined (Finn 2008; Xiao, Parker & Manser 2013). Consistent with other studies of ED teams (Crilly et al. 2017; Flowerdew et al. 2012; Grover, Porter & Morphet 2017; Johnston et al. 2016), the interview data revealed that the organisational factors of high workloads and staffing were perceived to be the main causes of breakdowns in team coordination. The Phase 1 and Phase 2 data also revealed that team stability mediated these challenges, allowing the team to work flexibly and efficiently, even in the context of heavy workloads. There were two aspects of team stability evident in the data. First, the team mental model that emerged between the experienced team members who were permanently based in the ED. Second, the top-down coordination performed by the nurse coordinator that managed the instability in team composition throughout the day.

Team Experience and the Team Mental Model

The interview data highlighted that problems stemming from the ineffective coordination of the team's specialised but overlapping roles, such as errors, delays and task duplication, were perceived to occur less often when the team comprised experienced ED clinicians. Failures in implicit coordination, that is the team losing its structure of who's expected to do what, breakdowns in explicit communication and conflicts over task responsibility were nearly always attributed to the presence of inexperienced staff. There is a growing recognition across healthcare settings of a positive relationship between the level of experience team members have of working in a team, and their ability to efficiently coordinate their tasks to deliver safe and efficient patient care (Bezemer et al. 2016; Cassera et al. 2009; Everson et al. 2018; Undre et al. 2006). This relationship is explained by the extent to which team members share a team mental model (Gardner, Scott & AbdelFattah 2017; Westli et al. 2010; Zajac et al. 2013).

A team mental model is the shared knowledge needed to work effectively in a team and emerges as team members interact in the workplace (Wildman et al. 2012; Zajac et al. 2013). Teams with a well-developed team mental model are able to work flexibly, coordinating and adapting their actions to changing demands because they share an understanding of events in the workplace, why they occur and are able to anticipate what is likely to happen next (Mohammed, Ferzandi & Hamilton 2010; Zajac et al. 2013). Teams with a high-functioning mental model are also more efficient because team members require less explicit communication, instead relying more on implicit coordination based on a deep understanding of the team's roles, its tasks and the work environment (DeChurch & Mesmer-Magnus 2010; Westli et al. 2010). Such teams are often described as being 'on the same page' (Burtscher & Manser 2012; Mohammed, Ferzandi & Hamilton 2010; Weller, Boyd & Cumin 2014).

The precise content of a team mental model is highly variable and context-specific since it encapsulates every aspect of knowledge that individuals need to work in a particular team (Burtscher & Manser 2012; Evans & Baker 2012). Wildman et al. (2012) describe five types of knowledge that

comprise team mental models: task-related (e.g. the method of referring a patient); team-related (e.g. the core duties of each role); process-related (e.g. considering relative workloads before delegating a task); and goal-related (e.g. providing timely and quality patient care). The more this type of knowledge is shared between team members, the more effective a team is in evaluating a work situation and coming to a shared understanding of how to respond, to anticipate what other team members need to complete their tasks, and to provide back-up when required (McComb & Simpson 2014; Salas, Sims & Burke 2005; Weller, Boyd & Cumin 2014; Zajac et al. 2013).

The team mental model that allowed the team to engage in back-up behaviour is highly complex and context-dependent, therefore opaque to inexperienced team members. For example, task back-up, where a clinician performed a task themselves when other team members were busy, requires knowledge of each roles' core duties and which tasks could be shared, as well as an understanding of how patterns of patient demand in the ED impact each role, and which role's core duties should be prioritised in the circumstances to achieve the team's goals (Kalisch, Weaver & Salas 2009; Porter et al. 2003). Zajac et al. (2013) argue that team mental models are particularly important for a team's ability to negotiate the ambiguity of overlapping roles to share tasks, while avoiding the problems of process conflict earlier discussed. For example, Phase 2 interviews identified conflict between doctors and RNs over the delegation of venepuncture procedures. The conflict was blamed on either the doctor's lack of knowledge that when delegated venepuncture was a shared task not a core RN duty, or on an apparent failure to consider relative workloads, both discordant with the team's mental model.

The complex and context-dependent nature of a team mental model means this knowledge is more readily developed and maintained when team composition is stable (Bezemer et al. 2016; Cassera et al. 2009; Everson et al. 2018). Team members who work together regularly also develop an understanding of their teammates' individual skills and preferences (Bezemer et al. 2016; Cassera et al. 2009) and establish the interpersonal relationships that improve the quality of communication, flexibility and collaboration within teams (Calnan & Rowe 2008; Parkinson & Parker 2013; Rydenfält, Odenrick & Larsson 2017; Schadewaldt et al. 2013). Established interpersonal relationships are also associated with the willingness of team members to engage in back-up behaviour (Smith-Jentsch et al. 2009). In the present study interviewees associated established interpersonal relationships with both task back-up (where relationships based on reciprocity were thought to increase task sharing within the team) and autonomy back-up (where relationships of mutual trust influenced doctors' and NP' decision to prescribe a medication at an RN's request). Thus, when interviewees cited the importance of team member experience for efficient team coordination, they were not only referring to clinical work experience, but also experience of working with each other.

Gaining experience of working with each other, to develop a team mental model and strengthen interpersonal relationships, relies on stable team membership and the spatial-temporal conditions that allow a set of team members to regularly interact (Bowles et al. 2016; Lewin & Reeves 2011; Rydenfält, Odenrick & Larsson 2017). However, these organisational conditions are rare for healthcare teams (Bowles et al. 2016; Hurlock-Chorostecki et al. 2013; Lewin & Reeves 2011; Weller, Barrow & Gasquoine 2011). Hospitals are staffed around the clock by nursing and medical staff on different shift patterns producing highly unstable teams whose composition changes constantly throughout a single day (Finn & Waring 2006; Gillespie et al. 2010; Hurlock-Chorostecki et al. 2013; Reeves, Lewin & Espin 2010). This instability was compounded in the ED by the large number of staff assigned across different clinical areas. This made it unlikely for two staff members to work together on a regular basis, and impossible for a particular combination of staff to be rostered together more than once in a doctor's rotation.

The problem of team instability was noted by Patterson et al. (2015) in their analysis of rostering data which found low levels of familiarity between team members working in UK EDs. In Patterson et al.'s (2015) study, and the current study, team member familiarity within the interprofessional team was not a consideration in the rostering process. Nurse and medical rosters for each area were determined separately and based on overall skill mix (i.e. grade) for each profession in each area of the ED. For junior doctors who may only work with an RN once or twice in a three-month ED rotation, it was difficult to remember RNs' names let alone understand their unique skill sets, or to establish meaningful working relationships, a problem observed among junior doctors on rotation in other parts of the healthcare system (Curtis, Tzannes & Rudge 2011; Weller, Barrow & Gasquoine 2011).

The ED is particularly subject to the destabilising effect of junior doctors on team composition since it is a mandatory rotation for post-registration medical training (Chong et al. 2010; Weiland, Mackinlay & Jelinek 2010). However, the spatial-temporal organisation of ED work did provide an environment where a team mental model and interpersonal relationships could emerge between permanent ED staff. Unlike a traditional hospital ward, senior doctors, NPs and RNs were permanently based in the ED, they shared a workspace and often executed tasks concurrently. These conditions created opportunities for regular interactions that allowed a team mental model and interpersonal relationships to emerge over time, despite the everyday instability in team composition. That the three roles shared a workspace may also explain why the goals of timely and quality patient care, and a sense of shared responsibility for the team's tasks were such strong features of the team's mental model, features often thought to be lacking in healthcare teams (Baker, Day & Salas 2006; Braithwaite et al. 2013; Finn 2008). By working concurrently under time pressure, ED doctors and nurses gained a deep understanding of each other's roles, and of how to work interdependently. In hospital wards doctors are not always present to see the nature and pressures of nurses' work, and

vice versa. In the ED, doctors' and nurses' work was visible to each other and they shared the consequences of high workloads and problems in patient flow. Emergency physicians' focus on the most urgent and acutely unwell patients meant they were only present in Fast Track sporadically. Consequently, in common with findings on acute hospital wards (Van Soeren, Hurlock-Chorostecki & Reeves 2011; Williamson et al. 2012), it was the NPs who provided a stabilising, consistent presence that helped maintain the team mental model in Fast Track.

Through a team mental model and established interpersonal relationships, clinicians with experience of working in the team were able to work flexibly and efficiently, even in the context of heavy patient workloads. However, it was also clear from Phase 1 and 2 data that the team could not rely solely on teamwork between team members to deliver whole episodes of patient care without errors, delays or omissions. Top-down coordination was also required.

Top-Down Coordination

Both Phase 1 and Phase 2 data showed that effective top-down coordination of the Fast Track area was crucial for managing unstable team composition, and high patient volume and turnover. In other areas of the ED, emergency physicians took on a coordination role along with the nurse coordinator for that area. These roles have also been observed in Australian EDs by Nugus et al. (2011). In Fast Track, the doctor-in-charge role was less clear since it was rarely an emergency physician and often a registrar who had a patient load. Consistent with RNs' core duties in the organisation of care, particularly as an information broker (Allen 2014), the top-down coordination function in Fast Track primarily fell to the nurse coordinator. The coordinator performed this function through their close monitoring of the electronic waiting list and through explicit communication with doctors, NPs and RNs. Like similar roles described in Australian (Grover, Porter & Morphet 2017; Nugus & Forero 2011) and UK EDs (Woloshynowych et al. 2007), the coordinator operated at the task level, prioritising and coordinating the completion of RNs' tasks, and at the team level, monitoring the queue and the work of the whole team to ensure patients flowed safely and quickly through the department.

At the task level, the coordinator prioritised RNs' work and was frequently observed communicating with RNs over the electronic waiting list, reflected in the high proportion of time RNs spent on these tasks. The coordination of RNs' work was particularly challenging in Fast Track due to the fluidity of their staffing arrangements: they were responsible for the care of multiple patients over different geographical areas and moved between these areas in response to changing demand. This resulted in a fragmented work pattern for RNs. The Phase 1 data revealed that RNs' average task duration was significantly shorter than doctors' or NPs' and that junior RNs found this fluidity and fragmentation challenging. Moreover, the frequent handovers between shifts were perceived to be a source of errors and delay in tasks being completed (Bakon et al. 2017; Kerr et al. 2016; Redley et al. 2017; Rydenfält, Odenrick & Larsson 2017) and made it difficult for doctors and NPs to know to whom to delegate

a task. To manage the fluidity of RNs' staffing arrangements and the unstable composition of the team, interviewees from all three roles advocated that the coordinator act as an intermediary in the task delegation process since they had a better knowledge of RNs' individual skills and their workload, and could keep track of completed and outstanding tasks.

At the team level, the coordinator monitored the electronic waiting list to ensure patients moved safely through the ED, checking their progress against the time-based performance targets, and expedited the admissions and referrals process (Grover, Porter & Morphet 2017; Nugus et al. 2011; Woloshynowych et al. 2007). A 'good coordinator' was universally understood to do more than coordinate RNs' tasks and monitor the waiting list, they were also assertive and proactive in coordinating their whole team towards its goals (Grover, Porter & Morphet 2017; Nugus et al. 2011; Woloshynowych et al. 2007). All teams need good leadership for efficient team performance (Kozlowski & Ilgen 2006; Reeves, Macmillan & Van Soeren 2010; Salas, Sims & Burke 2005). The coordinator was clearly in a leadership role for the RNs, prioritising their tasks and supporting junior RNs (Fernandez et al. 2008). However, it was less clear whether they were the leader for the whole team. It was agreed that the coordinator needed to be assertive with medical staff, but they did not have a clear mandate to prioritise doctors' tasks. Nor was it clear how the role worked vis-à-vis the doctor-in-charge, with both roles performed inconsistently. In the absence of clearly defined, and consistently performed leadership roles in Fast Track, the top-down coordination of the Fast Track team was thought to be more effective when the coordinator and the doctor-in-charge were experienced ED clinicians, highlighting again the importance of a team mental model and interpersonal relationships for effective team coordination.

Consistent with a growing body of evidence on healthcare teams, the team mental model and interpersonal relationships that emerged between stable team members, the experienced clinicians permanently based in the ED, allowed the team work flexibly and efficiently, even in the context of heavy workloads. However, the RNs' fluid staffing arrangements and unstable team composition meant the team could not solely rely on the teamwork of those providing care, Fast Track also required the effective top-down coordination, a role predominantly performed by the nurse coordinator.

The Nature of Flexibility in the ED Fast Track Team

Through the unique insights provided by taking a mixed methods approach to the division of labour in an ED Fast Track team, this study has revealed that the view of the healthcare professions as inflexible, specialised occupations must be balanced with an understanding of the flexibility inherent in the multiskilled and autonomous nature of professional work. On each of the three dimension of the analytical framework, the team had more in common with the ideal type of functional flexibility than Taylorism. First, their flexible occupational division of labour consisted of specialist but

overlapping roles and, through the teamwork of back-up behaviour, they used this role overlap to work flexibly to respond to individual patients' needs and changing workload demands. Second, they primarily coordinated their work using teamwork, orientated towards achieving the team's goals of timely and quality patient care. Third, all members of the team were autonomous professionals responsible for their own practice and emphasised the importance of clinical judgement in managing the complex, indeterminate tasks that comprised a high proportion of ED work.

Considering the reality of the Fast Track division of labour within the dualism of Taylorism and functional flexibility also illuminated the complex and often contradictory nature of flexibility within the team. In common with other workplaces in the wider economy (Carter et al. 2011; Thompson 2013; Watson 2012), and in healthcare (Wise et al. 2017), elements of Taylorism coexisted alongside functional flexibility. This duality was particularly evident in the expansion of nurses' roles into focal medical tasks as a multiskilling strategy to increase responsiveness while constraining their autonomy over those tasks in line with Taylorism. For RNs, this took the form of protocols, for NPs it was evident in the organisational and other policy constraints on their lawful autonomy. This is the first time a study has revealed the transaction costs generated when a Taylorist approach to reform is taken in place of the education and accountability framework required to make safe and appropriate decisions based on clinical judgment. The teamwork behaviours of autonomy and knowledge back-up to work around the Taylorism imposed on nurses did increase the team's responsiveness in the short-term, ensuring focal medical tasks were completed in a safe and timely manner. However, they also represent the transaction costs of the team managing their different levels of autonomy and knowledge over those tasks.

The teamwork of knowledge back-up was more than a transaction cost to ensure short-term responsiveness, it also helped clinicians to develop as multiskilled, autonomous professionals able to adapt to the changing needs of the patient population in the long term. Interprofessional knowledge back-up was evident in the clinical and organisational knowledge RNs and NPs shared with junior doctors to help them perform their focal medical tasks safely and effectively. The NPs were relied on to set and maintain the standards of care for less complex conditions through their education and supervision of the junior doctors and RNs in Fast Track, regarding this as part of their job. However, doctors were reluctant to share their diagnostic knowledge to develop RNs' skills to order investigations more accurately or to allow NPs to treat more complex conditions. Organisational restrictions on nurses' autonomy over focal medical tasks, together with doctors' reticence in providing interprofessional knowledge back-up highlights the medical profession's continued control over diagnostic knowledge that may hinder the longer-term adaptability of the workforce.

The teamwork behaviour of task back-up used the flexibility of the team's multiskilled, overlapping roles to share tasks in response to changing workload demands. Through a negotiated approach to task delegation, the team sought to minimise the transaction costs of errors and delays in tasks being

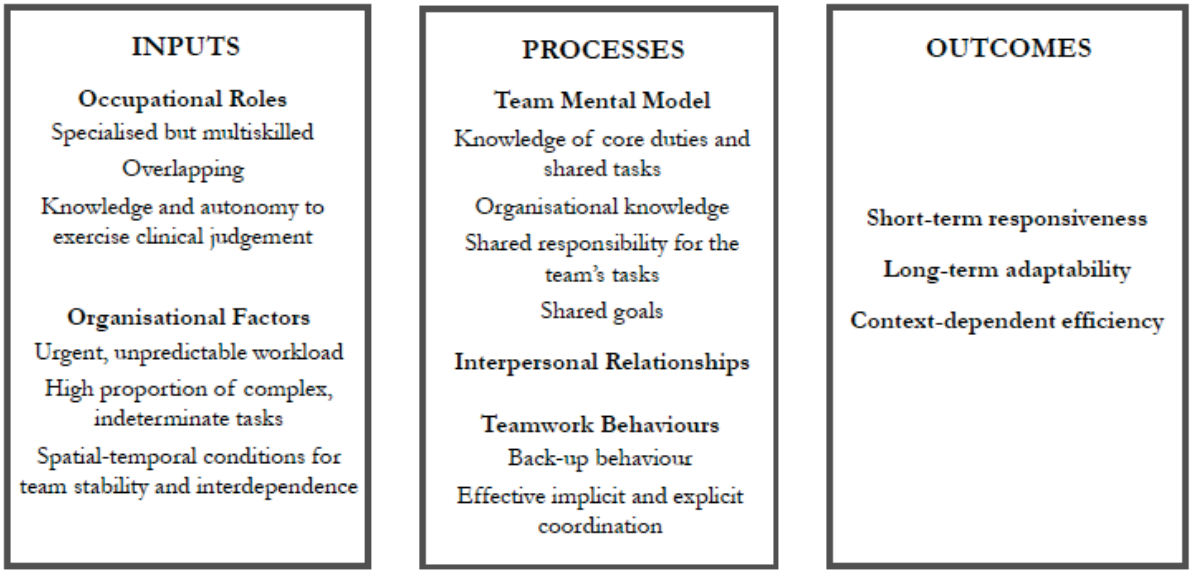
completed. Task back-up also sought to balance workloads across the team, working interdependently to prioritise and reprioritise each role's core duties to keep patients flowing through the ED. This teamwork behaviour demonstrates the team understood that the efficient use of their skills was context-dependent, as well as a sense of shared responsibility for the team's tasks. 'Being flexible' in the ED meant not sticking rigidly to your own core duties.

Finally, the study's division of labour perspective also revealed the organisational factors that promoted and hindered flexibility. The team's ability to engage in the flexibility of back-up behaviour and to coordinate its specialised yet overlapping roles efficiently was aided by the spatial-temporal conditions in the ED. Sharing a work space and working concurrently allowed a team mental model and interpersonal relationships to emerge between the stable, permanent members of the ED staff. These spatial-temporal conditions also meant doctors', NPs' and RNs' work was visible to each other and they had a shared experience of patient workload. In combination, these conditions perhaps explain why the team was so clearly orientated toward keeping patients flowing through the ED and understood this could only be achieved if they worked interdependently.

However, there were organisational factors in the ED that hindered flexibility due to the instability they created within the team: the large number of staff who were assigned across different areas of the ED; the high proportion of junior doctors on rotation in the team; the different rostering systems for each role; and the fluid RN staffing arrangements in Fast Track needed to meet the needs of multiple patients spread across different geographical areas. Effective top-down coordination was required to manage this instability, a function performed predominantly by an RN and sporadically by the doctor-in-charge. In the absence of clearly defined, consistently performed leadership roles, top-down coordination was more effective when undertaken by experienced ED clinicians with an established working relationship. Paradoxically, what the team needed to work flexibly was team stability.

The nature of flexibility found in the ED team is summarised in Figure 2. This visual representation is based on the 'input-process-output' model of team performance (Hackman 1987; Ilgen et al. 2005). The 'inputs' are the types of occupational roles, and the organisational factors that promoted flexibility within the team. The 'processes' include the team's mental model, interpersonal relationships, as well as the specific teamwork behaviours that demonstrated the team's flexibility. The 'outputs' of flexibility, renamed 'outcomes' in line with the language of health services research, are those described in the literature and found in the study, of the responsiveness to patients' needs in the short-term, adaptability in the long-term and efficiency in the ED context.

Figure 2 The Nature of Flexibility in the ED team



The input-process-output model is a simplified representation of the complex dynamics of team performance (Ilgen et al. 2005). Traditionally, the relationship between the three components of team performance are represented with arrows, suggesting a linear causation between inputs, processes and outcomes. In reality, the relationship inputs, processes and outcomes are interactive rather than linear (Ilgen et al. 2005). For example, the teamwork behaviour of task back-up was enabled by the team's overlapping roles, but the more individuals engaged in task back-up, interpersonal relationships based on reciprocity would emerge, in turn increasing role overlap. Further, the team processes themselves are interactive, with the team mental model and interpersonal relationships enabling flexible teamwork behaviours. Causation is not depicted in Figure 2 since its purpose is simply to summarise and elucidate the components of the ED team's division of labour that made it an exemplar of flexibility in a healthcare team.

Taken together, the inputs and the processes describe how tasks were distributed between occupational roles, and the structure of social relationships that organised and coordinated that distribution into a flexible occupational division of labour. The exemplar of the ED Fast Track team provides empirical support for the assertion that healthcare professionals work more flexibly in everyday practice than is often supposed (Abbott 1988; Freidson 2001; Hunter & Segrott 2014), especially in a busy workplace where the workload is urgent and unpredictable (Abbott 1988; Carmel 2006; Reeves, Lewin & Espin 2010). However, the study also revealed there were organisational factors beyond workload, in the high proportion of indeterminate tasks and the spatial-temporal workplace conditions that were fundamental to the nature of flexibility observed in the ED. In the final chapter of the thesis these insights on the context-dependent nature of workforce flexibility are used to define the concept in the healthcare context.

Study Limitations

Some limitations must be considered when interpreting the findings of the study. Through its division of labour perspective, the study provides for the first time an understanding of the nature of flexibility within a healthcare workplace. It focussed on the roles that delivered patient care within the Fast Track area of the ED. Therefore the work of other occupational groups such as paramedics, ancillary and administrative workers, and allied health professionals who also contributed to patient care in the ED were not included. Further, the impact of the wider hospital and healthcare system on the ED team's ability to work flexibly and to keep patients flowing through the ED was not reported in the findings. In particular, how attitudes to nurses' undertaking focal medical tasks, and the experience of time pressures in the ED differed from those on in-patient hospital wards.

The WOMBAT software used for the collection of the time study data was a robust, and user-friendly tool for measuring the task distribution within the team. In light of the importance of interprofessional knowledge back-up which emerged from the interviews, future research using the WOMBAT tool should differentiate who tasks were performed 'with', disaggregating the category 'nurse' into the different nursing roles found in healthcare workplaces. Capturing the direction of diagnosis discussions, for example an NP consulting a doctor or vice versa, would also be helpful in exploring the direction of knowledge back-up within teams. Given the findings on team stability and knowledge back-up for the development of novice clinicians' skills and the teams' ability to work flexibly, future research should aim to explore the perspectives of junior doctors and RNs.

In terms of the transferability of the inferences, the study's confinement to one tertiary hospital model of care, means the nature of the flexibility found in the team may not resonate in other models of care, or smaller or geographically different EDs. However, the purpose of looking in-depth at the work of one team was not to hold the nature of any flexibility found as a model for every healthcare workplace, rather it was to elucidate the components within a division of labour than promote or hinder flexibility. As the final chapter will argue, workforce flexibility is highly context dependent.

Summary

The findings of this meta-analysis provide unique insights into the flexibility of an ED Fast Track team, and the inherent flexibility of the healthcare professions. On each dimension of the analytical framework, the division of labour in ED Fast Track was more congruent with the ideal type of functional flexibility than Taylorism. However, the reality of flexibility within the team was more complex and often contradictory. The ED Fast track was chosen as a potential exemplar of flexibility in a healthcare team and, overall, the team was found to work flexibly to meet patients' needs. In the next chapter, the insights into what promoted and hindered flexibility in the ED team are used to define workforce flexibility in the broader healthcare context, and the implications for the organisation, development and regulation of healthcare professionals are discussed.

CHAPTER 10: CONCLUSIONS AND IMPLICATIONS

Introduction

This final chapter draws on the evidence from the exemplar of flexibility in the ED Fast Track team to define the concept of workforce flexibility for the broader healthcare context. The implications of the study's findings for three areas of policy are discussed: organising for flexible teams; knowledge development for flexibility; and professional regulation for flexibility. This is followed by reflections on the adequacy of the analytical framework in clarifying the concept of workforce flexibility and concluding remarks.

Defining Workforce Flexibility in the Healthcare Context

The aim of the study was to define the concept of workforce flexibility in the healthcare context. Across the world governments are concerned that the current healthcare workforce is not flexible enough to meet increasing and more complex health demands (Bodenheimer, Chen & Bennett 2009; Caley & Sidhu 2011; Tomblin Murphy et al. 2016) or to achieve efficiency of scarce resources (Campbell et al. 2013; OECD 2016; Productivity Commission 2015; Tsiachristas et al. 2015). The slow pace of reform towards more responsive, adaptable and efficient healthcare services is often blamed on the occupationally-controlled division of labour and the inflexibility of the professions within it (Bach, Kessler & Heron 2012; Harvey 2011; Moffatt, Martin & Timmons 2014; Nancarrow 2015). Consequently, the rhetoric of workforce flexibility is widely employed to legitimise reforms that have created new roles and altered the distribution of tasks between existing roles. However, what flexibility looks like at the workplace level has remained ambiguous. Elucidating the components of a division of labour that was an exemplar of flexibility in a healthcare workplace contributes to a broader definition of workforce flexibility in two key ways.

First, workforce flexibility must be understood as a division of labour at the workplace level and be defined as the capacity of a whole team to respond and adapt to the changing needs of its patients, and its efficiency given the context for its work. Not every healthcare team requires the type of flexibility found in the ED team, of extensive back-up behaviour between multiskilled professionals, since that was shaped by the specific organisational factors of emergency work. The occupational roles, the content of a team mental model, and the teamwork behaviours a team requires to 'be flexible' (i.e. responsive, adaptable and efficient) is highly context dependent. Thus the nature of a team's flexibility is shaped by the needs of its patients, the nature of its workload and the spatial-temporal conditions of the workplace. This call to define workforce flexibility as the capacity of a whole team to respond and adapt to the needs of its patients within its unique organisational context is in line with those being made in other fields of healthcare research and policy, including workforce

planning (Birch et al. 2015), teamwork research and intervention (Rydenfält, Odenrick & Larsson 2017; Salas, Zajac & Marlow 2018; Xiao, Parker & Manser 2013) and workforce reform (Bohmer & Imison 2013; Ricketts & Fraher 2013; White 2015). Understanding workforce flexibility from a context-dependent division of labour perspective requires a significant shift in rhetoric. The current academic and policy literature uses the term 'flexibility' interchangeably as an 'input', that is reforms to occupational roles, and as an 'outcome', where greater flexibility is assumed to be an end in itself, without considering the team or the organisational context.

Second, by applying the analytical framework both to the review of the extant literature and empirically to the division of labour in the ED team, the study has revealed that many of the reforms made to occupational roles that claim to increase flexibility have more in common with Taylorism. Pursuing both strategies concurrently appeals to organisations under pressure to achieve the outcomes of responsiveness and adaptability (requiring flexibility) and of accountability for risks and costs (requiring Taylorism) (Carter et al. 2011; Farjoun 2010; Graetz & Smith 2008; Schreyögg & Sydow 2010; Thompson 2013). However, just because pressure for these conflicting outcomes exists, does not mean they can all be achieved with one type of reform. The study has demonstrated that the Taylorist solution of using protocols to redistribute focal medical tasks to RNs, may increase responsiveness for some patients but generates the transaction costs of autonomy and knowledge back-up, potentially limiting the efficiency of these reforms in the workplace context.

Further, by uncovering the flexibility within a team that comprised only professionals highlights a need to more carefully examine the opportunity costs of seeking technical efficiency through the substitution of multiskilled, autonomous professionals with more narrowly skilled, less autonomous assistants. Assistant roles add a layer of delegation within a team, potentially increasing the risk of errors and delays in tasks being completed and the transaction costs of communication and supervision since assistants are not directly responsible for patient care. Furthermore, healthcare professionals are valuable not only because of the specialist knowledge they contribute to the complex process of patient care, but their broad-based tertiary education produces multiskilled workers with an enhanced capacity to acquire more skills, thus able to adapt to the changing needs of the patient population in the long term (Abbott 1988; Willis Commission 2012). This potential for adaptability is less evident in more narrowly educated, lower skilled assistant roles.

The purpose of highlighting the potential transaction and opportunity costs of taking a Taylorist approach to workforce reform is not to advocate that the high-skill division of labour found in the ED should be applied to every healthcare workplace. Rather it is to stress that not every redistribution of tasks or new occupational role will increase workforce flexibility. In many clinical settings RN protocols, assistants and other narrowly skilled roles are needed to improve responsiveness by increasing the availability of workers able to perform certain tasks, often for a lower wage. However, such roles do not necessarily produce an adaptable workforce in the longer term, nor are they

necessarily efficient in their workplace context due to the transaction costs they create. In the design and evaluation of workforce reforms there is a need to be more transparent and realistic about the outcomes being sought since 'flexibility' in itself is not an outcome.

Implications

In addition to the implications for the workforce reform process described above, the study's findings have implications for three areas of organisational and government policy. The first is the organisation of healthcare work to promote flexible teams. The second is the need for ongoing knowledge development to support flexibility. The third is the role of professional regulation to protect the multiskilled, autonomous status of the healthcare professions in the face of autonomy-constraining organisational policy.

Organising for Flexible Teams

The nature of flexibility observed in the ED team was shaped by the specific organisational factors of urgent and unpredictable workload and the high proportion of indeterminate tasks within emergency work. Crucially, the spatial-temporal conditions of ED work promoted team stability and interdependence that allowed a team mental model and interpersonal relationships to emerge: doctors and nurses shared a workspace, executed their tasks concurrently and the work of each occupational group was visible to all. These spatial-temporal conditions are highly unusual in healthcare, perhaps explaining why so few healthcare teams are found to be orientated towards shared goals or to understand their work as interdependent as did the ED team. That the organisation of work in healthcare creates so many barriers to effective teamwork also explains why interventions aimed at modifying individual attitudes and behaviours are not sustained in the longer term (Salas, Zajac & Marlow 2018). Even within the favourable environment of the ED, the traditional staffing practices of different shift patterns, separate rosters for each professional group together, and the transience of the junior doctor workforce created instability within the team which hindered their ability to work flexibly and efficiently.

This study found professionals to be much *more* interchangeable in performing their tasks than is often supposed but individual team members were much *less* interchangeable than current approaches to healthcare staffing assume. There is a growing recognition across a variety of healthcare settings of the importance of team stability for the team mental models and interpersonal relationships needed to deliver quality, safe and efficient patient care. If healthcare organisations are serious about the centrality of teams and teamwork in the future of patient care, then traditional staffing practices require a radical rethink: from monoprofessional rostering focussed only on skill mix to an interprofessional team-based approach that considers team member familiarity; aligning shift patterns between different occupational groups to minimise the transaction costs associated with instability in team composition; clearer leadership roles that recognise the importance of coordination for

interprofessional teams; and the design of the physical environment to maximise opportunities for team members to interact.

In geographically dispersed healthcare teams, and for doctors treating patients spread across multiple wards, achieving a minimum level of stability in the team responsible for patients' care becomes even more important for outcomes. This also has implications for organisational policy on the case-mix within hospital wards, since the wider the range of conditions on a single ward, the greater the number of doctors that ward staff must work with, therefore the greater the instability in the patient care team. More research is needed in different clinical environments to understand the impact of staffing and case-mix practices on teams' ability to work flexibly and efficiently to deliver safe and quality patient care.

These findings also raise concerns about the casual and agency staff used to meet workforce shortages, since these short-term numerical flexibility strategies treat healthcare workers as entirely interchangeable. Casual and agency staff have little prospect of developing the team mental model and relationships needed to work effectively in the team. Consideration should be given to how such workers are assigned to minimise instability and their impact on the efficiency of the team since they are likely to require more knowledge back-up to work safely and effectively in the team. Similar consideration should be given to the rotating junior doctors and to acknowledging the significant challenges they face in entering a team as a novice with limited clinical and organisational knowledge, no understanding of the team's mental model or any established interpersonal relationships. As such, junior doctors would particularly benefit from measures to promote team stability.

Knowledge Development for Flexibility

The study has also identified two types of knowledge development needed for workforce flexibility. The first is the interprofessional knowledge back-up that occurs in the workplace. Every clinician brings different levels of knowledge, skills and experience to a team and healthcare workplaces are a sites of continuous learning. Interprofessional knowledge back-up provided in the workplace allows team members with different skills and experience to respond to patients' needs safely and effectively in the short term, and to develop as multiskilled, autonomous professionals able to adapt to the changing needs of the patient population in the long term. Moreover, all clinicians acquire knowledge and skills related to the diagnosis and treatment of different patient conditions, through clinical experience and receiving knowledge back-up from experienced colleagues. However, this crucial form of teamwork and knowledge development is currently under-recognised in research and practice. With much of the current research agenda focussed on classroom-based approaches to interprofessional education, more studies are needed on the nature and prevalence of interprofessional knowledge back-up in the workplace.

Nurse practitioners appear to make a critical contribution to interprofessional knowledge development within healthcare teams. By sharing their clinical and organisational knowledge gained first through prolonged experience as an RN, and then through their education and experience as diagnosticians, NPs create a much-needed bridge between the nursing and medical domains of knowledge. Furthermore, interprofessional knowledge sharing and the development of their nursing and medical colleagues' long-term skills was regarded as part of their job in a way that it was not for doctors. Doctors' over-riding explicit concern in providing interprofessional knowledge back-up was the time it consumed indicating a need to recognise this crucial activity within a team's workload.

The second type of knowledge development to support workforce flexibility is the education needed to properly support reforms that redistribute focal medical tasks through the workforce. It there is a role of nurses, or other non-medical professionals, in the diagnosis and treatment of patients, then education programs should provide the knowledge required to develop clinical judgement for safe and effective decision, and to increase their intellectual mandate to perform those tasks. The present approach for RNs has sought to replace knowledge and clinical judgement with Taylorist protocols to manage risk and save training costs. While there is much debate about the future role for machine learning and algorithms in the diagnostic process, protocols presently remain far from an adequate replacement for clinical judgement based on individual knowledge and experience (Chen & Asch 2017; Obermeyer & Emanuel 2016). This study has demonstrated that these limitations generate the transaction costs of autonomy and knowledge back-up within teams, and limits both the short-term responsiveness and longer-term adaptability of the workforce.

In the case of the NPs, while their autonomy to diagnose and treat certain patient conditions marked a landmark change in the doctor-nurse division of labour, the long-term education and development of these roles does appear not to have been considered. The experience of the NPs in this study was that their specialist expertise in less complex conditions benefited the service, in terms of the quality and efficiency of the patient care they provided. It was also beneficial to their nursing and medical colleagues through the knowledge back-up they willingly provided, reducing the burden of supervision on other senior clinicians. However, NPs' specialisation had become deleterious to their job satisfaction. Moreover, their constrained access to new knowledge and skills limited their ability to adapt to the changing needs of the patient population.

The medical profession's control over the knowledge needed to diagnose and treat patients presents a barrier to the longer-term adaptability of the workforce. The challenge will be making that knowledge, which is currently embedded in the medical schools, specialist colleges and other education opportunities designed exclusively for doctors, more accessible to non-medical professionals outside those institutions. The medical profession has traditionally defended their control over knowledge on the basis that other occupations could not safely apply it (Abbott 1988). As the next set of implications argues, the scope of practice approach to regulating professionals in

Australia means they should be trusted to use only the medical knowledge within their scope of practice and individual competence.

Professional Regulation for Flexibility

The existing scope of practice approach to regulation in Australia has the potential to foster the multiskilled, autonomous professionals needed for a flexible workforce. Rather than stipulating the type of tasks a profession may undertake, or the conditions they may treat, the scope of practice approach emphasises the accountability of individuals to practice within their knowledge, competence and experience. This study has demonstrated that this flexible approach to professional regulation is overridden at the workplace level by the protocols and other organisational policies designed to restrict nurses' autonomy.

If RNs are to undertake focal medical tasks they not only need to be equipped with the knowledge to perform those tasks effectively, but also to be professionally accountable and have a level of autonomy that is appropriate to their competence and experience. This means changing the legislation to allow them to initiate medications under their own authority, and be directly accountable for their practice rather operating in the legal grey area of standing orders.

Autonomy over complex, indeterminate tasks such as ordering investigations and managing patients' symptoms with medications should reflect the educational preparation and experience of the person performing that task. For this reason, it is not appropriate for RNs to have the same autonomy and discretion over investigations and medications as doctors or NPs. However, current protocol approaches apply to every RN in the workplace regardless of their knowledge, competence and experience. Through autonomy back-up, clinicians work around these organisational restrictions to allow patients to benefit from experienced RNs' clinical judgement. Consideration should therefore be given to redistributing focal medical tasks to RNs' within a professional framework of education and accountability in place of the current fragmented, Taylorist approach where each workplace develops their own training and protocols. A professional framework of education and accountability would allow RNs to develop and apply their knowledge and skills as they gain clinical experience, and be directly accountable for their practice. It would also allow RNs' knowledge and skills to be transferable between workplaces, offering greater long-term adaptability than the current workplace-specific approach.

For NPs, organisational policies such as predefined formularies and formal scope of practice agreements that stipulate when they must consult a doctor, as well as their restricted access to the system of payments, represent an unwarranted restriction on their lawful autonomous practice. These restrictions should be removed since, from a flexibility point of view, they reduce NPs' ability to respond to patients' needs in the short term, and to develop the skills needed to adapt to future healthcare needs.

In seeking to manage the risk of nurses performing focal medical tasks, organisations control nurses' autonomy according to the lowest common denominator, the most junior RN or NP. This approach is unlikely to produce the responsive, adaptable and efficient healthcare workforce required to meet the challenges ahead. More research is needed on the drivers for the restrictions on professionals' autonomy and skills at the workplace level. There has been some analysis of the medical and nursing professions' participation in the standardisation of healthcare processes, and their alignment with organisational interests in managing costs and risks (Bail et al. 2009; Currie et al. 2012; Scott 2008). However, studies are needed to explore the role of vicarious liability, indemnity insurance and the litigation culture in limiting the long-term flexibility of the healthcare workforce.

Adequacy of the Analytical Framework

This section discusses the adequacy of the analytical framework, based on the ideal types of functional flexibility and Taylorism (Chapter 3), in meeting the study's aim and objectives. The validity of an ideal type rests in its ability to provide the points of comparison from which to illuminate reality (Kim 2012), and to enable us to see reality in a clearer, more systematic way (Johnson 2000). On a conceptual level, the analytical framework succeeded in helping to clarify the ambiguous concept of workforce flexibility and to reveal the underlying tensions and contradictions in the organisation and reform of healthcare work: between the benefits of specialisation and need for multiskilling; between management control and professional autonomy; between stability and flexibility. In doing so the analytical framework was also able to reveal the potential sources of transaction and opportunity costs of workforce reforms that have previously been under recognised in research and practice. On a practical level, the analytical framework provided the structure needed to investigate the ambiguous concept of workforce flexibility, setting the scope of the inquiry to allow the study to proceed in a systematic way.

The dimensions of work organisation included in the framework represent the major debates relevant to skills flexibility evident in the literature over the past century. However, in achieving the breadth needed to address each of these dimensions, some depth within each had to be limited. For example, the study focussed on detailing the teamwork behaviours impacting flexibility that had not previously been explored in the literature, which meant other teamwork behaviours such as the quality of communication between team members was not addressed in detail. Furthermore, the role of professional identities in shaping the occupational division of labour was not explored in depth, though both communication and professional identities within healthcare teams have been extensively researched elsewhere.

This is the first study to attempt to clarify the concept of workforce flexibility in the healthcare context. Future research might use the analytical framework, combined with a division of labour perspective on the work of healthcare teams to identify the nature of flexibility in other contexts,

such as hospital wards, geographically dispersed teams and primary care. This evidence would refine and deepen our understanding of the components of flexible healthcare teams, as well the short and long-term outcomes.

Conclusion

This thesis has, for the first time, described the division of labour within a team of doctors and nurses in rich detail. The study empirically demonstrated that healthcare teams do have a capacity for flexibility. More importantly, the study has defined the ambiguous concept of workforce flexibility in the healthcare context. When policy-makers extemporise about the desirability of a more flexible workforce it is not founded in a clear vision of flexibility as an input, a process or an outcome. Instead "flexibility" is deployed as a rhetorical device to persuade audiences of the attractiveness of reforms. It is simply a euphemism for "change", particularly the healthcare professions' willingness (or lack thereof) to concede to changes to their roles. However, as this study has revealed, not all reforms to professional roles will increase workforce flexibility. Instead, workforce flexibility must be understood holistically, as a division of labour at the workplace level and defined by the capacity of a whole team to respond and adapt to the changing needs of its patients, and its efficiency determined in that context.

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APPENDICES

Appendix A: ED Models of Care in NSW

Model of Care	Features	Staffing resources
Resuscitation	A coordinated, team-based approach to the structured management of resuscitation and trauma patients. Use of clinical guidelines/protocols to enhance decision-making in relation to trauma/resuscitation management.	Sufficient medical and nursing staff with competencies in advanced emergency care so that the ED can continue to operate while the resuscitation area is in use.
Acute Care	Area dedicated to the care of patients who are acute, potentially unstable and complex and require: cardiac monitoring, frequent observations, specialised interventions, a higher level of care and a more comprehensive management plan.	Senior medical staff trained and experienced to make timely decisions.Team consists of senior decision-maker directing junior RMO and nursing staff.
Sub-Acute	Lower acuity patients who may be high complexity, resource intensive and require multiple investigation, consults or procedures and therefore not eligible for Fast Track.	Designated area of non-monitored beds. No particular staffing requirements stipulated.
Fast Track	Fast track is dedicated to the treatment of ambulant, non-complex (single system problem) patients. Triage streams into Fast Track using pre-determined criteria to expedite the journey of less-urgent/non-complex patients.	Dedicated senior staff: Staff Specialist, Senior registrar, ED CMO, Nurse Practitioner or Physiotherapist.
ED Short Stay Unit	ED SSU is a designated unit, co-located with the ED, for the short-term care of patients who require observation, specialist assessment, diagnostics and/or treatment whose length of hospital stay is deemed to be limited (e.g. <24hrs)	Nursing staff with well-developed clinical skills and medical staff able to make disposition decisions.

Adapted from NSW Health (2012a) Emergency Department Models of Care

Appendix B: Phase 1 Data Collection Tools

B1: Task Categories for Data Collection - Definitions

DIRECT CARE

Patient Assessment
Any verbal or physical assessment or examination of patients
Asking about food/hydration/hygiene for assessment purposes
excl. Medication Discussion

Vital Signs
Blood pressure
Temperature
Heart rate
Respiratory rate
Oxygen saturation
Pain score
Neuro vascular observations

Perform Procedure
Performing tests on patient including ultrasound, electrocardiogram (ECG)
Performing procedures including venepuncture, catheters, wound repair and dressing, plaster of paris, bandaging
incl. removal of above
excl. medication related to the procedure
NOTE TASK DETAILS

Patient Communication
Communication with patients and/or relatives
excl. medication and assessment-related
Explain procedures / tests incl. asking for sample
Explaining the need to eat/drink (or not)
Explain test results / diagnosis
Explain ED care processes / referral / discharge / care planning

Privacy
Participant with patient but unable to hear / observe due to request for privacy

Patient Comfort
Retrieving water / food / blankets for patient
Adjusting bed, sitting up to drink / eat / take meds
Moving patient from trolley to bed.
Escorting patient to other parts of the ED

INDIRECT CARE

Procedure-related
Gather equipment for tests and procedures incl. vital signs equipment
Tidy up
Washing hands and putting on gloves
Discussing equipment issues with colleagues
Conducting tests in the ED e.g. blood gas or urinary analysis

Diagnosis
Discussing patient's potential diagnosis with colleagues
Phoning for test results
Examining test results
MAKE NOTES IN FIELDNOTES
USE "WITH" FUNCTION

Order Test or Procedure
Completing test order on computer
Ask a colleague to perform or order a test/procedure

Tidy
Preparing cubicle after discharge
Making bed
Pushing all the curtains back, general tidy-up

Locate
Looking for patients, forms, notes, colleagues
Excl. equipment, medication-related

Electronic Waiting List
Using EWL to manage patient flow purposes

MEDICATION

Prescribe
Write up order / prescription
Obtain drug authority
Give verbal order

Administer
Administer medications to patient incl. oral, topical, gas, injection, IV

Chart & Check
Co-signing medications
Chart medication after administration

Research Medications
Looking for information about medications in books or online.

Prepare
Gather equipment, medications, tidy up after administration

IV Management
Preparing and using IV equipment
Excl cannulation and administration of medication

Discuss
Discussion of medications with colleagues and patients
RN request to chart meds
General discussions about medications

SUPERVISION

Supervisor
Participant is supervising or educating a colleague in any aspect of patient care excl. issues related to Unit Administration
USE "WITH" FUNCTION

Supervisee
Participant being supervised or educated by a colleague in any aspect of patient care excl. issues related to Unit Administration
USE "WITH" FUNCTION

DOCUMENTATION
Completing patient's clinical notes (electronic or paper)
Admission and discharge process incl. referral letters, patient info sheets
Wristbands and stickers

PROFESSIONAL COMMUNICATION
Discussing tasks to complete and next patients to be seen.
Giving and receiving information regarding patient care incl. handovers
Discussing procedure (e.g. problems with cannulation)
excl. medication discussions, diagnosis discussions and instructions to perform tests/procedures
NOTE TASK DETAILS, USE "WITH" FUNCTION

UNIT ADMINISTRATION
Discussions, documentation and tasks related to the administration of the ED and hospital systems
Includes discussion about models of care and other processes, in the ED and the wider healthcare system (e.g. how to refer patients to hospital or community services)
Maintaining equipment and medication stores
Discussions or tasks related to staffing
NOTE TASK DETAILS

WAITING
ED quiet and participant completed all tasks possible

IN TRANSIT
Moving between patients or tasks until it is obvious what the next task is

SOCIAL
Any conversation between staff not related to patient care or unit administration
Personal breaks

B2: Task Detail Spreadsheet

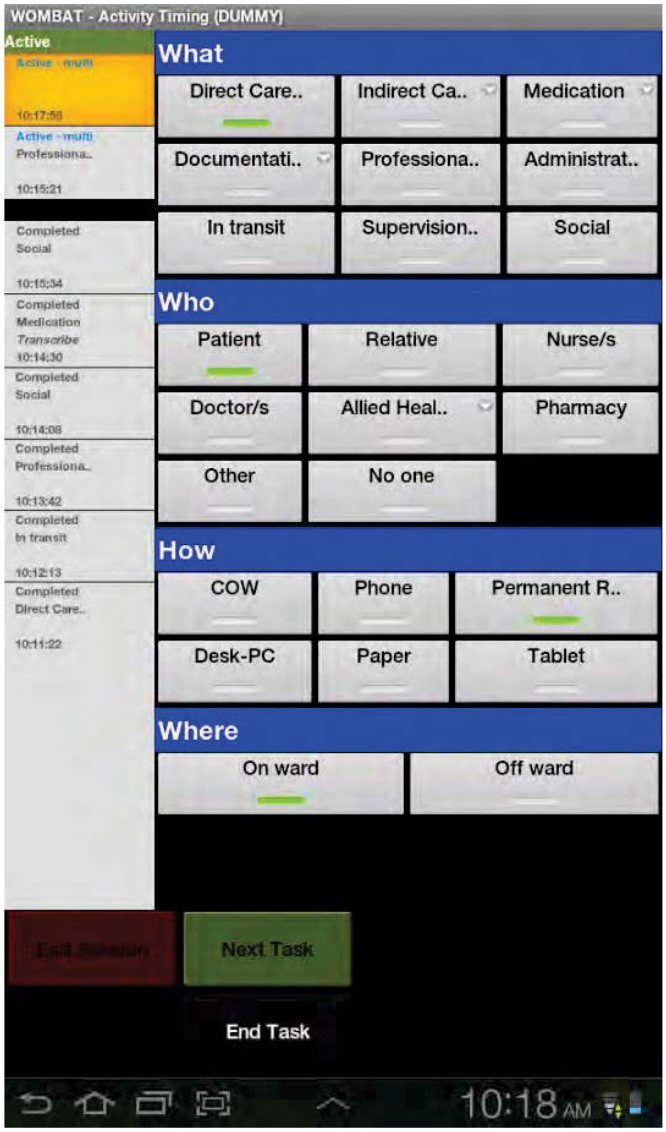
Below is an extract from the task details spreadsheet. The spreadsheet ran concurrently with the WOMBAT software to enrich the task data collected. Task details were noted during the time study observation sessions and were therefore concise. The codes D (Diagnosis), S (Supervision), O (order test/procedure), P (perform test/procedure), C (professional communication), UA (Unit Admin) were used to indicate the time study task category the details related to. The study ID, date and time meant the task detail data could be linked to the observation session in the time study data set. Between two and thirteen task details were recorded in each observation session.

For example, the task details for 201 (an NP) were collected during an observation session on 24/3/15 that commenced at 14:55. Task 1 - a Diagnosis tasks where an ED registrar consulting them about a paediatric patient with a dental condition. Task 2 - a Supervision task where the NP instructed the Reg about how to treat the paediatric patient with a dental condition. Task 3 – a Unit Administration tasks where the NP explained the system of orthopedic referrals to a physiotherapist. Task 5 – Ordered blood tests. Task 6 – Ordered X-ray.

Study ID	Date	Time	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6
201	24/3/15	14.55	D- Reg asked for advice on dental paeds	S - told reg how to treat dental paeds	UA - explain ortho referrals to physio	D get second opinion from reg	O bloods	O – X-ray
318	24/3/15	13:00	D blood results	D consult case w reg	S reg educated about diagnosis	D discussing ECG w reg	O ask RN to take bloods	S - ortho reg educated about treatment
130	25/3/15	10.10	C asked reg about pt - he didn't know	S educate jnr RN on bloods/can	P remove can	S told jnr RN which bloods to order		
324	25/3/15	16.05	D diagnosis discuss w NP	O xray	C w social worker	D discuss w SS	D check X-ray	
116	26/3/15	14	P UA	P UA	S student nurse IV			

B3: WOMBAT Software Interface

Work Observation By Activity Timing (WOMBAT) is a time study software for tablet computer developed in the Australian healthcare environment and managed by Macquarie University, Sydney (http://aihi.mq.edu.au/project/wombat-work-observation-method-activity-timing). An example of the WOMBAT software interface is provided below, though not the one used for this study. The panel on the left-hand side of the screen shows the time of active and completed tasks. In this example, the participant was multitasking: concurrently performing a Direct Care task with a Professional Communication task and had just completed a social interaction, and before that was transcribing medications.



B4: Time Study Participant Demographic Questionnaire

Study ID:

1. **Gender**:
   Male ☐ Female ☐

2. **Please confirm that you are directly employed at this ED (i.e. <u>not</u> agency, casual or VMO)**
   Yes ☐ No ☐

3. **Job Category**
   - ☐ RN
   - ☐ CNS
   - ☐ NP
   - ☐ Resident
   - ☐ Registrar
   - ☐ CMO
   - ☐ Emergency Physician

4. **How many years have you been registered as a medical practitioner /nurse?**

5. **How many years have you worked in emergency departments?**

6. **How long have you worked in <u>this</u> emergency department?**

RNs ONLY

7. **Which level of ED orientation training have you completed?**

   - ☐ Basic
   - ☐ Paediatrics
   - ☐ Triage
   - ☐ Fast Track
   - ☐ Fast Track Coordinator
   - ☐ Resuscitation & Trauma

B5: Fieldnote Example

An example of fieldnotes recorded on a day of fieldwork in Phase 1 is given in the box below. It shows the amount of time the researcher spent in the ED, the approximate number of minutes of time study data gathered and notes on the context. Different types of observations were recorded as 'conservations', where the researcher directly interacted with a time study participant or other clinician working in the ED, or 'observations' where the researcher observed behaviour or interactions between others. A study ID was noted when the observation related to a specific time study session. Speculative-personal reflections were recorded as 'thoughts' as they occurred to the researcher. Coding notes on the time study were also kept in the fieldnotes.

Wednesday 13th May 2015

In ED – 10:30-20:30, WOMBAT minutes: RN 160 NP 80 MO 200

ED quiet on arrival

Conversation with SRMO - said one of the reasons they liked working in ED is that it's "more of a team" than on the wards - "you can rely on the nurses here".

Conversation with NP. Taught RN to plaster this morning. They like to encourage those who show an interest to get involved. Commented that the RN training process was quite linear. If they technicians in the ED or if the RNs could do more procedures, the NPs could get through more patients "they're paying us to think".

Observation – FTC [coordinator] asked JMO – "why is she in a bed?", JMO said the registrar told her to, FTC said "Oh OK then". This was quickly followed with JMO asking "How do I give my patient endone?" – FTC "just chart it and let one of the nursing staff know".

Observation - Registrar asked FTC "What is the dose for Pandeine Forte?". FTC "Just two tablets"

Observation – [ID Registrar] asked FTC what to do about patients who are 'drug seeking'. FTC called NM and found out. (NM talks to pain service). JMO came through – said she'd been "sent by EP to Fast Track to see a patient" but didn't know what to do. [ID] explained the process – the JMO didn't know where the waiting room was so [ID] pointed to the door and said "they [nurses] don't like us [doctors] seeing patients on the beds, they like to keep them free". [ID] also complained of delays in loading imaged of X-rays and CTs – said ED team was friendly but radiographers were grumpy.

Thoughts – junior doctors are not always aware of their place in the team or the basics of the model of care. They seem to look to registrars for guidance but nurses seem to provide it.

Coding Notes

[ID] – started observing but disappeared with JMO.

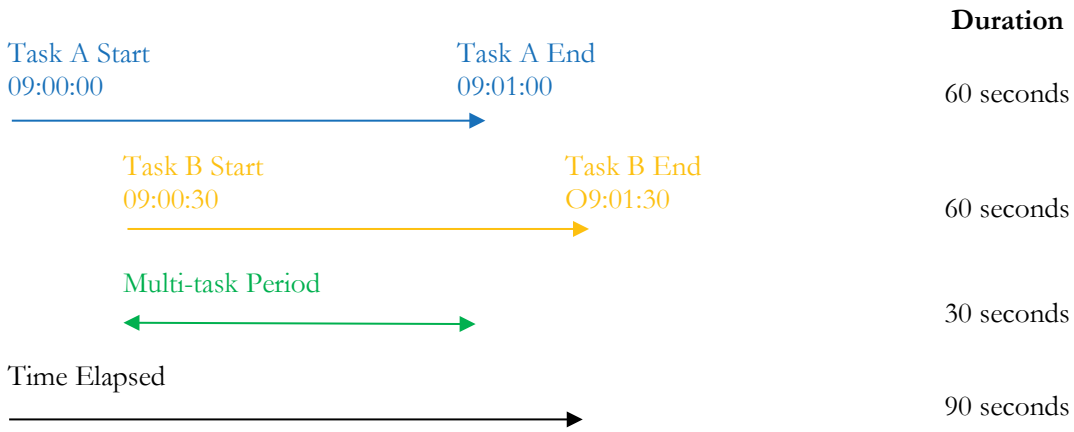
[ID] – was supervising student so multi-tasked all of the tasks with Supervisor Other

[ID] – **error** 11:55 looking for cannula, coded as locating - recode as procedure related.

B6: Multiskilling Data Interpretation

The multiskilling function in WOMBAT records each task separately in the dataset therefore total task time in the dataset is longer than time elapsed (i.e. clock time). The figure below provides a simple illustration. Task A started at 09:00:00 and ended at 9:01:00. Task B started at 09:00:30 and ended at Task B. Task A and B together account for 120 seconds of data in the dataset (total task time) whereas as the absolute time elapsed is 90 seconds, with 30 seconds of overlap. Calculations of the proportion of time spent on tasks are based on the total task time in the dataset not time elapsed i.e. The proportion of time on Task A is reported as 50% of total task time (60 secs / 120 secs) rather than 67% of elapsed time (60 secs /90 secs).

Figure 3 Example of recording of multi-skilling in WOMBAT



Appendix C: Phase 2 Interview Guide

Study ID:

Date:

Technically doctors and NPs can do everything that nurses can do – sometimes doctors and NPs do things (like take bloods) for themselves while sometimes they asked a nurse to do it.

MO/NPs

1 **Can you explain under what circumstances you do things for yourself and when you ask a nurse to do it?**

- Type of task – cannulation/bloods vs getting medications for patients
- Individual factors
- Which is better?
- What can go wrong when you delegate?
- Resistance?

RNs

1 **a) Why do you think this is?**

- Circumstances
- Does it vary between individuals?
- Have you noticed a difference between NPs and MOs?
- What about you? When do you ask a colleague to do something rather than do it yourself?

b) What about you, when do you ask a colleague to do something rather than do it yourself?

- Individual factors
- What can go wrong when you delegate?

c) I also noticed that sometimes RNs would ask doctors and NPs what they needed done and sometimes they waited for instructions. Why is that?

One of the reasons I chose ED for the study is that the RNs can prescribe certain medications and order tests autonomously.

2 **a) What are the benefits of this for service delivery?**

b) Where doesn't it work so well?

c) I often observed clinicians' prescribing medications or ordering tests for each other without examining the patient. Do you ever ask someone to do that and why?

What if someone asked you – when would you say yes / no?

The roles also have their specific responsibilities - sometimes the integration of those different roles seemed to go smoothly, at other times not.

3 **a) Can you explain why some shifts don't go smoothly in terms of how your work is integrated with the rest of the team?**

- Communication
- Individual factors
- Experience levels
- Difference Acute / FT
- The data suggests that RNs take more responsibility for the integration of tasks

b) What role does the coordinator / SMO play in integrating the tasks of the team?

- Explain "different" approaches and which is "best"
- Relationship between SMO/Coordinator

The NPs have been working in Fast Track for a long time and have become specialists in the treatment of minor injuries.

4 **a) What are the benefits to the department in NPs specialisation?**

- Knowledge resource
- Speed of treatment for targets

b) Are there any downsides?

- Availability of skills e.g. suturing POP
- When no NP on duty

c) Do you think NPs should expand their role within the ED?

- Any constraints?
- Why hasn't it happened?

5 **a) Are there any restrictions on your role that reduce your ability to respond to patients' needs?**

- Standing orders, clinical protocols, scope, hospital policy

b) Is there anything else that makes it difficult for you to respond to patients' needs?

Appendix D: Additional Phase 1 Time Study Results

Table 26 Frequency of 'Assessment and Diagnosis' tasks observed by role

	MO n (%)	NP n (%)	RN n (%)	Total n (%)	p (χ^2)
Patient Assessment	82 (30%)	79 (28%)	118 (42%)	279 (100%)	.505 (*1.4*)
Vital Signs	1 (2%)	6 (10%)	53 (88%)	60 (100%)	**≤.001** (*45.9*)
Diagnosis	128 (52%)	94 (38%)	23 (10%)	245 (100%)	**≤.001** (*144.8*)
Supervision	39 (32%)	42 (34%)	42 (34%)	123 (100%)	**.042** (*6.4*)
Documentation	165 (33%)	139 (28%)	194 (39%)	498 (100%)	**≤.001** (*13.1*)
Total	415 (34%)	360 (30%)	430 (36%)	1205 (100%)	**≤.001** (*66.3*)

Pearson χ^2, zero cells have an expected value <5, significant results bolded at p<.05

Table 27 Frequency of 'Investigations and Procedures' tasks observed by role

	MO n (%)	NP n (%)	RN n (%)	Total n (%)	p (χ^2)
Order Investigation/ Procedure	46 (44%)	35 (33%)	24 (23%)	105 (100%)	**≤.001** (*24.6*)
Prepare Investigation/Procedure	70 (19%)	119 (32%)	178 (49%)	367 (100%)	**.002** (*12.3*)
Perform Investigation/Procedure	30 (17%)	73 (43%)	68 (40%)	171 (100%)	**≤.001** (*20.5*)
Total	146 (23%)	227 (35%)	270 (42%)	643 (100%)	**≤.001** (*20.1*)

Pearson χ^2, zero cells have an expected value <5, significant results bolded at p<.05

Table 28 Frequency of 'Patient Communication and Comfort' tasks observed by role

	MO n (%)	NP n (%)	RN n (%)	Total n (%)	p (χ^2)
Patient Communication	176 (22%)	282 (36%)	331 (42%)	789 (100%)	**≤.001** (*28.8*)
Patient Comfort	25 (22%)	35 (31%)	52 (47%)	112 (100%)	.518 (*1.3*)
Total	201 (27%)	317 (28%)	383 (45%)	901 (100%)	**≤.001** (*29.6*)

Pearson χ^2, zero cells have an expected value <5, significant results bolded at p<.05

Table 29 Frequency of 'Organisation of Care' tasks observed by role

	MO n (%)	NP n (%)	RN n (%)	Total n (%)	p (χ^2)
EWL†	76 (29%)	51 (19%)	138 (52%)	265 (100%)	**.005** (*10.7*)
Professional Communication	304 (25%)	277 (23%)	638 (52%)	1219 (100%)	**≤.001** (*33.5*)
Tidying	3 (10%)	6 (19%)	22 (71%)	31 (100%)	**.013** (*8.7*)
Unit Administration	35 (21%)	58 (36%)	71 (43%)	164 (100%)	**.070** (*5.3*)
Total	418 (25%)	392 (23%)	869 (52%)	1679 (100%)	**≤.001** (*42.1*)

†Electronic Waiting List

Pearson χ^2, zero cells have an expected value <5, significant results bolded at p<.05

Table 30 Frequency of 'Off Task' tasks observed by role

	MO n (%)	NP n (%)	RN n (%)	Total n (%)	p (χ^2)
Locating	69 (33%)	40 (19%)	101 (48%)	210 (100%)	**.008** (*9.6*)
In Transit	19 (28%)	18 (27%)	30 (45%)	67 (100%)	.952 (*0.9*)
Waiting	45 (25%)	54 (30%)	80 (45%)	179 (100%)	.770 (*0.5*)
Social	49 (33%)	51 (35%)	47 (32%)	147 (100%)	**.004** (*10.8*)
Total	182 (30%)	163 (27%)	258 (43%)	603 (100%)	.129 (*4.1*)

Pearson χ^2, zero cells have an expected value <5, significant results bolded at p<.05

Table 31 Count of investigations or procedures ordered recorded in task details spreadsheet

	MO n	NP n	RN n	Total n
X-ray	8	15	3	26
Pathology	11	6	4	21
Venepuncture	5	2	4	11
Urinary Analysis	1		6	7
Vital Signs	2	1	2	5
Musculoskeletal	3	1		4
Other Imaging	2		1	3
Blood Sugar		2		2
Wound Care	1	1		2
Other	2	1	1	4
Total	**35**	**29**	**21**	**85**

Table 32 Count of investigation-related procedures performed, recorded in task details spreadsheet

	MO n	NP n	RN n	Total n
Venepuncture	10	9	17	**36**
Urinary Analysis	1	1	10	**12**
Electrocardiograph			10	**10**
Blood Sugar		2	3	**5**
Spirometry			2	**2**
Bladder Scan		1	1	**2**
Ultrasound	2			**2**
Blood Gas			1	**1**
Total	**13**	**13**	**44**	**70**

Table 33 Count of treatment-related procedures performed, recorded in task details spreadsheet

	MO n	NP n	RN n	**Total n**
Wounds	4	25	13	**42**
Musculoskeletal	2	14	3	**19**
Surgical	3	1		**4**
Removal of ring (using cutter)		3	1	**4**
Total	**9**	**43**	**17**	**69**