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Physiotherapy student contribution to the delivery of health services and the transition from student to new graduate Stoikov, Susan

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Physiotherapy student contribution to the delivery of health services and the transition from student to new graduate

Susan Stoikov

BPhty (Hons), BExSc, MPH

A thesis submitted in total fulfilment of the requirements of the degree of Doctor of Philosophy

Discipline of Physiotherapy School of Allied Health Faculty of Health Sciences Australian Catholic University 1100 Nudgee Road, Banyo, Queensland, 4014

Supervisory Team Professor Suzanne Kuys Dr Lyndal Maxwell Associate Professor Jane Butler Kassie Shardlow Mark Gooding

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Statement of Authorship

This thesis contains no material that has been extracted in whole or in part from a thesis that I have submitted towards the award of any other degree program in any other tertiary institution.

No other person's work has been used without due acknowledgement in the main text of this thesis.

All research procedures reported in this thesis were approved by the relevant Human Research Ethics Committees.

Name: Susan Stoikov

Signature:

nature:

Date: 14/12/2020

Publications, presentations and grants during candidature

Publications

Stoikov, S., Shardlow, K., Gooding, M., & Kuys, S. (2017). Clinical activity profile of preregistration physiotherapy students during clinical placements. *Australian Health Review*, 42(6), 661-666.

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Presentations

Gooding, M., Shardlow, K., Stoikov, S., & Kuys, S. (2017, August 26-29). *Student contribution to Health Services: Collaborative placements – meeting the needs of service delivery and clinical education*. National Allied Health Conference, Sydney, New South Wales, Australia.

Gooding, M., Shardlow, K., Stoikov, S., & Kuys, S. (2017, 11-14 July). *Is the clinical workload on placement preparing students for their transition to the workforce?* Australian and New Zealand Assoication of Health Professional Educators Conference, Adelaide, South Australia, Australia.

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	projects		Training Initiative
	Study 1	\$40,944	
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	Study 4	\$19,084	
	Study 3 & 5	\$18,500	
	Total	\$120,125	
Supplies	Telecommunications,		Clinical Education and
	printing, computer etc		Training Initiative
	Study 1	\$800	
	Study 2	\$800	
	Study 4	\$500	
	Study 3 & 5	\$150	
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Contributions by others to the thesis

The PhD candidate was principally involved in the study design, ethics applications, review of the literature, recruitment, data collection and analysis and manuscript and thesis preparation and review for Studies 1 to 5. The PhD candidate contributed at least 60% to published manuscripts.

Kassie Shardlow and Mark Gooding assisted in the study design, data collection and analysis and review of manuscripts (Studies 1, 4 and 5).

Professor Suzanne Kuys, Dr Lyndal Maxwell and Associate Professor Jane Butler provided considerable contributions to study design, data analysis and drafting of manuscript and thesis chapters.

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Susan Stoikov / PhD Candidate and corresponding author	Date
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Professor Suzanne Kuys / Principal supervisor and co-author	Date
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Abstract

Clinical education in physiotherapy is arguably the most important contributor to developing safe and competent new graduate physiotherapists and supporting the transition from student to new graduate. However, with increasing demand for clinical placements and a fiscal health environment, there is a growing need to identify how physiotherapy students contribute to the delivery of health services. This also raises the need to investigate how clinical placements impact the transition from student to new graduate. This thesis, comprising of five studies, examines the student contribution to the delivery of health services and how physiotherapy students transition to new graduates.

The first study investigated the direct patient care activity of individual physiotherapy students during 5-week clinical placements in three clinical areas: cardiorespiratory, musculoskeletal and neurorehabilitation. Clinical activity data, measured by occasions of service (OOS) and length of occasion of service (LOOS), was obtained from five Queensland public health sector hospitals totalling 300 weeks of clinical activity data. The clinical educator to student (CE:student) ratio, which describes the clinical educator full time equivalent supervising the number of students participating in the same clinical placement were also collected. The average OOS completed by an individual student during a cardiorespiratory placement was 98.3 OOS, 74.0 OOS for a musculoskeletal placement and 72.4 OOS in a neurorehabilitation placement. In the three clinical areas, the total number of OOS provided by students in each week increased from week 1 to week 4 and plateaued in week 5. A main effect existed between LOOS and weeks (F = 402.1, p < 0.001) and LOOS and clinical area (F = 1331.5, p < 0.001). In each clinical area the average LOOS reduced each week. There were differences between hospitals in each clinical area in the average OOS completed per student during a clinical placement. The average OOS per student per 5-week clinical placement block was not different between CE:student ratios in each of the three clinical areas.

The second study investigated the direct patient care activity of a group-of-students and how this compared to the direct patient care activity of a junior and senior physiotherapist. Study 2 also examined the impact of clinical area and CE:student ratio on the student contribution to the delivery of health services. Clinical activity data were obtained from physiotherapy students and physiotherapists working at five Queensland public health sector hospitals in the clinical areas of cardiorespiratory, musculoskeletal, neurorehabilitation and orthopaedics. Data were collected from 135 groups of physiotherapy students (408 individual student clinical placements) representing 2040 weeks of clinical activity data. The average OOS/day a group-of-students participating in a collaborative clinical placement was 10.6 OOS/day. A higher CE:student ratio produced more OOS/day in three of the four clinical areas. Clinical area and CE:student ratio accounted for 39% of the variance in average OOS/day a group-of-students completed. On average a group-of-students were able to meet the direct patient care activity of a junior and senior physiotherapist by week 2 of a 5-week clinical placement.

The third study was a qualitative exploration of the perspectives of new graduate and experienced physiotherapists on the student contribution to the delivery of health services. Focus groups with a semi-structured interview guide were conducted at five Queensland public health sector hospitals with new graduates and experienced physiotherapists. Focus group interviews were transcribed verbatim and a thematic analysis conducted. Three main themes were identified: tangible student contribution, non-tangible student contribution and factors that influence the student contribution. Factors that influenced the student contribution included meaningfulness of activities, autonomy, efficiency, students struggling with clinical practice and the CE:student ratio.

The fourth study investigated the change in direct patient care activity from student to new graduate. The clinical activity data of 412 student clinical placements representing 2060 weeks of clinical activity and 445 weeks of new graduate clinical activity data were obtained from five Queensland public health sector hospitals. Data were obtained from students on clinical placement across four clinical areas: cardiorespiratory, musculoskeletal, neurorehabilitation and orthopaedics. OOS and LOOS data were collected in weeks 4 and 5 of a 5-week clinical placement to determine the change in percentage of direct patient care, average OOS and average LOOS from physiotherapy student to new graduate. Students spent on average 56% of their time in direct patient care activities compared to 80% for new graduates (p < 0.001). In each clinical area students completed significantly less OOS than new

graduates (p < 0.001) completing approximately half as many OOS. Students LOOS was greater than new graduate in all clinical areas with an approximate difference of 30%.

The fifth study examined the perspectives of new graduate and experienced physiotherapists on the transition from student to new graduate in five Queensland public health sector hospitals. Focus groups with a semi-structured interview guide were conducted, transcribed verbatim and thematically analysed. Four themes emerged: preparedness for practice, protected practice, independence and affirmation of practice and performance expectations. Furthermore, three key strategies to enhance the transition from student to new graduate were identified. These were organisational, clinical placement experiences and self-efficacy.

This research program demonstrated that physiotherapy students contribute to the delivery of health services by primarily providing direct patient care but also in supporting the health service and staff development. The clinical area and CE:student ratio are important considerations when planning for student clinical placements and maximising the student contribution. There is a gap between student and new graduate practice, and transition to independent clinician poses many challenges which necessitates the need for stakeholders to work together to support the transition from student to new graduate.

Chapter 1 - Introduction

The development of clinical education in health disciplines, and certainly in physiotherapy, has resulted in an increased awareness of not only the need to manage the growing demand for student clinical placements, but also to understand the contribution of students on clinical placements to the delivery of health services. It has also prompted the need to consider the impact of clinical placements on the transition from student to new graduate. Health services are faced with the challenge of providing quality, efficient healthcare against the background of rising demand and costs while also endeavouring to support the growth in number of students requiring clinical placements. Thus, balancing the needs of the health services and the student are important to ensure the delivery of high-quality health services now and into the future. Developing an understanding of student contribution is imperative to plan sustainable clinical placement opportunities within hospital-based health services.

Clinical placements for health professionals, and specifically physiotherapy students, are an essential component of producing clinicians ready for independent practice (Hall, Poth, Manns, & Beaupre, 2015). Clinical placements encourage the application of theoretical knowledge to deliver care to patients across a variety of settings (Chipchase et al., 2012). While physiotherapy clinical placements are offered across all health settings, and in many clinical contexts, the demand for physiotherapy clinical placements is largely being met by public health facilities (Health Workforce Australia, 2013). In 2015, for example, the Queensland Public Health Sector offered 65% of all physiotherapy clinical placements required by Queensland universities (Queensland Physiotherapy Placement Collaborative, 2020), therefore understanding the impact students have in this setting is imperative.

The student contribution to the delivery of health services is most easily measured by assessing direct clinical care activity which is typically considered as providing care directly to patients. Direct clinical care activity for the remainder of this thesis will be referred to as direct patient care activity for ease of reading. Measures of direct patient care include occasions of service (OOS) and length of occasions of service (LOOS). To date, limited research has

identified student contribution to the delivery of health services. Several studies both in physiotherapy and other allied health professions have indicated that the combined clinical activity of the student/s and clinical educator rose during clinical placements compared with times when there were no students (Ash, Martin, Rodger, Clark, & Graves, 2015; Dillon, Tomaka, Chriss, Gutierrez, & Hairston, 2003; Ladyshewsky, 1995; Lopopolo, 1984). However, the physiotherapy student contribution to clinical activity independent of the clinical educator has not been identified. Regardless, there is some suggestion that overall students may increase health service activity (Dillon et al., 2003; Pivko, Abbruzzese, Duttaroy, Hansen, & Ryans, 2016). Despite this, there has been no clear quantification of student direct patient care activity during clinical placements and how, if at all, this contributes to the delivery of health services.

While understanding student direct patient care activity during clinical placements is necessary, it is important to appreciate what factors, if any, influence student contribution. Factors that could influence student contribution include the clinical area in which the student placement is occurring and the clinical educator to student (CE:student) ratio. Anecdotally, people requiring physiotherapy intervention in common clinical areas in physiotherapy, such as cardiorespiratory, musculoskeletal or neurorehabilitation, need differing duration, intensity and types of care. For example, physiotherapists working in musculoskeletal outpatients have defined and set appointments compared with physiotherapists who work on surgical wards where they would prioritise patients most at need. Currently, there is no research identifying student activity based on clinical area in physiotherapy. However, in occupational therapy, Ozelie and colleagues (2015) found positive differences in productivity scores (proportion of time spent in direct patient care each work day) while students were on placement between some clinical areas. The influence of CE:student ratio on student contribution has received some exploration. A ratio of one clinical educator to two students (1:2) has been shown to increase the number of patients seen per hour worked by 34% compared with the clinical educator alone in physiotherapy (Ladyshewsky, 1995). Other CE:student ratios are typically used in physiotherapy clinical placements. Understanding how clinical area and the CE:student ratio influences student contribution may, in the future, provide avenues to enhance the student contribution in current clinical placements.

Students may make contributions to health services other than providing direct patient care. The perceived contribution of students to health services has been reflected in a small number of qualitative studies. Reported benefits of providing clinical placements for staff include improving evidence-based and reflective practice whereas the challenges identified are increased workload and stress (Davies, Hanna, & Cott, 2011; Hall et al., 2015). How physiotherapists feel students contribute impacts on their willingness to take students and there is a perception that students reduce the efficiency of the physiotherapist (Hall et al., 2015). Understanding how physiotherapists perceive the contribution of students may allow a more comprehensive appreciation of the student contribution to the delivery of health services.

Clinical placements are a learning opportunity within entry-level physiotherapy programs to support the teaching of skills and to introduce students to what is required to practice as a physiotherapist in the workplace. To date there is no clear understanding of whether current student activity during clinical placement is adequate to prepare students to transition to clinical practice as a new graduate. The transition from student to independent clinician has received sporadic attention in allied health professions over the past decade, however no research has quantified the change in direct patient care activity required during this transition. Both new graduates and their employers report that workload management is one of the greatest challenges when transitioning from student to clinician (Duchscher, 2009; Moriarty, Manthorpe, Stevens, & Hussein, 2011). Thus, it is important to understand if and how direct patient care activity changes from student to new graduate to support transition into the profession.

The transition from student to new graduate can be challenging with new graduates needing to adapt to new roles and responsibilities. New graduates at times feel ill-prepared for the demands of independent clinical practice with the realisation that they may lack knowledge and skills and, must socialise into the work environment and profession (Duchscher, 2009). Clinical placements play a key role in student preparedness for practice and must provide sufficient exposure and challenge to facilitate learning (Toal-Sullivan, 2006). Miller and colleagues (2005) argue that clinical placements should as best as possible mimic real-life practice such as interactions with the multidisciplinary team, larger caseloads and assist to

3

provide students with an understanding of psychosocial factors that can impact patient care. It is important that key stakeholders collaborate to ensure students are supported in their transition from student to new graduate and prepared for practice with the required skills to practice effectively as a new graduate physiotherapist.

With the growing demand for efficient, high quality health services and increasing demand for clinical placements, understanding the impact that students have is essential for sustainable quality clinical placements that are mutually beneficial to the health service and student. To date, it is unclear what the quantifiable contribution of students is to the delivery of health services and the factors that impact this contribution. Clinical placements are designed to prepare students for professional practice, however the change in clinical activity that is required from student to new graduate has received little attention. Clinical placements are fundamental to producing well-rounded graduates who will provide health care into the future and thus knowledge of how students interact with health services and how they transition into health services may enhance the relationship between key stakeholders.

The purpose of this program of research was to identify physiotherapy student activity during clinical placements, explore the influence of the clinical area and CE:student ratio on student activity, and describe the effect student activity has on the delivery of health services. Additionally, the direct patient care activity required in the transition from student physiotherapist to independent clinician was explored, along with perceptions of the profession on how new graduates transition into the profession.

Five studies were planned for the completion of this thesis with the following objectives.

- To determine the direct patient care activity physiotherapy students undertake during clinical placements in common areas of physiotherapy practice.
- To determine the direct patient care activity contribution of a group of physiotherapy students compared to the clinical activity of physiotherapists and the impact of clinical area and CE:student ratio on this contribution.

- 3. To explore the perception of physiotherapists on the contribution of students to the delivery of health services.
- 4. To determine the change in direct patient care activity from physiotherapy student to new graduate.
- 5. To describe the perceptions of physiotherapists on the transition from student to new graduate physiotherapist.

Following the introduction, this thesis comprises eight chapters: Chapter 2 – Background, Chapter 3 – Methods, Chapters 4 to 8 – Studies 1 to 5 and Chapter 9 – Discussion and conclusion. Study 1 has been published, Studies 4 and 5 have been accepted for publication and are published online, and Studies 2 and 3 are being prepared for publication. Table 1.1 below outlines the actual and proposed publications for this program of research.

Table 1.1 Actual and proposed publications including journal name, impact factor and Web of Science ranking

Study	Short Title	Proposed Journal	Journal Impact Factor	Web of Science Ranking
1	Clinical activity profile of physiotherapy students	Australian Health Review (published)	1.036	H 42
2	Direct patient care activity of a group-of-students	Physiotherapy Theory and Practice	1.129	H42
3	Perceptions of physiotherapists on the student contribution to the delivery of health services	Advances of Health Sciences Education	2.552	H 51
4	Quantitative transition from student to new graduate	Physiotherapy Theory and Practice (published online)	1.129	H 42
5	Perceptions of physiotherapists on the transition from student to new graduate	Physiotherapy Theory and Practice (published online)	1.129	H 42

Chapter 2 - Background

2.1 Entry – level physiotherapy

Entry-level physiotherapy programs in Australia range from undergraduate four-year Bachelor degrees, to three-year post graduate extended Masters or Doctoral programs (Australian Health Practitioner Regulation Agency, 2013). Regardless of the length and degree type, an essential requirement of all physiotherapy programs is for students to participate in clinical education experiences or placements across a wide variety of environments and settings in the physiotherapy practice areas of acute, rehabilitation and community practice (Australian Physiotherapy Council, 2017). Historically, students were required to undertake clinical placement experiences in the clinical areas of cardiorespiratory, musculoskeletal and neurological physiotherapy (Australian Physiotherapy Council, 2011). However, the physiotherapy accreditation guidelines changed in 2017 to indicate that students must have experiences in physiotherapy practice areas rather than in key clinical areas (Australian Physiotherapy Council, 2017). The timing of clinical placements varies within entry-level physiotherapy programs depending on the degree type and curriculum schedule. In most Bachelor programs, for example, clinical placements typically occur across the third and fourth years whereas in Masters and Doctoral programs clinical placements may occur after six to nine months of study.

Although there are no minimum number of clinical education hours physiotherapy students must complete prior to registration (L. McAllister & Nagarajan, 2015) students must demonstrate competence in a variety of skills including physiotherapy specific skills as well as generic skills, such as effective written and oral communication skills, required by the university. While the average number of hours students spend in clinical placements has been reported to be 1000 hours (Health Workforce Australia, 2014a) variability exists in the amount of clinical education hours included in entry-level physiotherapy programs. In Australia in 2014, nine of the sixteen (56%) Bachelor degree programs include more than 1000 hours while seven of the eight (87%) Masters programs include less than 1000 hours of clinical placement experience (Health Workforce Australia, 2014a). Therefore, students will

undertake different hours of clinical exposure depending on the university attended and type of program completed.

There is shortage of allied health professionals in Australia (Australian Government Department of Health, 2021; T. Schofield, 2009), especially in physiotherapy, across a wide variety of clinical specialities (Australian Health Workforce Advisory Committee, 2004; Pretorius, Karunaratne, & Fehring, 2016). Despite the growth in the number of health professional graduates, the shortage in physiotherapy, and in fact all allied health professions, in regional and remote areas was also identified as a significant concern (Cosgrave, Maple, & Hussain, 2018; Struber, 2004). Some of this shortage relates to older physiotherapists in the baby boomer generation retiring and the growth in healthcare use by older Australians (Pretorius et al., 2016; D. Schofield & Fletcher, 2007). This demand for more physiotherapists has resulted in an increased number of physiotherapy programs. Over the last decade there has been considerable growth in the number of physiotherapy programs across Australia as a whole and similarly within each state. In 2004, 12 Australian universities provided physiotherapy entry-level programs (McMeeken, Grant, Webb, Krause, & Garnett, 2008), currently in 2020 there are 22. This growth is evident in Queensland; with the number of universities providing entry-level physiotherapy programs increasing from two in 2007 to six in 2018. This growing number of physiotherapy programs has resulted in increased student numbers and therefore increased need for clinical placements. Managing the need for more clinical placements in a finite health system is challenging.

Australian Health Workforce Advisory Committee (2004) suggested that clinical placement providers were under increasing pressure to provide entry-level physiotherapy students clinical placements and that better links between government health services and universities were necessary to manage the workforce demand. In one year alone from 2011 to 2012, Australia wide the clinical placement requirements for physiotherapy students grew by 21% with the public health sector providing 74% of all clinical placement activity in 2012 (Health Workforce Australia, 2013). The majority of physiotherapy clinical placements (84%) were provided in major cities with 10% provided in inner regional centres and 5% in outer regional areas (Health Workforce Australia, 2013). Specifically, in Queensland the number of physiotherapy students requiring clinical placement from 2010 (270 students) to 2019 (529 students) has doubled, which saw a 37% increase in the total number of clinical placements offered by the Queensland Public Health Sector (Queensland Physiotherapy Placement Collaborative, 2020). Placements offered by the Queensland Public Health Sector in 2019 accounted for approximately 57% of all placements required by the six universities (Queensland Physiotherapy Placement Collaborative, 2020). Despite the Queensland Public Health Sector increasing the overall clinical placement numbers over the past 10 years, there has been a reduction in the proportion of Queensland Public Health Sector clinical placements compared to the universities clinical placement requirements. Thus, while the Queensland Public Health Sector has increased clinical placement numbers, the demand for entry-level physiotherapy clinical placements has outstripped what has been able to be offered within the Queensland Public Health Sector.

2.2 Queensland Physiotherapy Placement Collaborative

The Queensland Physiotherapy Placement Collaborative (QPPC) was established in 2008 to ensure the equitable distribution of physiotherapy clinical placements provided by the Queensland Public Health Sector. The QPPC is made up of representatives from each Queensland university offering physiotherapy programs and representatives from the Queensland Public Health Sector. The Queensland Physiotherapy Placement Coordinator facilitates the central allocation of clinical placements in conjunction with universities. The Physiotherapy Placement Coordinator is employed by the Queensland Public Health Sector to manage the allocation of all student placements throughout the year for the Queensland Public Health Sector (Queensland Physiotherapy Placement Collaborative, 2013).

The establishment of the QPPC has resulted in increased clinical placement capacity. The QPPC reached consensus on the timing of clinical placements resulting in nine defined 5-week clinical placement blocks scheduled throughout the year. Clinical placements commence at the end of January and finish in early December. Universities participate in the nine clinical placement blocks based on their individual curriculum schedule. As a result of the QPPC,

placement capacity and quality initiatives have become core business in the Queensland Public Health Sector.

2.3 Health services

From the early 1990s to 2018 health expenditure in Australia rose by 150% per person (Australian Institute of Health and Welfare, 2016a, 2019b). The Australian Institute of Health and Welfare (2016a) reports that this rise can be attributed to several factors including a growing population, an increasingly ageing population, consumer expectations about access, and delivery of health services and technologies. The demand for public hospital services also rose from 2009-10 to 2017-18 where hospital separations grew by 24.6% (Australian Institute of Health and Welfare, 2015a, 2019a). Outpatient and emergency department occasions of service (OOS) on average grew by 2.5% each year between 2009-10 and 2013-14 (Australian Institute of Health and Welfare, 2015c). However, no comparable data exists in recent years due to changes in how this data is collated. Hospital separations are considered to be when an admitted patient ceases the intended care (Australian Institute of Health and Welfare, 2019b) and, with ongoing pressure for health services to ensure efficiency and quality healthcare, the utilisation of clinician time and number of OOS is increasingly important.

Due to the demand for efficient healthcare delivery an activity-based funding model was designed to help quantify and provide funding to health services. Activity-based funding, also referred to as casemix funding, was proposed by the Australian Government in 2011 as part of the National Health Reform Agreement (Council of Australian Governments, 2011) to enhance the quality, efficiency and outcomes of healthcare in Australia. The activity-based funding model had a staged roll-out across Australia and by 2014-15 all major Queensland public hospitals were participating in this model. In this model, funding to hospitals is based on 'activities' or services provided to patients with the Australian Independent Hospital Pricing Authority setting the price at which hospitals are remunerated (Queensland Government, 2014).

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All services performed by allied health professionals are funded through this model, which highlights the need to accurately collect clinical activity data to ensure health services and physiotherapy departments are appropriately funded. Therefore, it is necessary that all treating clinicians and students who provide services to patients record clinical activity. With this model in place health services primarily measure contribution as providing treatment services to patients which highlights the need to assess how students contribute to the health service.

2.4 Measuring health service contribution

Clinical activity of allied health professionals in Australia is documented using the classification system developed by the National Allied Health Casemix Committee (2001). The Allied Health Activity Classification Hierarchy outlines the types of activities allied health professionals perform within four major categories clinical care, clinical service management, teaching and training, and research (National Allied Health Casemix Committee, 2001). These four categories are commonly grouped into direct patient care activities and non-direct patient care activities (Hearn, Govier, & Semciw, 2016). Direct patient care activities are considered those where patient care is provided and the remaining three categories are non-direct patient care activity. Time spent in direct and non-direct patient care activities is the clinical care ratio (Hearn et al., 2016). Key definitions relating to clinical care activity are presented in Table 2.1.

Term	Definition	
Direct patient care	The combination of individual patient attributable and non-individual	
	patient attributable time (Hearn et al., 2016).	
Individual patient	Time in activities related to the direct clinical care of an individual	
attributable time	patient to influence their health status (Allied Health Professions'	
	Office of Queensland, 2014).	

Table 2.1. Allied health clinical activity definitions

Term	Definition		
Occasion of	Any direct patient care activity provided to an individual or group to		
service	influence their health status. This may include assessment, treatment,		
	reading and writing of chart and organising follow up services (Allied		
	Health Professions' Office of Queensland, 2014).		
Length of	Time in minutes to complete an occasion of service (Allied Health		
occasion of	Professions' Office of Queensland, 2014).		
service			
Non-individual	Activities related to clinical care that cannot be assigned to an		
patient attributable	individual patient or groups of patients (Allied Health Professions'		
time	Office of Queensland, 2014).		
Non-direct patient	Professional and management activities necessary to support clinical		
care	care and include teaching and training, clinical service management		
	and research (Allied Health Professions' Office of Queensland, 2014;		
	Hearn et al., 2016).		
Clinical service	Professional and management activities, such as attending staff		
management	meetings and training, which support and are essential to clinical		
	care (National Allied Health Casemix Committee, 2001).		
Teaching & training	Activities that relate to the formal teaching and training of		
	undergraduate, postgraduate and health professionals to improve		
	their knowledge and skills (National Allied Health Casemix		
	Committee, 2001).		
Research	Activities that are directly associated with developing or completing a		
	formal research project approved by a research committee to		
	improve the delivery of health services (National Allied Health		
	Casemix Committee, 2001).		

Health services use the Health Activity Classification Hierarchy (National Allied Health Casemix Committee, 2001) to quantify the direct patient care activity of staff to receive funding for services through the activity-based funding model. Specifically, activities related to direct patient care are more easily quantified and offer the greatest contribution to the

health service as this involves interventions with patients. Direct patient care is typically measured by OOS and length of occasions of service (LOOS), which are readily available in all hospitals as this is part of the minimum data set required by the National Allied Health Casemix Committee (2001).

While non-direct patient care activity can be measured using time it is far more difficult to quantify the contribution to the delivery of health services, as the impact is not immediate. These non-direct patient care activities play an important and necessary role in health service delivery and may include attending staff meetings, mandatory training and participating in service improvement activities (Australian Commission on Safety and Quality in Healthcare, 2010). Other non-direct patient care activity is important for example teaching and supporting staff and student learning, to maintain patient safety and to build capacity in current and future health professionals (Frenk et al., 2010). These types of non-direct patient activities are challenging to attribute value or contribution to (Haines, Isles, Jones, & Jull, 2011) as they are context specific. Figure 2.1 illustrates the classification of clinical activity.



Figure 2.1. Allied Health Activity Classification Hierarchy. Adapted from National Allied Health Casemix Committee (2001).

2.5 Contribution of the physiotherapist

Physiotherapy can play an essential role in the treatment of patients across the lifespan to support optimal functioning and participation in the community (Physiotherapy Board of Australia and Physiotherapy Board of New Zealand, 2015). The physiotherapist's contribution is most easily described by reporting the direct patient care activity (OOS and LOOS) which health services currently use (Hearn et al., 2016) with non-direct patient care activity being more challenging to measure contribution and interpret. Despite this, and although out of scope for this research, both direct and non-direct patient care activity measures should be evaluated when determining the physiotherapist's contribution to the delivery of health services.

There is very little research identifying the caseload and quantifiable contribution of physiotherapists working in public health systems across the world (Burnett & Klaiman, 2009). Guidelines have been proposed for physiotherapy caseloads for rehabilitation services and range from 1.25 to 2 full time equivalent staff per 10 beds (Australasian Faculty of Rehabilitation Medicine, 2011). A Canadian study reported that physiotherapists working in Level 1 trauma centres on average were allocated twelve patients, however some patients would receive more than one treatment (Fisher et al., 2012). Already differences across clinical areas are noted in these studies. For other common areas such as acute medical or musculoskeletal inpatients and outpatients there are no guidelines regarding clinical caseload. Furthermore, compliance with guidelines provided for clinical caseloads has only been reported for inpatient rehabilitation where less than 50% of health services comply with recommended staffing guidelines (Barrett, Stephens, Hulcombe, & McEvoy, 2015). So, while guidelines provide a reasonable benchmark, it remains unclear as to what an actual caseload is for a physiotherapist, if this varies across clinical areas, and therefore the contribution of the number of OOS and LOOS to the health service.

Entry-level clinicians spend approximately 84% of their time completing activities related to direct patient care (Hearn et al., 2016). However, LOOS has not been investigated for physiotherapy. With increasing experience clinicians, including physiotherapists, are likely to have additional management responsibilities and as a result less time is spent in direct patient

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care activities (Hearn et al., 2016; Lopopolo, 1984; Simmons & Kuys, 2011). An analysis of actual OOS and LOOS for physiotherapists with differing level of experience and in different clinical areas should be performed to help inform the physiotherapy profession of actual workload.

A small number of studies to date have investigated allied health non-direct patient care activity (Hearn et al., 2016; Lopopolo, 1984; Simmons & Kuys, 2011). These studies indicate that physiotherapists with primarily clinical roles spend between 16-29% of their time in non-direct patient care activities (Hearn et al., 2016; Lopopolo, 1984; Simmons & Kuys, 2011). Although a basic understanding of time spent in direct and non-direct patient care activities exists it is not clear what the relationship is between these types of clinical activity, nor the contribution of non-direct patient care activities to the delivery of health services.

There are limited studies quantifying the contribution of physiotherapists to the delivery of health services, however the profession continues to grow in numbers (Australian Institute of Health and Welfare, 2016b) and scope of practice (Kersten et al., 2007; Khalid, Sarwar, Sarwar & Sarwar, 2015). Physiotherapy has been recognised for many years as an integral part of maintaining and improving the health of patients across the spectrum of disease and across the lifespan (Bürge, Monnin, Berchtold, & Allet, 2016; Denehy & Berney, 2006; Higgs, Refshauge, & Ellis, 2001; Nous Group, 2020). An example of physiotherapists contribution to health services is their active involvement in the management of patients during the current coronavirus disease 2019 pandemic by providing acute respiratory management and long-term rehabilitation (Thomas et al., 2020). Despite the importance of physiotherapists in the management of a wide variety of conditions, there is limited literature available reporting physiotherapy direct and non-direct patient care activity and how these contribute to the delivery of health services.

2.6 Contribution of the student

Identifying student contribution to health service delivery has only received sporadic attention over the last 30 years across health disciplines. Measuring student contribution to

service delivery poses several challenges including defining what the tangible and measurable contribution is. Student contribution is most easily described as activities associated with direct patient care activity though non-direct patient care activities, such as attending training, should also be considered. However, there are less obvious and more challenging measures of student contribution such as providing contemporary education to staff and bringing evidence-based knowledge to clinicians. To date, very few attempts have been made to quantify the student direct patient care contribution. Figure 2.2 demonstrates the classification of student clinical activity (Allied Health Professions' Office of Queensland, 2014). Within the Queensland Public Health Sector, allied health students are required to record all direct patient care activity, however do not need to record non-direct patient care activity (Allied Health Professions' Office of Queensland, 2014). The following section describes student direct patient care activity and factors that may influence this, student non-direct patient care and other challenges and benefits that students may present to the health service during clinical placements.



Figure 2.2. Student clinical activity classification

2.6.1 Student direct patient care activity

A variety of measures have been used to quantify student contribution, though primarily student contribution has been measured by analysing activities associated with direct patient care activity. Specifically, OOS, LOOS, revenue or cost and productivity measures have been used. Most research describes the clinical educator-student team which refers to the total direct patient care activity of both the clinical educator and student/s. In some clinical placement models the clinical educator's primary responsibility is to supervise students with no responsibility for a specific clinical caseload (Stiller, Lynch, Phillips, & Lambert, 2004). However, in other clinical placement models the clinical educator and students (Stiller et al., 2004). Thus, analysis of clinical activity of the clinical educator-student team and the student alone poses challenges, which makes interpretation and comparison of the available literature difficult.

Only one study was found that assessed the direct patient care activity of students independent of the clinical educator. Hughes and Desbrow (2010) found that 59 dietetic students each produced on average approximately 166 OOS per 10-week placement which tended to increase each week over the 10-week placement (Hughes & Desbrow, 2010). The average LOOS was 40 minutes over the 10-week placement with LOOS reducing over the 10 weeks (Hughes & Desbrow, 2010). This suggests that as dietetic students' experience increased during clinical placements more treatments were completed with each treatment taking less time to complete. There are no studies in physiotherapy reporting the number of OOS and LOOS of students and if similar changes occur across the placement weeks to provide insight into the physiotherapy student contribution to the delivery of health services.

Students on clinical placement, even when assessed using the clinical educator-student team appear to be at least of no detriment to the health service and may provide some overall benefit. While assessment of the clinical educator-student team makes it difficult to determine the direct patient care activity of students alone, it does provide some evidence of how students contribute to the delivery of health services. No change in overall direct patient care activity was found in occupational therapy service delivery when students were undertaking clinical placements (Ozelie et al., 2015; Rodger et al., 2012). Rodger and

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colleagues (2012) reported that the clinical educator-student team spent longer per OOS compared to pre-placement activity when the clinical educator was alone. However, the total number of OOS did not change during student clinical placements (Rodger et al., 2012). Similarly, Ozelie and colleagues (2015) found no change in the ratio of direct patient care time to total time of an occupational therapist with and without a student. In nutrition and dietetics, Ash and colleagues (2015) reported an increase in OOS by the clinical educator-student team compared with the clinical educator alone. Ash and colleagues (2015) also identified an increase in LOOS for the clinical educator-student team, however this did not reach statistical significance.

Early research in physiotherapy assessing the clinical educator-student team provides some insights into the contribution of students to the delivery of health services during clinical placements. Overall, health service productivity appears to improve during physiotherapy student clinical placements. Lopopolo (1984) reported clinical educators spend less time in direct patient care activities (38.5% of total time) during clinical placements (compared with 51% without students). Similarly, Ladyshewsky and colleagues (1998) indicated that the productivity of the clinical educator was reduced, measured by the percentage of time spent in direct patient care per hour worked, during clinical placements. However, both studies suggest that student direct patient care (Ladyshewsky et al., 1998; Lopopolo, 1984). Thus, while the proportion of clinical educator time and clinical activity may reduce this evidence supports that students are able to moderate this effect by producing OOS and delivering patient care.

Ladyshewsky (1995) reported in an acute inpatient setting the clinical educator-student team on average produced approximately 1.98 OOS per hour worked compared with 1.48 produced by the clinical educator alone prior to student clinical placements. This represents a 34% increase in the number of patients treated (a representation of OOS) compared with the clinical educator alone (Ladyshewsky, 1995). Although the productivity benefits of physiotherapy students were supported, sample sizes in these studies were small (<28 clinical educator-student teams; Ladyshewsky 1995; Ladyshewsky et al., 1998) or not reported (Lopopolo, 1984). Thus, further investigation is required to determine if the findings of these studies are still applicable for physiotherapy in current health systems and in Australia.

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More recent studies also indicate that physiotherapy students provide a quantitative contribution to the delivery of health services. Dillon and colleagues (2003) in an American study reported the clinical educator-student team reviewed 15% more patients than the clinical educator alone. However, only five clinical educator-student teams from one university were reported. Additionally, students had varying levels of experience being in their first, second and third years of physiotherapy studies which may influence the direct patient care activities able to be provided. Pivko and colleagues (2016) also reported greater direct patient care activity (number of patients treated per hour) for the health service compared with pre-placement direct patient care activity when assessing the clinical educator-student team.

The findings of the available literature on the impact of students during clinical placements on health service delivery is varied. However, the majority of evidence supports that students do not reduce service productivity and in fact may provide some overall net benefit. The current available quantitative data regarding student contribution in physiotherapy provides some useful insight though, this information is difficult to transfer to an Australian setting due to different healthcare systems with most studies based in the USA. Furthermore, the clinical education of student health professionals varies across disciplines in the length of clinical placements, number of clinical placements and clinical setting (L. McAllister & Nagarajan, 2015) which can make comparison to physiotherapy clinical placements difficult. Physiotherapy student contribution to the delivery of health services has received little investigation. Thus, in order to effectively determine student contribution accurate quantification of the student and physiotherapist clinical activity and factors that may influence this, such as the clinical area and clinical educator to student (CE:student) ratio, is necessary to prevent misrepresentation, either positive or negative, of the student contribution to the delivery of health services.
2.6.1.1 Economic evaluation of direct patient care activity

Another strategy for measuring student contribution has been assessing the cost or cost benefit of clinical placements using direct patient care activity. Several preliminary studies in a small cross section of health disciplines have begun to determine the relationship between clinical placements and economic value. This research is limited and ranges in quality but does provide some economic quantification of the student contribution. The following discusses the available literature which assesses the student contribution using varying types of economic evaluations.

Lopopolo (1984) conducted an economic evaluation of physiotherapy clinical education by analysing direct patient care activity in six acute-care facilities in the USA. Clinical educator, student and physiotherapist (not involved in clinical education) activity and time were categorised and a cost was attributable to the time physiotherapists spent directly with the patient (Lopopolo, 1984). Lopopolo (1984) found that the clinical educator-student team within an acute hospital setting generated \$408 USD compared to \$299 USD when a physiotherapist did not have students; resulting in a net benefit of \$109 USD per student per day. This study was conducted more than 30 years ago, so it is possible that this benefit may be different now.

Another method of assessing the economic cost of students is to compare students to new graduates. Cost benefit estimates of dietetic student clinical placements indicate students need to be working at 80% efficiency of a new graduate to achieve neutral cost to the health service (Hughes & Desbrow, 2010). Hughes and Desbrow (2010) attributed cost by expressing clinical educator time as lost opportunity cost and using the time spent providing clinical services by the student as revenue gained. An economic evaluation of the student contribution is beyond the scope of this research.

2.6.2 Factors influencing student direct patient care activity

Student contribution may be influenced by the clinical area of the placement and the CE:student ratio. These factors have received sporadic attention over the past 20 years. In physiotherapy there is no published research identifying whether student clinical activity differs based on clinical area. Anecdotally, within the physiotherapy profession there is an informal understanding that LOOS in the common clinical areas of cardiorespiratory, musculoskeletal, neurorehabilitation and orthopaedic physiotherapy differs. Therefore, it is possible that total number of patients, and number of OOS and LOOS may vary between clinical areas. However, it is unclear as to whether this influences student contribution.

2.6.2.1 Clinical area

It is possible that the clinical area in which students are delivering services may influence their contribution, though has received little investigation. Clinical areas, at least in physiotherapy, can differ in their service models and patient acuity. For example, patients seen in outpatient settings are typically scheduled for specific times and duration of services. In contrast, those in more acute care settings may be more complex and require more frequent and a shorter duration of OOS. In occupational therapy, clinical educator-student teams in paediatrics and inpatient rehabilitation spent a greater proportion of time in direct patient care than their counterparts in outpatient rehabilitation (Ozelie et al., 2015). Physiotherapists and physiotherapy students in hospitals would likely be working in similar clinical areas and therefore, it is possible that similar differences might be found. Similarly, dietetic students who completed greater than 200 OOS over 10-week clinical placements were twice as likely to treat patients with cardiovascular disease and obesity compared with students who completed less than 100 OOS (Hughes & Desbrow, 2010). These studies provide some evidence that clinical area should be considered when analysing the contribution of students to the delivery of health services.

Another reason for anticipating clinical area may influence direct patient care is varying patient to physiotherapy staff ratio. Information regarding recommended patient to

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physiotherapist ratios is limited in Australia, however in the United Kingdom guidelines exist in some populations (Squires & Hastings, 1997). Recommended workload guidelines for physiotherapists treating older people in an acute setting is 1.0 full time equivalent per 25 beds (Squires & Hastings, 1997). In contrast, recommended staffing levels for physiotherapists in a rehabilitation setting is 1.25 to 2.5 full time equivalent per 10 beds (Australasian Faculty of Rehabilitation Medicine, 2011). This represents a 50% difference. It is possible that in an acute setting there are more patients available to the clinical educator, which may allow students to provide a greater number of OOS compared to students in a rehabilitation setting or perhaps rehabilitation patients take longer to treat. This may impact on the student contribution to the delivery of health services in each clinical area and warrants further investigation.

2.6.2.2 Clinical Educator to student ratio

The CE:student ratio describes the full time equivalent clinical educator directly supervising the total number of students. For example if one clinical educator was responsible for three students the ratio would be 1:3. The CE:student ratio in physiotherapy has been the focus of several investigations however, only limited studies have quantified the influence, if any, of the CE:student ratio (Ladyshewsky, 1995; J. Moore et al., 2014). A systematic review examining models of clinical education found there was no difference between CE:student ratios however conclusions were based on a limited number of poor-quality studies (Lekkas et al., 2007). The review, however, aimed to examine different types of clinical education models, such as non-discipline specific clinical educator models, not the CE:student ratio alone. This review consisted of 61 studies of which 65% were considered of low quality mostly offering expert opinion (Lekkas et al., 2007). The remaining studies often lacked power and did not use validated outcome measures. Where the CE:student ratio is 1:2 or greater it is referred to as a collaborative clinical placement model (Ladyshewsky, 1995). The following paragraphs describes the current quantitative and qualitative research relating to the CE:student ratio alone.

In a quantitative study, Moore and colleagues (2014) evaluated physiotherapy student clinical placements with physiotherapists supervising between four and eight students (CE:student ratio: 1:4 - 1:8) during military internships. Productivity and efficiency were assessed at three time points; when students were not present, on arrival of the students for approximately one month and during the placement following their one month settling in period. Productivity was assessed using number of encounters per full time equivalent and an American based model whereby standardised value units is used within the productivity measure to determine efficiency (J. Moore et al., 2014). No change was found in productivity or efficiency measures at any time point indicating that more students did not enhance the productivity or efficiency of the organisation (J. Moore et al., 2014). These results must be interpreted with caution as the sample size of students and clinical educators was not reported nor the actual length of the clinical placement. In contrast CE:student ratio of 1:2 has been shown to enhance service productivity (defined by the number of OOS per worked hour) by 34% (Ladyshewsky, 1995). Further investigation of the CE:student ratio is warranted to examine the specific impact of different ratios on student contribution to the delivery of health services.

Perceptions of physiotherapy clinical educators using different CE:student ratios have been explored qualitatively. Moving from a CE:student ratio from 1:1 to 1:2 has caused some concern among the physiotherapy profession regarding the quality of clinical education experiences (Baldry Currens & Bithell, 2003). These findings led to preliminary investigations of the acceptability of increasing the CE:student ratio in light of growing demand for placements (Lekkas et al., 2007). Clinical educators felt that a CE:student ratio of 1:2 enhanced peer learning and workplace efficiency when students were able to take greater than 50% of their caseload (Baldry Currens & Bithell, 2003). Similarly, Moore and colleagues (2003) indicated that physiotherapy clinical educators and students reported that a CE:student ratio of 1:2 and 1:3 promotes peer learning and eases the burden on the clinical educator to provide the student with support compared to a CE:student ratio of 1:1. However, increasing CE:student ratio also has perceived disadvantages to student learning with clinical educators and students alike reporting spending less individual time with each other (A. Moore et al., 2003). This would suggest that CE:student ratio has an effect on clinical

placements as perceived by students and clinical educators both in terms of student learning outcomes and students contributing to the delivery of health services.

Student clinical activity during clinical placements is likely influenced by the clinical area and CE:student ratio. From the available literature it is unclear as to the effect of these factors on student direct patient care activity and whether there is an interaction between clinical area and CE:student ratio. No study to date has compared the clinical activity of students or clinical educators for different CE:student ratios across different clinical areas. This program of research aims to provide insight into the impact the clinical area and CE:student ratio has on student direct patient care activity which may lead to avenues to optimise the student contribution to the delivery of health services.

2.6.3 Student non-direct patient care activity

Student non-direct patient care activities may include attending education, providing education to staff, contributing to research or attending a staff meeting. Limited research is available identifying the non-direct patient care activities students undertake during a clinical placement with no research found in physiotherapy. Rodger and colleagues in 2011 and 2012 indicated that occupational therapy and nutrition students spent on average approximately 110 minutes (approximately 23% of total time) each day in activities not related to direct patient care. However, limited detail was provided as to what activities were performed by students during this time. Student non-direct patient care activities that may contribute to the delivery of health services include providing education to staff (Davies et al., 2011) about a requested topic or completing research. These activities may offer benefit to the delivery of health services by increasing staff knowledge and promoting new clinical findings. Other activities that are considered non-direct patient care activities such as a student attending a staff meeting may result in little benefit to the health service although these activities may assist in the socialisation of the student into the profession. Identifying the non-direct contribution of students to the delivery of health services is challenging, however should not be ignored.

2.6.4 Student contribution: Perceived benefits and challenges

The benefits and challenges associated with student clinical placements in health services have been investigated in several health disciplines and are discussed below. Considering the perceived benefits and challenges of clinical placements provides useful insights into the student contribution to health services, both positive and negative.

The benefits for health services of providing clinical placements appear similar across professions with physiotherapy research indicating these include enhancing the reflective skills of physiotherapists, students providing new and current knowledge (Davies et al., 2011), and supporting the development and continuation of the profession (Hall et al., 2015). Occupational therapy managers indicated that providing clinical placements promotes up-to-date practice in their staff and acknowledge that students directly assist with patient care (DeWitt, Rothberg, & Bruce, 2014). Pivko and colleagues (2016) reported that 26% of physiotherapists surveyed felt the exceptional students made a difference to clinical productivity whereas only 6% reported students struggling with clinical practice impacted productivity. Furthermore, staff retention was enhanced in the Northern Territory (Australia) when staff provided clinical placements for students (Smedts, Campbell, & Sweet, 2013). The benefits are difficult to quantify but the research suggests that students offer a contribution to the health service in addition to providing OOS.

Clinical placements also provide challenges for health services; though this has only been investigated qualitatively. Physiotherapists' perceptions of student clinical education have been investigated and the challenges reported related to increased stress from time, workload and space constraints, and managing challenging students (Davies et al., 2011). Time pressures which increase clinical educator stress are also consistently reported with nursing clinical educators (Carlson, Pilhammar, & Wann-Hansson, 2010) and occupational therapy managers (DeWitt et al., 2014) reported this to be a major challenge when providing student placements. Nursing clinical educators also report that lack of time during student clinical placements can impact on patient care (Carlson et al., 2010). Furthermore, Canadian physiotherapists felt their efficiency and that of the workplace was reduced by having students, and that perceived stress influenced their decision to provide clinical placements

(Hall et al., 2015). In a study of 60 general medical practitioners working in a wide variety of practice settings, 91% perceived time constraints and reported completing at least 30 minutes of additional time for 3-5 hours of practice when supervising a medical student (Sturman, Rego, & Dick, 2011). Additionally, the time spent teaching students often meant increased waiting times and shorter consultations for patients (Sturman et al., 2011). Thus, similar themes exist throughout the literature (Carlson et al., 2010; Sturman et al., 2011) relating to the challenges of clinical placements and should be considered when analysing the student contribution.

Qualitative assessments of the perceived contribution of students offer useful insights to understand the possible contribution of students other than providing OOS to patients. There are both perceived benefits and challenges to providing clinical placements for health services, however only one study has assessed how this impacted student clinical activity (Pivko et al., 2016). No study has specifically focused on physiotherapists' perspectives on student contribution relating to direct patient care activity. A qualitative analysis of physiotherapists' perception of student contribution will provide additional information to key stakeholders to maximise the student contribution while still ensuring a learning environment.

2.7 Student and clinical educator activities associated with clinical placements

While it is important to understand student direct and non-direct patient care activity in the context of student contribution, it is also imperative to appreciate the other activities of clinical educators and students associated with clinical placements. Physiotherapy students undertaking clinical placements must be supervised by a clinical educator (Australian Physiotherapy Council, 2011). Additionally, how clinical educators and students utilise their time may impact student contribution to the delivery of health services. Clinical placements offer a learning environment designed to allow students to transform theory into practice (Koontz, Mallory, Burns, & Chapman, 2010) which would suggest that not all the student's time would be spent in direct patient care. Although the current clinical activity classifications (Allied Health Professions Office of Queensland, 2014) only recognises direct and non-direct

patient care activity there is an additional component to student clinical placements not classified by health services, which are activities associated with learning. Learning activities may include self-directed learning and reflection and receiving feedback; these will be discussed further below. Figure 2.3 highlights the activities students participate in during clinical placements including learning activities.



Figure 2.3. Student activities during clinical placements

2.7.1 Student learning activities

Participation in learning activities accounts for approximately 8-15% of total student daily time (Ash et al., 2015; Rodger, Stephens, et al., 2011; Rodger et al., 2012). Learning activities have been suggested to consist of orientation, student tutorials, self-directed learning, reflective practice and receiving feedback. Specific detail as to the types of learning activities and how long students participate in them was not found in the literature, however it is important to gain an understanding of what these learning activities are. The following discusses some of the key learning activities that the literature suggests students should participate in to enhance their learning which may in the future improve their contribution to the delivery of health services.

The Physiotherapy Practice Thresholds in Australia and Aotearoa New Zealand state that being a physiotherapist requires competency in self-directed learning and reflective practice (Physiotherapy Board of Australia and Physiotherapy Board of New Zealand, 2015). It would therefore seem appropriate that physiotherapy students practice and develop these skills while on clinical placement. Self-directed learning has been demonstrated to enhance the efficiency of skill training and self-reported confidence in newly graduated doctors (Brydges, Nair, Ma, Shanks, & Hatala, 2012). A systematic review of self-directed learning in the education of health professionals indicated that self-directed learning improved knowledge and could be effective in skill development (Murad, Coto-Yglesias, Varkey, Prokop, & Murad, 2010).

While self-directed learning is an important part of learning it is important to note that this should not be the only strategy used by learners to enhance knowledge and skill. Self-directed learning has the potential to result in misinformation and ineffectual and incorrect learning without appropriate guidance and support (Brydges et al., 2012). Brydges and colleagues (2012) argue that an expert should support self-directed learning and challenge the learner to ensure competence rather than confidence alone is achieved. Clinical placements can provide an opportunity for students to participate in self-directed learning while having the support of a physiotherapist to guide and challenge their learning and clinical reasoning. Time dedicated to self-directed learning during clinical placements may offer valuable learning outcomes for the student and enhance their delivery of care to patients. However, if and how much time is spent by students participating in self-directed learning is currently unknown.

Another learning strategy crucial for an effective health professional and essential for physiotherapy registration in Australia is reflective learning or practice (Physiotherapy Board of Australia and Physiotherapy Board of New Zealand, 2015). Reflective practice is defined as a "cognitive process to a task or event to understand it and for consideration of making a change" (Taylor, 2010, p. 6). This helps clinicians manage the ambiguous and often challenging scenarios that occur during the delivery of healthcare (Kember, 2008). Health professionals demonstrate greater depths of reflective practice and do this more automatically compared with students or novice learners (Clouder, 2000). However, reflective practice develops over time and is most used in complex problem solving (Mann, Gordon, &

MacLeod, 2009). Clinical placements offer the perfect opportunity for students to develop reflective practice skills under guidance in an authentic clinical care environment, however how often and its effectiveness needs ongoing investigation and is beyond the scope of this research.

Provision of effective feedback during clinical placements is important for student learning and development (Molloy, 2009), however students and clinical educators need to set aside adequate time to ensure understanding of feedback provided (Koh, 2008). Students weight feedback given by clinical educators heavily as it has a significant influence on confidence, self-esteem and ongoing motivation for improvement (Clynes & Raftery, 2008). Although feedback is important students report they do not receive enough feedback during clinical placements (Burgess & Mellis, 2015; Cantillon & Sargeant, 2008). Effective feedback should be task orientated, specific and support students' reflective skills (Archer, 2010). Providing students with effective feedback requires training and ongoing development of these skills to avoid providing consistent negative feedback (Burgess & Mellis, 2015). Providing effective feedback to students is crucial for the student's ongoing development which may then improve their performance and enhance patient care. While feedback is an essential component of clinical placements, this research will not specifically investigate feedback during clinical placements.

2.7.2 Clinical educator activities

Clinical educators provide direct supervision and support to students during clinical placements to enhance student knowledge (Health Workforce Australia, 2011). The supervision of students by clinical educators is classified according to the National Allied Health Casemix Committee (2001) as teaching and training, which is a non-direct patient care activity. Although clinical educators may be supervising direct patient care performed by students their immediate primary role is to supervise and teach. Thus, part of the clinical educator's non-direct patient care time is supporting students to contribute to the delivery of health services. To date, there is no research that identifies the time clinical educators spend supervising students during clinical placements.

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Clinical educators participate in non-direct patient care activities which are necessary for student clinical placements. Typically, clinical educators orientate students upon arrival at a facility, prepare and provide formative and summative feedback, review student tasks such as documentation and self-reflection activities, and provide oversight and support to student learning outcomes (Health Workforce Australia, 2014b). Clinical educators have been shown to spend on average between 20-40 minutes a day in activities associated with clinical placements such as student assessment and feedback (Ash et al., 2015; Rodger, Stephens, et al., 2011). These studies did not identify how time in activities associated with clinical placement were spent. Consideration of how much time clinical educators participate in activities associated with clinical placements shave on the delivery of the health services.

Clinical placements provide students with opportunities to develop clinical reasoning skills by enabling them to gain experience in the management of patients, receive feedback from a practising clinician (Clynes & Raftery, 2008), and provide an opportunity to foster socialisation into the health profession (Rodger, Fitzgerald, Davila, Millar, & Allison, 2011). As part of clinical placements students and clinical educators must dedicate time to student learning and performance to support students to develop the skills necessary for the profession. The activities of students and clinical educators that are directly associated with clinical placements has received little investigation. It is likely that a balance between direct patient care activity, non-direct patient care activity and learning activities is necessary to ensure core competencies of the profession are met.

2.8 Transition from student to new graduate

Clinical placements offer value to health professional students and are an important strategy to support students to become safe and effective clinicians. However, there is debate about the preparedness of students becoming independent clinicians as transferring theoretical knowledge and supervised practice into a clinical setting poses several challenges for new graduates (Talberg & Scott, 2014). Preparedness, for the purpose of this research, includes readiness for providing direct patient care independently and application of more generic skills such as time management, communication and professionalism (Talberg & Scott, 2014).

It would be reasonable to suggest that there would be a change in clinical activity as a student transitions to a new graduate physiotherapist, as activities specific to clinical placements such as receiving daily feedback would no longer occur. There may also be changes to the activities required of a new graduate such as staff competencies or regular mandatory training. To date there is no quantitative investigation of the change in clinical activity undertaken as a student transitions to an independent practising clinician. The following section discusses transition theory, characteristics of the transition from student to new graduate, new graduate preparedness for practice and the requirement of new graduate support.

2.8.1 Characteristics of new graduate transition to practice

Although there has been increasing interest in the student transition to new graduate in physiotherapy and allied health, the predominant transition theory from student to new graduate was developed in nursing. The three stages of transition during a nurse's first year of practice, including the initial phase of transition shock was described by Duchscher (2008; 2009). Transition shock occurs when nurses feel a lack of preparedness in the skills and knowledge required of the workplace and experience significant emotional turmoil. As they progress to the second stage new graduate nurses have difficulty reconciling their role with the perceptions they developed during their training (Duchscher, 2008). While new graduate nurses had ongoing issues with physical and emotional fatigue this was less than in the first stage (Duchscher, 2008). However, in the final stages of the first year of practice new graduate nurses had reached an understanding of their new roles and responsibilities, had accepted some of the frustration associated with their roles and were able to reflect on their growth over the past year (Duchscher, 2008).

In physiotherapy, new graduates described and displayed similarities to the themes and stages outlined in Duschsher's (2008; 2009) work. Higgs and colleagues (2009) report that new graduate physiotherapists experienced challenges such as increased stress adjusting to

their own role and gaining understanding of the roles of others within the health care team. New graduate physiotherapists also reported initially having negative emotions such as being terrified and overwhelmed (P. Miller et al., 2005). However, as the year progressed, new graduate physiotherapists acknowledged the amount of learning that occurred and skill development in areas such as patient care and time management which earlier in the year were difficult (P. Miller et al., 2005). The new graduate transition year is marked by a range of difficult professional and personal issues as professional socialisation occurs. While some research exists identifying the challenges for new graduate physiotherapists it does not detail the cause of some of these challenges.

Other disciplines, such as occupational therapy and pharmacy have described some of the themes associated with the new graduate transition to practice. Occupational therapy new graduates report feeling shocked by the organisational and professional expectations required of them and realising that while they had some generic and technical skills these needed to be developed to support effective therapeutic relationships and outcomes (Seah, Mackenzie, & Gamble, 2011). Pharmacy interns described struggling with the realities of practice such as interactions with other health professionals and managing conflict (Noble, Coombes, Nissen, Shaw, & Clavarino, 2015). New graduates across several health professions describe similar experiences in their first year of practice typically associated with understanding their role in the workplace and recognising the need to develop skills across a wide variety of areas to feel competent.

2.8.2 New graduate preparedness for practice

Employers offer a unique perspective of new graduate preparedness; being able to view the new graduate in terms of clinical skills and role within the work team. Employers of physiotherapy new graduates in New Zealand felt that health discipline knowledge and skills were sufficient. However, professionalism, confidence and attitudes towards the health service were of concern (Sole et al., 2012). This sentiment was echoed in a literature review which indicated social work employers felt that new graduate knowledge was adequate, but improvements were necessary in caseload and risk management (Moriarty et al., 2011). New

graduate knowledge and skills appear to be sufficient to commence independent practice upon graduation from university however, other professional skills need further development both during their entry-level education and when entering the profession.

In contrast to the opinions of employers of new graduates (Moriarty et al., 2011), occupational therapy new graduates in Australia and New Zealand indicated that they felt least competent in both clinical skills, such as preparing an intervention using evidence-based practice, and generic skills, such as describing and demonstrating the role of an occupational therapist (Gray et al., 2012). Despite new graduate occupational therapists feeling least competent in both specific and generic skill domains, approximately 70% overall felt somewhat prepared for their role (Gray et al., 2012). Similar findings were reported for medicine with first year doctors indicating a moderate level of preparedness for their role as a junior doctor (Burford, Whittle, & Vance, 2014). Limited evidence in physiotherapy exists which describes student or new graduate feelings of preparedness. This research will investigate new graduate's perceptions of preparedness during the transition to new graduate.

The transition from student can be challenging for new graduates as they work with a greater level of independence, receiving less supervision compared with being a student, and integrating skills and knowledge into the independent professional care of patients (Banks et al., 2011). In a study of new graduates across 13 health professions, including physiotherapy, workload management, perceived lack of practical exposure during entry-level programs and conflict management were areas that new graduates reported struggling with (Merga, 2016). This was similar to social work new graduates who reported difficulties in managing busy workloads and dealing with conflict (Moriarty et al., 2011). The many challenges associated with being a new graduate has resulted in new graduates reporting high levels of stress and burnout (Arlene Walker et al., 2013). In occupational therapy more recent graduates describing their new graduate experience reported higher levels of stress than those who graduated prior to 2000 (McCombie & Antanavage, 2017). New graduates across many health professions have reported difficulties with the transition from student to new graduate and warrants further investigation to understand where the gaps exist between student and new graduate practice.

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While the employer and new graduate perspective on the transition from student to new graduate and new graduate preparedness has received some attention in the literature there has been little investigation of physiotherapists working with and supporting new graduates. Experienced physiotherapists who often support new graduates have a unique perspective of new graduate transition as they work with them closely and are an important source of skill and knowledge development (Moores & Fitzgerald, 2017). Experienced physiotherapists often act as clinical educators for students so understand the support requirements and abilities of students and how this changes once a new graduate. This research program will seek the perspectives of experienced physiotherapists to provide new information to understand how students transition to new graduates.

2.8.3 New graduate support

Transitioning from the role of physiotherapy student to new graduate physiotherapist potentially poses several professional and personal difficulties suggesting that new graduates will likely benefit from support. There are varying levels of support provided within and between new graduate health professionals (Adamack & Rush, 2014; Merga, 2016). Research investigating new graduate support has primarily been conducted in nursing. Reviews conducted in both nursing (Rush, Adamack, Gordon, Lilly, & Janke, 2013) and occupational therapy (Moores & Fitzgerald, 2017) identified important components that support new graduate transition and should be considered in new graduate programs. Rush and colleagues (2013) indicated that formal new graduate support programs were necessary and should consist of a new graduate support person, peer support and formal practical training. Moores and Fitzgerald (2017) also agree that new graduates require support in the form of formal clinical supervision, colleagues and encouragement for continuing professional development and training. The need for new graduate support is reported in the literature, however there is limited evidence in physiotherapy outlining what support is available and its benefit.

While new graduate support programs are considered an important aspect of supporting new graduates the culture in which they practice also impacts on new graduate transition (van

Rooyen, Jordan, Ham-Baloyi, & Caka, 2018). For physiotherapy new graduates, the clinical environment in which they worked had a significant impact, either positive or negative on the new graduate transition (Black et al., 2010). Cohesive environments that have a social context of welcoming new graduates and providing them with access to senior clinicians who are willing to support and share their knowledge are more likely to support new graduate transition (Levett-Jones & FitzGerald, 2005; Toal-Sullivan, 2006). Not only is the work environment important but having supportive colleagues or mentor/s was seen as beneficial for new graduates to socialise into the profession and to improve skills and knowledge (Black et al., 2010; Forbes, Lao, Wilesmith, & Martin, 2020). The environment and support provided to new graduates plays an important role in the transition from student to new graduate and requires further investigation due to limited evidence in physiotherapy.

There are a variety of factors that impact on the student transition to new graduate. Clinical placements play an important role in preparing students for independent practice therefore, it is not surprising that those who reported more practical experience prior to graduation felt more prepared than those who had less hands-on experience (Burford et al., 2014). Duchscher (2009) argues that there are gaps in preparing students for practice especially relating to workload management and professional issues. While most new graduates feel at least moderately prepared for practice, workload management appears to be a key issue for new graduates and employers. Thus, new graduates will require support upon transition into the workplace. However, to date, there is no literature quantifying the change that occurs from student to new graduate and limited evidence in physiotherapy that evaluates the factors that impact and support the new graduate transition to practice. This program of research will investigate the change in clinical activity required to transition from student to new graduate in public hospitals and investigate the perceptions of new graduates and experienced physiotherapists on the transition from student to new graduate. Understanding the transition from physiotherapy student to new graduate will assist universities, new graduates and employers to develop strategies to support the transition to an independent health professional.

2.9 Conclusion

In summary, clinical placements are beneficial for students. However, to date there is limited research identifying the contribution students make to the delivery of health services during clinical placements. There appears to be some suggestion that students make a positive contribution to the delivery of health services, however the available evidence is not without methodological concerns. Furthermore, little is known about the influence of clinical area and CE:student ratio on student contribution. It is therefore necessary to quantify the student contribution to the delivery of health services to inform key stakeholders and potentially promote sustainable clinical education. Despite the importance of quantitative measures to document the student contribution it is necessary to gain the perspectives of the physiotherapy profession, as there may be aspects of the student contribution to the delivery of health services to inform key stakeholders and potentially promote sustainable clinical education.

The quantitative change in clinical activity from student to new graduate has not previously been described and therefore it is not clear whether students are adequately prepared for the transition to new graduate. Investigating with both quantitative and qualitative methodologies will assist to understand the transition from student to new graduate. The world (World Health Organisation, 2014) and Australia are facing health workforce shortages (Leach, Segal, & May, 2010; Nancarrow, 2015) and health services are trying to meet a growing demand (Australian Institute of Health and Welfare, 2015a; World Health Organisation, 2014) to provide high quality healthcare. Therefore, understanding how students contribute to the delivery of health services and their transition into the health workforce may provide avenues to expand clinical education, enhance the student contribution and preparedness for practice.

2.10 Aims and Significance

2.10.1 Aims

This program of research had two aims; to determine the physiotherapy student contribution to the delivery of health services and to understand the transition from student to new graduate physiotherapist. The first aim was accomplished by determining individual student direct patient care activity and how a group-of-students (i.e. those students who participate in the same clinical placement with the same clinical educator) contribute to the delivery of health services. A comparison between the direct patient care activity of a group-of-students and registered physiotherapists was also completed. Furthermore, a qualitative investigation with new graduates (reflecting on their student experience) and experienced physiotherapists to assist in developing a greater understanding of the student contribution beyond direct patient care activity was undertaken.

To investigate the second aim, this program of research determined the change in direct patient care activity required from student to new graduate. A qualitative investigation to understand how new graduate and experienced physiotherapists perceive the transition from student to new graduate was undertaken. This research will provide greater insights into new graduate preparedness for practice and strategies that may support the transition from student to new graduate.

2.10.2 Significance

The demand for clinical placements is increasing with growing numbers of physiotherapy students across Queensland and Australia. While growth in the number of physiotherapy students poses challenges especially in the supply of clinical placements, it is essential that physiotherapy students are well trained to ensure patient safety, public confidence in physiotherapists and a sufficient physiotherapy workforce. Clinical placements provide a critical source of clinical experience prior to independent practice. To date, there is little quantitative research identifying physiotherapy student clinical activity on clinical placement and the influence of this contribution on the delivery of health services. The growth in healthcare delivery and costs is also an important consideration and it is imperative that the contribution physiotherapy students make to health services is understood. Understanding this contribution has the potential to offer valuable information to key stakeholders such as health service managers and universities to plan for sustainable clinical education. This research will provide valuable knowledge regarding the influence of clinical area and the CE:student ratio on student clinical activity and therefore health service delivery.

Furthermore, the transition from student to new graduate is challenging. Therefore, it is important to understand the quantitative change in direct patient care activity from student to new graduate and what strategies are currently used or could be used to support student preparedness and transition into the physiotherapy profession. By appreciating the student contribution to service delivery and understanding the transition from student to new graduate, key stakeholders can develop strategies to ensure the sustainability of clinical placements and maximise student learning to ensure a beneficial outcome for all stakeholders.

Chapter 3 - Methods

This program of research has used a multi-methods design to investigate the research aims. The following details why a multi-methods approach was taken to achieve the research aims. Studies 1 to 3 are directed towards the first aim of the research program to understand the student contribution to the delivery of health services. Studies 4 and 5 are directed towards the second aim, to understand the transition from student to new graduate. Determining the physiotherapy student contribution will also assist in understanding the physiotherapy student transition to new graduate. Three quantitative studies and two qualitative studies are included in this thesis. Two quantitative studies specifically identify the student contribution to the delivery of health services (Studies 1 and 2) with the third study quantifying the student transition to new graduate (Study 4). Qualitative methods were used to explore the perceptions of both the student contribution to the delivery of health services (Study 3) and the student transition to new graduate physiotherapist (Study 5).

This research program was supported by funding from the Directors of Physiotherapy Services Queensland Clinical Education and Training Initiative. One of the conditions of this funding grant included the formation of a steering committee of experts to help guide and inform the project to ensure strong methodology while maintaining practicality and applicability. The steering committee was formed with an expert panel including health service managers, clinical education experts, university stakeholders, researchers and data expert

3.1 Multi-methods research design

A multi-methods approach was taken to investigate the research aims for this research program as a single method (qualitative or quantitative) could not provide the depth of understanding of the student contribution to the delivery of health services or the transition from student to new graduate. Multi-methods research and mixed methods research are often used synonymously in the literature, and while several similarities exist, these two methodologies do differ (Anguera, Blanco-Villaseñor, Losada, Sánchez-Algarra, & Onwuegbuzie, 2018). Both methodologies combine the dichotomies of quantitative and qualitative research with the sole purpose of understanding the problem regardless of the methodology used (Creswell & Creswell, 2017; Hesse-Biber, 2015; Tillman, Clemence, & Stevens, 2011). Multi-methods methodology uses the rigor associated with both qualitative and quantitative study design to limit the biases of each (Teddlie & Tashakkori, 2009). Multi-methods approach may use two or more qualitative or quantitative study designs or a combination of qualitative and quantitative study design typically in two or more studies to answer different parts of the same research question (Anguera et al., 2018). Mixed methods combine the qualitative and quantitative findings within a single study.

Multi-methods and mixed methods approaches are effective at answering research questions that require integration of information and where research questions are 'what and how' (Hesse-Biber, 2015; Tashakkori, Teddlie, & Johnson, 2015). For example, what do students contribute to the delivery of health services and how do students do this. A goal of this research program was to support clinical education key stakeholders such as health services, universities and clinical educators in decision making about student clinical placements all of whom weight the results of different study design and their outcomes differently. Thus, to maximise the impact of these studies it was important that both quantitative and qualitative data could be presented. Selecting a single methodology may have potentially misrepresented the research questions and provided a simple view of a complex and integrated problem.

3.2 Quantitative study designs

Quantitative methods were used in three studies within this research program: Study 1, Study 2 and Study 4. The following details a description of the participants, setting, the procedure of each study, the measures used and statistical analysis.

3.2.1 Participants

Participants included in the quantitative studies included both physiotherapy students and physiotherapists. Study 1 included physiotherapy students only, Study 2 included

physiotherapy students and junior and senior physiotherapists. Study 4 participants were physiotherapy students and new graduate physiotherapists.

3.2.1.1 Students

Physiotherapy students who attended clinical placements at six Queensland public health sector hospitals in 2014 and 2016 participated in the quantitative studies. All physiotherapy students were in the final stages of their entry-level physiotherapy program, had completed most of their pre-clinical course work and were undertaking clinical placements as part of the requirements for registration as a physiotherapist in Australia. During the data collection period students had a range of clinical placement experiences due to the varying schedules of clinical placements for the six universities that provide entry-level physiotherapy programs in Queensland.

3.2.1.2 Junior and senior physiotherapists

Junior and senior physiotherapists who worked at five Queensland public health sector hospitals participated in Study 2. A junior physiotherapist was defined as a physiotherapist with two-three years of practice. Junior physiotherapists have been defined in the literature as those with less than five years experience who rotate through different clinical areas within a hospital (K. Hall et al., 2020; Snowdon et al., 2020). In regional facilities with lower numbers of physiotherapy staff (Adams, Jones, Lefmann & Sheppard 2015), it is possible that physiotherapists with four and five years experience may take on more senior roles including student supervision. Thus, to ensure a junior and senior physiotherapist could be clearly defined junior physiotherapists were considered to have two-three years experience only.

Senior physiotherapists were those with more experience, are generally non-rotational and have specialised skills in a particular clinical area (K.Hall., et al. 2020). The direct patient care activity performed by physiotherapists tends to be proportional to their level of experience with junior physiotherapists completing a greater proportion of the workload compared to senior physiotherapists (Hearn et al., 2016). However, senior physiotherapists are often called

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upon to be the clinical educator for students. Hence the selection of both junior and senior physiotherapists to compare to a group-of-students. A group-of-students will be discussed in detail in section 3.2.2.2.

3.2.1.3 New graduate physiotherapists

New graduate physiotherapists who worked in five Queensland public health sector hospital in 2016 participated in Study 4. For the purposes of this study, a new graduate physiotherapist had less than one year of clinical practice experience. New graduates in each participating hospital moved between clinical areas in their first year to gain clinical experience.

3.2.1.4 Participating hospitals

Hospitals were primarily selected based on their type, location, number of physiotherapy students, number of new graduates employed, and clinical educator to student (CE:student) ratio used during clinical placements. The two common clinical placement models were also reflected in these hospitals. In the first model the clinical educator's primary role was to supervise students and in the second model the clinical educator had dual roles in managing and being responsible for a clinical caseload and supervising students (Stiller et al., 2004). Six Queensland public health sector hospitals participated in the studies described in this thesis; with a total of five hospitals participating in each of the individual studies. Four hospitals participated in all three quantitative studies. These four consisted of two metropolitan and two regional hospitals.

Three of the four hospitals that participated in all studies were considered Principal referral hospitals; whilst the fourth hospital was described as a Public acute group A hospital (Australian Institute of Health and Welfare, 2015b). Table 3.1 outlines the hospital type, location and study the hospital participated in. The type of hospital refers to the hospital's peer group code which is a hospital classification system used to analyse and interpret hospital statistics and performance indicators (Australian Institute of Health and Welfare, 2015b). The classification system groups hospitals that have similar characteristics such as

patient volumes and range of speciality services (Australian Institute of Health and Welfare, 2015b). Principal referral hospitals have a large range of specialty services with some highly specialised units, significant patient volumes (approximately 75000 acute weighted separations), an intensive care unit and 24-hour emergency department (Australian Institute of Health and Welfare, 2015b). Public acute group A hospitals have a range of services but not the breadth of a Principal referral hospital, large patient volumes (approximately 27000 acute weighted separations) and typically have an intensive care unit and 24-hour emergency department (Australian Institute of Health and Welfare, 2015b).

Hospital	Peer Group Code	Location	Study	Study	Study	Study	Study
			1	2	3	4	5
1	Principal referral						
	hospital	Metropolitan	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark
2	Principal referral						
	hospital	Metropolitan	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark
3	Principal referral						
	hospital	Regional	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark
4	Public acute						
	group A	Regional	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark
5	Principal referral						
	hospital	Metropolitan	\checkmark				
6	Public acute						
	group A	Metropolitan		\checkmark	\checkmark	\checkmark	\checkmark

Table 3.1. Participating hospital peer group code, location and study involvement

A hospital in Study 1 was replaced with another metropolitan hospital for Studies 2 and 4. An alternate hospital was sought as the original hospital's information management system, where data were to be collected from, was undergoing some changes and there was difficulty with interpreting patient group data. At the time the replacement hospital was considered similar with peer group code of Principal referral hospital, however the replacement hospital

has since been reclassified by the Australian Institute of Health and Welfare (2015b) as a Public acute Group A hospital.

Across the six hospitals involved four different information management systems were used: Performance Indicators version 5 (PI5; three hospitals), Allied Health Integrated Information System (AHIIS; one hospital), Allied One (one hospital) and Activity Barcoding (ABC; one hospital). While the information management systems differed, due to the Australian Health Activity Hierarch Classification system a minimum data set was able to be obtained from each of the six hospitals.

3.2.2 Procedures

Physiotherapy student and physiotherapist activity in the quantitative studies were retrieved from the hospital information management systems. Physiotherapy student and physiotherapist clinical activity data is entered contemporaneously after the OOS occurred. Retrieving already collected data was deemed the most appropriate for these studies as it is efficient, cost-effective and is an existing practice (Keogh & Stenson, 2015). To quantify the student contribution to the delivery of health services and the transition from student to new graduate, clinical activity data were collected.

Clinical activity data were selected for several reasons. Firstly, clinical activity data is completed contemporaneously as part of routine practice by all students and physiotherapists utilising standardised data collection rules. Therefore, the data collection methods were consistent across all hospitals. Secondly, all students and physiotherapy staff receive training in the rules and entry associated with clinical activity data and data are checked regularly for data entry errors and accuracy from the physiotherapy department data custodian.

3.2.2.1 Study 1

To profile physiotherapy student clinical activity, de-identified student direct patient care activity data were obtained from each hospital's information management system. Data were collected from students who were undertaking cardiorespiratory, musculoskeletal and neurorehabilitation clinical placements. These clinical areas were selected as historically they were considered key areas of physiotherapy practice (Australian Physiotherapy Council, 2011). While these clinical areas are no longer specifically described in the accreditation standards set out by the Australian Physiotherapy Council, the physiotherapy profession and universities value these clinical experiences and at the time of data collection still labelled clinical placements in terms of the above clinical areas.

Clinical placement blocks were selected to ensure that each hospital provided 20 weeks (four clinical placement blocks of five weeks) of clinical activity data for each clinical area and all universities were represented. The selected clinical placement blocks also accounted for seasonal variation and student cumulative clinical placement experience. It was important to consider seasonal variation as in some clinical areas workload increases. For example there is a higher hospital admission rate for patients with respiratory illness (D'Souza et al., 2007; Murdoch, Mitra, Lambert, & Erbas, 2014) and stroke (X. Y. Wang, Barnett, Hu, & Tong, 2009; Y. Wang et al., 2003) during the winter months and, as physiotherapy plays an important part in the treatment of patients with these conditions, a likely increase in physiotherapy workload during the winter months is expected.

Having diversity in the student clinical placement experience was to ensure data were representative of all clinical placements not just those when students were inexperienced or were nearing graduation. Furthermore, due to university curriculum schedules students from different universities may participate in the same clinical placement with varying degrees of clinical placement experience.

3.2.2.2 Study 2

De-identified individual student direct patient care activity were obtained over the nine blocks of clinical placements in 2016 across four clinical areas: cardiorespiratory, musculoskeletal, neurorehabilitation and orthopaedics. The orthopaedics area was included in Study 2 as it is common clinical placement and considered an important area of physiotherapy practice in the Queensland Public Health Sector.

A group of students is considered as all the students attending the same clinical placement together (ie. in the same CE:student ratio) and will be referred to as group-of-students in this thesis. The data for each student were combined to give the total direct patient care activity of a group-of-students on clinical placements. The data for a group-of-students were used to compare against a junior and senior physiotherapist as it is the group- of-students that impact upon the caseload of one physiotherapist (clinical educator). Also, it is unreasonable to expect a single student to complete the caseload of a physiotherapist as they are on clinical placement to develop skills through experiential learning and are expected to take longer to complete tasks.

A minimum of five weeks of de-identified clinical activity data of a junior and senior physiotherapist was requested from each hospital across the four clinical areas of cardiorespiratory, musculoskeletal, neurorehabilitation and orthopaedics. Participating hospitals were provided with an Excel spreadsheet to assist them in obtaining the correct data from their information management systems. Each hospital was asked to provide data that were most representative of normal clinical activity to avoid bias and misrepresentation of physiotherapist activity as this would be compared with students' direct patient care activity. To determine representative data of normal clinical activity, hospitals were encouraged to consider when physiotherapy staffing was stable, there was minimal uncovered staff leave and no major hospital activities had been undertaken that would impact on physiotherapy workload.

3.2.2.3 Study 4

De-identified student and new graduate clinical activity was obtained for those undertaking clinical placements or working in cardiorespiratory, musculoskeletal, neurorehabilitation and orthopaedics areas. Student data were obtained for weeks 4 and 5 only as these are the final two weeks of a student's clinical placement and when the clinical educator determines whether the student has met an adequate standard to become a new graduate physiotherapist based on the Assessment of Physiotherapy Practice (Dalton, Davidson, & Keating, 2011). Hospitals were requested to provide a minimum of five weeks of new graduate clinical activity data in each clinical area that represented normal clinical activity as discussed above.

3.2.2.4 Data accuracy

To ensure data accuracy for the quantitative studies several steps were taken. Students receive small group training prior to the commencement of each clinical placement in the rules of clinical activity data entry and the specific requirements of each information management system. Specifically, in Studies 2 and 4 students and physiotherapists were also offered an additional online learning package and had access to a simple flow diagram of the rules associated with clinical activity data collection. Students were also offered a clinical activity data collection too to assist them to capture their clinical activity data in real time throughout the course of a day. Cross checking of data by data custodians at each hospital also occurred to ensure the reports generated based on the Excel spreadsheet provided to participating hospitals was producing accurate data from the information management system.

Furthermore, prior to Study 1 accuracy and feasibility of student direct patient care data were investigated to determine whether data collection using data retrieved from hospital information management systems would be accurate and appropriate for use in the quantitative studies. The research candidate work-shadowed eight students across the four clinical areas and recorded the student's clinical activity. Students and supervisors provided permission for this work-shadowing to occur. The candidate was not involved in the

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supervision of the students and did not interfere with patient care. This occurred at one metropolitan Principal referral hospital where a significant number of students undertake clinical placement each year. The information management system at this hospital is relatively unfamiliar to most students so it provided a good guide as to whether students understood the rules associated with clinical activity data entry and how to enter this data into a novel system. The student's clinical activity data documented by the research candidate was then compared with the student's written record and cross checked with the data entered in the information management system. There was 100% agreement in the occasions of service (OOS) data, 90% agreement in the length of occasions of service (LOOS) and 95% agreement in the overall clinical time recorded.

3.2.3 Measures

Clinical activity data consists of direct and non-direct patient care activity as per the Australian Health Activity Hierarchy classification system (National Allied Health Casemix Committee, 2001). Direct patient care activity consists of OOS and LOOS. An OOS, is defined as any intervention to alter a person's health status (Allied Health Professions' Office of Queensland, 2014) and must be at least 10 minutes in duration to be recorded (Allied Health Professions Office of Queensland, 2014). For Studies 1, 2 and 4 OOS was collected. The Queensland Health Allied Health Information Management Business Rules set out the parameters for the recording of data based on National Allied Health Hierarchy classification (National Allied Health Casemix Committee, 2001). In Study 1 OOS frequency data were collected by week and data were not able to be attributed to an individual student. In Studies 2 and 4 OOS per day was able to be determined due to the collection of number of days and data were able to be attributed. A LOOS is the time taken to complete one occasion of service and is measured in minutes. In Studies 1 and 4 LOOS data were collected. If an OOS was greater than 210 minutes, it was excluded as it is unreasonable for a patient to be treated for that length of time and was deemed to be likely a recording error.

Group treatment sessions were used to provide physiotherapy intervention for patients at hospitals involved in this research program. Each information management system manages

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group treatment data differently and thus the inclusion of data pertaining to group treatment sessions in the quantitative studies differed. In Study 1, a group treatment was considered as one OOS regardless of the number of patients who participated in the group. In Studies 2 and 4 group treatment data could be attributed to a group-of-students and an individual student (respectively). Due to the variability in the use of groups at individual hospitals a consistent approach was undertaken to provide a true representation of student and physiotherapist clinical activity. If the total time of the patient group divided by the number in the group was 10 minutes or greater per patient it was considered an OOS. The LOOS however, was excluded for groups so as not to skew the results.

Non-direct patient care activity was collected in Studies 2 and 4 for physiotherapist participants only as students are not required to record non-direct patient care. Non-direct patient care was collected to allow the determination of the total minutes worked each day by a physiotherapist to determine an accurate count of days worked. A standard day for a physiotherapist in the participating hospitals was considered to be 460 minutes. After discussion with the expert panel, a day was counted if the total time spent in direct and non-direct patient care activity was between 270 and 640 minutes even if no OOS had been completed. A minimum of 270 minutes was selected as this is approximately half a work day and less than this would not be representative of a normal work day. Furthermore, a maximum of 640 minutes would ensure consideration of staff who are completing a small amount of overtime, however beyond 640 minutes would suggest a recording error.

Other information collected for the quantitative studies included total number of students in the Queensland Public Health Sector on clinical placement in each clinical area and the CE:student ratio. These data were obtained from the Queensland Physiotherapy Placement Collaborative, which is a collaborative made up of representatives from Queensland Public Health Sector and Queensland universities the provide entry-level physiotherapy programs to ensure the equitable distribution of Queensland Public Health Sector clinical placements.

3.2.4 Analysis

Descriptive analyses were undertaken for all variables in each of the quantitative studies. Table 3.2 outlines the statistical tests undertaken in each study, their purpose and the outcome measure they were used to assess. The following describes the statistical analysis in more detail.

Continuous variable data were collected in Studies 1, 2 and 4 (with exception to above stated OOS data in Study 1), therefore parametric statistical tests were chosen over non-parametric methods (Fagerland, 2012). For each study, data underwent normality and homogeneity of variance testing to ensure that the assumptions of parametric analysis methods such as t-tests and analysis of variance (ANOVA) were met. Significance for all test was set at p < 0.05. Statistical analysis was performed using Statistical Package for Social Sciences (SPSS) v23 (IBM Corp, 2015).

3.2.4.1 Study 1

For Study 1 an independent t-test was deemed sufficient to assess the difference between OOS across different CE:students ratios in different clinical areas. In Study 1 an independent t-test could not be performed for the cardiorespiratory area as two hospitals had two cardiorespiratory clinical placements running simultaneously which meant that data could not be separated into each clinical placement. Study 1 OOS data were pooled in each clinical area to provide an overall profile of physiotherapy students on clinical placement. Therefore, OOS data were collected as count data and this was unable to be attributed to an individual student, therefore no test of mean difference could be performed. A two-way ANOVA was used to determine the effect of clinical placement weeks and clinical area on student LOOS as there were two independent variables (clinical placements weeks and clinical area).

3.2.4.2 Study 2

Study 2 used two different types of regression analyses, linear regression and a multiple variable regression. These tests are statistical models that identify the relationships between

independent and dependent variables (OOS/day). A linear regression is used when only one independent and one dependent variable is being analysed. Linear regression analysis was used to determine if, and at what time point (y-intercept), a group-of-students met the equivalent caseload of a junior or senior physiotherapist.

Multiple variable regression is used when two or more independent variables act on a dependent variable (Hoffman, 2015) and was used in Study 2 to determine the relationship between average OOS/day of a group-of-students with clinical area and CE:student ratio. Multiple variable regression requires univariate analysis first to understand the unadjusted relationships of the independent variables (clinical area and CE:student ratio) on the dependent variable (OOS/day) (Valveny & Gilliver, 2016). Multiple variable regression can then identify exploratory or predictive models (Valveny & Gilliver, 2016) such as the relationship between average OOS/day and the clinical area and CE:student ratio.

A one-way ANOVA was selected when the means of more than two groups were being assessed to compare the OOS/day of group-of-students with a junior and senior physiotherapist. A one-way ANOVA in this instance reduces the risk of type I error compared to multiple t-tests as multiple t-tests risk of type I error is additive for each test (Kim, 2014).

3.2.4.3 Study 4

An independent t-test was used to determine the difference between OOS/day and LOOS of students and new graduates.

Study	Statistical Test	Purpose	Outcome
1	Two-way ANOVA	To determine whether an interaction exists between two independent variables and the dependent variable	To determine whether clinical placements weeks and clinical area independently or combined impact student LOOS.
	Independent t-test	Assess the difference between the means of two different groups	Assess the difference in OOS per block by CE:student ratios in each clinical area
2	Multiple variable regression	A statistical model to determine the impact independent variables have on the dependent variable	To predict the effect clinical area and CE:student ratio has on average OOS/day in a group-of-students
	One-way ANOVA	Assess the difference between means of two or more groups.	Assess the difference between the average OOS/day in students, and junior and senior physiotherapists
	Linear regression analysis	A statistical model to describe the relationship between an independent variable and the dependent variable.	To determine if, and at what time point, a group-of- students reach the workload of junior and physiotherapists
4	Independent t-test	Assess the difference between the means of two different groups	Assess the difference between average OOS/day and LOOS in students and new graduates

Table 3.2 Summary of statistical test	ts nurnosa and maasuras	for Studios 1 2 and A
Table J.Z. Jullinaly of Statistical lesi	is, purpose and measures	TOT Studies 1, 2 and 4

OOS – Occasions of service

LOOS – Length of occasion of service

3.3 Qualitative study designs

Qualitative methods were used in two studies within this research, Study 3 and Study 5. These two studies were conducted concurrently as the same participant groups were being investigated. The following details the participants, procedures and analysis performed for these two studies.

3.3.1 Participants

The qualitative studies included two groups of physiotherapists; new graduate physiotherapists and experienced physiotherapists who were involved in supervising new graduates.

3.3.1.1 New graduate physiotherapists

Two cohorts of physiotherapy new graduates participated in Studies 3 and 5; new graduates from 2017 participated after approximately 11 months of clinical practice experience and 2018 new graduates after 2-3 months of clinical practice experience. Two different cohorts were selected to gain the opinions of new graduates as they were initially transitioning into the profession and from those who were nearing the completion of the transition from student to new graduate. A prominent theory in health professional transition from student to new graduate is 'Transition Shock' which suggests that during a new graduate's first year of practice they move through three stages (Duchscher, 2008, 2009). Therefore, it was important to appreciate new graduates' perspectives when they first commenced work and at the end of the first year so they had time to reflect on their experience and offer additional insights into the transition from student to new graduate.

3.3.1.2 Experienced physiotherapists

Experienced physiotherapists were described as any physiotherapist who had five or more years of physiotherapy practice experience, were actively involved in the clinical education of

physiotherapy students and had an understanding of new graduate work practices either by providing them with supervision or working closely with them. An experienced physiotherapist group were used with the above inclusion criteria to ensure they were able to comment on student activity, how this changes for the new graduate, and the issues and strategies that support the new graduate transition.

Both participant groups worked at the five Queensland public health sector hospitals as described in Table 3.1.

3.3.2 Procedures

Focus groups, using a semi-structured interview guide were used to gather participant responses. A focus group is a small group of approximately 5 – 10 people with a moderator present to discuss a specific theme or topic for the purpose of research (Gill & Baillie, 2018; Teddlie & Tashakkori, 2009). Focus groups not only gather participant perspectives and attitudes but also promote group participants to interact, explore the topic widely, explain their thoughts, agree and disagree on views to give rich data (Tausch & Menold, 2016). Barbour (2010) suggests that it is the participant group interaction and dynamics that often improve the richness of data compared to one-on-one interviews.

Focus groups were planned to be conducted with two new graduate groups (2017, 2018) and one experienced physiotherapist group from each of the five hospitals. New graduate and experienced physiotherapist focus groups were held separately as it is important that participants in focus groups feel equal to each other and free to discuss their thoughts openly (Acocella, 2012).

A semi-structured interview guide (Table 3.3 and 3.4) was used during the focus groups to ensure the research aims were investigated and to gently guide the focus groups' discussion (a more detailed version of the semi-structured interview guide can be found in Appendix 1). A semi-structured interview guide is a list of questions, with prompts that may be used to encourage participants to provide greater detail in answering the questions. Questions should be flexible, able to change in order and encourage the flow of an interview so participants can

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engage fully and in-depth, and reflective responses can be obtained (Kallio, Pietilä, Johnson, & Kangasniemi, 2016). To develop the semi-structured interview guide questions the research aims were reviewed, questions were then brainstormed and sent to an expert panel for feedback. The expert panel included members of the Steering Committee and the doctoral candidate's supervisory team. Questions were further refined with the addition of specific prompts (Krueger & Casey, 2010). The semi-structured interview guide was pilot tested with experienced physiotherapists and physiotherapists who were 13-15 months post-graduation so as not to reduce the pool of new graduate participants. Feedback was sought from these volunteers regarding their understanding of the questions and their responses reviewed with small changes made to the semi-structured interview guide. Pilot testing has been recommended to enhance participant understanding of the questions and the quality of data collection (Kallio et al., 2016).

Focus group questions were similar between groups and explored the activities students participated in during clinical placements and whether and how these activities changed once a new graduate. Questions relating to the transition from student to new graduate were also included and focused on participant experiences, the factors that impact on the student transition and strategies that may support the transition from student to new graduate. All participants were provided with the question guide 24-hours prior to the focus group to ensure they had knowledge of the topics (Traynor, 2015), to aid informed consent and allow participant reflection on their past experiences.
Table 3.3 Semi-structured interview guide for new graduates

New graduate semi-structured interview guide

1. Thinking back to your time as a student in a hospital setting, what sorts of things did you do?

As you know, delivery of health services encompasses treating patients, attending handover and case conferences, attending work group meetings and training.

- 2. Do you think the things you did on placements contributed to the delivery of health services?
- 3. Could you tell me the types of things you are doing or have done as a new graduate physiotherapist?
- 4. Has your contribution to the delivery of health services changed now you are a new graduate physiotherapist?
- 5. Did you feel you were prepared to become a new graduate? Why do you feel you were or were not prepared?
- 6. What do you think would have made you better prepared for the transition from student to new graduate?

Experienced physiotherapist semi-structured interview guide

Thinking about students

- 1. When you take students what are some of the things they do while they are on placement?
- 2. The delivery of physiotherapy services in a hospital involves many different things. Do you think the activities that students do contribute to service delivery? Why or why not?
- 3. Do you think students could offer more to the delivery of health services? If so, what?
- 4. Towards the end of placement, say in weeks four and five, how many treatments would students do in your clinical area? Approximately how long does it take them to complete a treatment?
- 5. What are your expectations of a student who meets entry-level physiotherapy standards in your clinical area? How do you determine this?

Thinking about new graduates

Can you tell me about how your hospital supports new graduates for example do you have an orientation / mentoring process.

- 6. In your clinical area, what clinical load would you expect most new graduates would manage?
- 7. Do you feel that new graduates are adequately prepared for the other activities involved in the delivery of services? ie. not those specifically related to direct patient care?
- 8. What, if anything, would enhance new graduate preparation to be work ready? When should this be provided and by whom?

Focus group interviews were estimated to take 60 minutes, were voice recorded and transcribed verbatim professionally in preparation for analysis. The candidate checked all audio recordings with the transcripts to ensure their accuracy. At the commencement of the focus group demographic information of age, gender, years of experience, clinical areas worked and years of clinical education experience (experienced physiotherapists only) were collected. Prior to referring to the semi-structured interview guide, the moderator (doctoral candidate) introduced themselves and welcomed participants, provided an overview of what would occur and topics that would be discussed. The moderator also set ground rules regarding confidentially and trust. The above steps are considered good practice when conducting focus groups (Breen, 2006). At the end of each focus group a summary was provided to participants with the main points of discussion to ensure accuracy of meaning (Carey, 2015). Participants were invited to contact the focus group moderator should they wish to provide any further information or feedback.

3.3.3 Analysis

An inductive thematic analysis was conducted as described by Braun and Clarke (2006). This approach seeks to synthesise, analyse and describe themes without the prejudice of preconceived codes (Nowell, Norris, White, & Moules, 2017). Thematic analysis aims to 'fully realise' the themes through in-depth analysis rather than the summary of participant direct responses (Clarke & Braun, 2018). This approach was used to capture the rich information and ideas surrounding the student contribution and transition to new graduate in a logical, considered and methodical approach as outlined below.

Focus group transcripts were read multiple times by two investigators (SS and SK) to increase immersion and familiarisation with the data. This step also supports researchers to understand the whole dataset and therefore main ideas and reduce the potential for having a narrow focus while coding (Vaismoradi, Turunen, & Bondas, 2013). During familiarisation with the data notes were taken.

From the familiarisation and documentation notes, a list of key ideas was developed and coding commenced. A code is a textual description of a meaningful piece of raw data and these are then organised into meaningful groups (Guest, MacQueen, & Namey, 2012). Initial coding was completed independently by two investigators (SS and SK). Codes with similar ideas were grouped together to identify themes and subthemes. An inductive method was used so the codes and themes were closely linked with the raw data rather than using a pre-existing framework (Nowell et al., 2017). Together the investigators reviewed and compared their independent coding and theme identification which led to the development of preliminary themes.

Investigators continued to re-read the transcripts and review codes and themes independently. This review process ensures all codes are identified and themes are consistent with the dataset (Braun & Clarke, 2006). Themes were further refined until consensus was met. These themes were then reviewed by two other investigators to ensure an accurate representation of the data.

3.4 Ethical considerations

There were several ethical considerations including informed consent, anonymity and confidentiality that were addressed in each study. The aims of this program of research was to investigate the student contribution to the delivery of health services and the transition from student to new graduate, which meant investigating groups of people that may be considered vulnerable such as students and new graduates. The following details the consent process for participants and participating hospitals, and how anonymity and confidentiality was maintained.

Studies 1, 2, and 4 received ethical approval from the Metro South Human Research and Ethics Committee and the Australian Catholic University Human Research and Ethics Committee (HREC HREC/15/QPAH/133 and 2016-152R respectively; Appendix 2). Studies 3 and 5 received ethical approval from the Metro South Human Research and Ethics Committee

and the Australian Catholic University Human Research and Ethics Committee (HREC/17/QPAH/265 and 2017-233R respectively; Appendix 2).

3.4.1 Informed consent

Permission from each hospital was obtained to collect the clinical activity data of students and physiotherapists from their respective information management systems. This permission was gained from the Director of Physiotherapy of participating hospitals and the research governance committee at each participating hospital. Clinical activity data is collected as part of routine practice by individual hospitals and this data is used for activitybased funding and health service delivery planning. Individual participant consent was not required as each hospital has ownership of this data, it is part of routine practice, no patient information was obtained, and no participant was identifiable.

In Studies 3 and 5 individual participant written informed consent was obtained from the new graduate and experienced physiotherapists. To ensure participants felt comfortable to provide their informed consent the focus group questions were provided to them 24-hours in advance. At the commencement of the focus group, the procedures were clearly explained, and participants were provided with an opportunity to ask any further questions. Participants were made aware that the focus group was for the purpose of qualitative research, would be voice recorded and de-identified quotes may be published.

3.4.2 Anonymity and confidentiality

Only the data that were required for Studies 1, 2 and 4 were obtained from hospital information management systems. The research candidate provided the data custodian at each participating hospital with an Excel spreadsheet with the exact information that was required, therefore there was no risk of additional information being provided. The data from each hospital were de-identified prior to the research candidate receiving this data. Due to the large sample size across the five hospitals in each study no individual student or

physiotherapist could be identified based on their clinical activity data. Hospitals were also de-identified on reporting of the results.

In Studies 3 and 5, new graduate and experienced physiotherapist focus groups were conducted separately, and no direct line-managers of experienced physiotherapists were participants. Supervisors of new graduate participants may have participated in the experienced physiotherapist focus groups only. During transcription of the audio files, all identifiable information was removed to ensure participant anonymity. Each participant was allocated an alphanumerical code which was used throughout the transcripts.

All data both qualitative and quantitative were stored on a password protected computer drive with individual files also password protected.

Chapter 4 - Study 1

What direct patient care activity do physiotherapy students undertake during clinical placements in common clinical areas of physiotherapy?

Study 1 profiles the direct patient care activity including occasions of service (OOS) and length of occasions of service (LOOS) of physiotherapy students during clinical placements in three common clinical areas of physiotherapy; cardiorespiratory, musculoskeletal and neurorehabilitation. This study also compares different clinical educator to student (CE:student) ratios within each clinical area. The following paper has been published in the Australian Health Review.

Stoikov, S., Shardlow, K., Gooding, M., & Kuys, S. (2017). Clinical activity profile of preregistration physiotherapy students during clinical placements. *Australian Health Review*, 42(6), 661-666.

4.1 Abstract

Objective: To determine the direct patient care activity profile of entry-level physiotherapy students during clinical placements and the contribution to health service delivery.

Methods: Clinical activity data from 2014 were obtained from five Queensland public health sector hospitals providing entry-level physiotherapy student clinical education in three common clinical areas (cardiorespiratory, musculoskeletal and neurological) over four 5-week placement blocks. Number of student occasions of service (OOS) and length of occasion of service (LOOS) were collected.

Results: Twenty weeks of student data were collected from each hospital in each clinical area; representing 29.1% of cardiorespiratory, musculoskeletal and neurorehabilitation student placements. Students completed 19,051 OOS. Average OOS per student per block undertaking a cardiorespiratory placement was 98.3 OOS, 74.0 OOS in musculoskeletal and 72.4 OOS in neurorehabilitation placements. For LOOS, a main effect existed between weeks (F = 402.1, p < 0.001) and between clinical areas (F = 1331.5, p < 0.001). An interaction effect was found between clinical placement weeks and clinical areas (F = 8.4, p < 0.001).

Conclusions: Student clinical activity data is useful to understand the student contribution to health services. Student contribution appears to increase throughout the clinical placement and consideration should be given to the CE:student ratio to enhance overall student contribution.

4.2 Introduction

Entry-level physiotherapy student clinical education within clinical practice settings is a core component of developing competent, effective and safe clinicians (Australian Physiotherapy Council, 2011). The physiotherapy profession requires a significant level of clinical training prior to registration, with clinical placements needing to occur in various health settings and clinical areas (Health Workforce Australia, 2014a). Accreditation requirements for entry level physiotherapy programs in Australia published in 2011 indicated that students must complete placements that provide opportunities to develop competence in the key areas of physiotherapy (cardiorespiratory, musculoskeletal and neurological) (Australian Physiotherapy Council, 2011). Providing clinical placements can result in many benefits and challenges to healthcare services. Benefits include encouraging staff to engage in reflective practice (Sturman et al., 2011) and increased exposure to evidence-based practice and current knowledge (DeWitt et al., 2014). Reported barriers include managing time constraints and coping with students who were struggling with clinical practice (Davies et al., 2011). Although early physiotherapy research identified that student clinical placements within healthcare services enhance overall productivity (Ladyshewsky et al., 1998), there is limited quantitative data identifying student contribution to service delivery. This would be valuable to inform health policy, planning and resourcing requirements of clinical placements and enhancing capacity and skill to provide quality clinical education.

One aspect of student contribution that has attempted to be quantified is student productivity. Clinical educator and student occasions of service (OOS) and time spent treating patients have been measured; with comparisons made prior to, during and after student clinical placements (Hughes & Desbrow, 2010; Rodger, Stephens, et al., 2011). However, to date no study has investigated the volume of, or change in, physiotherapy student OOS or length of occasion of service (LOOS; treatment time) throughout a clinical placement across different clinical areas. Another factor which might influence student contribution is the clinical educator to student (CE:student) ratio. A systematic review found that there was little quantitative evidence to suggest the most effective or productive CE:student ratio (Lekkas et al., 2007). Further research is required to inform best practice clinical education.

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This study investigated the quantitative contribution entry-level physiotherapy students make to physiotherapy service delivery in Queensland public health sector hospitals. The primary aim was to determine the profile of student direct patient care activity including identifying the volume of, and change in, student OOS and LOOS across a placement in three key clinical areas of physiotherapy practice and hospitals. The secondary aim was to identify the effect of CE:student ratio on student clinical activity.

4.3 Methods

4.3.1 Study design

A retrospective observational study utilising physiotherapy student clinical activity data from five Queensland public health sector hospitals was conducted. Participating hospitals provided their consent for the use of hospital clinical activity data. Metro South Health and the Australian Catholic Universities Human Research Ethics Committees approved this study (HREC/15/QPAH/133 and 2016-152R).

4.3.2 Participants

Five Queensland public health sector hospitals participated in the study including three metropolitan and two regional hospitals. Hospitals were selected based on the type of hospital, location, the hospital's information management system, and the volume of physiotherapy students undertaking clinical placements in the three clinical areas at each hospital. The type of hospital was determined using the peer group descriptions Principal referral hospital and Public acute group A hospitals (Australian Institute of Health and Welfare, 2015b). Principal referral hospitals are large tertiary teaching hospitals that on average complete 74,631 acute weighted separations and have a wide variety of specialty areas (Australian Institute of Health and Welfare, 2015b). A Public acute group A hospital completes on average 27,155 acute weighted separations, however, does not have the same breadth of specialty areas as a Principal referral hospital (Australian Institute of Health and Welfare, 2015b).

4.3.3 Procedures

Student direct patient care activity data from 2014 were obtained from each participating hospital in three common physiotherapy clinical areas; cardiorespiratory, musculoskeletal and neurorehabilitation. For each clinical area data were obtained from four clinical placement blocks, each five weeks in length providing 20 weeks of direct patient care clinical activity data for each clinical area for each hospital. Clinical placement blocks were selected to ensure all Queensland universities providing entry-level physiotherapy programs were represented for each clinical area and data were available across the calendar year to capture seasonal variation and student prior clinical placement experience.

Direct patient care activity data utilised in this study were obtained from hospital specific information management systems in Excel format in which students recorded this data as part of routine practice. Information regarding the total number of 2014 clinical placements, CE:student ratio at each hospital and total 2014 Queensland public health sector hospitals physiotherapy clinical placements in the three common clinical areas was also obtained from the Queensland Physiotherapy Placement Collaborative (Queensland Physiotherapy Placement Collaborative, 2016).

4.3.4 Measures

Student clinical activity was determined by student documented OOS and LOOS. For the purposes of this study an OOS was defined as a single interaction between a student physiotherapist and patient to deliver care that influenced patient health outcomes. Due to differing information management systems recording group data differently, groups were recorded as one OOS. LOOS describes the time in minutes to provide an OOS (Allied Health Professions' Office of Queensland, 2014).

4.3.5 Analysis

All data were de-identified prior to being pooled and analysed. Descriptive statistics were used to describe total student OOS, combined hospital student OOS and the average OOS/student in each clinical placement week by clinical area. Percentage change of each week of the clinical placement as well as overall change from week 1 to week 5 was calculated. No p values are reported for OOS data due to de-identified data resulting in a count of OOS.

LOOS data were examined for outliers with upper and lower limits set at 210 minutes and 10 minutes respectively for an OOS. The lower limit represents the minimum LOOS as defined by governing rules for clinical activity data recording (Queensland Physiotherapy Placement Collaborative, 2016). An upper limit of 210 minutes was selected as a longer student treatment time for a single OOS would be unreasonable. Data falling outside this range were removed for LOOS analysis, however included for OOS analysis. A two-way ANOVA was used to examine the effect of clinical areas and placement weeks on LOOS.

Hospital variability in each clinical area was described by the average OOS/student/block to account for the different numbers of students at each hospital in the three clinical areas. Average OOS/student/block was determined by calculating the total OOS in each hospital and correcting for the total number of students in the clinical area.

Total OOS completed by a group-of-students during a clinical placement and an individual student were compared for different CE:student ratios. Comparison between total OOS could only be performed in musculoskeletal and neurorehabilitation placements due to some limitations in the cardiorespiratory data. Combined student data at two hospitals hosting separate cardiorespiratory clinical placements simultaneously could not be separated for accurate data analysis. A Welch two sample t-test was used to determine the differences between CE:student ratios in each clinical area. Statistical analysis was performed using SPSS v23 (IBM Corp, 2015) with significance determined at 0.05.

4.4 Results

Four of the five participating hospitals are considered Principal referral hospitals (Hospitals 1, 2, 3 and 5), with Hospital 4 being a Public acute group A hospital (Australian Institute of Health and Welfare, 2015b). Four different information management systems were used in the five hospitals to collect student direct patient care activity data.

In total, 300 weeks of student direct patient care activity data from all hospitals was collected; representing 29.1% of all 2014 Queensland public sector hospital clinical placements in the key clinical areas. This represented 27.6% of all 2014 cardiorespiratory placements, 28.1% of musculoskeletal placements and 31.9% of neurorehabilitation placements. Students at the five hospitals produced 19,051 OOS across these three clinical areas.

4.4.1 Occasions of service

Across all clinical areas, total OOS increased on average 129% across the five weeks of the clinical placement. Weeks 1 to 3 saw the most growth in OOS in all clinical areas with a 100% increase in OOS in cardiorespiratory, 70% in musculoskeletal and 80% in neurorehabilitation over weeks 1 to 3. Figure 4.1 illustrates the average OOS per student per week in each clinical area with growth observed from week 1 to week 4, plateauing in week 5. When all clinical placements are considered for each clinical area, cardiorespiratory students on average produced the most OOS for a block (98.3 OOS/student/block). Musculoskeletal (74.0 OOS/student/block) and neurorehabilitation (72.4 OOS/student/block) students were similar in the average number of OOS per student per block. Cardiorespiratory students also produced more OOS than students in the musculoskeletal and neurorehabilitation areas in each week of a clinical placement.



Figure 4.1. Average weekly occasions of service per student per block in each clinical area.

4.4.2 Length of occasion of service

Identification of outliers resulted in 138 (0.72%) LOOS outside the limits set which were removed for analysis. Two-way ANOVA revealed a main effect between weeks (F = 402.1, p < 0.001) and between clinical areas (F = 1331.5, p < 0.001) for LOOS. The average cardiorespiratory LOOS over 5 weeks was 49.6 minutes (95%CI 49.0 to 50.2); musculoskeletal: 58.0 minutes (95%CI 57.2 to 58.8); and neurorehabilitation: 74.4 minutes (95%CI 73.7 to 75.1). A significant interaction effect existed between clinical placement weeks and clinical areas (F = 8.4, p < 0.001). A significant difference was found between all clinical areas in each week (p < 0.01), with cardiorespiratory OOS having the shortest LOOS in each week and neurorehabilitation OOS the longest LOOS over the 5 weeks (Figure 4.2).



Figure 4.2. Average (95% confidence interval) length of occasion of service by week in each clinical area.

4.4.3 Hospital variability

Across the three key clinical areas, average OOS per student varied between hospitals (Figure 4.3). Cardiorespiratory placements varied 110% in OOS, ranged from 62.9 OOS per student per block (Hospital 1) to 132.0 OOS per student (Hospital 5). Similarly, variation was observed in neurorehabilitation placements with a 113% difference, ranging from 50.0 OOS per student per block (Hospital 2) to 106.4 OOS per student per block (Hospital 3). Average OOS per student per block (Hospital 2) to 106.4 OOS per student per block (Hospital 3). Average OOS per student per block (Hospital 5) to 80.1 OOS per student per block (Hospital 3).



Figure 4.3. Average occasions of service per student per block in each hospital.

4.4.4 Clinical educator to student (CE:student) ratio comparison

CE:student ratios ranged between 1:2 and 1:4 in participating hospitals. In musculoskeletal placements there was a significant difference (p < 0.001) between total OOS per block for students in a 1:3 CE:student ratio (221.3, 95%CI 205.6 to 237.0 OOS/block) compared with a 1:4 ratio (294.9, 95%CI 282.8 to 306.9 OOS/block). In neurorehabilitation placements there was no significant difference (p = 0.28) between total OOS per block for students in a 1:2 CE:student ratio (162.2, 95% CI 141.2 to 183.1 OOS/block) versus a 1:3 ratio (191.8, 95% CI 142.6 to 240.8 OOS/block). However, when the average OOS/student/block was compared between different CE:student ratios (Figure 4.4) there was no significant difference in the average number of OOS an individual student could produce per block in any clinical area.



Figure 4.4. Average (SEM) occasions of service (OOS) per student per block for different clinical educator to student ratio in each clinical area.

4.5 Discussion

Student contribution to physiotherapy service delivery has not previously been investigated and quantified. To date it has been unclear as to the number of OOS and the LOOS physiotherapy students complete while on 5-week clinical placements. This study found that student OOS increased throughout a placement with a concomitant reduction in LOOS. Students on cardiorespiratory placements completed a higher number of OOS compared to the other clinical areas. CE:student ratio had some influence over the student contribution to service delivery, though this was not consistent across all clinical areas. This information can be useful to clinical educators, health service managers, universities and physiotherapy professional governance to benchmark student clinical activity, plan health service delivery and the associated resource requirements of clinical placements.

Unsurprisingly student OOS increased across weeks 1 to 5 of the placement block. This is in contrast to previous studies (Rodger, Stephens, et al., 2011; Rodger et al., 2012) where no

change in OOS during clinical placements was reported for the student-supervisor team in occupational therapy and dietetic students. Although not statistically significant, Rodger and colleagues (2012) demonstrated the number of OOS had periods of growth during placements of longer length (10-14 weeks), with the main growth occurring between weeks 1 to 3. This early period of growth was also present in the current study up to week 4. This may suggest that the early weeks of clinical placements allow students to apply theoretical knowledge and gain a foundation in the clinical area.

As the number of OOS increased LOOS decreased. It is expected that students develop a variety of skills and refine these throughout their clinical placements fostered by experiential learning and clinical educator facilitation. One strategy that clinical educators may use to increase student learning is to increase the number of OOS undertaken by students as a way of preparing students for entry into the profession. Hughes and Desbrow (2010) reported similar findings with a significant reduction in LOOS over 10-week dietetic student placements with a trend of increasing OOS by week. A reduction in the clinical educator supervision of students over the 10 weeks was also found (Hughes & Desbrow, 2010) suggesting, that students develop some level of independence during clinical placements, which increases over the duration of the placement. Thus, it would seem reasonable to assert that student OOS increase and LOOS decreases as a result of increasing experience in a clinical area as the placement weeks progress, enhancing student contribution to the health service in the later weeks of placements. Therefore, shorter placements may impact on the ability of a group-of-students to maintain the required service requirements of a clinical area.

Variation between clinical areas in number of OOS offers some insight into the difference in LOOS in each clinical area and likely reaffirms what is informally understood by the physiotherapy profession. Neurological patients often take longer to treat than inpatient cardiorespiratory patients and musculoskeletal outpatients with designated appointment times. The results of this study indicate that clinical areas that provided fewer student OOS tended to spend more time per OOS such as in neurorehabilitation. Due to the increased length per OOS, the total number of student OOS may be limited compared with other clinical areas. Therefore, it is imperative to consider clinical areas separately when analysing clinical placements due to the varying needs and clinical requirements of patients.

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Hospital variance in the average OOS/student/block in cardiorespiratory and neurorehabilitation is an interesting finding and requires careful consideration. Selection of clinical placement blocks ensured that all universities were represented which aimed to achieve a balance between those students who were attending their first placement and those who had completed several clinical placements prior. The data in this study is representative of the 2014 calendar year and includes a spread of placements across months to accommodate any seasonal changes in service delivery demands. This suggests hospital variability is due to individual hospital factors which might include clinical placement structure and culture, clinical educator's preferences and the amount of learning and other activities students undertake which do not directly produce OOS. Musculoskeletal placements demonstrated more consistency in average OOS per student per block and this may be due to the nature of musculoskeletal placements that use appointment scheduling.

It appears that changing CE:student ratios had little impact on the average OOS produced by an individual student over the course of a placement. This suggests there is no ceiling effect on patient OOS with a CE:student ratio up to 1:4. Thus increasing student numbers per clinical educator could potentially result in increased OOS for the health service. This is supported by a previous study investigating a 1:2 model where two students were more productive than one student or a physiotherapist alone (Ladyshewsky, 1995). In contrast, a US study found no change in productivity with between 4 and 8 students (J. Moore et al., 2014) suggesting that student, facility and workplace needs are important when considering total student numbers. Despite this there appears to be agreement that students do not reduce the productivity of a health service. Therefore, it is reasonable to assert that increasing student numbers per clinical educator can result in increased OOS for the health service. Thus, consideration should be given to the CE:student ratio to potentially enhance the student contribution and as a method of managing placement demand.

Limitations

While this study provides an understanding of student contribution to physiotherapy clinical activity there were some limitations. The use of retrospective clinical activity data resulted in

limited ability to check the accuracy of data collected and entered. However, health services regularly use this data to inform service delivery and thus this study provides an analysis on real world clinical activity data. Furthermore, due to differences in data information management systems groups OOS were allocated a single OOS. At those hospitals and in clinical areas where groups are frequently held OOS may have been underestimated.

4.6 Conclusion

Hospitals that actively engage in providing clinical placements for physiotherapy students should consider using student clinical activity data when planning both service delivery and clinical placement demand. Understanding student contribution to service delivery allows for effective workload management and in fact with careful consideration of hospital logistics, may enhance the overall direct patient care activity of the service. Furthermore, the results should encourage hospitals to consider their CE:student ratio and clinical education resourcing. While this study has provided valuable information, in order to fully appreciate and understand the student contribution to service delivery, further research is necessary to understand placement models and the impact a group-of-students has on service delivery compared with a registered physiotherapist.

4.7 Summary

- Student OOS increases from week 1 4, and plateaus in week 5 and LOOS decreases each week in across three physiotherapy clinical areas (cardiorespiratory, musculoskeletal and neurorehabilitation).
- The number of OOS and LOOS differs by clinical areas, with cardiorespiratory students completing more OOS and having a lower average LOOS.
- There is variability among the total OOS per student per clinical placement block between hospitals this is more marked in cardiorespiratory and neurorehabilitation.
- A higher CE:student ratio produces more OOS in musculoskeletal only, however individual students complete the same OOS regardless of the CE:student ratio of the clinical placement.

Chapter 4 provided a profile of physiotherapy student direct patient care activity during clinical placements to understand how they contribute to the delivery of health services. This study highlighted that the clinical area and CE:student ratio impacts upon the student direct patient care activity and warrants further investigation. Furthermore, to understand how the student direct patient care activity does contribute it must be compared to the activity of a physiotherapist. Chapter 5 will investigate direct patient care activity of a group-of-students, the impact of the clinical area and CE:student ratio on the student contribution and, if and when a group-of-students meet the workload of a junior and senior physiotherapist.

Chapter 5 – Study 2

How does the direct patient care activity of a group of physiotherapy students compare to the clinical activity of registered physiotherapists?

This chapter investigates the direct patient care activity of a group-of-students on clinical placement participating in a collaborative clinical placement model. The study identifies the influence of the clinical area and clinical educator to student (CE:student) ratio, and compares the activity of a group-of-students to that of registered physiotherapists. The following paper has been prepared for publication.

Stoikov, S., Gooding, M., Shardlow, K., Maxwell, L., Butler, J., & Kuys, S. A collaborative clinical placement model for physiotherapy students results in equivalent (or greater) direct patient care activity than that delivered by physiotherapists alone: An observational study.

5.1 Abstract

Objective: To determine the contribution physiotherapy students make to direct patient care activity during a collaborative clinical placement model. Secondary aims were to determine the impact of clinical area and clinical educator to student (CE:student) ratio and to ascertain if a group-of-students participating in a collaborative model could meet the equivalent direct patient care activity of a junior or senior physiotherapist.

Methods: 408 physiotherapy students in 135 student groups and 42 physiotherapists, in four clinical areas of physiotherapy: cardiorespiratory, musculoskeletal, neurorehabilitation and orthopaedics from five hospitals in Queensland Public Health Sector participated in this study. Physiotherapy student, and junior and senior physiotherapist occasions of service (OOS) were collected from hospital information management systems. Number of days of clinical activity was recorded to provide the average OOS/day.

Results: Across a 5-week clinical placement a group-of-students in a collaborative clinical placement model provided on average 10.6 OOS/day. In three of the four clinical areas, a group-of-students participating in higher CE:student ratios produced more OOS/day. Clinical area and CE:student ratio predicted 39% of the variance in the average OOS/day of students participating in a collaborative clinical placement model. On average a group-of-students reached the equivalent direct patient care activity of a physiotherapist by week two of a 5-week clinical placement.

Conclusions: Physiotherapy students in a collaborative clinical placement model met or exceeded the direct patient care activity of a physiotherapist, irrespective of clinical area and CE:student ratio.

5.2 Introduction

Physiotherapy clinical education is an essential component of entry-level physiotherapy programs and a requirement for registration as a physiotherapist in Australia (Australian Physiotherapy Council, 2017). Numbers of physiotherapy students are increasing globally (Pivko et al., 2016), with the number in Australia almost doubling from 2011 to 2016 (Australian Health Practitioner Regulation Agency, 2011, 2016). The increasing demand for student clinical placements requires innovative approaches to placement models. Across many allied health professions, a one-to-one apprenticeship model is used (Rodger et al., 2008); however, the effect of a collaborative clinical placement model on the delivery of health services should be explored. A collaborative clinical placement model refers to a model where one clinical educator supervises two or more students concurrently (Lekkas et al., 2007). Clinical educators have dual roles while supervising students; maintaining delivery of health services while directly supervising students' practice and supporting students' knowledge and clinical reasoning development ensuring they are safe and effective (Health Workforce Australia, 2014b; Lo, Curtis, Keating, & Bearman, 2017).

Quantitatively, there is some suggestion that physiotherapy students make a positive contribution to the delivery of health services (Dillon et al., 2003; Pivko et al., 2016). However, there has been little research investigating student contribution within a collaborative clinical placement model and if this is influenced by clinical area (such as musculoskeletal or cardiorespiratory) and/or clinical educator to student (CE:student) ratio. Disease category appeared to influence dietetic student contribution (Hughes & Desbrow, 2010), suggesting that clinical area should be considered. The influence of the CE:student ratio within a collaborative clinical placement model appears to be inconclusive (Lekkas et al., 2007) although Study 1 suggests higher CE:student ratios provide a greater student contribution. These factors should be further investigated to determine their impact on student contribution during clinical placements.

Although a variety of metrics have been used to assess student contribution, the most common is the number of treatments provided to patients. In Australia, clinical activity of health professionals in the public health system is classified as direct and non-direct patient care activity (National Allied Health Casemix Committee, 2001). Direct patient care refers to activities provided directly to patients, while non-direct patient care activities are those that support provision of clinical care such as staff supervision and service improvement activities (Hearn et al., 2016). The proportion of direct and non-direct patient care a physiotherapist provides is generally associated with their level of experience; with junior physiotherapists, who are more likely to be supervising students (Hearn et al., 2016). For the purposes of this study, physiotherapy student contribution to the delivery of health services refers to the direct patient care provided by students to patients while on clinical placement. Direct patient care activity is measured in terms of occasions of service (OOS) which refers to any "examination, consultation, treatment or other service provided to a patient" (Australian Institute of Health and Welfare, 2012). As physiotherapists and physiotherapy students collect direct patient care activity data daily; an opportunity exists to compare clinical activity of a group-of-students working in a collaborative clinical placement model with both junior and senior physiotherapists.

The primary aim of this study was to determine physiotherapy student contribution to the delivery of health services in terms of direct patient care activity provided by a group-of-students during a collaborative clinical placement model. Secondary aims were to determine the influence of clinical area and CE:student ratio on student contribution, and if students working together in a collaborative clinical placement model could meet the equivalent direct patient care activity of a junior and senior physiotherapist.

5.3 Methods

5.3.1 Study design

An observational study utilising physiotherapy student and physiotherapist clinical activity data from five Queensland public health sector hospitals was conducted. Consent for the use of hospital clinical activity data was provided by each participating hospital. Ethical approval was obtained from institutional human research ethics committees (HREC/15/QPAH/133 and 2016-152R).

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5.3.2 Participants

Five Queensland public health sector hospitals participated in this study (three metropolitan and two regional hospitals). Clinical activity data were obtained from physiotherapy students and physiotherapists at these facilities. Physiotherapy students were undertaking clinical placements in cardiorespiratory, musculoskeletal, neurorehabilitation and orthopaedic physiotherapy. Students from all six Queensland universities providing entry-level physiotherapy programs were represented.

A sample of junior and senior physiotherapists from the same hospitals and clinical areas as the students also participated. A junior physiotherapist was defined as someone in their second or third year of practice. A senior physiotherapist was a physiotherapist working in a defined senior role requiring them to possess high-level knowledge, skills and/or clinical leadership relevant to a specific area of clinical practice (Queensland Industrial Relations Commission, 2016). Of the five participating hospitals, three were defined as Principal referral hospitals, offering a wide range of specialised divisions and high patient volumes and two were Public acute group A hospitals with some specialised units but not a large range of specialities (Australian Institute of Health and Welfare, 2015b).

5.3.3 Procedures

In Australia, physiotherapy clinical placements are five weeks in length and timetabled over nine separate blocks from January to December. De-identified student direct patient care activity data were collected from each hospital's information management system for all nine 2016 clinical placement blocks in the areas of cardiorespiratory, musculoskeletal, neurorehabilitation and orthopaedics. Direct patient care activity of each student attending the same clinical placement (within the same CE:student ratio) were combined to provide the overall direct patient care activity for a group-of-students within a clinical area. Students received training in the hospital's information management system data entry requirements prior to undertaking their clinical placement. Each hospital provided at least five weeks of de-identified clinical activity data for junior and senior physiotherapists that best represented normal clinical activity within the four clinical areas. Physiotherapists receive training in allied health data collection based on the National Allied Health Casemix Committee data classification (National Allied Health Casemix Committee, 2001) and enter clinical activity data into the information management systems as part of routine practice.

5.3.4 Measures

Direct patient care activity was used to measure the contribution of a group-of-students. OOS and number of student placement days were collected to give the average OOS/day for a group-of-students for each week and across the course of a 5-week placement. A day was recorded if a student in the group provided an OOS. The total number of clinical placements provided by the Queensland Public Health Sector in each of the four clinical areas and the CE:student ratio for each clinical placement, were collected from the Queensland Physiotherapy Placement Collaborative.

Junior and senior physiotherapist average OOS/day were determined by dividing the total number of OOS by the total number of days physiotherapists engaged in clinical activities. Total number of days were determined by analysing time spent providing both direct and non-direct patient care activity each day. If the total daily clinical activity time for a physiotherapist was between 270 minutes and 640 minutes, even if the OOS was zero, it was included for data analysis. Data outside this range were excluded as these would not accurately represent a normal day of a full-time employed physiotherapist working approximately 460 minutes each day.

5.3.5 Analysis

Descriptive analyses were conducted for all variables. All group-of-student data were pooled to complete a multivariate regression to describe the association between group-of-student average OOS/day, clinical area and the CE:student ratio. Group-of-student average OOS/day were compared with junior and senior physiotherapist average OOS/day in each clinical area using one-way analysis of variance (ANOVA). Post hoc analysis with the least squared difference was used to determine the influence of CE:student ratio. A regression analysis determined firstly if, and secondly when, a group-of-students were able to complete the equivalent direct patient care activity of junior and senior physiotherapists. Where there were less than five groups of students in a CE:student ratio for a clinical area data were excluded in the ANOVA and regression analyses due to low statistical power (Button et al., 2013). Pvalue was set at 0.05 and analyses were conducted using SPSS v23 (IBM Corp, 2015).

5.4 Results

Data were collected for 135 groups of physiotherapy students (408 individual student clinical placements) across nine 5-week physiotherapy clinical placement blocks, representing 2040 weeks of clinical activity data. This data sample represented 41% of all Queensland Public Health Sector placements for the four clinical areas over the data collection period. Group-of-student's data were obtained across CE:student ratios for each clinical area. All student data were included in the analyses.

Physiotherapist daily total clinical activities time was examined with 4.7% of physiotherapist data removed to obtain an accurate representation of physiotherapist average OOS/day. Junior and senior physiotherapists data resulted in a combined 303 weeks of clinical activity data (junior physiotherapist 143 weeks; senior physiotherapist 160 weeks). Table 5.1 provides the descriptive statistics for a group-of-students in each CE:student ratio and junior and senior physiotherapists in each clinical area. Two hospitals were unable to provide clinical care activity for junior physiotherapists in either the musculoskeletal or orthopaedics areas. One hospital was unable to provide senior physiotherapist data for the cardiorespiratory and orthopaedics areas.

Clinical Area	Participant Type		Ν	OOS/day		Weeks of
						data
				Mean	(95% CI)	
Cardiorespiratory	CE:student ratio	1:2	2	7.4	(5.2 to 9.5)	10*
		1:3	23	11.4	(10.1 to 12.7)	115
		1:4	16	14.6	(13.2 to 16.0)	80
	Physiotherapist	Junior	7	10.5	(8.3 to 12.8)	44
		Senior	6	8.7	(6.7 to 10.7)	47
Musculoskeletal	CE:student ratio	1:3	16	10.4	(9.2 to 11.6)	80
		1:4	14	12.1	(10.9 to 13.3)	70
	Physiotherapist	Junior	4	7.5	(6.1 to 9.0)	38
		Senior	5	7.0	(6.2 to 7.8)	43
Neurorehabilitation	CE:student ratio	1:2	21	7.3	(6.5 to 8.1)	105
		1:3	18	9.9	(8.1 to 11.7)	90
	Physiotherapist	Junior	5	8.6	(7.8 to 9.3)	38
		Senior	7	9.0	(7.1 to 10.9)	52
Orthopaedics	CE:student ratio	1:2	7	10.9	(9.9 to 11.8)	35
		1:3	15	9.4	(8.2 to 10.5)	75
		1:4	3	14.7	(9.0 to 20.5)	15*
	Physiotherapist	Junior	3	9.5	(1.8 to 17.2)	23
		Senior	5	10.1	(7.7 to 12.6)	28

Table 5.1 Direct patient care activity for clinical educator to student (CE:student) ratios, junior and senior physiotherapists by clinical area and number of weeks of data collected.

OOS - Occasions of service

* Data not included in ANOVA analysis comparing group-of-students average OOS per day with junior and senior physiotherapists

5.4.1 Influence of clinical area and CE:student ratio on group-of-students' clinical activity

The number of OOS/day a group-of-students provided across a 5-week placement was associated with clinical area and CE:student ratio. Multivariate regression identified that clinical area and CE:student ratio accounted for 39% of the variance (R² = 0.39 p < 0.001) in the number of OOS/day a group-of-students completed. Univariate unadjusted crude estimates and the adjusted values for clinical area and CE:student ratio for group-of-students OOS/day are shown in Table 5.2. There was a difference between clinical areas irrespective of CE:student ratio, however statistical significance was reached only between cardiorespiratory OOS/day and musculoskeletal OOS/day and neurorehabilitation OOS/day. Regardless of clinical area, CE:student ratios of 1:3 and 1:4 completed on average more OOS/day than a 1:2 ratio. Both clinical area and CE:student ratio were independently predictive of group-of-student OOS/day (Figure 5.1a & 5.1b).

Table 5.2. Multivariate regression of clinical area and clinical educator to student (CE:student) ratio and the impact on a group-of-student's average occasions of service (OOS) per day.

		Clinical Area			CE:stude		
		Difference in OOS/day compared to the			Difference in OC		
		cardiorespiratory area			to 1:2 CE:st		
		Mean 95% Cl			Mean		
	Constant	MSK	NR	Orth	1:3	1:4	
OOS/day		-1.3	-4.0	-2.0	2.3	5.4	
Unadjusted		-2.6 to 0.1	-5.2 to -2.7	-3.5 to -0.6	1.1 to 3.4	4.1 to 6.8	
estimates		p = 0.74	p < 0.001	p = 0.007	p < 0.001	p < 0.001	
OOS/day	9.7	-1.6	-2.0	-0.86	1.7	4.5	$R^2 = 0.39$
Adjusted		-2.8 to -0.3	-3.4 to -0.7	-2.2 to 0.5	0.4 to 2.9	2.9 to 6.2	p < 0.001
estimates		p = 0.015	p = 0.004	p = 0.22	p = 0.011	p < 0.001	

MSK – musculoskeletal

NR – neurorehabilitation

Orth – orthopaedics



Figure 5.1a. Univariate analysis of occasions of service (OOS) per day by clinical area, adjusted for clinical educator to student ratio.





Figure 5.1b. Univariate analysis of occasions of service (OOS) per day for clinical educator to student ratio adjusted for clinical area.

5.4.2 Comparison of direct patient care activity of groups-of-students, junior and senior physiotherapists

Data for students and physiotherapists were normally distributed. Pooled clinical care activity of all student groups for all clinical areas was greater compared to pooled clinical activity of junior and senior physiotherapists in all clinical areas (F = 5.19; p = 0.006). A group-of-students provided a comparable number of OOS/day (10.6 OOS/day) compared with a junior physiotherapist (9.21 OOS/day; p = 0.056) and more than a senior physiotherapist (8.71 OOS/day; p = 0.005).

In the cardiorespiratory area, groups of students completed on average more OOS/day compared with physiotherapists (F = 8.65; p < 0.001). A group-of-students in a CE:student ratio of 1:4 completed more OOS/day than a group-of-students in a CE:student ratio of 1:3 (p = 0.001). Furthermore, a group-of-students in a CE:student ratio of 1:4 provided more OOS/day than junior (p = 0.002) and senior physiotherapists (p = 0.036). A group-of-students in CE:student ratio of 1:3 completed more OOS/day than a senior physiotherapist (p = 0.036) and was comparable to a junior physiotherapist (p = 0.466).

In the musculoskeletal area, groups of students completed more OOS/day compared with physiotherapists (F = 11.31, p < 0.001). A group-of-students in a CE:student ratio of 1:4 completed more OOS/day than a group-of-students in a CE:student ratio 1:3 (p = 0.023). Both a group-of-students in a 1:3 and 1:4 CE:student ratio provided more OOS/day than junior (p < 0.013) and senior physiotherapists (p < 0.002).

In the neurorehabilitation area, there were differences in the OOS/day completed by groups of students and physiotherapists (F = 3.45, p = 0.024). A group-of-students in a CE:student ratio of 1:3 completed more OOS/day than a 1:2 ratio (p = 0.003) but there was no difference for a group-of-students in either CE:student ratio and a junior (p > 0.31) and a senior physiotherapist (p > 0.13).

In the orthopaedics area, no difference in average OOS/day was found between groups of students and physiotherapists (F = 0.96, p = 0.425). A group-of-students in a CE:student ratio

of 1:2 completed a similar average number of OOS/day to a group-of-students in a 1:3 CE:student ratio (p = 0.112). A group-of-students in both 1:2 and 1:3 CE:student ratios completed an equivalent number of OOS/day compared to both junior and senior physiotherapists (p > 0.331). A group-of-students in a CE:student ratio of 1:4 provided the highest OOS/day for any clinical area but these data were excluded from the ANOVA due to only three groups being represented.

5.4.3 Time for a group-of-students to reach physiotherapist direct patient care activity equivalence

In all clinical areas (except neurorehabilitation 1:2 compared to senior physiotherapist) a group-of-students provided the equivalent OOS/day of junior and senior physiotherapists by the end of a 5-week clinical placement (Figure 5.2). Irrespective of clinical area, the weekly average OOS/day students provided met the equivalent direct patient care activity of a physiotherapist by approximately week 2 of a 5-week placement in most CE:student ratios. In cardiorespiratory, musculoskeletal and neurorehabilitation areas a higher CE:student ratio resulted in reaching physiotherapist equivalent direct patient care activity (OOS/day) earlier in the placement. The exception was for orthopaedics, where a 1:2 CE:student ratio was able to attain equivalent OOS/day of a physiotherapist sooner than a 1:3 ratio.



Figure 5.2. Group-of-student occasions of service (OOS) per day by week compared to junior and senior physiotherapist in each clinical area.

5.5 Discussion

Little investigation has occurred determining the contribution of physiotherapy students undertaking clinical placements using a collaborative clinical placement model to the delivery of health services. This study found that student contribution, in this case the OOS/day completed by a group-of-students on clinical placement, was influenced by clinical area and CE:student ratio. Furthermore, in most instances a group-of-students could complete the equivalent OOS/day of a physiotherapist by week 2 of a 5-week clinical placement. Overall, higher CE:student ratios were more likely to meet and even exceed the OOS/day provided by a physiotherapist. Additionally, students in higher CE:student ratios were able to achieve equivalent direct patient care activity of a physiotherapist earlier in the placement than students in lower CE:student ratios.

Students appear to make a contribution to the delivery of health service. Certainly, in the four clinical areas investigated in this study, groups of students provided a large quantifiable volume of direct patient care activity. Previous research quantifying student contribution has shown that physiotherapy students do not necessarily reduce service delivery (J. Moore et al., 2014), and may in fact positively contribute to service delivery (Dillon et al., 2003; Pivko et al., 2016). However, the impact of clinical area or CE:student ratio was not investigated. Although it has been previously reported that students are often perceived to reduce health service efficiency (M. Hall et al., 2015) this current study suggests that regardless of clinical area and CE:student ratio; groups of students provided at least comparable, if not more, direct patient care activity than a physiotherapist.

Variation in the time taken to complete an OOS between different clinical areas was found in Study 1. Thus, clinical area may influence the number of OOS/day able to be completed by a student and therefore the contribution a group-of-students can make to the delivery of health services. For example, in Study 1 cardiorespiratory students on average take 50 minutes to complete an OOS compared to 75 minutes in neurorehabilitation. This study has shown that clinical area influenced the student contribution to the delivery of health services suggesting that student activity in different physiotherapy clinical areas should be considered separately.
Student contribution also appears to be influenced by the CE:student ratio. A collaborative clinical placement model with a higher CE:student ratio tended to complete more OOS/day compared to lower CE:student ratios and physiotherapists. While a previous review (Lekkas et al., 2007) was unable to draw conclusions about the impact of the CE:student ratio in physiotherapy, the current study provides evidence that CE:student ratio is important to consider when measuring student contribution to direct patient care activity. However, it may be that the influence of CE:student ratio also depends on the clinical area. For example, in Study 1 a CE:student ratio of 1:4 in the musculoskeletal area completed more OOS over 5-week clinical placements than a 1:3 ratio. However, in Study 1 no difference was reported between a 1:2 and 1:3 ratio in the neurorehabilitation area. This difference may be associated with the different sample sizes in the Study 1 and Study 2, nine clinical placement blocks were collected in the current study compared with four in Study 1. In the orthopaedics area a 1:2 ratio completed more OOS/day than a 1:3 ratio, however a 1:4 ratio produced the most average OOS/day for any clinical area. Further investigation of physiotherapy student contribution in orthopaedics is required due to the low sample size.

Clinical area and CE:student ratio explained 39% of variance in the average OOS/day, suggesting that other factors also influence student contribution. Previous research has shown that hospital size (Lopopolo, 1984) and internal support provided to clinical educators, either formal or ad hoc support (Haines et al., 2011) may have an impact. However, even when taking these factors into account, the additional direct patient care activity provided by student collaborative clinical placement models may afford physiotherapists the opportunity to participate in other activities such as support of other staff members, professional development and service improvement activities. In order to effectively utilise the direct patient care activity contribution a group-of-students makes to the delivery of health services, further research should be conducted to identify how this could be utilised.

While a group-of-students offer a contribution to the delivery of health services it is important to consider the resources necessary to provide clinical placements. A clinical educator is required to directly supervise physiotherapy students to ensure safe and effective patient care and thus student OOS only occur because a clinical educator is present. At the beginning of a 5-week placement, a group-of-students do not complete the equivalent OOS/day of a physiotherapist. Thus, the clinical educator and/or other staff members must provide additional direct patient care activities until the students have achieved the skill level to enable them to take a larger proportion of the caseload. It is important to account for the activities of other members of the physiotherapy team during clinical placements (Haines et al., 2011) to gain a more accurate representation of the impact students have on the delivery of health services. Therefore, understanding the contribution of a group-of-students to delivery of health services can only be achieved when all the direct and non-direct patient care activities of all physiotherapy team members are considered.

Limitations

This research has provided valuable information relating to the contribution a group-ofstudents makes to the delivery of direct patient care within health services but there were limitations. This research was conducted in Queensland public health sector hospitals only thus, generalisability to other Australian states and internationally may be reduced. In 2012, 76% of all physiotherapy clinical education occurred within the Australian public health system in major and regional cities (Health Workforce Australia, 2013). Therefore, these data are representative of the hospitals where physiotherapy students undertake clinical placements nationally (Health Workforce Australia, 2013). Unfortunately, not all CE:student ratios could be assessed for each clinical area, however those presented are common throughout Australia (Health Workforce Australia, 2014a). It was also intended that comparator data for both junior and senior physiotherapists were obtained from all hospitals and in all clinical areas, however this was not possible.

5.6 Conclusion

This study has shown that a collaborative clinical placement model for a 5-week clinical placement in physiotherapy, regardless of clinical area and CE:student ratio, results in a group-of-students reaching and even exceeding the OOS of a junior and senior physiotherapist. Thus, collaborative clinical placement models may be mutually beneficial for

the student and the health service. This finding may assist health services to plan and effectively manage clinical care activities whilst providing clinical placements. As this study has only looked at direct patient care further research is necessary to understand whether other activities that students undertake may provide a contribution to the delivery of health services and whether the type and volume of the student contribution promotes student development to support the transition to new graduate.

5.7 Summary

- Clinical area and CE:student ratio was predictive of student OOS/day combined and independently.
- A group-of-students at least meet and, in some cases, exceed the direct patient care activity of a physiotherapist.
- A group-of-students in a higher CE:student ratio is generally able to meet the direct patient care activity of a physiotherapist earlier in the clinical placement and has a greater average OOS/day.

Chapter 5 identified the influence of the clinical area and CE:student ratio on the contribution of physiotherapy students and provided data across four clinical areas (cardiorespiratory, musculoskeletal, neurorehabilitation and orthopaedics) to describe if and when a group-of-students could meet the direct patient care of a physiotherapist. While this study provides valuable information, it does not describe other activities completed by students that may contribute to the delivery of health services and whether there are other factors that impact upon the student contribution. Chapter 6 will explore the student contribution further by obtaining the perspectives of physiotherapists.

Chapter 6 - Study 3

What are the perceptions of experienced physiotherapists and new graduates on the physiotherapy student contribution to the delivery of health services during clinical placements?

Study 3 explores the perceptions of physiotherapists on the contribution of physiotherapy students to the delivery of health services as well as identifying factors that impact upon the student contribution in Queensland public health sector hospitals. This paper has been prepared for publication.

Stoikov, S., Maxwell, L., Shardlow, K., Butler, J., Gooding, M., & Kuys, S. Exploration of the contribution of physiotherapy students to the delivery of health services: a qualitative study. In preparation for submission.

6.1 Abstract

Objective: To understand the perspectives of physiotherapists on the contribution of students to the delivery of health services during clinical placements.

Methods: Focus groups with a semi-structured interview guide were completed separately with new graduate physiotherapists reflecting on their student experience and experienced physiotherapists from five Queensland public health sector hospitals. Interviews were transcribed verbatim in preparation for inductive thematic analysis. Interview manuscripts were read independently and initially coding completed. Codes were compared and further refinement of themes occurred. Themes were reviewed by two investigators.

Results: Nine new graduate focus groups were conducted with 38 participants. Six experienced physiotherapist focus groups were conducted with 35 participants, the average clinical practice experience of experience physiotherapists being 11.5 years (SD 5.1). Students participate in a range of activities during clinical placements some of which contribute to delivery of health services and others which support student learning. Three major themes were identified: tangible student contribution, non-tangible student contribution and factors that influence the student contribution.

Conclusions: Overwhelmingly, physiotherapists felt that students do contribute to the delivery of health services, however careful consideration of a variety of factors is necessary to ensure a positive student contribution.

6.2 Introduction

Across the world and in many health disciplines the demand for clinical placements is growing (McBride, Fitzgerald, Morrison, & Hulcombe, 2015; Rodger et al., 2008) which has increased the impetus to understand the impact students have on the delivery of health services in public health systems. In Australia, the public health system provides 74% of all clinical placements required for all health professionals (Health Workforce Australia, 2013). There are varying reports in the literature surrounding student actual and perceived contribution to the delivery of health services, however most research focuses on the barriers and enablers for clinical placements rather than specifically on how students contribute. This paper explores the perceptions of physiotherapists on physiotherapy student contribution and what factors impact how students contribute to the delivery of health services.

Physiotherapy students participate in a wide variety of activities during clinical placements including the provision of direct patient care, education sessions, team meetings and activities directly associated with being a student such as receiving feedback (Milanese, Gordon, & Pellatt, 2013). However, little is known about how these activities contribute, or not, to the delivery of health services. There is growing evidence surrounding the contribution students make to direct patient care with Study 2 of this research program demonstrated that clinical placements with a clinical educator to student (CE:student) ratio of 1:3 or 1:4 are able to meet or exceed the workload of a physiotherapist in some clinical areas after week 2 of a 5-week clinical placement. Other research undertaken in the USA also found that students provide a positive contribution to direct patient care by increasing the activity of the student - clinical educator team (Dillon et al., 2003; Pivko et al., 2016). While quantitative research suggests that physiotherapy students contribute positively to direct patient care, other qualitative reports indicate that physiotherapists perceive students to reduce the efficiency of health care delivery (M. Hall et al., 2015). Therefore, it is important to understand if and where the discrepancy between actual contribution and perceived contribution is and how it impacts health services.

Previously most reports relating to the student contribution were conducted using qualitative methods which allowed for consideration of the many factors where students may contribute

to the delivery of health services based on factors that promote clinical educators and health services to support clinical placements. These studies suggest that students can provide other health professionals with up-to-date knowledge (DeWitt et al., 2014; M. Hall et al., 2015), bring enthusiasm to the workplace (Davies et al., 2011) and encourage clinical educators to consider their own clinical practice (Sturman et al., 2011). While understanding the enablers and barriers to clinical placements is important, this study specifically focusses on how students contribute to the delivery of health services.

There are likely to be several factors that impact the contribution of students to delivery of health services including the CE:student ratio, the clinical area the placement is undertaken in, students struggling on clinical placement, clinical educator preferences and health service logistics such as clinical education model. In Study 2 it was demonstrated that the CE:student ratio and clinical area impacted the amount of direct patient care students provide for the health service. Students who are struggling during clinical placements place an additional burden on health services and clinical educators (Davenport, Hewat, Ferguson, McAllister, & Lincoln, 2018) as they require additional time and resources from the clinical educator. Clinical educators play an important role in student learning and their biases and preferences are likely to impact on the supervisory relationship and the activities that students participate in during clinical placements (Ernstzen, Bitzer, & Grimmer-Somers, 2009). Additionally, health services differ in their set-up and support of clinical placements which may influence how students contribute to the delivery of health services. Thus, it is likely a combination of factors that may influence the student contribution to the delivery of health services. Therefore, the purpose of this study was to examine the perceptions of physiotherapists working in Queensland public health sector hospitals to identify and describe the contribution students make to the delivery of health services and the factors that impact on type, volume and quality of the student contribution.

6.3 Methods

6.3.1 Study design

A qualitative study with content thematic analysis utilising focus groups with a semistructured interview guide was undertaken with physiotherapists from five Queensland public health sector hospitals. All participants provided their written informed consent. Ethical approval was provided by institutional human research ethics committees (HREC/17/QPAH/265 and 2017-233R).

6.3.2 Participants

New graduate and experienced physiotherapists employed at five Queensland public health sector hospitals and participated in clinical placements either as a student or clinical educator participated in this study. A new graduate was considered a physiotherapist with less than one year of practice experience. New graduates from 2017 and 2018 were selected for this study. An experienced physiotherapist was a physiotherapist with at least five years of practice experience who actively participated in the education and support of students during clinical placements. Both metropolitan and regional hospitals were included in this study, of the five hospitals three are classified as Principal referral hospitals and two as Public acute group A hospitals (Australian Institute of Health and Welfare, 2015b).

6.3.3 Procedures

Focus groups for new graduate and experienced physiotherapists were conducted at each hospital. Each interview lasted approximately 60 minutes, was voice recorded and transcribed verbatim for analysis. Prior to the commencement of each focus group demographic data were collected from participants including age, gender, clinical areas that the participant primarily worked in, years of experience, and years of experience as a clinical educator (experienced physiotherapists only). Interview questions related to the activities that students performed during clinical placements, what impact these activities had on the health service and how students can enhance the delivery of health services. Interview questions were provided to participants prior to the interview to aid in informed consent and allow time for reflection by participants.

6.3.4 Analysis

An inductive thematic approach was taken to analyse the manuscripts as outlined by Braun and Clarke (2006). Two researches (SS and SK) independently read transcripts multiple times and identified words, sentences and sections of text that providing meaningful information. Initial coding and theme identification took place independently and was then compared, and preliminary themes were established. Transcripts were re-read by researchers and the initial coding and themes was reviewed and refined until consensus reached. Themes were reviewed by two other researchers for accuracy and confirmation of meaning.

6.4 Results

Nine new graduate focus groups with 38 participants and six experienced physiotherapists focus groups with 35 participants were conducted. Focus groups ranged in size from two to eight participants with a median group size of five. The majority of new graduates were aged between 20-25 (97.5%), females made up 74% of the new graduate group and 69% worked in metropolitan hospitals with the remaining working in regional hospitals. The majority of the experienced physiotherapist group were aged between 26-35 (66%), with 60% of participants female and 63% worked in metropolitan hospitals. Five new graduate focus groups included participants with 3 months practice experience and four focus groups included participants with 11 months practice experience. Experienced physiotherapists had a mean of 11.5 years (SD 5.1) physiotherapy practice years and 6.8 years (SD 4.3) of clinical education experience.

New graduates reflecting on their student experience and experienced physiotherapists described a variety of activities that students participate in during clinical placements. These

were direct and non-direct patient care activities and learning activities. While there was a variety of activities reported, not all new graduate participants had the opportunity to experience each activity as a student. Table 6.1 describes the common activities that students participate in during clinical placements.

Direct patient care activities	Non-direct patient care	Learning Activities
	activities	
Assessment and	Provide an inservice to	Attended inservices for
treatment of individual	staff	physiotherapists
patients	Develop patient	• Attended tutorials for
• Running group therapy	handout	students
classes	Conduct literature	Interprofessional learning
• Attending ward rounds,	review	(informal and formal)
case conferences and	Conduct quality	including work-shadowing,
family meetings	improvement activity	interprofessional education
Complete patient		sessions, home visits with
referrals to other		different disciples
services		Watching surgery
Home visits		Attended staff mandatory
		training

Table 6.1 Student clinical placement activities

Following analysis of the transcripts three key themes emerged relating to the student contribution to the delivery of health services. These were tangible student contribution, non-tangible student contribution and factors that influence the student contribution.

6.4.1 Tangible student contribution

New graduates and experienced physiotherapists reported the main contribution to health services by physiotherapy students was the provision of direct patient care. New graduates highlighted that when they were students they felt that they were able to at times be more thorough with patients as they had more time available compared with being a new graduate.

Experienced physiotherapists described that clinical placements with a CE:student ratio of 1:2 or greater provided a considerable contribution to direct patient care which afforded other physiotherapists time to complete other direct and non-direct patient care tasks. New graduates also described that the combined direct patient care activity of a group-of-students towards the end of a clinical placement provided the health service with a significant benefit.

NG15: "I think probably by the end of the placements you probably helped around caseloads, and you know, taking quite a few off the physios by then, especially if there was, you know, two to four physio students."

NG32: "I feel like it's because you've only got like, what, three or four patients and everything that you do is thorough. Everything that you could throw at a patient they get that."

NG33: "I think sometimes as students, when you have that reduced client load, you can kind of give more to your patients in terms of empathy because you've got more time to listen and more time to clinically reason through a patient's presentation."

PT100: "[Students are] able to physically see more patients; we can reduce our waiting list and waiting times by having students here ... When you have say ... three students on acute, and they're taking the bulk of the caseloads, it then frees up the staff to catch up with those non-clinical things."

New graduates and experienced physiotherapists agreed that students contributed to activities that were not directly associated with direct patient care but the contribution had a distinct outcome provided by the health service such as providing education to staff, completing quality improvement activities or producing patient handouts.

NG14: "I guess maybe the inservices, um, sometimes ... especially if you were directed by, um, the department as to what to do with your in-service, like, they gave you the topic; I felt like they were actually interested in what you were talking about, so then you were adding something to the departmental knowledge."

PT102: "Doing, say, for example, a quality [improvement] activity project, then they're obviously contributing towards our service improvement activities as well."

6.4.2 Non-tangible contribution

Although the primary contribution of students was seen as providing direct patient care, new graduates and experienced physiotherapists described a contribution which was difficult to quantify but was associated with staff development. This included encouraging reflective practice in staff, exposing junior staff to leadership roles and improving staff educational, communication and feedback skills.

NG04: "Challenge, challenge their [clinical educators] thoughts ... and challenge their practice as well"

PT102: "They probably make a kind of indirect contribution to our succession planning and staff development too."

PT134: "[Having students] actually forces you to look at your own practices a little bit and make sure that you're doing things at the level you should."

6.4.3 Factors that influence the student contribution

There were several factors that influenced the student contribution to the delivery of health services. These included, meaningfulness of activities, autonomy, efficiency, students struggling with clinical practice and the CE:student ratio.

Meaningfulness of activities

New graduates felt their contribution was greatest when the activity or task provided was relevant to their placement, would be of benefit and may make a difference to the health service. Experienced physiotherapists indicated that when students completed an activity well and that was important to the work area it was beneficial.

NG10: "I had the opportunity to do one minor quality [improvement] activity which I think was actually quite ... beneficial for the department"

PT128: "If they're doing inservices or updating ILP's [independent learning packages], that definitely helps us ... particularly if it's a topic that you wanted to look at in the year anyway"

Autonomy

New graduates felt they contributed more when their clinical educator afforded them more autonomy. They reported feeling immersed in all physiotherapy roles which enabled them to effectively deliver health services.

NG12: "I definitely felt a difference on one placement versus the other as to how much I felt I was contributing to the team by how much autonomy I was given."

PT130: "If they're a good student ... where they're a bit more independent ... You might be able to get them to help other physios ... That's when they can actually be improving service delivery."

Efficiency

Both new graduates and experienced physiotherapists described that students at times had the potential to reduce health service efficiency. New graduates acknowledged as a student they were initially inefficient in providing patient care and even with improvement, performed some tasks slower than a physiotherapist such as providing handovers to other staff. Experienced physiotherapists agreed that initially students reduced efficiency, however this changed throughout the placement and in some clinical areas a group-of-students could complete a greater volume of direct patient care than a physiotherapist could alone.

NG09: "We may not be as efficient seeing patients ... I s'pose, we may take longer in our initials [assessment], and the handovers and things we do to doctors and nurses may be not be to the same standard, initially, as a qualified physio."

PT100: "They [students] might actually extend their [patients] episode of care a little bit further because it just takes them a little bit longer to get through that process of progressing the patient to a point where they can be discharged."

Student inservice presentations were reported to be at times inefficient for students and physiotherapists, especially if the presentation was of poor quality or the physiotherapy team already knew the information.

NG05: "You would do an in-service on something that everyone else on the team had recently had a meeting on, or they knew ... So, I suppose that was probably not the best of use of the student's time or the people listening to the presentation."

PT116: "An example where it's not useful and a waste of everyone's time is if there's a substandard student level presentation delivered in an in-service slot."

Students struggling with clinical practice

Students struggling with the demands of clinical placements and those with challenging behaviours were seen to detract from health service delivery due to needing to provide them with increased teaching and learning support which may reduce the time spent in patient care or the physiotherapist's other duties. Experienced physiotherapists felt students who were struggling with clinical practice were a significant burden.

PT114: "I've had some struggling students ... and they have made a massive impact on our service delivery. We've been under seeing people whenever they're here ... I've had to stop

or limit my supervision of other staff, or have non-clinical contact for the students to allow me to do that."

Clinical educator to student ratio

In traditional clinical placements with a CE:student ratio of 1:1, experienced physiotherapists report that students can create additional work for the clinical educator who is responsible for a clinical caseload and providing student supervision. A student struggling with clinical practice in this model was also seen to reduce the contribution of the physiotherapist and student to delivery of health services. However, CE:student ratios of 1:3 or 1:4 were considered by participants as being able to provide more direct patient care then the clinical educator alone and in some hospitals students were seen as essential to health service delivery.

PT123: "Yep, the people in the acute areas, they create their load from the area; whereas the one on one placements are part of the load, they still have a load and the student, so they can sometimes [detract from service delivery]"

6.5 Discussion

Participants in this study felt that students contributed to the delivery of health services and that their contribution was multifaceted. An emphasis was placed on the tangible contributions such as providing direct patient care or completing a quality improvement activity, although participants also recognised students contributing to staff professional development. While there were several areas in which students provided contribution to the delivery of health services, it was acknowledged that there were factors that impacted the student contribution.

The volume of direct patient care that students provide was overwhelmingly identified as the student's greatest contribution. Quantitative data from Study 2 on physiotherapy clinical placements indicates that a group-of-students can meet and at times exceed the caseload of a physiotherapist and thus this supports the delivery of health services. While the volume of

direct patient care produced by students was valued, the benefits of providing clinical placements extended beyond this, affording physiotherapists opportunities to support service delivery in other ways including helping other staff with clinical caseloads, supporting unexpected leave or completing quality improvement activities or training. The findings of this study are in contrast to a qualitative report published by Hall and colleagues (2015) where physiotherapy students were perceived to reduce overall workplace efficiency, especially physiotherapy students early in their physiotherapy program. In the current study new graduate participants were reflecting on clinical placements in the final year of their physiotherapy programs which may account for the differing opinions in these studies. Importantly this recognises that there are factors that influence how students' contribution is perceived and the volume of direct patient care that they can complete.

The CE:student ratio was identified as an important factor that influenced the volume of direct patient care students were able to contribute. A CE:student ratio of 1:3 or greater was seen as more valuable as the students could typically exceed the workload of a physiotherapist. This is supported by quantitative data from Studies 1 and 2 that indicated that higher CE:student ratios produce more occasions of service for the health service. A traditional apprenticeship model of clinical placements (CE:student ratio of 1:1), typically used in specialty areas, may limit student contribution and impact on the efficiency of the clinical area as students may have less theoretical knowledge and have difficulty translating previous knowledge to a specific clinical area. Baldry Currens and Bithell (2003) argue that greater efficiencies can be gained using a 1:2 model compared to a 1:1 model as the clinical educator can delegate a larger proportion of their caseload to students and have fewer superficial questions to respond to. The present study provides further evidence to support the findings of Studies 1 and 2 that the clinical area and CE:student ratio impact on the student contribution to the delivery of health services and should be considered by health services when planning clinical placements and service delivery.

The perceived autonomy by new graduate physiotherapists while they were students on clinical placements influenced how they felt about their contribution to the delivery of health services. Patton and colleagues (2018) suggested that physiotherapy student level of independence is largely dictated by the clinical educator's willingness to allow students to

perform some tasks without direct supervision. The clinical educator's primary concern appeared to be patient safety, and when the clinical educator had a larger workload, students reported having less opportunities for direct patient care (Patton et al., 2018). The clinical educator's opinion of student competence and skills has also been reported to limit student direct patient care (Carlson et al., 2010). This suggests that the student contribution may in fact be limited by the clinical educator's personal preferences surrounding student supervision, their own workload and student competence. Thus, developing clinical educators' skills and monitoring their workload may assist to balance the direct patient care of the clinical educator and student. Offering students greater opportunities to participate in direct patient care and develop autonomy may not only support the student contribution but aid in preparation for the transition to new graduate.

Experienced physiotherapists felt that students who were struggling during clinical placements reduced the student contribution as well as their own contribution to the delivery of health services during clinical placements. Supporting students who were having difficulties during clinical placements is reported to be a barrier to providing clinical placements as clinical educator stress and time pressures increase (Davies et al., 2011; M. Hall et al., 2015). Students struggling with clinical practice need more time and support to maintain patient safety, correct techniques, and facilitate effective clinical reasoning. This means clinical educators have to reprioritize their time including time allocated to their own workload, the support of other students and other non-direct patient care tasks. Prompt support to the student and clinical educator from key people, including university staff is necessary, so that a plan can be made to continue to progress the student's skills and knowledge while not impacting the delivery of health services.

Students were also seen to contribute by completing some form of quality improvement activity or inservice for the health service. Although these non-direct patient care tasks were seen as a positive contribution, this was only the case when it was of a high standard and added benefit to the service. Quality improvement activities and inservices that were perceived to be of most benefit were typically activities that were identified by health service staff and given to the students to complete. Student engagement in learning tasks is important and must be perceived as meaningful in order for the learning objective or task to

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be completed successfully (Skoien, Vagstol, & Raaheim, 2009). Therefore, clinical educators and students should work collaboratively to identify non-direct patient care activities that support service delivery and patient care while providing the student with additional learning experiences to ensure student engagement (Milanese et al., 2013). This will not only enhance student knowledge but will also provide a positive contribution to the health service and may assist student understanding that health service delivery encompasses more than just providing direct care to patients.

Students and clinical educators identified several activities perceived as contributing to the delivery of health services. However, were not directly associated with patient care. Students were reported to provide new knowledge and evidence-based practice to the health services which provided an opportunity for professional development for clinical educators. This is consistent with the literature that describes students as being able to bring current knowledge to practicing clinicians which is seen as a significant benefit to providing clinical placements (Davies et al., 2011; Ohman, Hagg, & Dahlgren, 2005). Not only was new knowledge provided by students but having students on clinical placements also offered professional development opportunities for staff to experience leadership roles and gain skills such as giving feedback and conflict resolution all of which have a positive indirect impact on health service delivery (Rodger et al., 2008).

Another contribution by students which was difficult to quantify was encouraging staff to participate in reflective practice. Reflective practice is an essential component of physiotherapy practice and activities that stimulate reflection promote a clinician who is self-aware and adaptable to change (Mann et al., 2009); necessary attributes of clinicians in current healthcare environments. Delany and Bragge (2009) suggest that having students on clinical placements encourages clinical educators to consider their perceptions of their own knowledge, and teaching and learning within their professional construct. Supervising students provides clinical educators with avenues to reflect on why, how and what they do in the process of teaching students thus engaging them in reflective practice.

Limitations

Although this study has provided some valuable information to aid in understanding the student contribution to the delivery of health services there were limitations. Participants in this study worked in Queensland public health sector hospitals and their perceptions of the student contribution are reflective of their experiences in this setting only. It would be useful to investigate how students contribute to the delivery of health services in other settings such private practice or in community settings to determine the similarities and differences relating to the student contribution compared to public health sector hospitals. Furthermore, the new graduates were reflecting on their experience as students which may be impacted by recall bias. A longitudinal study that followed students throughout their clinical placement experiences may provide additional information about how the student contribution may vary between clinical placements and over time. Further investigation is also needed to understand the patient's perspective of student delivered health services and how patients perceive students contribute to health services.

6.6 Conclusion

With the growing number of students requiring clinical placements and the high demand for health services it is essential that student clinical placements are mutually beneficial to both parties. This study demonstrates that students do contribute to service delivery by providing both patient care and offering staff opportunities for professional development. It appears that when the student is steadily progressing and successfully managing their clinical placement, and with the appropriate CE:student ratio in place, then a reciprocal relationship exists between the health service and student. However, when these components do not align then it is imperative that structures exist to support the clinical educator, health service and the student to ensure optimal health care delivery.

6.7 Summary

- Physiotherapists feel that primarily students contribute to the delivery of health services by providing direct patient care, however, acknowledge that student contribution is not limited to direct patient care alone.
- Students also contribute by providing health service initiated quality improvement projects, staff education and building professional skills in the clinical educator such as reflective practice.
- A range of factors impact the student contribution including meaningfulness of activities, autonomy, students struggling with clinical practice and the CE:student ratio.

Chapter 6 provides evidence of the range of activities undertaken by students beyond direct patient care that contribute to the delivery of health services. However, given the importance of clinical placements and the significant role in preparing students for independent practice it is unclear how the activities that students participate in support the transition to new graduate. Chapter 7 investigates individual student and new graduate physiotherapist direct patient care activity to determine whether a gap exists between the caseload of students on clinical placements and the caseload requirements of new graduates.

Chapter 7 - Study 4

What is the change in direct patient care activity from physiotherapy student to new graduate?

Study 4 of this thesis explores the change in direct patient care activity from physiotherapy student to new graduate to understand the volume of change in direct patient care that is required upon transition into the profession. The following paper has been published online in Physiotherapy Theory and Practice.

Stoikov, S., Gooding, M., Shardlow, K., Maxwell, L., Butler, J., Kuys, S. (2021). Changes in direct patient care from physiotherapy student to new graduate. Physiotherapy Theory and Practice, *37*(2), 323-330.

7.1 Abstract

Objective: To determine the change in direct patient care activity that occurs from physiotherapy student to new graduate.

Methods: Physiotherapy students and new graduates working in five Queensland public health sector hospitals across four clinical areas of cardiorespiratory, musculoskeletal, neurorehabilitation and orthopaedics participated in this study. Percentage of day spent in direct patient care, average occasions of service (OOS) per day and average length of one OOS (LOOS) for physiotherapy students and new graduate physiotherapists was collected.

Results: Students on average spent 56% of their day in direct patient care compared to 80% for new graduates (p < 0.001). When all clinical areas were combined, physiotherapy students performed 4.4 OOS per day compared to 8.8 OOS per day for new graduates (p < 0.001). Student LOOS was on average 30% longer than new graduates and a significant difference was found in each clinical area between students and new graduates LOOS (p < 0.001).

Conclusion: This is the first study to quantify the change in direct patient care activity from physiotherapy student to new graduate. Physiotherapy student caseload must double with a concomitant reduction in LOOS to meet physiotherapy service delivery requirements post-graduation; this has implications for the student transition into the profession. Key stakeholders should ensure effective strategies are available to support physiotherapy students transition into the profession.

7.2 Introduction

Clinical placements are a fundamental component of university physiotherapy programs, supporting students to transform theory into practice within a real-world environment (Koontz et al., 2010). Clinical placements offer students opportunities to practice professional skills, develop independent clinical reasoning, socialise into the profession (Bartlett, Lucy, Bisbee, & Conti-Becker, 2009; Lindquist, Engardt, Garnham, Poland, & Richardson, 2006), contribute to the delivery of health services and work within the multidisciplinary team (Dudouloz, Savard, Burnett, & Guitard, 2010). Supervision on physiotherapy clinical placements involves a physiotherapist either directly observing direct patient care or is easily contactable for support to students (Health Workforce Australia, 2011). The number of clinical placement hours undertaken by physiotherapy students varies across universities (Health Workforce Australia, 2014a). Regardless, physiotherapy programs must demonstrate that students receive a breadth and depth of experience (clinical areas and settings) across the lifespan (Australian Physiotherapy Council, 2017) to meet the Australian Physiotherapy Council accreditation requirements in order for students to be eligible for registration with the Physiotherapy Board of Australia. Although there is no minimum requirement for clinical placement hours in Australia, physiotherapy students complete an average of 1000 hours of clinical training during their degree (Health Workforce Australia, 2014a). Research suggests that students who undertake more 'hands on' experience feel more prepared as beginning practitioners (Adam, Strong, & Chipchase, 2013; Brockwell, Wielandt, & Clark, 2009; Burford et al., 2014). Thus, clinical placements play an essential role in preparing students to transition into the profession while under the supervision and guidance of physiotherapy clinical educators.

The transition from student to new graduate is often challenging (A Walker & Costa, 2017) with health professional new graduates feeling only moderately prepared for this transition (Burford et al., 2014; Gray et al., 2012; Talberg & Scott, 2014). Transition requires moving from supervised practice to being an independent clinician who functions competently and safely in a clinical environment (Black et al., 2010) and, following orientation and a settling in period, is able to meet the expected workload (Duchscher, 2009). New graduate health professionals have described challenges in their first year of practice including managing

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workload, dealing with conflict and time management (Black et al., 2010; Moriarty et al., 2011). Employers report new graduates' clinical skills are generally adequate, however have identified that improvements were required in workload and risk management (Moriarty et al., 2011). Thus, perception of workload management appears to be a common issue upon graduation for both new graduates and employers, however little is known about the change in caseload required during the transition from physiotherapy student to new graduate in clinical settings.

The clinical activity of physiotherapists and students is formally collected and recorded based on the Australian Health Activity Hierarchy classification system (National Allied Health Casemix Committee, 2001). Physiotherapists are required to account for all activities in their work day including direct patient care activity, which includes the number of occasions of service (OOS) and length of occasions of service (LOOS) in minutes (National Allied Health Casemix Committee, 2001) and non-direct patient care activities such as attending training and engaging in research related activities. In contrast, students only record direct patient care activity, that is, the time spent directly providing clinical care to patients. Students on clinical placement will also engage in other activities such as self-directed learning, workshadowing and receiving feedback from the clinical educator; activities which are necessary to improve performance (Burgess & Mellis, 2015; Murad et al., 2010), however these activities are not recorded. Despite the collection of direct patient care activity, there is no quantitative understanding of the change in the volume and time spent in direct patient care activities from student to new graduate.

Therefore, the primary aim of this study was to determine the change in direct patient care as quantified by OOS and LOOS that occurs from physiotherapy student to new graduate.

7.3 Methods

7.3.1 Study design

An observational study utilising physiotherapy student and new graduate physiotherapist clinical activity data from five Queensland public health sector hospitals was conducted. Participating hospitals provided their consent for the use of hospital clinical activity data. Metro South Health and the Australian Catholic Universities Human Research Ethics Committees approved this study (HREC/15/QPAH/133 and 2016-152R).

7.3.2 Participants

Physiotherapy students and new graduates in five Queensland public health sector hospitals working in four clinical areas: cardiorespiratory, musculoskeletal, neurorehabilitation and orthopaedics, participated in this study. A new graduate was defined as a physiotherapist who had less than one year of clinical practice experience. Metropolitan and regional hospitals were included in this study. Three hospitals were Principal referral hospitals, while two were defined as Public acute group A hospitals (Australian Institute of Health and Welfare, 2015b).

7.3.3 Procedures

De-identified direct patient care activity data of physiotherapy students and new graduates were obtained from each hospital's information management system. Physiotherapy student direct patient care activity data were collected for nine 5-week clinical placement blocks in 2016. Only data from weeks 4 and 5 of each placement (final two weeks of a 5-week clinical placement) were analysed in this study as Study 1 found that during these weeks students have reached their peak number of OOS per day. The Queensland Physiotherapy Placement Collaborative provided the total number of clinical placements within the Queensland Public Health Sector and in the four clinical areas in this study.

Each hospital was asked to provide at least five weeks of de-identified new graduate physiotherapist clinical activity data that best represented normal clinical activity within each clinical area. The same new graduate's clinical activity data may have been provided across several clinical areas due to new graduates rotating through multiple clinical areas. No data were obtained for a new graduate's first week in each new clinical area or for weekend and after-hours work.

7.3.4 Measures

The outcome measures of interest included percentage of daily time spent in direct patient care, average OOS per day and average LOOS. Any intervention provided to a patient to alter their health outcomes is considered an OOS and LOOS refers to the time in minutes taken to complete one OOS (Australian Institute of Health and Welfare, 2012). For student data percentage of daily direct patient care was determined by summing all LOOS in weeks 4 and 5 and dividing this by the total minutes worked in these weeks. Student average OOS per day was determined by obtaining the total OOS over weeks 4 and 5 divided by the total number of days the student attended clinical placement in those two weeks. A student day was included if any OOS was recorded. Student average LOOS was determined by obtaining the total LOOS time (minutes) in weeks 4 and 5, divided by the total number of OOS students provided in those two weeks.

For new graduate data, percentage of daily direct patient care was determined by summing all LOOS time (minutes) and dividing this by the total time (in minutes) worked. New graduate average OOS per day was determined by dividing the total OOS by the number of days the new graduate engaged in clinical activities. A day was counted for a new graduate if the total daily time was in the range of 270 to 640 minutes even if the OOS was zero. New graduate average LOOS was determined by obtaining the total LOOS time (minutes), divided by the total number of OOS new graduates provided. For both students and new graduates LOOS data were excluded if an OOS exceeded 210 minutes as it would be unreasonable to treat a patient for greater than 210 minutes and likely to be a recording error.

7.3.5 Analysis

Descriptive statistics were completed for all variables for physiotherapy students and new graduates. Normal distribution was determined by reviewing the skewness and kurtosis, and completing a Shapiro-Wilk normality test. Independent t-tests were used to compare physiotherapy student and new graduate percentage daily direct patient care, average OOS per day and LOOS in all clinical areas combined and in each clinical area. Analyses were conducted with SPSS v23.0 (IBM, 2015) and significance was set at p < 0.05.

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7.4 Results

Data were collected from 412 student clinical placements (2060 weeks): 136 cardiorespiratory, 105 musculoskeletal, 100 neurorehabilitation and 71 orthopaedics clinical placements. This data represented 31.5% of total Queensland Public Health Sector placements provided in 2016 and more specifically 42% of cardiorespiratory, 43% of musculoskeletal, 40% of neurorehabilitation and 40% of orthopaedic clinical placements. For student data no OOS data were removed and 0.1% of data were removed from LOOS analysis for exceeding 210 minutes. Student data were normally distributed.

Across the five hospitals 445 weeks of new graduate data were collected in the four clinical areas: 186 weeks for cardiorespiratory, 93 weeks for musculoskeletal, 91 weeks for neurorehabilitation and 75 weeks for orthopaedics. Of this 4.6% of OOS and LOOS data were removed as the total time of direct and non-direct patient care activity was outside the range of 270 to 640 minutes. New graduate data were normally distributed.

Students performed less direct patient care activity compared to new graduate physiotherapists. The comparison between student and new graduate direct patient care was significant (p < 0.001) when all clinical areas were combined and in each clinical area (Figure 7.1). The average direct patient care OOS and LOOS along with the mean difference between physiotherapy students and new graduates is shown in Table 7.1.



Figure 7.1. Average (SD) percentage of daily time physiotherapy students and new graduate physiotherapists spent in direct patient care activities across all clinical areas combined and in each clinical area.

A significant difference was found between the average OOS per day completed by students and new graduates when all clinical areas were combined and in each clinical area (p < 0.001). In three of the four clinical areas, students provided approximately half as many OOS per day compared to a new graduate physiotherapist (Figure 7.2).

On average new graduates LOOS was less than students when all clinical areas where combined and in each clinical area (p < 0.001; Figure 7.2). Students took between 30 - 34% longer to complete an OOS in cardiorespiratory, neurorehabilitation and orthopaedics areas compared to a new graduate, and 21% longer in the musculoskeletal area (Figure 7.2).

Table 7.1. Mean (SD) percent (%) direct patient care, occasions of service (OOS) per day and length of occasion of service (LOOS) of physiotherapy students and new graduates and mean difference (95% confidence interval (CI)) comparing physiotherapy students and new graduates across all clinical areas combined and in each clinical area.

	% Direct patient care Mean, (SD)		OOS per day Mean, (SD)		LOOS (minutes) Mean, (SD)		Between group differences New graduate compared to Student		
							Average, 95% CI		
	Student	New	Student	New	Student	New	% Direct	OOS per	LOOS
		Graduate		graduate		graduate	patient	day	(minutes)
							care		
All clinical areas	56	80	4.4	8.8	60	42	24*	4.4*	18*
combined	(15)	(10)	(1.2)	(1.9)	(18)	(7)	19 to 29	4.0 to 4.8	13 to 23
Cardiorespiratory	58	82	4.7	10.1	56	37	24*	5.5*	19*
	(14)	(8)	(1.1)	(2.0)	(14)	(8)	20 to 29	4.9 to 6.1	12 to 26
Musculoskeletal	52	74	4.3	7.5	57	45	23*	3.3*	12*
	(14)	(12)	(1.0)	(1.5)	(17)	(4)	15 to 31	2.6 to 3.9	8 to 15
Neurorehabilitation	57	82	4.1	8.1	67	47	26*	4.0*	20*
	(15)	(9)	(1.3)	(1.3)	(18)	(7)	19 to 32	3.2 to 4.8	15 to 26
Orthopaedics	58	81	4.6	8.8	60	41	23*	4.3*	20*
	(17)	(11)	(1.4)	(1.4)	(21)	(4)	13 to 32	3.3 to 5.2	14 to 25

* p < 0.001



Student New Graduate

Figure 7.2. Average number of occasions of service per day and length of occasion of service completed by physiotherapy students and new graduates across all clinical areas combined and in each clinical area.

7.5 Discussion

The amount of direct patient care activity changed from physiotherapy student to new graduate physiotherapist. Physiotherapy students spent approximately 55% of their day providing direct patient care compared with 80% as a new graduate physiotherapist. In the four clinical areas of cardiorespiratory, musculoskeletal, neurorehabilitation and orthopaedics, physiotherapy students completed approximately half the OOS compared to new graduates and took on average 30% longer to complete an OOS. The comparatively lower caseload as a physiotherapy student has implications for the transition to a new graduate.

In all clinical areas, physiotherapy students spent just over half their day providing direct patient care activity. This proportion of time is similar to occupational therapy students who spent approximately 4.5 hours in a working day in direct patient care activities during 10 to 14-week clinical placements (Rodger, Stephens, et al., 2011). These findings indicate that students spend nearly half of their clinical placement time engaged in activities other than direct patient care. Currently it is unclear what other types of learning experiences students engage in during clinical placements when not involved in direct patient care as this is not typically recorded. Thus, the proportion of time students should spend in direct patient care activities of learning experiences when on clinical placement, and the type and value of these experiences is unclear and warrants further investigation.

Anecdotally these other activities may include 'non-hands on' learning experiences that are integral to the student becoming an independent, professional clinician such as work-shadowing, receiving feedback (Rodger, Stephens, et al., 2011) and participating in self-directed and reflective learning. Student work-shadowing of clinicians during clinical placements is an effective strategy to promote inter-professional practice, teamwork and socialisation into the profession (E. Anderson & Thorpe, 2010; Wright, Hawkes, Baker, & Lindqvist, 2012) and is appreciated by students (Sevenhuysen, Farlie, Keating, Haines, & Molloy, 2015). Similarly, students place a high regard on feedback, which is important for student learning, self-esteem and motivation for improvement (Clynes & Raftery, 2008). Self-directed learning and reflection are also essential components of learning (Murad et al., 2010)

and for developing safe and effective clinicians. These activities are described in the Physiotherapy Practice Thresholds and are key competencies required for initial and continuing registration as a physiotherapist in Australia and New Zealand (Physiotherapy Board of Australia and Physiotherapy Board of New Zealand, 2015) and are therefore important skills for students to practice in a clinical environment. While these other activities that students engage in during clinical placements are considered valuable both students and clinical educators report valuing 'hands on' experience as being key to a good clinical placement experience (Sevenhuysen et al., 2015).

Physiotherapy students undertake fewer OOS and take longer to complete an OOS than new graduate physiotherapists. Therefore, as students transition to the workforce OOS will need to increase and LOOS reduce to meet the caseload of a new graduate physiotherapist. Interestingly, in the musculoskeletal area, the adjustments required (increased OOS, reduced LOOS) to meet the new graduate caseload is fewer than other clinical areas. It may be that the scheduling of appointments in musculoskeletal areas, with pre-determined appointment times, is a contributing factor to the fewer adjustments required. Study 1 demonstrated that physiotherapy student LOOS reduces over a 5-week clinical placement by approximately 20-25 minutes with the most marked reduction in LOOS in the first 3weeks, likely due to increasing clinical experience. It is anticipated that students would continue to reduce the LOOS upon entering the profession as their clinical experience grows. A reduction in LOOS would seem reasonable as new graduates are accountable for their own practice (Crosbie et al., 2002); no longer needing direct supervision from another physiotherapist for routine, dayto-day clinical practice or need to wait for permission to proceed with certain tasks. However, a reduction in LOOS alone may still be insufficient to reach the required new graduate caseload in all clinical areas.

As students transition to new graduate physiotherapists a 50% increase in OOS per day is required. Managing this increase in caseload is a key concern raised by new graduates (Gray et al., 2012; Moriarty et al., 2011). New graduate physiotherapists reported feeling overwhelmed and exhausted with their new roles (P. Miller et al., 2005). Similar feelings have been reported by pharmacy interns who felt unprepared for the workload required upon graduation (Mak, March, Clark, & Gilbert, 2013). Employers of physiotherapy new graduates

also describe concerns about the ability of new graduates to work autonomously and cope with the pressures of clinical work (Barnitt & Salmond, 2000). Nursing and medical supervisors identify that managing a busy workload is a significant stress for the new graduate and have reported new graduates are often ill prepared to manage the multiple demands, especially caseload, of the busy health environment (Hickey, 2009; A Walker & Costa, 2017). This suggests that students are unaware and even unprepared for the demands of a new graduate clinical workload, the associated responsibility that independent practice brings, and are at increased risk of excessive stress and burnout as a new graduate (Barnitt & Salmond, 2000; P. Miller et al., 2005).

This current study is the first to quantify the differences in direct patient care activities and the gap between students and new graduates. It is clear that increased workload demands for new graduates upon entering the workforce will pose challenges for health services and employers as they need to provide adequate support for new graduates while ensuring service delivery demands are met. Health services, employers, clinical placement providers and university stakeholders all have a role to play to assist students' preparedness for professional practice during the transition from student to new graduate. High levels of stress are commonly experienced by students (Walsh, Feeney, Hussey, & Donnellan, 2010) and new graduates (P. Miller et al., 2005) therefore students, new graduates and universities all have roles identifying strategies to manage stress, improve resilience (Delany et al., 2015) and promote effective learning practices to support the transition into the profession.

Clinical placement providers need to be mindful of the caseload offered to students ensuring that it is sufficient in volume (P. Miller et al., 2005) and complexity (Newton, Billett, Jolly, & Ockerby, 2009) to develop graduates who can, with a degree of autonomy, manage the demands of the busy clinical environment. Health services and other employers must be cognisant that current student experiences may mean that new graduates require additional support to manage their workload and should have resources in place to support their transition into professional practice (Moores & Fitzgerald, 2017). Moving from student to new graduate physiotherapist poses challenges, however developing partnerships between stakeholders that acknowledges the responsibility of all parties in developing and supporting

the student transition into the profession may result in improved experiences for the student, new graduate, health service and employers.

Limitations

While this study provides valuable information relating to the change in direct patient care activity, OOS and LOOS of physiotherapy students to new graduates, there are some limitations that need to be acknowledged. This study was conducted in metropolitan and regional Queensland public health sector hospitals and therefore may not represent the caseload in other clinical settings. However, nearly 80% of all physiotherapy clinical placements in Australia are conducted in the public health sector in metropolitan and regional areas (Health Workforce Australia, 2013). Therefore, the findings from the current study are likely to be relevant to both private and public sector employers.

The other activities that students engaged in during clinical placements were not able to be described. Students on clinical placements only record direct patient care activity, or at least that is the case in Australia. Future studies could investigate how students spend the remaining part of their work day to gauge the value and time spent in activities other than direct patient care.

7.6 Conclusion

Clinical placements are designed to provide students with experience of the realities of physiotherapy practice. However, the data from this study demonstrates that students only experience approximately 50% of the clinical caseload required of a new graduate physiotherapist. The other learning activities students participate in during clinical placements, the value of these and the time that should be allocated to these to facilitate the transition to new graduate, is unclear and warrants further investigation. Given the disparity in caseload between student and new graduate, active stakeholder engagement from health services, universities, students, new graduates and the profession is essential to support and optimise this aspect of the student transition into the profession.

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7.7 Summary

- Students spend approximately 50% of their time in direct patient care activities compared to new graduates who spend approximately 80% in direct patient care activities.
- Student OOS is approximately 50% less than that of new graduate physiotherapists with students taking approximately 30% longer to complete an OOS.

The study in chapter 7 quantified the substantial change in direct patient care from student to new graduate. Further research is necessary to understand whether this change is acceptable and manageable in a public hospital setting and the other factors that impact the student transition to new graduate. Chapter 8 presents an investigation of the perceptions of physiotherapists on the transition from student to new graduate.

Chapter 8 – Study 5

What are the perceptions of physiotherapists on the transition from physiotherapy student to new graduate in the Queensland Public Health Sector?

Study 5 explores the perceptions of experienced physiotherapists and new graduate physiotherapists on the transition from student to new graduate. Furthermore, the study identifies several challenges and factors that supported the student transition to new graduate and provides strategies for consideration to improve this difficult transition to independent practice. This study has been accepted for publication and is published online in Physiotherapy Theory and Practice.

Stoikov, S., Maxwell, L., Butler, J., Shardlow, K., Gooding, M., Kuys, S. (2020). The transition from physiotherapy student to new graduate: are they prepared? Physiotherapy Theory and Practice. DOI: 10.1080/09593985.2020.1744206.
8.1 Abstract

Objective: To explore the perspectives of new graduate and experienced physiotherapists on the transition from student to new graduate.

Methods: Fifteen focus groups were conducted using a semi-structured interview guide; nine new graduate groups and six experienced physiotherapist groups. Interviews were transcribed in preparation for thematic analysis whereby researchers examined transcripts independently and identified codes. Codes were compared and themes developed, discussed and refined. Themes were reviewed by two investigators.

Results: Four themes emerged surrounding the transition from physiotherapy student to new graduate: preparedness for practice, protected practice, independent and affirmation of practice and performance expectations. Both groups identified increased caseload volume and complexity were challenging, and that students were typically protected from realistic workloads. New graduates at times felt unprepared for their new roles and highlighted that coping with the change in independence and managing expectations of themselves was difficult. Strategies identified that may assist the transition from student to new graduate included organisational, clinical placement experiences and building self-efficacy.

Conclusions: Challenges are experienced during the transition from physiotherapy student to new graduate. To enhance this transition a multifactorial approach is required that includes all key stakeholders and strategically targets challenges associated with the student transition to new graduate.

8.2 Introduction

For healthcare professionals, the transition from student to new graduate refers to the period when a graduating student enters the profession as an independent clinician (Duchscher, 2008). In this period individuals transition from a university environment with a focus on individual learning and skill development to one where the primary focus is the delivery and responsibility of providing patient care. Following more than ten years of investigating new graduate nursing transition, Duchscher (2008; 2009) describes three stages of new graduate nurse transition. In the first stage of professional role transition (transition shock), nursing graduates often realise their lack of preparedness, knowledge and skills. During this stage the focus is on task completion and socialisation into the work environment resulting in physical and emotional fatigue (Duchscher, 2009). In the second stage, nursing graduates can have difficulty reconciling the perceptions of their roles that were developed during their education and the reality of professional practice. Nursing graduates have been shown to reach a level of stability and comfort in their ability, roles and confidence in the final stage of transition at approximately 12 months (Duchscher, 2009). This description of nursing transition although developed to manage workforce attrition (Murray, Sundin, & Cope, 2019), highlighted opportunities for strategies to support new graduate transition. It is unclear if physiotherapy graduates experience a similar transition or if similar support strategies can be identified.

New graduate health professionals' perceptions of preparedness, or readiness for practice, has received growing attention in the literature with common themes emerging. New graduates in occupational therapy (Toal-Sullivan, 2006) and nursing (Merga, 2016) have described a significant gap between their entry-level education and the requirements of the workplace. Across a range of health disciplines including physiotherapy, medicine, social work and occupational therapy, both new graduates and employers report that new graduates often struggle to meet the workload requirements of a busy health environment and have difficulty with time and conflict management (Black et al., 2010; Merga, 2016; Moriarty et al., 2011) despite having adequate clinical skills (Moriarty et al., 2011; Toal-Sullivan, 2006). Other important new graduate skills such as clinical reasoning, professional behaviour and effective interprofessional practice are also essential in a healthcare environment; however, such skills

have been identified as being underdeveloped in new graduate health professional (Grace & Trede, 2011; Smith & Pilling, 2007; Toal-Sullivan, 2006). It is unclear if such skills are identified in the transition from physiotherapy student to new graduate. Additionally, it appears that while the perspectives of new graduates themselves and employers have had some limited investigation, perceptions of experienced clinicians supporting and supervising new graduates has not been explored.

Arguably, clinical placements are the most influential component of entry-level health professional education for not only fostering clinical skills, but also for developing social and professional skills of future clinicians (Delany & Bragge, 2009; Edwards, Smith, Courtney, Finlayson, & Chapman, 2004; Toal-Sullivan, 2006). In Australia, the public health sector provides the majority of physiotherapy clinical placements with most of those occurring within hospitals (Health Workforce Australia, 2013). It is reasonable to suggest that the transition from physiotherapy student to new graduate should potentially offer less challenges in that setting. Therefore, the aim of this study was to explore physiotherapists' perspectives of the student transition to practice within public hospitals.

8.3 Methods

8.3.1 Study design

A qualitative study utilising focus groups with a semi-structured interview guide was undertaken in five public health sector hospitals with content thematic analysis. Written informed consent was obtained from all participants. Ethical approval was provided by institutional human research ethics committees (HREC/17/QPAH/265 and 2017-233R).

8.3.2 Participants

New graduate and experienced physiotherapists working in five Queensland public health sector hospitals participated in this study. New graduate physiotherapists were defined as physiotherapists who had been practising for less than one year. Two new graduate cohorts were selected, a group who were 11 months post-graduation (2017) and had practiced across several different clinical areas in their respective hospitals and a group who were 2-3 months post-graduation (2018) with experience in only one to two clinical areas. Two groups were selected to obtain the experiences of new graduates at the beginning and end of their first year.

Experienced physiotherapists were eligible if they had been practising for five years or more, were actively involved in the clinical education of students and have an understanding of new graduate work practices. The eligibility criteria were selected to ensure that experienced physiotherapist participants were able to comment on current and realistic practice knowledge of both students and new graduates. Recruitment occurred via each participating hospital's physiotherapy new graduate support person or clinical education coordinator who provided information regarding the study to potential participants. Interested physiotherapists contacted the researcher for further information.

Participating hospitals were purposively selected based on location and the number of students and new graduates supported each year. Three participating hospitals were located in metropolitan settings and two were regional hospitals. The five hospitals were classified as either Principal referral hospitals and Public acute group A hospitals (Australian Institute of Health and Welfare, 2015b). Principal referral hospitals have large patient volumes, an extensive range of services including some very specialised services. Public acute group A hospitals have substantial patient volumes, an array of speciality areas but do not provide the breadth of services as Principal referral hospitals (Australian Institute of Health and Welfare, 2015b).

8.3.3 Procedure

Fifteen separate focus groups were planned, with two new graduate (2017, 2018) and one experienced physiotherapist group across each of the five hospitals. A semi-structured interview guide was used to frame the focus group questions. Questions for all groups explored the various activities undertaken by students (range, type, number and complexity)

and how these activities change upon becoming a new graduate. The transition experience from student to new graduate was also explored with prompts including feelings of preparedness, challenging and supportive experiences, and strategies to assist or facilitate the transition from student to new graduate. Focus group questions were reviewed within the research team who have experience in conducting qualitative research and pilot tested prior to implementation. Questions were provided to participants prior to the focus group to aid in informed consent of participants, ensure participants were familiar with the questions and had time to reflect on their experiences.

Focus groups lasted approximately 60 minutes, were voice recorded and transcribed verbatim in preparation for data analysis. Focus groups were facilitated by a physiotherapist with more than 10 years clinical experience as well as extensive experience in the clinical education of physiotherapy students and support of physiotherapy new graduates. At the completion of each focus group a summary was provided by the facilitator of the main discussion points. Participants were able to provide feedback and further comments at the end of the focus group or could provide these in writing later. Demographic information of participants collected included age, gender, years of experience, clinical areas and years of clinical education experience (experienced physiotherapists only).

8.3.4 Analysis

An inductive thematic approach to analysis was undertaken (Braun & Clarke, 2006). Transcripts were read multiple times by two researchers (SS and SK) who independently identified words, sentences and sections of meaningful text, undertook initial coding and independently identified themes. Initial codes and themes were compared to commence the development of preliminary themes. Researchers continued to re-read the transcripts and review coding and themes, to refine the thematic analysis, until consensus on themes was achieved. Themes were reviewed by two other researchers to confirm accuracy and meaning.

8.4 Results

Fifteen focus groups were conducted, nine new graduate groups with a total of 38 participants, and six experienced physiotherapist groups with a total of 35 participants. One hospital did not have any new graduates employed at the time of the focus groups in 2018 and one hospital had a large number of experienced physiotherapist participants and therefore two focus groups were held. The number of new graduates and experienced physiotherapists that met the inclusion criteria at each hospital (potential participants) was unable to be determined. The participant characteristics are shown in Table 8.1. New graduates' mean practice experience was 0.63 (SD 0.4) years with experienced physiotherapists practicing on average for 11.5 (SD 5.1) years. Experienced physiotherapists had an average of 6.8 (SD 4.3) years of clinical education experience.

	New graduate	Experienced physiotherapist
	(n = 38)	(n = 35)
Age range, n (%)		
20 – 25	37 (97.5)	1 (2.8)
26 – 30	1 (2.5)	10 (28.6)
31 – 35		13 (37.1)
36 - 40		4 (11.4)
41 – 45		4 (11.4)
46 – 50		2 (5.7)
51 – 55		0 (0)
56 – 60		1 (2.8)
Gender, n (%)		
Female	28 (73.7)	21 (60.0)
Male	10 (26.3)	14 (40.0)
Geographical location, n (%)		
Metropolitan	26 (68.4)	22 (62.9)
Regional	12 (31.6)	13 (37.1)

Table 8.1. Participant characteristics

Four key themes relating to student transition to new graduate practice were identified. These themes were: 1) preparedness for practice; 2) protected practice; 3) independence and affirmation of practice; and 4) performance expectations. In addition, participants identified three strategies to support the transition from physiotherapy student to new graduate practice namely organisational, clinical placement experiences, and self-efficacy. There was no discernible difference between the perspectives of participants in the two new graduate cohorts or between participants from metropolitan and regional hospitals in either the new graduate or experienced physiotherapists groups. Therefore, the results are presented as new graduate and experienced physiotherapists groups.

Preparedness for Practice

New graduate participants identified that they felt prepared for physiotherapy assessment and treatment skill requirements however, struggled with the significant rise in caseload, with participants indicating a typical doubling of the required caseload. Experienced physiotherapist participants also recognised that the large increase in patient numbers combined with managing and prioritising a ward list was a challenge for new graduates. New graduate participants found that managing the increased complexity of patients compared to those they saw as students further compounded the challenge of new graduate practice. Not only were the presenting conditions of patients more complex, but concomitant psychosocial factors added to the complexity. The combination of more complex patients and a doubling of caseload were reported as the most challenging aspect of the transition from student to new graduate.

NG21: "I think knowledge and stuff like that is still there. You do all the same things you do as a student as a new grad ... but you need that time management, you need to be quicker, ... So, coming from doing six [as a student] and then ... [as a new graduate] where you've got thirty people, and it's just you, it just sometimes can be a little bit overwhelming"

NG34: "I'd say my caseload is so much more complex now ... so I'm seeing patients with a lot of stuff going on that I don't think I would've ever touched as a student."

PT118: "I think that's the biggest gap ... They go from five to six patients as a student to a med[ical] list that's blown out to twenty [patients]."

PT131: "So, if they've done an acute placement but in a small hospital or didn't have very complex patients ... I think the preparedness for them to, you know, take on that caseload and try to meet that caseload, they're not as prepared."

Clinical placements were seen as a key component of student preparedness for practice. Both participant groups indicated that the location, type and expectations of a placement influenced the transition to new graduate practice. New graduate participants felt that clinical placements with low caseload numbers and a limited range or acuity of conditions did not assist their transition to new graduate practice.

NG26: "I think how prepared you are for working as a new graduate is purely dependent on, by chance, the placements that you got."

PT128: "I think the quality of student placements and opportunities does impact on their readiness for work once they have graduated."

Experienced physiotherapist participants perceived that increased demand for placements within both the public and private health sector as a consequence of an increasing number of students was compromising student experiences. Experienced physiotherapists voiced concerns that the capability of new graduates was reducing and that this may negatively impact the profession.

PT104: "My concern is that if placements get watered down, purely because of numbers, and they need to get student placements anywhere, we see that difference with our new grads. The ones who have had solid placements in core areas can hit the ground running, and the ones who haven't ... they just haven't had the experience."

Protected Practice

New graduate participants described that as students, they were not exposed to all roles and tasks that were required of physiotherapists working in a public sector hospital. New graduate participants reported feeling sheltered during clinical placements as they did not undertake all relevant tasks associated with being a physiotherapist such as reviewing and prioritisation of ward lists, use of allied health assistants, interaction with the multidisciplinary team such as case conference and family meetings, and managing complex patients. New graduate participants reported this lack of exposure to realistic and full workloads as making the transition from student to new graduate more challenging. Experienced physiotherapist participants reported selecting or screening patients for students and not asking students to do some of the activities expected of them as a physiotherapist in the workplace.

NG18: "... although I believe I was quite a good student ... I think the educators that I had were quite protective"

NG19: "Behind the scenes stuff was done by the educators, and we just did a lot of the patient care. I feel like I didn't really do prioritising of lists, and printing out of handovers and all that sort of stuff. Generally, our supervisors would do all that."

NG35: "As a student, I felt that I got sheltered and got picked out particular patients for me"

PT117: "... so we filter, in some way shape or form, the complexity of the patients that come through."

Independence and Affirmation of Practice

New graduate participants reported at times struggling with the independence and increased responsibility they were now required to demonstrate. They were unaccustomed to receiving only minimal supervision and feedback about their performance, and often wanted reassurance that they were providing quality patient care. Experienced physiotherapist

participants acknowledged that new graduates were expected to manage a caseload relatively independently although support was always available; however, it was expected that new graduates would seek this support when needed.

NG07: "We didn't have a clinical educator to go to anymore, so you were the person in charge ... the patient was your responsibility. So, that in itself was a huge step up."

PT104: "There's obviously a bit more independence ... you come as a new grad, then all of a sudden you've got, 'yep your clinical, there's your ward'."

Performance Expectations

New graduate participants reported having high expectations of themselves to meet the workload they perceived was required of them. They also expected themselves to be highly efficient and provide the same physiotherapy outcomes as more experienced physiotherapists. Experienced physiotherapist participants indicated that new graduates wanted to be seen as competent and often had difficulty identifying appropriate boundaries for work-life balance.

NG12: "I think it was more the expectation that I placed on myself, I guess the expectation that my caseload would be the same as theirs in complexity, that I would have the same discharge rate and the same success with patients."

PT107: "... so their expectations of themselves are ridiculously high ... 'we don't actually expect you to see all thirty patients and we don't actually expect you to do every quality task without some delegation' [to other physiotherapists or physiotherapy assistants]."

New graduate participants reported excessive stress at times associated with their new roles and their own performance expectations. Some new graduate participants described their stress as burnout with some health services implementing strategies to prevent burnout. Experienced physiotherapist participants noted increasing issues with new graduates' ability to appropriately manage stress. NG05: "Um, for me, I got stressed at work and I actually cried at work, and then I went to my boss and they talked to me about having a week off to regroup."

PT104: "I think some new grads have obviously more resilient than others ... because I have noticed that the burnout rate is increasing. The new grads will admit it to me; they know it, they don't think about it."

Strategies to Support Transition

New graduate and experienced physiotherapist participants identified a range of strategies that supported or may potentially support the transition from student to new graduate. These were identified as organisational, clinical placement experiences and self-efficacy support strategies.

Organisational

Both new graduate and experienced physiotherapist participants identified that the inclusion of a physiotherapy new graduate support person played an important role in assisting new graduates to transition into the workplace. The new graduate support person role was slightly different in each hospital, however commonly this role involved assisting new graduates to manage their caseload by facilitating their prioritisation and clinical reasoning skills, acting as an education source and sounding board, and helping them navigate the challenges associated with becoming a new graduate. New graduate participants found this person to be invaluable with their clinical and caseload management advice supporting the transition to new graduate practice. A formal new graduate support program was also recognised by participants as valuable to support new graduates in the workplace.

NG28: "I think having the new grad support person is just amazing."

NG17: "And knowing that they're there for you [new grad support person], like, they're not going to judge if you don't know things. It's a really good spot to be in because you feel like you can ask stupid questions or you can ask complex questions." PT118: "... when they start in January, that new grad support person would help with their prioritisation skills, um, help with them with complex patients and do buddy treatments."

Both participant groups acknowledged that specific organisation wide new graduate training courses and local facility specific training assisted new graduates to be better prepared for managing deteriorating and more complex patient presentations. Experienced physiotherapist participants reported that a need for increased training and support of new graduates had been identified over recent years.

NG11: "I think the competencies here are really, really good, and they're something that I found very helpful"

PT126: "There's a massive push on training as well, you know, to get them up to scratch."

New graduate participants felt that participating in observational placements while at university would have provided them with a better perspective of the roles and responsibilities of physiotherapists. They also suggested that for individual students, placement allocation should be reviewed by universities to ensure appropriate learning experiences across a variety of physiotherapy practice areas and settings. New graduate participants reported that there should be a fair distribution of placements to the student cohort and placements should provide a reasonable caseload, a variety of patient presentations and have adequate support to improve clinical competence.

NG31: "I think even observation. So, we went straight into prac [clinical placements], but even if it's once a week at a hospital observing what a physio does and how they manage their caseloads, that would've been good."

NG04: "I think it would be really important, like, when the uni is setting up your placements, to make sure that you get a wide variety of different hospital sizes."

Experienced physiotherapists felt prior to clinical placement student's communication and interpersonal skills could have benefited with more opportunities to spend time in clinical environments prior to clinical placements.

PT133: "[Prior to clinical placements students should know] how to converse with someone you don't know, like a stranger, so just some basic communication ... how to make small talk and how to introduce yourself and how to engage somebody."

PT129: "a lot of them [students] haven't never stepped in a hospital [before clinical placements] ... [students could] work shadow for a day here or there beforehand then they might have a bit of a better understanding of some of the process going on ... that may assist."

Clinical Placement Experiences

New graduate participants highlighted several activities associated with clinical practice that they felt, with more exposure and practice, would have positively influenced their transition from student to new graduate. These included managing a larger caseload (when appropriate), management of complex patients, opportunities to prioritise a complete ward list, greater autonomy performing clinical tasks (as appropriate), improved understanding of inter-professional practice, attendance and input at family and multidisciplinary team meetings to improve conflict resolution and negotiation skills, and delegating to allied health assistants.

NG12: "You might want to bump up somebody's caseload, one of your students, to give them an opportunity to see more patients during the day."

NG35: "A bit more on prioritisation ... when you've only got five patients to do it on it's quite clear ... 'But I'm going to give you the list and I want you to look at the list of a ward and you can show who you think should be for physio and what order you think you'd see them." Experienced physiotherapist participants suggested that a change to the current placement structure with consideration of one or more longer placements to allow greater immersion to provide opportunities for students to build a wider range of clinical skills, develop more autonomy and undertake practice more aligned with new graduate practice would be valuable.

PT109: "I wonder whether slightly longer student placement being able to see their progress and having more time, once you've got the clinical sorted, to go on and do some of that more prioritisation between clinical and non-clinical times."

Experienced physiotherapist participants raised the need to consider a quality framework around all clinical placements to ensure students were receiving experiences that were valuable and supported the transition to new graduate practice.

PT129: "I'm concerned about the quality of the profession and how this will decrease with less quality placements and lower expectations of clinical placements."

PT116: "... the wide variability and quality of the placements; that's definitely one feature. I think that should be university led in terms of a better quality framework to ensure um that students are getting good experiences."

Self-efficacy

New graduate participants described the importance of peer support from fellow new graduates and identified several personal skills which, if more developed, may have assisted their transition to new graduate practice. These included better communication and conflict resolution skills along with improved stress management skills. New graduate participants also felt strongly that understanding the expectations of what is required of a new graduate during clinical placement and upon commencing work as a physiotherapist would have been beneficial. Experienced physiotherapist participants identified resilience and assertiveness as attributes that new graduates were lacking.

NG01: "I think I've really valued being a new graduate with other new graduates. I think it would be so hard to start somewhere and be ... there'd be one new graduate"

NG01: "I think it probably would have been helpful ... to have the expectations of the new graduates in that facility kind of explained to you, because I had no idea how much work the new graduates did."

PT101: "... some targeted training by uni on resilience and self-care."

8.5 Discussion

Participants, both experienced and new graduate physiotherapists, identified and acknowledged that the transition from student to new graduate was challenging and overwhelmingly felt that clinical placements played a critical role in preparing new graduates for independent practice. The change in caseload volume and complexity was seen as the most difficult aspect of this transition. However, students being sheltered from the workloads expected of a new graduate whilst on clinical placement; managing the change in independence, affirmation and expectations of themselves as a new graduate were also highlighted as key issues by all participants. A multifactorial approach including strategies targeting organisational, clinical placement experiences and building self-efficacy was highlighted as key to supporting the transition from physiotherapy student to new graduate.

Authentic clinical placements

Both participant groups felt that new graduates were unprepared for their clinical caseload due to the combination of a large increase in caseload volume and patient complexity, despite having adequate physiotherapy technical skills. Study 4 found the caseload of new graduate physiotherapists is approximately double that completed by physiotherapy students during clinical placements. Additionally, new graduates must manage a more complex clinical caseload, along with other clinical and non-clinical tasks such as attending multi-disciplinary meetings and training activities (Toal-Sullivan, 2006). Students often have limited experience

managing the demands they will face as a new graduate and thus delegation of tasks and time management becomes a challenge (Merga, 2016). This limited experience and practise during clinical placements appears to challenge new graduate physiotherapists' ability to prioritise effectively and then efficiently manage their caseload, therefore potentially impacting the provision of patient care. Limiting student involvement in the range of physiotherapy roles is unlikely to promote problem solving, knowledge translation and appropriate interpersonal communication which are essential skills for clinicians in the current healthcare environment.

Clinical placements should be a supportive learning environment rather than a protective one, allowing students the opportunity to develop necessary skills to meet the demands of an increasingly complex clinical caseload (Toal-Sullivan, 2006). However, the results of this study suggest that clinical educators often shelter students from the diversity of complexity in patients. These findings are similar to that reported for nursing (O'Shea & Kelly, 2007) and occupational therapy (Toal-Sullivan, 2006). Managing patients with complex needs may challenge a student's reflective, communication and conflict resolution skills (Hunt, Adamson, Higgs, & Harris, 1998), but increasing complexity is essential to improving the application of knowledge and skills in the clinical environment (Newton et al., 2009). Although the purpose of clinical placements is to provide practical application of theoretical knowledge, there should not be a preconceived idea of an appropriate patient or task for a student. During the early stages of clinical placement, students may not possess sufficient clinical, professional or interpersonal skills to successfully and relatively independently treat a complex patient. However, patient complexity extends beyond just those patients who clinically present with complicated and or multiple conditions and includes patients who have complex psychosocial factors (P. Miller et al., 2005). Staged exposure through work shadowing and allowing students to complete a component of the physiotherapy intervention may support students to develop their understanding and management of complex patients.

This research highlights the importance of realistic physiotherapy practice experiences in authentic clinical placements for the development of student capabilities that will facilitate successful transition into the physiotherapy profession. Clinical placements influence student preparedness for practice by promoting the development of skills and confidence to apply knowledge in a healthcare context (Edwards et al., 2004; Toal-Sullivan, 2006). It is this learning

in context that occurs during clinical placements that many authors argue is essential for students to move from just theoretical knowledge and skills to translating these knowledge and skills within and between contexts (Bates, Ellaway, & Watling, 2018; Guile & Griffith, 2001). Therefore, clinical placements should provide sufficient exposure, challenges and opportunities for problem solving in a well-supported authentic clinical environment to improve student learning outcomes (Patton, Higgs, & Smith, 2013).

The new graduates in this study perceived that clinical placements with low numbers and a lack of diversity of patient presentations, acuity and interventions negatively impacted on their ability to develop requisite knowledge and skills for new graduate practice. The ability to manage and prioritise a clinical caseload is key feature of physiotherapy practice. New graduates identified the desire to have more opportunities for a larger caseload, exposure to family meetings, case conferences and multidisciplinary interactions during student placement experiences. It is likely that attending meetings related to patient care are, in themselves, not the important activities but rather that they provide exposure to teamwork and the opportunity to develop skills such as negotiation and conflict resolution. Perhaps it is incorrectly perceived that clinical placements should be a place where primarily technical skills are practised rather than understanding the complex nature of providing quality care to patients.

Although not the only component of preparation for practice, a range of health disciplines, including physiotherapy have identified insufficient practical exposure to develop skills necessary to practice independently during their entry-level programs (Merga, 2016). The time spent participating in authentic clinical practice environments is valuable as it provides students with the opportunity to experience a clinical caseload, exposure to the roles of a physiotherapist and gain valuable skills in a health team environment. However, it is essential that students build on the skills developed during pre-clinical learning as well as skills developed during clinical placements to maximise their skill development and enhance their transition to practice. The integration and communication of students' clinical skills is not formally mandated by universities and students often 'silo' their learning between clinical placements and translation of skills does not always occur (Kilminster, Zukas, Quinton, & Roberts, 2011). Developing a formal process/program whereby universities,

students and clinical educators are able to communicate freely may improve student's progress and performance. Open communication about student assessment, skill development and further skills or attributes the student wishes to develop or tasks to participate in may result in more effective translation of skills, participation in more complex activities, encourage assessment as learning (Ajjawi & Boud, 2018) and therefore better preparedness for practice.

Transition

Moving from supervised practice as a student to independent clinician was seen as a significant transition. New graduate physiotherapists are, for the most part, required to practice autonomously and in this study new graduates reported that they struggled with a lack of affirmation from their senior colleagues. It has been demonstrated that occupational therapy and nursing new graduates find the responsibility that comes with independent clinical practice difficult and that they value feedback and recognition provided by their colleagues (Duchscher, 2008; Toal-Sullivan, 2006). In contrast to the regular and daily supervision students received from clinical educators during clinical placements, post-graduation there is less frequent support and this is often new graduate led. The collegial nature of relationships that new graduates experience working in the profession reduces the amount of feedback provided at a time where their caseload is larger and more complex, thus it is important to provide feedback and affirmation to support new graduate development.

An organisational culture which includes support for new graduates commencing in the workplace is essential (Rush et al., 2013). Each participating hospital in this study employed an experienced physiotherapist in a new graduate support role, though there was variability in how these roles were implemented. Regardless, the new graduate support role was seen as invaluable by both participant groups, and commonly provided mentorship to new graduates. Ideally this role would assist new graduates to manage their new responsibilities, support the adjustment to independent practice and complete buddy sessions (where the new graduate support person watches or assists in a patient treatment with a new graduate) to provide feedback on their performance. A new graduate resource person, along with

mentoring and peer support have been shown to be effective strategies to support nursing students' transition to practice resulting in improved new graduate retention and job satisfaction (Rush et al., 2013). A formal new graduate support program which included professional development (both clinical and professional skills) was also seen as valuable by nursing new graduates and promoted an environment where new graduates felt safe to ask questions and encouraged sound clinical decision making (van Rooyen et al., 2018). Strategies such as these can assist new graduates to transition into their professional role more effectively and should be considered by health services.

New graduate participants in this research expected that they should undertake their role independently and should be able to function at a level similar to an experienced physiotherapist. The combination of new graduates' high expectations of their own performance; coupled with their desire to please their new colleagues and supervisors, and their lack of understanding about health service expectations; appeared to result in feelings of stress for new graduates. While stress associated with a new role is not uncommon (Brennan et al., 2010; Solomon & Miller, 2005), stress that new graduates feel is associated with greater absenteeism and negative psychological emotions (Chang & Hancock, 2003). To manage new graduate high expectations and reduce role ambiguity, providing a clear and comprehensive orientation and outlining service provision expectations should be a priority for all employers to encourage an environment that welcomes new graduates, supports their development (Morrow, 2009), and assists them to manage their workload and emotions. Other strategies that support coping with the demands of clinical practie as new graduates include resilience training (M. McAllister & McKinnon, 2009) and stress management education (Merga, 2016). Supporting a new graduate's personal development and work relationships may lessen the burden of some of the challenges associated with transitioning to the physiotherapy profession for employers and new graduates.

Limitations

While this study provides valuable insights into the transition from physiotherapy student to new graduate there were limitations. The results of this study reflect the experiences of physiotherapists (both new graduates and experienced) in Queensland public health sector

hospitals and may not reflect perceptions of physiotherapists on the transition from student to new graduate across different health settings and contexts. Understanding challenges in the public health sector setting may provide a benchmark and assist to inform stakeholders across the profession on how to prepare and support students for their professional practice as a physiotherapist due to an appreciation of student experiences. Consideration of reproducing a similar study in other settings, such as private practice, may be of benefit to the profession. Two groups of new graduate physiotherapists were recruited to this study. Both new graduate cohorts identified similar themes; this was somewhat surprising given that nursing research has suggested approximately a 12-month period is sufficient for new graduates to feel confident in their professional role (Duchscher, 2009). It is possible that a longitudinal study of new graduate physiotherapists may have provided greater insights into the progression of transition and settling into their professional roles. A more thorough understanding of the transition process is required to identify optimal timing and type of strategies and supports during the transition from student to new graduate.

8.6 Conclusion

The transition from physiotherapy student to new graduate appears challenging; with changes in caseload volume, complexity and autonomy alongside managing new graduate expectations suggests that new graduates can feel overwhelmed and ill-prepared for their new role. Clinical placements appear to have a significant influence, positive or negative, on new graduate preparedness for practice. Consideration should be given to strategies that support realistic physiotherapy practice, staging the progression and exposure to increasingly complex patients and tasks, encourage an appropriate degree of autonomy and promote resilience and stress management. Engagement from students, new graduates, universities, health service providers and the wider physiotherapy profession will be crucial in ensuring new graduate preparedness for the transition from student to independent physiotherapy clinician.

8.7 Summary

- The transition from student to new graduate is challenging with the change in caseload volume and complexity seen as the greatest challenge.
- The change in autonomy from student to new graduate, combined with being sheltered as a student and new graduate own expectations also impacted on the student transition to new graduate.
- Several strategies including organisational, clinical placement experiences and strategies that promote self-efficacy were identified.

Chapter 9 – Discussion and Conclusion

Understanding the contribution of physiotherapy students to the delivery of health services and the transition into the physiotherapy profession is growing in importance. With increasing student numbers (and therefore demand for clinical placements) occurring in the context of increasingly complex clinical environments and finite health services resources, it is imperative that there is a greater appreciation of the relationship between students and health services and how students transition into these health services as professionals. Currently there is limited research that quantifies the physiotherapy student contribution to the delivery of health services and the transition from student to new graduate.

Firstly, this research program aimed to understand the physiotherapy student contribution to the delivery of health services by quantifying student clinical activity during clinical placements and seeking the perspectives of physiotherapists. Initially developing a profile of physiotherapy student direct patient care activity was undertaken to determine the type and how much direct patient care is performed by students during clinical placements. Determining the impact of student delivered patient care on the delivery of health services required a comparison with the health service resource use (clinical educator time) to support clinical placements. After quantifying student patient care activity, it was important to ascertain physiotherapists' perceptions of students' contribution and how students supported health service delivery.

Secondly, this research program aimed to investigate the transition of physiotherapy students to new graduates. The change in direct patient care activity from student to new graduate was quantified and the perspectives of new graduates and experienced physiotherapists on the challenges and potential strategies that may support the transition from student to new graduate were documented.

The following chapter provides a summary of the findings for the five studies included in this thesis. Studies 1-3 identified the student contribution to the delivery of health services and Studies 4 and 5 focussed on the student transition to new graduate. A detailed discussion of

the clinical implications and limitations of this program of research will be presented. Suggestions will also be provided regarding practical applications of the findings and future research directions.

9.1 Summary of results

9.1.1 Physiotherapy student contribution to the delivery of health services

Three studies investigated the student contribution to the delivery of health services; Studies 1 and 2 quantified the student contribution through analysis of student direct patient care activity and Study 3 provided the perspectives of physiotherapists on the landscape of the student contribution. The following section provides a summary of results for each study.

9.1.1.1 Physiotherapy student direct patient care activity

Study 1 documented the direct patient care activity provided by individual students on clinical placements. Three hundred weeks of physiotherapy student clinical activity was collected across the clinical areas of cardiorespiratory, musculoskeletal and neurorehabilitation from five Queensland public health sector hospitals. Student direct patient care activity was quantified in terms of the number and length (duration) of student occasions of service (OOS). Clinical educator to student (CE:student) ratio was considered.

Study 2 determined the contribution a group-of-students participating in collaborative clinical placement models to the delivery of health services. Clinical activity data were obtained from 135 groups of students (2040 weeks) and 19 junior (143 weeks) and 23 senior (160 weeks) physiotherapists across four clinical areas: cardiorespiratory, musculoskeletal, neurorehabilitation and orthopaedics in five Queensland public health sector hospitals. These data were collected to identify the impact of clinical area and CE:student ratio on student OOS/day, and compare the direct patient care activity of a group-of-students in different collaborative clinical placement models to that of a junior and senior physiotherapist.

9.1.1.1.1 Direct patient care activity

Individual student OOS increased from week 1 to week 4 with a plateauing observed in week 5. This pattern was consistent across the three clinical areas: cardiorespiratory, musculoskeletal and neurorehabilitation. Students on cardiorespiratory clinical placements completed more OOS each week and in total compared with students on musculoskeletal and neurorehabilitation placements.

There was variability between hospitals in the average OOS per student, with cardiorespiratory and neurorehabilitation areas having the greatest variability of 110% and 113% respectively. The musculoskeletal area was more consistent with only 20% variation in the hospital average OOS per student.

Clinical placement weeks and clinical area had a significant effect on length of occasions of service (LOOS). Student LOOS decreased from weeks 1 to 4 with a plateau in week 5. Cardiorespiratory on average had the shortest LOOS (49.6 minutes, 95%CI 49.0 to 50.2) with neurorehabilitation the longest LOOS (74.4 minutes, 95%CI 73.7 to 75.1).

9.1.1.1.2 Influence of the clinical area and clinical educator to student ratio

In Study 1, for musculoskeletal placements with a CE:student ratio of 1:4 more OOS were completed than for a CE:student ratio of 1:3. There was no difference found in neurorehabilitation placements and no statistical comparison could be performed for cardiorespiratory placements. However, for each clinical area the average OOS per student remained the same regardless of CE:student ratio. In Study 2, multivariate regression analysis revealed clinical area and the CE:student ratio, combined and independently, were predictive of the average OOS/day completed by a group-of-students. Irrespective of the CE:student ratio during cardiorespiratory placements groups of students were able to complete significantly more OOS/day compared to those on neurorehabilitation and orthopaedics placements. More OOS/day were completed by a group-of-students in CE:student ratios of 1:3 and 1:4 compared to CE:student ratio of 1:2 regardless of the clinical area.

9.1.1.1.3 Comparison of occasions of service of a group-of-students with junior and senior physiotherapists

When all clinical areas were combined, a group-of-students provided a comparable number of OOS/day (10.6 OOS/day) compared to a junior physiotherapist and significantly more than a senior physiotherapist. In the cardiorespiratory, musculoskeletal and neurorehabilitation areas a higher CE:student ratio completed more OOS/day. In the orthopaedics area a CE:student ratio of 1:2 and 1:3 completed similar OOS/day compared to a junior and senior physiotherapist. In cardiorespiratory and musculoskeletal areas, a CE student ratio of 1:3 and 1:4 completed more OOS/day than a senior physiotherapist.

In all clinical areas a group-of-students met the equivalent caseload of a junior and senior physiotherapist by week 5 except in the neurorehabilitation area where a CE:student ratio of 1:2 did not meet the caseload of a senior physiotherapist. On average, a group-of-students met the comparable direct patient care activity of a junior and senior physiotherapist by week 2 of a 5-week placement, irrespective of clinical area. In all clinical areas, except orthopaedics a higher CE:student ratio met the equivalent workload of a physiotherapist earlier in the clinical placement.

9.1.1.2 Physiotherapists perspectives of student contribution

The perspectives of new graduates, through reflection on their student experience, and those of experienced physiotherapists on the student contribution to the delivery of health services were sought. Nine new graduate and six experienced physiotherapists focus group interviews were undertaken to explore the student contribution to the delivery of health services. Three key themes were identified: tangible student contribution, non-tangible student contribution and factors that influence student contribution.

9.1.1.2.1 Tangible and non-tangible student contribution

Both new graduate and experienced physiotherapist participants felt that the biggest contribution students made to the delivery of health services was providing direct patient care. New graduate participants felt that as students they could provide longer interventions for patients and be more thorough. New graduate participants also felt that towards the end of their clinical placement the combined activity of the group-of-students was able to do a substantial volume of direct patient care.

Experienced physiotherapist participants expressed similar ideas and indicated that the volume of direct patient care provided by students released physiotherapists to complete other tasks. New graduate and experienced physiotherapist participants felt that students also contributed by promoting staff development in the forms of reflective practice and development of leadership skills however they acknowledged that this was difficult to quantify.

9.1.1.2.2 Factors that influence student contribution

Both participant groups indicated several factors influenced the student contribution including meaningfulness of activities, autonomy, efficiency, students struggling with clinical practice and the CE:student ratio. New graduate and experienced physiotherapist participants indicated that when students completed activities that were relevant to the health service and done well it was of benefit. New graduate participants also felt that when, as a student, they were given a degree of appropriate independence in patient care they were able to support the delivery of health services more effectively.

Both new graduates and experienced physiotherapist participants acknowledged that students were less efficient at the commencement of placement however this improved throughout the placement and the collective activity of a group-of-students towards the end of clinical placements was greater than a single physiotherapist. Experienced physiotherapist participants reported needing to spend a greater amount of time with students who were struggling with clinical practice which meant they were unable to spend equitable time with

all students and to complete other tasks beyond patient care. The CE:student ratio was perceived as a determining factor of the overall student contribution, with CE:student ratios of 1:2 or more seen as providing more OOS for the health service and therefore more efficient. While overall both participant groups felt students contributed to the delivery of health services, both new graduate and experienced physiotherapist participants acknowledged that factors such as students struggling with clinical practice and the CE:student ratio could have a significant influence on the student contribution both positive and negative.

9.1.2 Transition from physiotherapy student to new graduate

The transition from physiotherapy student to new graduate was investigated quantitatively (Study 4) and qualitatively (Study 5).

Study 4 quantified the change in direct patient care activity from student to new graduate by examining the difference between the percentage of direct patient care, average OOS/day and LOOS of students and new graduates. The clinical activity data of 412 physiotherapy students and 50 new graduates working across cardiorespiratory, musculoskeletal, neurorehabilitation and orthopaedics areas were compared.

Study 5 explored the perspectives of new graduates and experienced physiotherapists on the transition from student to new graduate. Four themes were identified in the transition from student to new graduate along with three strategies that may support the transition from student to new graduate.

9.1.2.1 Patient care activity

Study 4 highlighted that on average individual students spent significantly less time per day in direct patient care activities (56%) compared to new graduates (80%), and this was similar across all clinical areas. When all clinical areas were combined students completed half (4.4 OOS/day) the average OOS/day compared to new graduates (8.8 OOS/day). In the cardiorespiratory area, students completed less than half the average OOS/day compared to new graduates. In the remaining clinical areas, students performed slightly greater than half the average OOS/day of new graduates.

The average LOOS was significantly longer for students than new graduates; approximately 30% longer. This difference was observed when all clinical areas were combined as well as within each clinical area of cardiorespiratory, musculoskeletal, neurorehabilitation and orthopaedics (p < 0.001).

9.1.2.2 Perspectives on the transition experience

Four themes were identified in the transition from student to new graduate: preparedness for practice, protected practice, independence and affirmation of practice and performance expectations.

Preparedness for practice

Both new graduate and experienced physiotherapist participants indicated that the significant rise in caseload (often doubling) was challenging for new graduates and this, coupled with increased patient complexity, meant that new graduates had difficulty adjusting to the demands of their workload. Furthermore, both groups highlighted that clinical placements play an essential role in preparing students for the transition to new graduate. Experienced physiotherapist participants voiced concerns about the increasing number of students and impact this potentially has on the student clinical placement experiences.

Protected practice

New graduate participants reported that, as students, they were not exposed to all aspects of physiotherapy practice during clinical placements and felt that this would have been valuable during their clinical placements. Experienced physiotherapist participants also acknowledged that as clinical educators they screened patients and selected what they perceived to be "student appropriate" patients and tasks, rather than students experiencing all the roles of a physiotherapist in the workplace.

Independence and affirmation of practice

New graduate participants reported struggling with the responsibilities of independent practice and wanted feedback and reassurance they were performing at the expected level. Experienced physiotherapist participants expected new graduates to manage their caseload relatively independently and indicated they were there to support new graduates, however they reported that this often had to be initiated by the new graduate.

Performance expectations

New graduate participants indicated they placed high expectation on themselves to be able to efficiently meet the workload demands. This was compounded by their perceived (selfimposed) expectations to be able to achieve the same caseload volumes and clinical outcomes as their more experienced colleagues. Experienced physiotherapist participants also agreed that new graduates wanted to be seen as competent but also identified that new graduates had difficulty with managing work-life balance at times. Both groups indicated that burnout and excessive stress were present in some new graduates.

9.1.2.3 Strategies to assist transition

Several strategies were identified to support the transition from student to new graduate related to organisational, clinical placement experiences and self-efficacy. Organisational strategies were related to workplace practices including the utilisation of a dedicated new graduate support roles and targeted training for new graduate skills development. Strategies for clinical placement experiences included the intentional incorporation of more observational experiences prior to clinical placement. Provision of clinical placements which exposed students to higher caseloads, greater patient complexity and provided opportunities to participate in the full range of activities that physiotherapists engaged in was seen as an important strategy to assist the transition to new graduate. Experienced physiotherapist participants also suggested longer clinical placements to allow students to develop their skills more thoroughly and consideration of a quality framework for clinical placements may be helpful. Building self-efficacy was seen as important by both participant groups with an

emphasis on improving communication, conflict resolution and stress management skills, along with training targeted at resilience.

9.2 Clinical implications

To date there is limited research that investigates the student contribution to the delivery of health services. While the transition from student to new graduate has received some attention in the literature, it is limited in allied health and specifically in physiotherapy. There is very limited quantification of the student contribution and to date no quantification of the change in direct patient care activity from student to new graduate. Several clinical implications have emerged from this research program which may provide valuable information for key stakeholders in student clinical education and new graduate employment, not only for physiotherapy but other health professional disciplines across Australia. The following outlines some of the key clinical implications of the student contribution to the gap between student and new graduate practice, including strategies that may reduce the gap and support new graduates in the transition to practice.

9.2.1 Students do contribute to the delivery of health services

Physiotherapy students on 5-week clinical placements contribute to the delivery of health services across a range of physiotherapy clinical areas. Although some reports in the literature suggest students on clinical placements can be perceived as burdensome (Fairbrother, Nicole, Blackford, Nagarajan, & McAllister, 2016; M. Hall et al., 2015) the findings from this research program indicate otherwise. Fairbrother and colleagues' (2016) qualitative study included four clinical educators and while Hall and colleagues' (2015) survey included over 3000 physiotherapists only 19% had supervised four or more students in the preceding 3 years which may account for the discrepancy in results. Students contribute in several ways; by providing patient care, completing required quality improvement activities or providing inservices and encouraging staff professional development and leadership.

The contribution of physiotherapy students to patient care has previously been reported although typically the clinical educator-student team is described (Dillon et al., 2003; Pivko et al., 2016). At the very least the clinical educator-student team does not reduce the overall patient care activity completed. This research program is the first to specifically investigate the student contribution independent of the clinical educator. Previous research investigating student contribution has largely focused on patient care, but this research program has illustrated that the student contribution extends beyond patient care. Given the variety of ways students are able to contribute, a reframing and rethinking of the value of clinical placements is required throughout health professions to acknowledge student input and promote clinical education.

9.2.1.1 Groups of students can meet a physiotherapist's caseload

This research program demonstrated the patient care activity of a group-of-students independent of their clinical educator can at least meet, and at times exceed the caseload of a physiotherapist. This on average appears to occur at the completion of week 2 of a 5-week clinical placement. This was demonstrated in all clinical areas investigated in this research program, however in the clinical areas of cardiorespiratory and musculoskeletal a group-of-students were able to complete considerably more patient care activity than the physiotherapist alone in weeks 4 and 5.

Two models of clinical placements were used by participating hospitals in this research program. In the first model the clinical educator's primary responsibility was to supervise students only and the clinical educator was not responsible for a specific caseload separate to the students. In the second model, the clinical educator had dual roles managing their own clinical caseload (independent of the students) while still providing supervision to students (Stiller et al., 2004). This research program did not set out to determine whether one model of clinical placement that groups of students participated in was more successful than the other however this warrants further investigation.

Direct patient care activity completed by students can support the delivery of health service in other ways such as covering unexpected leave, completing quality improvement activities or participating in education, training and research. Lopopolo (1984) found that towards the later part of student clinical placements the clinical educator spent more time on personal and administrative tasks (professional development, staff training, research) in line with the rise in the net benefit of the student (measured in financial gain based on income generating patient care). Health services should consider the clinical placement model used, how the clinical placement is structured to optimise student direct patient care and what other activities staff can participate in that would maximise the additional benefit provided by a group-of-students for the health service.

9.2.1.2 Clinical educator to student ratio matters

This research program demonstrated that CE:student ratio can impact the student contribution to the delivery of health services. Commonly, clinical placements in allied health use a 1:1 CE:student ratio (Briffa & Porter, 2013; Millington, Hellawell, Graham & Edwards, 2019). In hospital settings, however, physiotherapy has explored clinical placements with higher CE:student ratios (Dillon et al., 2003; Fairbrother et al., 2016; Ladyshewsky et al., 1998). CE:student ratios used by participating hospitals in this research program ranged from 1:2 to 1:4 and anecdotally these CE:student ratios were instigated in physiotherapy in Queensland over 15 years ago to manage clinical placement demand and build physiotherapy clinical placement capacity within Queensland public health sector hospitals. Some CE:student ratios were more common in particular clinical areas than others. For example 1:3 and 1:4 CE:student ratios were more common in the cardiorespiratory, musculoskeletal and orthopaedics areas, whereas 1:2 and 1:3 were the usual CE:student ratios used in neurorehabilitation. A group-of-students participating in higher CE:student ratio produced more OOS for the health service in the clinical areas investigated in this research program with the exception of a CE:student ratio of 1:2 compared to 1:3 in the orthopaedic area. However, the number of OOS per day an individual student provided did not differ based on the CE:student ratio. Thus, health services received a greater benefit from higher CE:student ratios which did not impact on the patient volume individual students experienced.

Clinical placements with higher CE:student ratios may enhance the experience of students and clinical educators. Research suggests that students and clinical educators found a CE:student ratio of 1:2 beneficial (Alpine, Caldas, & Barrett, 2019; Baldry Currens & Bithell, 2003). In contrast it has been reported that there is a perception that higher CE:student ratios result in less one-on-one time with the student which is perceived as a disadvantage (Briffa & Porter, 2013; A. Miller, Pace, Brooks, & Mori, 2006). While this may be the case, a higher CE:student ratio provides students with several benefits including opportunities to work more autonomously, participate in peer learning and reduces student anxiety (Alpine et al., 2019; Sevenhuysen et al., 2015). Students may experience more autonomy as the clinical educator is required to supervise other student/s and/or complete a part of their own caseload. Student autonomy is a key component of students developing confidence (Clouder, 2009), feeling as though they are contributing to the delivery of health services and may support the transition to new graduate. Student engagement in intentional peer assisted learning activities is an effective strategy for developing reflective practice, improving problem solving skills and teamwork in students (Morris & Stew, 2007; Sevenhuysen, Haines, Kiegaldie, & Molloy, 2016). Clinical educators may have a more positive experience when supervising two or more students as the students are able to provide support to one another rather than relying on the clinical educator alone (Baldry Currens, 2003). In summary a higher CE:student ratio can not only support the delivery of health services but also allows students to experience some autonomy and encourages independent learning and practice.

Clinical placements with 1:1 CE:student ratio, although the traditional CE:student ratio, may not be the most efficient or effective for health services or students. Traditional 1:1 clinical placements may even be detrimental to health services with a CE:student ratio of 1:1 criticised for being resource intensive (Baldry Currens, 2003). A clinical educator provides a similar level of background information and support for one student as is required for two or more students without the benefit of students taking a larger proportion of the clinical educator's caseload (Baldry Currens, 2003; Fairbrother et al., 2016). Traditional 1:1 clinical placements also lack opportunities for student peer learning and support (Baldry Currens, 2003; Fairbrother et al., 2016). Health services should review the CE:student ratio to ensure clinical placements are effective, efficient and grounded in evidence thus supporting students, clinical educators and the delivery of health services during clinical placements.

While this research program indicates a higher CE:student ratio provides more OOS for the health service other factors need to be considered if a higher CE:student ratio on clinical placement were used. These may include having sufficient physical space for students, sufficient number and variety of patient presentations (A. Moore et al., 2003) and staff experience and skill at providing clinical education and supervising multiple students simultaneously. Having sufficient physical space for students both in staff rooms and treatment areas can be challenging and may limit the number of students that can undertake a placement simultaneously. Clinical placements must provide sufficient caseload volume and type to expose students to varied experiences in patient care and assist student transition to new graduate (P. Miller et al., 2005). Insufficient caseload volume may for example, reduce student learning experiences. Student learning experiences can be also affected by clinical educator skill and preparedness. Universities have a role in ensuring that students receive sufficient caseload volume and complexity and are well supported, and may be able to provide professional development to clinical educators to support them to meet the demands of supervising multiple students simultaneously. Baldry Currens and Bithell (2003) suggest that the success of collaborative clinical placements (ie. where the CE:student ratio is 1:2 or higher) is impacted by the skill and confidence of the clinical educator supervising multiple students. To ensure maximum benefit for all stakeholders participating in higher CE:student ratios clinical educators must be appropriately skilled to support multiple students on clinical placement and have appropriate patient numbers and physical space for students.

9.2.1.3 Students contribute more than patient care during clinical placements

Benefits to the health service from providing student clinical placements extends beyond just patient care. It is generally understood that the clinical educator imparts and develops students' knowledge and skills while on clinical placement, however it would be naïve to think that students do not offer this in return. Several qualitative studies have reported that students encourage reflective practice in clinical educators, increase recent graduate confidence due to working with students (Baldry Currens & Bithell, 2000) and provide current evidence-based practice (Davies et al., 2011). Furthermore, having students improves recruitment, exposes staff to leadership skills and supports the future development of the profession (Baldry Currens & Bithell, 2000; M. Hall et al., 2015).

There is a growing body of research supporting the many ways students contribute to health services. This information needs to be accessible for people in health services management and other settings where physiotherapists work. Translation of this research into practice could be enhanced by transforming it into user-friendly resources for clinical educators (Rodger et al., 2008) and demonstrating applicability and strategies to maximise contribution of students beyond providing direct patient care. Universities and health services need to explicitly encourage staff to participate in clinical education, clearly emphasising the myriad of benefits both personally and professionally and for the health service.

9.2.1.4 Consideration of the student struggling with clinical practice

While students are able to support the delivery of health services, concerns have been raised about the impact of students who are struggling during clinical placements have on the delivery of health services. Students who are not progressing as anticipated through the clinical placement, lack knowledge, clinical reasoning or communication skills can increase the workload of the clinical educator (Davenport et al., 2018). Bearman and colleagues (2013) suggest that clinical educators typically manage students who are struggling with clinical placement by providing more direct feedback and supervision resulting in more time with the individual student. This may be detrimental to other students and to the clinical educators may experience negative psychological emotions such as anxiety, helplessness and self-blame when supporting a student struggling with practice; potentially negatively affecting their mental health. Universities provide variable support to students struggling during clinical placements and clinical educators (Cleland et al., 2013; J. Finch & Poletti, 2014; Wiskin, Doherty, von Fragstein, Laidlaw, & Salisbury, 2013) though no evidenced-based framework

seems to be consistently used. Several authors indicate (Bearman et al., 2013; Cleland et al., 2013) that simply providing additional effort for students struggling with clinical placements will not suffice. Strategies that are underpinned by learning and teaching research such as individualised goal-orientated learning plans (Hauer, Ciccone, et al., 2009) should be provided to lessen the burden on the clinical educator and the potential negative impact a student struggling with clinical practice has on the delivery of health services.

Universities should be tasked with providing evidence-based support to clinical educators in the learning context of clinical placements. While some universities provide valuable professional development for clinical educators regarding supporting students who are struggling during clinical placements (Patton et al., 2013), clinical educators would likely benefit from individualised support from universities with specific evidence-based strategies (Brigley, 2018). Students who struggle during clinical placements may experience difficulty transitioning to practice and often go on to be weak clinicians (Cleland et al., 2013) with concerns raised about patient safety and quality care (Yepes-Rios et al., 2016). Therefore, it is important that students who are struggling during clinical placements and their clinical educators receive timely evidence-based support to maximise students' potential and minimise the burden and risk on the clinical educator and health service.

9.2.1.5 We are all in this together

Clinical placements in public health sector hospitals provide students with opportunities to experience the many roles of a physiotherapist in a wide variety of clinical settings, across the continuum of care and in many age groups. The public health sector continues to provide the majority of clinical placements (Australian Institute of Health and Welfare, 2020) and as a sector is well versed in supporting students on clinical placements. There are a variety of supports and professional development opportunities within the public health sector for clinical educators to promote effective student learning (Allied Health Professions' Office of Queensland, 2020; Health Education and Training, 2019; Health Victoria, 2020; South Australia Health, 2020). While students receive many benefits from undertaking public health sector clinical placements this research program has demonstrated that health services also
benefit, through provision of patient care and supporting staff development. Thus student clinical placements in the public health sector not only support student experiential learning and skill development but also contribute to the delivery of health services resulting in a mutually beneficial relationship for students and health services.

Public health services have an important role and in Australia should continue to be the major provider of physiotherapy clinical placements. Public health services have a vested interest in ensuring an appropriately skilled workforce is provided for the whole community into the future (Queensland Health, 2020). Public health services acknowledge the importance of providing clinical education to health professional students for ongoing health service provision to the community (Allied Health Professions' Office of Queensland, 2020; South Australia Health, 2020). The resources that exist within the public health sector to support student clinical placements is unlikely to be available in private practice or other health settings. This suggests that the public health sector may provide the physiotherapy profession with relative consistent student experiences during clinical placements and the ability to monitor and benchmark student assessment. The public health sector, as the major clinical placement provider, is able to work in partnership with universities to ensure the physiotherapy profession maintains the practice threshold standards and has clear expectations of new graduate skills and abilities. The interdependence that students, universities, public health services and the physiotherapy profession has, demonstrates the importance of fostering strong relationships between stakeholders. These relationships are not only necessary for the development of physiotherapy students but for supporting the transition from student to new graduate.

Despite the importance of the public health sector in the provision of student clinical placement the physiotherapy profession irrespective of clinical setting should be encouraged to support student clinical placements for the betterment of the profession. The Canadian Physiotherapy Ethical Code of Conduct (Canadian Physiotherapy Association, 2021) clearly states that "members of the physiotherapy profession have an ethical responsibility to … contribute to the development of the profession through support of … student supervision". While in the Australian Physiotherapy Code of Conduct (2014) the language is not as strong "it is good practice to contribute to … assessment, feedback and supervision of students" and

the focus is on the benefit provided to the physiotherapist rather than the responsibility to the profession. Perhaps a change in the language used in Australia and a cultural shift that encourages the profession to actively engage in student clinical placements could be considered to ensure the quality of future physiotherapists to provide care to the Australian population.

9.2.2 Student one minute, new graduate the next – the gap

This research program demonstrated a gap exists between student skills and experience in direct patient care and the requirements of the workplace. Study 4 found that physiotherapy students must double their OOS and reduce their LOOS by approximately 30% to manage a new graduate caseload. While this research program is the first to quantify this change from physiotherapy student to new graduate other authors (Merga, 2016; Moriarty et al., 2011) have acknowledged that the change in caseload volume and complexity is challenging for new graduates in physiotherapy and other health professions. Whilst new graduate physiotherapists have the skills to perform adequate patient assessment and treatment, the challenge occurs when new graduate physiotherapists are required to undertake OOS faster due to the larger caseload and with patients who are more complex compared to their student experience. Upon commencing work, new graduates are still developing the skills to prioritise workload and manage the many demands expected in the workplace (Black et al., 2010). The gap in a new graduate's ability to undertake the volume and complexity of patient care expected of them poses challenges for the workplace.

New graduate physiotherapist participants in this research program identified gaps in important aspects of physiotherapy practice such as confidence to work autonomously, working in the interprofessional team and understanding of the expectations of the workplace and of themselves. New graduates often lack confidence in independent clinical decision making, however confidence develops through positive experiential interactions both as a student and new graduate (Black et al., 2010; Forbes, Lao, et al., 2020). Students have varying experiences in interprofessional practice based on university curriculum (Kalb & O'Conner-Von, 2012), workplace culture and clinical educator preferences (Pollard, 2009)

despite being an essential aspect of physiotherapist practice. Without appropriate experiences to support the development of autonomy and interprofessional practice there will continue to be a gap in new graduate skills. Study 5 demonstrated that new graduate physiotherapists' expectations to be comparable with physiotherapists with more experience do not align with workplace expectations and was to the detriment of themselves. The pressure new graduates perceived, real or otherwise, can increase stress and potentially negatively impact performance (Boamah, Read, & Spence Laschinger, 2017). The gap between student and new graduate practice is more than just providing the required volume and complexity of direct patient care and includes several other aspects of physiotherapy practice which will likely influence the new graduate transition to independent practice.

9.2.3 Enhancing clinical placements may narrow the gap and support the transition to new graduate

The transition from student to new graduate poses many challenges, not only for the new graduate but for health services as well. To support the student transition to new graduate key stakeholders such as new graduates, employers and universities must cooperatively work together to assist students to develop and maximise all the skills required to move to independent practice as a new graduate. Clinical placements play a crucial role in developing safe and effective new graduate clinicians. To achieve this, clinical placements need to provide students with realistic experiences that enable students to participate in the full breadth of physiotherapy practice including technical, interpersonal and interprofessional skills. This research program identified several strategies that have the potential to enhance the experiences of physiotherapy students during clinical placements to facilitate the transition to new graduate. These include enhanced preparation for clinical placements, consideration of longer clinical placements and supporting the translation of skills between clinical placements and optimising the student contribution during clinical placement.

9.2.3.1 Students must be prepared for clinical placements

As clinical placements play an important role in student preparedness for practice, it would seem reasonable to suggest that students need to be ready to maximise the time on clinical placements by having adequate theoretical knowledge, technical skills and interpersonal skills prior to clinical placement. Learning and practicing technical and communication skills in the laboratory and participating in simulation training has demonstrated benefits such as improved student confidence and communication skills (Phillips, Mackintosh, Bell, & Johnston, 2017; J. Robertson & Bandali, 2008). However, Newton and colleagues (2009) assert that students need to be adequately prepared and need to practice applying their knowledge in an authentic clinical environment prior to attending fulltime clinical placement. It would appear that students may have sufficient knowledge and technical skills before commencing clinical placement as a group of physiotherapy students is able to meet the direct patient care activity of a physiotherapist in week 2. However, in this research program new graduate physiotherapists, reflecting on their student experience, felt that observational experiences would have been of benefit prior to full-time clinical placement. Observational experiences have been reported to assist physiotherapy students to understand the roles of a physiotherapist, how physiotherapists work in the healthcare team and different communication strategies with patients (Lindquist, Engardt, & Richardson, 2004). Additional time spent in observational experiences and engaging in intentional reflective activities preceding fulltime clinical placements, may enhance student understanding of the healthcare system and the role and scope of the physiotherapist within the interprofessional team which may better prepare students for clinical placements.

Developing interpersonal skills, has received growing attention due to identified shortcomings in several new graduate health professional's communication skills (Cole & Wessel, 2008; Parry & Brown, 2009; Xie, Ding, Wang, & Liu, 2013). In this research program experienced physiotherapist participants also identified concerns regarding the communication skills of students and felt that engagement and rapport with patients would be enhanced if physiotherapy students were able to more effectively communicate with the patient. When training communication skills, some lecture-based material is warranted, however communication skills training ideally should be practical, in a clinical environment

and commence early in health professional training (Parry & Brown, 2009; Xie et al., 2013). O'Brien and Poncelet (2010) suggest that student communication skills should be practiced prior to clinical placements, with other disciplines and preferably in a clinical environment. Observational clinical experiences incorporating intentional reflective activities may provide opportunities for students to clarify their role and the roles of other professions, observe and practice communication with patients and gain some insight into conflict resolution in the healthcare environment. Intentional reflective activities should be used during observational placements as it supports building and integrating new knowledge and encourages students to be actively engaged in their learning (Baird & Winter, 2005, p. 153). Observational experiences combined with intentional reflective activities may support students to appreciate their profession's role in the interprofessional team and develop communication strategies; both of which may facilitate students to integrate into the workplace setting during clinical placements.

9.2.3.2 Clinical placement length needs further consideration

This research program identified that physiotherapy new graduates felt less prepared in many areas including managing caseload volume and complexity and increased autonomy. Longer clinical placement/s towards the end of a student's clinical placement experience may enhance participation of students in the workplace to develop the skills where they feel less prepared. Physiotherapy accreditation standards in the United States require students to participate in extended clinical placement experiences (Commission on Accreditation in Physical Therapy Education, 2020), of varying lengths, but typically greater than 8 weeks (Baylor University, 2020; Myers & Covington, 2019) at the end of their program. In other disciplines such as medicine, nursing and optometry longer clinical placements have demonstrated an array of benefits compared to traditional short block clinical placements (Kirkman, Bentley, Armitage, & Woods, 2019; Levett-Jones, Lathlean, Higgins, & McMillan, 2008; Roberts, Daly, Held, & Lyle, 2017; Walters et al., 2012). These benefits include improved patient-centred care by the student (Thistlethwaite et al., 2013; Walters et al., 2012), greater participation in overall management of patient care and clinical tasks (Walters et al., 2012), a sense of belonging in clinical teams (Levett-Jones et al., 2008), socialisation into the

profession (Roberts et al., 2017) and an appreciation and understanding of the roles of other health disciplines (Walters et al., 2012). Participation in one or two longer clinical placements may allow students the opportunity to experience and participate in a greater volume of direct patient care, a wider range of more complex activities and become an involved member of the patient-centred care team similar to a practicing physiotherapist.

While longer placements may be valuable, several challenges need to be considered including reduced opportunities for physiotherapy students to experience a wide range of clinical placements that include opportunities to treat patients across the lifespan, throughout the continuum of care and in different environments (Australian Physiotherapy Council, 2017; Commission on Accreditation in Physical Therapy Education, 2020). Longer clinical placements may necessitate a change in the way physiotherapy clinical placements are delivered in Australia and would require consultation with key stakeholders. Despite these challenges it would appear worthwhile to further investigate the impact of longer clinical placements on the student transition to new graduate.

9.2.3.3 Supporting the translation of skills throughout and between clinical placements

The structure and format of clinical placements throughout entry-level physiotherapy programs may impact upon student knowledge and skill acquisition, translation of these between clinical placements and transition into independent practice as a new graduate. There are generic knowledge and skills requirements that physiotherapy students must develop for all areas of practice including communication skills, critical thinking and problem solving (Hunt et al., 1998). There are also generic technical skills that are transferrable between clinical areas such as completing a thorough patient interview, patient education or the principles of exercise prescription. In Australia, physiotherapy students mostly undertake clinical placements in 5-week blocks, typically in a specified clinical area and service setting, for example, a 5-week cardiorespiratory placement in an acute hospital or a 5-week musculoskeletal placement in private practice. As students commence and progress through clinical placements it is important that the skills developed throughout the theory and practical component of the entry-level program are built upon and sequential development

of the student's physiotherapy practice occurs. Traditional block placements in one clinical area have been criticised for encouraging 'silo' learning (Hauer, O'Brien, & Poncelet, 2009) which may negatively impact a student's ability to build on and translate knowledge and skills to new environments. As physiotherapy clinical placements in Australia are 5-weeks in length, combined with the time challenges associated with clinical placements, clinical educators have limited time in which to assess a student's capability and provide targeted feedback to meet specific learning needs of the student (Burgess & Mellis, 2015). Thus, strategies that assist the clinical educator and physiotherapy student to maximise knowledge and skills development during their 5-week clinical placement must be considered.

Learning contracts have been suggested as a tool to support student development during clinical placements with benefits including increased student motivation, individualised student learning goals and promotion of lifelong learning (Bailey & Tuohy, 2009). However, learning contracts are not routinely used during physiotherapy clinical placements in Australia. Learning contracts are typically student generated which some students struggle with (Rye, 2008). Previous research also identified that knowing how to create an appropriately challenging learning contract can result in increased anxiety in some students (Chan & Wai-tong, 2000); and may not necessarily represent student actual learning needs (Tsang, Paterson, & Packer, 2002). Additionally they can be regarded by students as activities to complete rather than opportunities for growth (Bailey & Tuohy, 2009). Despite the challenges of learning contracts however, with the input of key stakeholders these offer a foundation from which a student development plan can be formulated that may support a student's skill development and translation of knowledge.

Integration of all student learning is important for the translation of knowledge and skills in preparation for the transition to independent practice as a new graduate and lifelong learner. Fastre and colleagues (2013) suggest that to be a professional the ability to identify improvement in one's self is essential and that developing sustainable assessment skills in students will enhance their ability to translate knowledge and seek improvement in performance. Sustainable assessment is defined as "assessment that meets the needs of the present without compromising the ability of students to meet their own future learning needs" (Boud, 2000, p. 152). It aims to refocus assessment on developing learners' ability to

make evaluative judgments (Tai, Ajjawi, Boud, Dawson, & Panadero, 2018) on both their own performance, and the performance of others. Sustainable assessment can be promoted by encouraging learners to engage in self-assessment and peer assessment tasks; followed by a feedback dialogue which includes reflection on the learners' capacity to evaluate their performance against practice standards; appraise situations and circumstances and then draw sound conclusions in accordance with the analysis (Boud, 2007, p. 19). Encouraging students and clinical educators to engage in activities that support further learning may increase the student's participation in their learning (Ajjawi & Boud, 2018), promote lifelong learning habits (Boud & Soler, 2016) and improve evaluative judgment (Tai et al., 2018); all important skills for physiotherapists. Sustainable assessment not only promotes learning in the present but may also assist students to meet future learning and practice needs (Boud, 2000) which is essential for physiotherapists given the changing health care environment.

Currently, in Australia, there is no formal program or process by which physiotherapy students, clinical educators and universities work together to enhance student performance and skills as students progress from one clinical placement to another. A process whereby students develop and document an agreed development plan between themselves, the clinical educator and university, that moves with the student as they progress through clinical placements would be of benefit and promote sustainable assessment. The current and future clinical educator and student could discuss the student's development plan and highlight the student's abilities, including strengths and areas for improvement, thus essentially completing a clinical educator handover with the student. The health profession's discipline specific clinical placement assessment tool or some form of standardised tool and the student's development plan could be used as the basis to share key information. It is important that the student is encouraged to take responsibility and actively engage in this process to improve student self-regulation and evaluative judgement (Boud & Molloy, 2013; Trumble, 2018). As students are actively involved in this process, concerns surrounding privacy should be alleviated. This process would promote discussion between clinical educators, students and universities of student capabilities and attributes. Such a handover process may support students to translate knowledge learnt, use assessment as learning and build skills more effectively. This approach may support students practicing at a level that is

closer to that which will be required of them as new graduates by the end of their clinical placements and facilitate transition into the workplace.

Important factors to consider with the proposal of the clinical educator handover outlined above include time, student confidentially and potential future clinical educator bias. However, the current system adopted in Australia, of student-led feed-forward of information, where the student agrees to or provides information to the clinical educator themselves about past performance on clinical placements is likely to be to the detriment of the student, health service and profession (Bearman et al., 2013). Optimal timing of this proposed clinical educator handover may vary but options may be following summative feedback or at the beginning of each clinical placement after students have had some time to reflect on the previous clinical placement. This clinical educator – student handover may also encourage students to use assessment for growth rather than as a judgement of capability (Ajjawi & Boud, 2018). The time taken for clinical educators to share information about the student performance would be worthwhile as it would likely enable the incoming clinical educator an opportunity to target specific areas of need based on the student's development plan and build on current strengths earlier in the placement. Frellsen and colleagues (2008) argue that the risk of bias against a student by sharing information about the student performance is outweighed by the benefit of providing support for the betterment of student learning. While issues exist with sharing information about student performance, if it is transparent, with the student's development plan the focus and involves key stakeholders the benefits may outweigh the potential barriers.

9.2.3.4 Realistic physiotherapy practice experience may assist student transition to new graduate

Clinical placements offer value to both health services and students. Students contribute to health services by primarily providing patient care. It is this experience with patient care in a clinical environment that provides students with opportunities for learning new knowledge and developing skills. Some key activities that enhance the meaningfulness of clinical placements for both health services and students include providing sufficient patient volume

and student autonomy. Students should experience sufficient patient volume and complexity that challenges their clinical reasoning and time management. Where feasible, students should be afforded appropriate autonomy to promote problem solving and confidence. This research program demonstrated that providing students with appropriate autonomy and sufficient patient volumes also enhanced the contribution of the student to the delivery of health services. Therefore, clinical placements that promote the student contribution may also positively influence the student transition to new graduate.

Student experiences on clinical placement can shape their clinical practice as new graduates and provide a foundation of clinical experience. Based on the findings of this research program appropriate patient volume and complexity are fundamental to developing student preparedness for practice. Insufficient caseload, challenge and problem-solving activities may limit student opportunities to develop time management, clinical reasoning and other key health professional skills. Across many health professions new graduates struggle with managing their workload, more complex interpersonal skills such as conflict resolution and dealing with stress (Moriarty et al., 2011; A Walker & Costa, 2017). The most obvious and relevant place for students to experience the demands of independent practice is on clinical placement. Every effort should be made to promote clinical placements with realistic physiotherapy practice where students are able to experience a caseload that comprises sufficient volume, that includes clinically and psychosocially complex patients, prioritisation of workload and interprofessional team and family meetings. While this may pose challenges for students, clinical educators and clinical placement providers continuing clinical placements in their current form may be detrimental to the profession.

Clinical placements should not be limited to providing patient care alone and students should have realistic physiotherapy practice experience. Other activities such as service improvement activities and providing education to other staff are important aspects of physiotherapy practice for student physiotherapists to experience. Health service driven quality improvement activities or inservices provide students with the opportunity to experience meaningful activities that support the delivery of health services and contribute to staff education and patient care. Clinical placements that enable students to participate in meaningful patient care, health service and staff development activities are giving students

opportunities to develop important skills essential for physiotherapists. Exposure to these activities and acknowledgement of the challenges of clinical practice may support the student transition to new graduate. This in turn has the potential to reduce the burden to upskill and provide support for new graduates in public health hospitals. Encouraging students to contribute to the delivery of health services will likely positively impact their skill development and in turn help bridge the gap between student practice and independent practice required of a new graduate physiotherapist.

9.2.4 Expectations of new graduates must evolve

The expectations of new graduates by the physiotherapy profession and of themselves appear to be misaligned. The physiotherapy profession has evolved due to changes in the health care system and the needs and expectations of patients (Chartered Society of Physiotherapy, 2018; Maharaj et al., 2018). While the Australian and New Zealand physiotherapy practice requirements have aimed to reflect this change a mismatch remains between new graduate capabilities and that expected of employers. The following outlines the evolving requirements of physiotherapy new graduates and considers expectations of new graduates by the profession and of themselves.

9.2.4.1 The evolving requirements of new graduates' skill set

Physiotherapists have a wide scope of practice restoring and optimising function and quality of life that may be compromised due to injury, disease or environmental factors along with a significant role in health promotion and education across the lifespan (Physiotherapy Board of Australia and Physiotherapy Board of New Zealand, 2015). Physiotherapists work across clinical areas such as cardiorespiratory or musculoskeletal physiotherapy, but also in other fields such as education and workplace health and safety. Additionally, physiotherapists work across a range of clinical settings from private practice through to public health services, all while treating people across the lifespan from paediatrics to those in their final stages of life. With the expanding scope of physiotherapy professional skills and knowledge, educating new graduates to meet the professional requirements and workplace expectation poses challenges (Crosbie et al., 2002).

Over the past 15-20 years physiotherapy practice standards in Australia have evolved in response to the changes that have occurred in the healthcare system and the profession. In the Australian Standards of Physiotherapy, in 2006, five of the nine physiotherapy practice requirements focused on what could be considered physiotherapy "technical skills" including assessment, interpretation and analysis of assessment findings, developing and providing an intervention/s and monitoring the effect of the intervention (Australian Physiotherapy Council, 2006). In 2015, these standards were revised. In contrast, the current physiotherapy threshold standards (Physiotherapy Board of Australia and Physiotherapy Board of New Zealand, 2015) describes seven physiotherapist practice requirments (roles) of which only one is specific to physiotherapy "technical skills". While similarities exist between the two standards, such as being an effective communicator and a professional and ethical practitioner, there is a change in the language used to describe the competencies of physiotherapists. Physiotherapists, in the current threshold standards, need to be selfdirected and reflective in their practice, collaborative and be an effective educator and leader (Physiotherapy Board of Australia and Physiotherapy Board of New Zealand, 2015). The current threshold standards suggest that physiotherapists need to be adaptable, and responsive to the changing needs of patients and health challenges in the community. The language used in the current thresholds standards explicitly describes the 'non-technical skills' of the physiotherapist which directly impacts physiotherapy program providers as they now must explicitly assess these skills.

9.2.4.2 Expectations of new graduates need to be considered by the profession

While some within the physiotherapy profession may expect new graduates to perform at the same level of perceived competence as previous generations (Crosbie et al., 2002), the requirements of the health care system and patients have changed. Patient acuity, complexity and expectations have increased (Rush et al., 2013), thus requiring health professionals to be more capable, adaptable and resilient (J. Anderson, Ross, Macrae, & Wiig, 2020; H. D.

Robertson et al., 2016). With the rise in clinical placement demand (Johnston, Newstead, Sanderson, Wakely, & Osmotherly, 2017; Queensland Physiotherapy Placement Collaborative, 2020) and evolution of the Physiotherapy Accreditation Guidelines (Australian Physiotherapy Council, 2011; 2017) the landscape of physiotherapy clinical placements in Australia is changing. Rather than specifically identifying clinical areas in which clinical placements must occur (cardiorespiratory, musculoskeletal and neurological physiotherapy) accreditation guidelines now describe clinical settings (acute, rehabilitation and community practice) (Australian Physiotherapy Council, 2011, 2017). Therefore, it is likely that clinical placement experiences of current graduating physiotherapists are different to those previously. For example, cardiorespiratory placements previously primarily occurred in acute hospitals, public or private, however cardiorespiratory experiences for students may now occur in the community and private practice settings. Perhaps although the requirements set out by the Australian Physiotherapy Council have changed, the profession has maintained some of the traditional new graduate expectations which poses challenges for new graduates and employers if expectations do not align.

McAllister and Nagarajan (2015) suggest a mismatch between new graduate skills and abilities and employer expectations, and although there has been a recent shift to more explicitly describe the capabilities required of physiotherapists, this disparity is likely to still exist. Dean and Levis (2016) argue that often there is a lack of clarity for the profession about the requirements and content of university curriculum. Thus, there is need for engagement between universities and clinical placement providers and potentially employers to share information about accreditation standards and changes to curriculum content. This may assist to bridge the gap between entry-level education and professional practice. While it is a requirement of physiotherapy program providers to engage with the profession and employers (Australian Physiotherapy Council, 2017), disparity between university preparation of graduates and employers remains likely (Merga, 2016; Sole et al., 2012). Furthermore, engagement of clinical placement providers and employers in accreditation standards and university curriculum may promote active involvement of the profession in curriculum design to reflect current practice, enhance clinical placement experiences (Kell & Jones, 2007), focus the skill development of students to match employer requirements and realign the profession's expectations of new graduates. A shared understanding between physiotherapy program providers, clinical placement providers, employers and the profession regarding accreditation standards, practice thresholds and university curriculum will hopefully manage any differences in expectations. To align expectations, key stakeholders need to share knowledge and be cognisant of the challenges, priorities and requirements of each other.

Expectations of new graduate physiotherapists need consideration by the profession. It is unlikely that upon graduation, new graduates will have the experience of, or be able to complete the workload of a physiotherapist without considerable support in the form of caseload management, knowledge and skill acquisition and mentoring. While entry-level training and clinical placement experiences supports the student's ability to be a clinician there is no in-between; they are either a student or a physiotherapist. Thus, a balance needs to be sought between universities, the physiotherapy profession and employers surrounding new graduate preparedness for practice. While it is unreasonable to expect universities to produce graduates who are able to manage a workload in all areas of physiotherapy, universities strive to produce graduates who have sufficient capabilities to adapt and develop the required knowledge and skills to manage patients across many clinical areas and settings. Thus all employers, irrespective of the clinical setting, in conjunction with the new graduate must build on the skills developed during entry-level training to meet the requirements of the workplace. This will require the health service to provide support for the new graduate's development and transiiton (Moores & Fitzgerald, 2017). New graduate transition and support should be a shared responsibility between universities, employers, the profession and the new graduate.

9.2.4.3 New graduates need to be mindful of their own expectations

New graduates face many challenges during the first year of practice and this research program has demonstrated that new graduates often have unrealistic expectations of themselves such as being able to perform at the same level as an experienced physiotherapist. These high and often unrealistic expectations new graduates have of themselves, combined with the challenges of transitioning into the profession and workplace, may cause new graduates increased stress. In this research program new graduate participants expectations of themselves appear to be self-imposed. Other research has previously found similar new graduate expectations in nursing and physiotherapy (Morrow, 2009; Solomon & Miller, 2005). However, the influence of perceived workplace expectations and workplace culture on new graduate expectations of themselves cannot be ruled out as this was not formally investigated. Irrespective of the cause of new graduate high expectations of themselves, health services and employers should clearly identify the expectations of the workplace with new graduates upon commencement of employment and how these may change over time.

New graduate high expectations of themselves in this research program, may have contributed to new graduate participants' feelings of stress and burnout. While research investigating burnout is limited in physiotherapy new graduates, early research by Scutter and Goold (1995) indicated that 60% of recent physiotherapy graduates (less than 5 years of experience) were experiencing moderate to high levels of exhaustion. Higher levels of burnout were also found in physiotherapists working in public hospitals compared to private practice (Scutter & Goold, 1995). Increased stress and burnout has implications for the physiotherapist but has also been associated with a negative impact on the quality of patient care (Boamah et al., 2017; Chang & Hancock, 2003; Rogan et al., 2019). The Physiotherapy Board of Australia's Code of Conduct (2014) mandates that physiotherapists are responsible for their own health and wellbeing to maintain the safety of patient care. While the responsibility does lie with the physiotherapist, employers must be cognisant of the risk of burnout and high levels of stress in new graduates to ensure adequate support is provided to maintain quality patient care. New graduates need to be aware of their limitations, seek support, and both employers and new graduates must have an awareness of the signs of symptoms of stress and burnout.

New graduates should be self-aware and participate in activities that promote effective coping strategies to manage the demands of being a new graduate. Resilience interventions such as mindfulness training have been shown to improve resilience, reduce negative psychological emotions and enhance coping (Cleary, Kornhaber, Thapa, West, & Visentin, 2018). Several authors suggest that just participating in a resilience intervention increases

understanding and self-awareness of resilience that may in fact result in improved resilience (Cleary et al., 2018; M. McAllister & McKinnon, 2009). Training resilience for health professionals should ideally commence during entry-level programs and be continued following graduation to promote reflective and adaptable clinicians (Carvalho, Guerrero, & Chambel, 2018; M. McAllister & McKinnon, 2009). Participation in resilience training and developing positive coping strategies may assist new graduates to mitigate some of the challenges associated with becoming a new graduate.

9.2.5 New graduate support is essential

New graduates likely require considerable support upon entering the workplace; to socialise into their profession and workplace, adapt to the changes that becoming a new graduate brings in addition to developing their clinical knowledge and skills. This research program demonstrated that public health sector hospitals recognised this need and provided support to new physiotherapy graduates. It is likely physiotherapy new graduates will need assistance to manage their caseload, prioritise patients and other non-direct patient care tasks, understand their own limitations and achieve work-life balance.

The physiotherapy profession and the workplaces that employ physiotherapists differ in the support provided to new graduates despite the degree of autononomy physiotherapy new graduates are expected to work at. New graduates in other disciplines, who have similar requirements for the volume of knowledge and skills, are not expected to have full responsibility of patient care. In Australia, medical new graduates participate in a one year internship program where close supervision is provided in mandated areas of clinical practice at accredited training facilities (such as public hospitals, some general practices and community based health services) prior to full registration being granted (Medical Board of Australia, 2020). A key feature of a medical graduate's first year experience is an internship program with specific training, education and mentorship to support the development of the skills and knowledge for safe and effective patient care. Nursing also have a long established culture of training for new graduate nurses where preceptors support, mentor and supervise new graduate skill development and socialisation into the profession (Levett-Jones &

FitzGerald, 2005). While physiotherapy new graduate support programs exist, there is no mandated training program and the culture of supporting new graduates differs throughout the profession (Black et al., 2010; Merga, 2016; P. Miller et al., 2005). Employers of new graduate physiotherapists should have an understanding of the experiences of new graduates, new graduates' limitations and provide support and mentorship that is necessary for a profession with a wide scope of practice and autonomy for patient care.

New graduate support programs exist in a variety of health professions, however the research has largely focused on medical and nursing new graduate programs (Smith & Pilling, 2007). There is limited available evidence specifically investigating new graduate support programs in allied health, but there is likely some transferability from medicine and nursing to allied health new graduate programs. Common elements of new graduate support programs include a formal program providing targeted education and training (Merga, 2016; Rush et al., 2013), clinical supervision and a new graduate support person, mentor or preceptor (Merga, 2016; Rush et al., 2013; van Rooyen et al., 2018). A new graduate support person was highly valued by participants in this research program. It is reasonable to suggest that individuals who provide support to new graduates should have the appropriate skills and attributes and receive ongoing training (Powers, Herron, & Pagel, 2019; Rush et al., 2013). Attributes that are considered beneficial for those who support new graduates include patience, kindness, and being respectful and encouraging (Forbes, Lao, et al., 2020; Johnstone, Kanitsaki, & Currie, 2008). It is also reasonable to suggest that new graduate support programs should exist across all settings of physiotherapy practice, not just in the public health sector, to promote and support new graduate development. New graduate support is an essential component in bridging the theory practice gap and should be targeted and supported with an appropriately skilled clinician regardless of the practice setting.

Clinical or professional supervision has been used widely in allied health to support the development of new graduates. Clinical supervision is often a component of new graduate support programs. However, there is conjecture about the overall effectiveness of clinical supervision especially in allied health due to limited high-quality studies (Dawson, Phillips, & Leggat, 2013). Clinical supervision is a formal process whereby a health professional receives professional support to improve competence, patient safety and quality care (Pollock et al.,

2017). Clinical supervision is mandatory for new graduate allied health professionals who work in the Queensland Public Health Sector (Queensland Government, 2018, 2019). Direct supervision of patient procedures as part of clinical supervision has been demonstrated to improve patient safety (Snowdon, Hau, Leggat, & Taylor, 2016). However, a systematic review by Pearce and colleagues (2013) on the content of clinical supervision found that supervision sessions are largely spent discussing tasks with only few reports of provision of feedback about live observation of patient care. Study 5 indicated that new graduates seek feedback and affirmation of performance therefore clinical supervision also provides an existing support framework for new graduates to discuss team dynamics, conflict resolution and caseload and stress management (Dawson et al., 2013); skills areas that new graduates can find challenging. Clinical supervision offers an existing vehicle to support new graduate with targeted support in areas such as self-efficacy, providing feedback on observed patient care and interprofessional practice.

9.3 Limitations

While every effort was made to ensure the rigor of the studies included in this research program there were some limitations. Each chapter has summarised the respective limitations of each study with the following providing further detail on the sample, and collection and use of clinical activity data obtained from hospital information management systems.

9.3.1 Sample is not representative of all health settings

Data were obtained from a sample of six Queensland public health sector hospitals which were representative of metropolitan and regional areas. This research program did not obtain data from any Queensland rural hospitals or Queensland public health sector community services which may reduce the generalisability of the results of the research program to these settings. However, 95% of Australian physiotherapy clinical placements in 2013 and 2014 were undertaken in metropolitan and inner regional areas (Australian Institute of Health and Welfare, 2020) from where participating facilities for this program of research were located. Furthermore 60% of all physiotherapy clinical placement hours occurred in public hospitals in Australia (Australian Institute of Health and Welfare, 2020), so while other key settings of clinical placement were not included, the sample represents the primary setting in which clinical placements occur in Australia.

No data were collected from other Australian states, so differences in the organisation of clinical placements and the support provided to new graduates may vary and therefore consideration of these factors when reviewing the results is important. However, Queensland physiotherapy clinical placements have similar percentage of public health sector placements (Queensland 72%, Australian states range 72-88%,) and geographical distribution as other states (Queensland metropolitan clinical placements 78%, Australian states metropolitan clinical placements range 78-93%) (Australian Institute of Health and Welfare, 2020). Furthermore, to be accredited to provide a physiotherapy program in Australia, universities must meet specific standards (Australian Physiotherapy Council, 2017) for the provision of clinical placements and support provided to clinical educators and students during clinical placements thus there is likely to be relative consistency regarding clinical placements between states.

9.3.2 Clinical activity data

Clinical activity data (Studies 1, 2 and 4) were based on data both physiotherapy students and physiotherapists recorded and entered into participating hospitals information management systems. These data relied on participant accuracy of recording and entering of direct and non-direct patient care activity. While students and physiotherapists receive training in the rules that govern the consistent recording of clinical activity (National Allied Health Casemix Committee, 2001) and in the use of the information management system, it is possible that there may have been some data entry errors. Data management principles were developed for this research program to consistently manage data that appeared to reflect data entry errors. These included excluding LOOS data greater than 210 minutes and having minimum

(270 minutes) and maximum (640 minutes) total daily clinical activity time limits to ensure days a physiotherapist worked were accurately represented. Only a very small percentage of data in each of the quantitative studies needed to be excluded for being outside of these ranges, this information is reported in the individual study. Additionally, work-shadowing of students was undertaken to check for data recording and entering accuracy, further details can be found in 3.1.2.4.

Four information management systems were used to obtain clinical activity data. There were differences in the way each of these information management systems managed data and produced reports, especially for group data. One information management system used real time data collection which gave a LOOS for an individual within a group, with the potential for the combined LOOS of group participants to exceed the allocated time of the group, thus overestimating time spent in direct patient care. Another system was unable to compile frequency of OOS for group data. In Study 1, frequency of student OOS data were collected with no data being attributed to a particular student. This combined with differences in information management systems meant that group data could only be allocated one OOS for Study 1 which may have underestimated student OOS. Due to these issues, in Study 2 and Study 4 individual student data were collected and a new hospital was included for data collection.

Students may provide additional OOS to patients for the purposes of learning which a physiotherapist would not normally provide. In Study 3 both students and clinical educators highlighted that at times students saw patients that would unlikely be seen by a physiotherapist or saw patients on more occasions than the treating physiotherapist would. This would increase individual student OOS and therefore may underestimate how long it takes for a group-of-students to complete the caseload of a physiotherapist if students are providing additional OOS which a physiotherapist would not usually provide. This is more likely in the cardiorespiratory area where a student might see a patient twice a day to increase their exercise tolerance where a physiotherapist may not have time to do a second OOS due to managing a larger caseload. Increases in OOS associated with being a student is less likely in the clinical area of musculoskeletal physiotherapy as patients have scheduled appointments. Holland (1997) demonstrated that patients received similar numbers of

treatments from the clinical educator-student team compared to the clinical educator alone in the musculoskeletal area. While the overall number of additional OOS for learning purposes is likely to be low due to patient turnover in the busy hospitals selected for this program of research, it is important to consider.

In Study 5, two different groups of new graduates participated; one after 2-3 months of practice and the other group after 11 months of practice. Data were purposively sampled from these two groups to gain new graduate perspectives as they began their professional practice and after some experience as a physiotherapist. However, it may have been beneficial to follow the same groups of new graduates throughout their first year of practice to understand whether their feelings changed or there are perceived new challenges. Qualitative longitudinal research has received growing attention as an effective methodology to understand temporal relationships (Thomson & McLeod, 2015) and may have proved beneficial in determining what and when strategies may be more effective at supporting new graduates.

9.4 Future Research

This research program has highlighted areas for further research relating to physiotherapy student contribution to the delivery of health services and the transition from student to new graduate physiotherapist. The following describes areas of future research which may provide key stakeholders with further evidence-based guidance to support the student contribution while on clinical placement and the transition from student to new graduate.

9.4.1 Expansion of data collection into other health settings

This research program focussed on public health sector hospitals. However, physiotherapy practice occurs in other settings such as private practice, community and aged care settings (M. Hall et al., 2015; Rodger et al., 2008). There is a growing need to source clinical placements external to the public health sector due to the rise in demand for clinical placements. The public health sector, despite increasing clinical placements, has been unable to meet the

demands of growing student numbers (McBride, Fitzgerald, Costello, & Perkins, 2018; Queensland Physiotherapy Placement Collaborative, 2020). It would be worthwhile to investigate the student contribution in other health settings, such as private practices, community and aged care facilities and determine the impact students have on these services. There is some qualitative research to suggest that students offer value to private practices by providing patient care and staff professional development, however this needs to be balanced against the challenge of the resources required (primarily time and physical space) to support student clinical placements (Forbes, Dinsdale, Dunwoodie, Birch, & Brauer, 2020). However, there is no quantification of the student contribution in other health settings. Understanding how students contribute may facilitate growth in student clinical placements or allow key stakeholders to develop strategies that may manage some of the challenges of having student clinical placements. While this research program provides valuable information for the profession, ongoing research is necessary to map the contribution of students across a wide variety of health settings.

Physiotherapists work across a broad range of settings however, there is limited research identifying whether new graduates experience the same challenges as those new graduates in a public hospital setting. Hospitals support 60% of clinical placements, however only 25% of the physiotherapy workforce is based in a hospital setting, compared with 40% of physiotherapists working in a private practice setting (Australian Institute of Health and Welfare, 2020). Thus, similar research to quantify the change in clinical activity from student to new graduate and the perspectives of employers and new graduates in private practice and other employment settings, such as, community and non-government organisations is warranted to investigate the student transition to new graduate. Solomon and Miller (2005) indicated that physiotherapy new graduates in private practice similarly feel overwhelmed and recommended further research to support new graduates to transition successfully into professional practice in this setting. Furthermore, the provision of health care is shifting from acute hospitals to community settings (Australian Government Productivity Commission, 2017) which will see more new graduates employed in this area. Understanding the challenges of new graduates beyond the public health sector hospitals will assist physiotherapy program providers, the profession and employers to provide the necessary support for students and new graduates.

9.4.2 Understanding the 'other' activities students participate in on clinical placement

There is a significant disparity between the percentage of time students and new graduates spend in direct patient care activities. Presumably this other time for students is spent participating in other learning activities which support their development, however, little is known about the types and value of these activities. Feedback, work-shadowing, self-directed and reflective practice have been reported in the literature (Burgess & Mellis, 2015; Donaghy & Morss, 2007; Murad et al., 2010; Wright et al., 2012) and are essential for learning and for registration as a physiotherapist (Physiotherapy Board of Australia and Physiotherapy Board of New Zealand, 2015). However, to what extent these activities occur during clinical placements is unknown and warrants further investigation.

Students spend approximately 45% of their day in these other learning activities, it is therefore, important to determine what these learning activities comprise, how these activities support learning and if they assist the transition to new graduate. It is also important to consider whether the balance is right between direct patient care activities and these other learning activities given the value students place on direct patient care experiences (Milanese et al., 2013; Sevenhuysen et al., 2015). Physiotherapy students have previously reported finding little value in teaching and learning activities not associated with patients such as assessment from peers and receiving a lecture from the clinical educator (Milanese et al., 2013). These activities may in fact be valuable, but it is important to consider how these activities are delivered to be engaging for students. Without developing an understanding of the other learning activities that occur during clinical placements and the importance of these activities clinical placement providers and clinical educators are unable to target the activities that offer the most value. Optimising the type and time students spend in these other learning activities during clinical placements may provide additional benefit for student learning.

9.4.3 Key stakeholder perspectives

This research program only obtained data from students, new graduates, clinical educators and experienced physiotherapists. The perspectives of directors of physiotherapy, health service managers or universities all of whom are key stakeholders, were not sought. Brown and Kennedy-Jones (2005) argue that health services who have learning and teaching as a key organisational imperative generally are more successful at supporting and providing clinical education. Not only is the culture of an organisation important, but also the financial commitment to student clinical placements during times of fiscal restraint (McBride et al., 2015). Health service managers are responsible for managing staffing and budgets and thus play a role in the volume of clinical placements provided and resourcing to support new graduates as they enter the workplace. The organisational goals and strategic directions play an important role in health service engagement in clinical placements and new graduate support and the perspective of physiotherapy directors and health service managers would offer further insights into the benefits and challenges of providing clinical education and new graduate support.

Universities are fundamental in providing health professional education and supporting students during clinical placements and are experts in learning and teaching. Universities are often considered accountable for graduate readiness due to the requirement of providing technical and professional knowledge and skills (Syed Aznal et al., 2019). Understanding university perspectives on how students contribute and the transition from student to new graduate may promote stronger relationships between key stakeholders. Research that maps the university curriculum, including learning material specifically designed to support the student transition to new graduate, with the physiotherapy practice thresholds and employer expectations may assist in bridging the gap in expectations. Understanding where there may be gaps will allow for the development of targeted strategies within university curriculum and new graduate support programs to better support the transition from student to new graduate.

Understanding the patient experience of student delivered health services may provide valuable information regarding the quality and quantity of the student contribution. There has been a growing attention of the need to include consumers in healthcare to seek their perspectives to promote safe, quality patient-centred care (Hinchcliff et al., 2016). A recent literature review suggested that patient feedback to students improved their clinical and communication skills (E. Finch et al., 2018) thus the patient perspective may provide greater depth in the understanding of how students contribute to the delivery of health services. The

information gained from evaluating patient perspectives on student contribution may guide health services and clinical educators to consider not only the impact students have on health services but also on the quality of direct patient care provided by students.

9.5 Conclusion

This research program has contributed new evidence in support of the student contribution to the delivery of health services. Students contribute by providing patient care, completing health service initiated quality improvement activities and either directly or indirectly providing staff professional development. Health services should consider how clinical placements can assist in the delivery of health services and strategies such as use of a higher CE:student ratio can maximise this contribution. While at times clinical placements can be challenging for clinical educators and health services, together key stakeholders can promote effective student learning, tackle some of the difficulties together, such as demand for clinical placements, providing support for student learning, and build a relationship of trust and support.

To date, there has been no quantification of the patient care activity from student to new graduate, with this research program providing key learnings in understanding the significant change that occurs from physiotherapy student to new graduate. New graduate physiotherapists feel overwhelmed by their workload and stressed about their new roles which is likely to have a significant negative impact on their wellbeing with the potential to reduce the quality of care provided to patients.

Authentic clinical placements that mimic realistic physiotherapy practice, that challenge a student's caseload management skills, clinical reasoning and interpersonal skills are essential for student learning and development and preparation to be an independent clinician. There is no doubt that the transition from student to new graduate is difficult which highlights the need for cooperation among key stakeholders to investigate and implement strategies that ensure new graduates are work ready and able to respond to the challenges of busy health care environments.

Physiotherapy students on clinical placements contribute to the delivery of health services, and maximising this contribution may in turn assist students to develop the necessary skills and attributes that will support their transition to new graduate. Having new graduates with some experience of the demands of realistic practice may allow the health service to target the support provided to new graduates to assist them to meet the required workload demands. The clinical education of physiotherapy students and the transition to new graduate is complex, however with ongoing key stakeholder engagement and implementation of effective strategies to support student learning and the transition from student to new graduate the relationship between health services, universities and students on clinical placements can continue to strengthen.

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Appendices

Appendix 1 – Detailed semi-structured interview guide

Questions for New Graduates

Thank you for offering your time to be involved in this session today. We are here to talk about what you did on clinical placement as a student and how you felt the about the transition from being a student to a new graduate. This is so we can better understand exactly what students do and perhaps optimise the experiences for students and support the transition to new graduate. Before we get started can you please tell me about the clinical placements you undertook as a student, particularly those in public hospitals.

1. Thinking back to your time as a student in a hospital setting, what sorts of things did you do?

As you know, delivery of health services encompasses treating patients, attending handover and case conferences, attending work group meetings and training.

- 2. Do you think the things you did on placements contributed to the delivery of health services?
 - Discuss treating patients
 - Discuss other activities not directly associated with treating patients such as attending inservices and self directed learning
- 3. Could you tell me the types of things you are doing or have done as a new graduate physiotherapist?
 - Discuss treating patients
 - Discuss other activities no directly associated with treating patients
- 4. Has your contribution to the delivery of health services changed now you are a new graduate physiotherapist?
 - Discuss number of treatments and how long to complete a treatment

- Discuss change in time or type of activities that aren't directly associated with patient treatment.
- Types and complexity of activities
- 5. Did you feel you were prepared to become a new graduate? Why do you feel you were or were not prepared?
 - Discuss aspects that you felt prepared for
 - Discuss aspects that were challenging during the transition from student to new graduate
- 6. What do you think would have made you better prepared for the transition from student to new graduate?
 - Discuss workload demand
 - Discuss moving from student with supervisor to independent clinician
 - Discuss time management
 - Discuss who should assist in the transition

Questions for Physiotherapists

Thank you for offering your time to be involved in this session today. I am interested in finding out what you get students to do on clinical placements, what new graduates do and any similarities or differences between students and new graduate activities. Finally I would like to explore how well you feel students are prepared to enter the workforce as a new graduate.

We will start with students.

 When you take students what are some of the things they do while they are on placement?

- Probe patients, case conference, ward rounds, family meetings, inservice attendance and delivery

- 2. The delivery of physiotherapy services in a hospital involves many different things. Do you think the activities that students do contribute to service delivery? Why or why not?
 - Probe what else do you think students offer. Eg. EBP, inservices
- 3. Do you think students could offer more to the delivery of health services? If so, what?
- 4. Towards the end of placement, say in weeks four and five, how many treatments would students do in your clinical area? Approximately how long does it take them to complete a treatment?
 - Seek clarification regarding whether time includes chart writing, referrals etc or is this time just treating the patient.
 - Specifically discuss number of treatments and length of treatment
 - Discuss whether differences exist between adequate, good and excellent students
- 5. What are your expectations of a student who meets entry-level physiotherapy standards in your clinical area? How do you determine this?
 - Discuss number of treatments, length of treatments
 - Discuss ability to manage complex patients or manage a range of patients in the area

We have discussed students, I would now like us to focus on new graduates and how they transition from student to new graduate for the following questions. Can you tell me about how your hospital supports new graduates for example do you have an orientation / mentoring process.

- 6. In your clinical area, what clinical load would you expect most new graduates would manage?
 - Discuss number of treatments and length of treatment
 - Discuss ability to meet caseload

- 7. Do you feel that new graduates are adequately prepared for the other activities involved in the delivery of services ie. not those specifically related to direct patient care?
 - Discuss new graduate ability to complete activities not directly associated with patient care
 - Discuss other factors such as self-directed learning, teamwork, professionalism
- 8. What, if anything, would enhance new graduate preparation to be work ready? When should this be provided and by whom?
 - Discuss student preparation to commence work as new graduate. Eg. Student preparation be longer / more clinical placements
 - Discuss whether preparation is at uni, health services, profession
 - Discuss new graduate support to enhance service delivery

Appendix 2 – Ethical approvals

Study 1, Study 2 and Study 4

Metro South Health Amended Letter Enquiries to: Metro South Human Research Ethics Committee 07 3443 8340 Phone. Fax HREC Ref. 07 3443 8003 HREC/15/QPAH/133 E mail: EthicsResearch PAH@health gld gov au Miss Susan Bathersby Department of Physiotherapy Princess Alexandra Hospital 199 Joswich Road WOOLLOONGABBA QLD 4102 Dear Miss Bathersby HREC Reference number: HREC/15/QPAH/133 Protocol title: An investigation into the contribution of pre-registration physiotherapy students on five week clinical placements to the delivery of physiotherapy services within Queensland Health. Thank you for submitting the above research protocol to the Metro South Health Human Research Ethics. Committee for ethical and scientific review. This protocol was considered by the Low Risk Review Panel and will be ratified at the next Metro South HREC meeting. You are reminded that this latter constitutes ethical approval only. You must not commence this research protocol at a site until separate authorisation from the Hospital Health Service Chief Executive (CE) or Delegate of that site has been obtained. A copy of this approval must be submitted to the Research Govornance Office(r)/Delegate of the relevant institution with a completed Site Specific Assessment (SSA) Form for authorisation from the CE or Delegate to conduct this research at the sites listed in the appendix. If this study currently receives grant funding, please remember to forward a copy of this approval letter to the relevant Grants Office of the Administering Institution(s) for the grant. I am pleased to advise that the Low Risk Roview Panel of the HREC has granted approval of this research protocol. The documents reviewed and approved include: Document Version Date Low or Negligible Risk Research Application Form 20 February 2015 Participant Information Sheet - Directors of Physiotherapy 3 9 March 2015 Participant Information Sheet - Clinical Educators 9 March 2015 3 Survey Phase 1 - Directors of Physiotherapy 5 5 February 2015 Survey for Clinical Educators - Phase 1 4 5 February 2015 Response to Request for Further Information 1 9 March 2015

This HREC approval is valid from 9 March 2015 until 9 March 2017

Please note the following conditions of approval:

1. The Principal Investigator will immediately report anything which might warrant review of ethical approval of the protocol in the specified format, including unforeseen events that might affect continued ethical acceptability of the protocol. Serious Advarse Events must be notified to the HREC as soon as possible. In addition the Investigator must provide a summary of the advarse events, in the specified format, including a comment as to suspected causality and whether changes are required to the Patient Information and Consent Form. In the case of Serious Advarse Events occurring at the local site, a full report is required from the Principal Investigator, including duration of treatment and outcome of the event.



Page 1 of 3

Metro South Health



Enguities to: Phone: Fax: HREC Ref: E-mail: Metro South Human Research Ethics Committee 07 3443 8049 07 3443 8049 HREC/17/OPAH/285 Ethicuresearch cath@health.cld.cov.au

Ms Susan Stoikov Physiotherapist Physiotherapy Department 199 Ipswich Road Wooloongabba Qid 4102

Dear Ms Stolkov

HREC Reference number: HREC/17/QPAH/265 Project Title: Perceptions of physiotherapists on the contribution of physiotherapy students to the delivery of health services and the transition from student to new graduate

Thank you for submitting the above research protocol to the Metro South Human Research Ethics Committee for ethical and scientific review. This protocol was first considered by the Human Research Ethics Committee (HREC) at the meeting held on 9 May 2017.

You are reminded that this letter constitutes ethical approval only. You must not commence this research protocol et a sile until separate authorisation from the Metro South Chief Executive or Delegate of that sile has been obtained.

A copy of this approval must be submitted to the Research Governance Office(r)/Delegate of the relevant Institution with a completed Sile Specific Assessment (SSA) Form for authorisation from the Chief Executive or Delegate to conduct this research at the siles faled in the appendix.

If this study currently receives grant funding, please remember to forward a copy of this approval lefter to the relevant Grants Office of the Administering Institution(a) for the grant.

I am pleased to advise you that the research protocol meets the requirements of the National Statement on Ethical Conduct in Human Research (2007) and ethical approval has been granted. The documents reviewed and approved include:

Document	Version	Date
MSF31 Submission checklist form		12 April 2017
Coverletler	1	10 April 2017
NEAF - Submission Code: AU/1/C62D213		10 April 2017
Research Protocol	2	10 April 2017
Participant Information Sheet/Consent form	2	10 April 2017
Questions for Recent Graduates	4	27 February 2017
Quastions for Physiotherapists	4	27 February 2017
Demographic data collection - Recent Graduates	1	1 April 2017
Demographic data collection - Physiotherapist	1	1 April 2017
Various curriculum vitae (for information)		

This HREC approval is valid from 23 May 2017 until 23 May 2020.

Please note the following conditions of approval:

 The researcher must provide an annual report to the HREC and a final report on completion of the study, in the specified format. Approval is contingent upon submission of this.

Appendix 3 – Study 1 publication

CSRO PUBLISHING Australian Health Review, 2018, 42, 720 http://dx.doi.org/10.1071/AH16181_CO

Corrigendum

Clinical activity profile of preregistration physiotherapy students during clinical placements

Susan Stoikov, Kassie Shardlow, Mark Gooding and Suzanne Kuys

Aust Health Review 2017; doi: http://dx.doi.org/10.1071/AH16181

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Clinical activity profile of preregistration physiotherapy students during clinical placements

Susan Stoikov^{1,2,5} BPhty(Hons), MPH, Physiotherapist

*Kassie Shardlow*³ BPhty, Statewide Physiotherapy Clinical Education and Training Program Manager

*Mark Gooding*⁴ BPhty (Hons), GCertHlthServMt, GCertHlthProfEd, Queensland Physiotherapy Placement Coordinator

*Suzanne Kuys*² BHumanMovSt, BEdSt, BPhty(Hons), GDipPH, PhD, National Head, School of Physiotherapy

¹Physiotherapy Department, Princess Alexandra Hospital, Metro South Hospital and Health Service, 199 Ipswich Road, Woolloongabba, Qld 4102, Australia.

²School of Physiotherapy, Australian Catholic University, 1100 Nudgee Road, Banyo, Qld 4014, Australia. Email: suzanne.kuys@acu.edu.au

³Metro South Hospital and Health Service, C/- Logan Hospital Physiotherapy Department, PO Box 6031, Yatala, Qld 4207, Australia. Email: Kassie.Shardlow@health.qld.gov.au

⁴Physiotherapy Department, Townsville Hospital and Health Service, IMB 1, Post Box 670, Townsville, Qld 4810, Australia. Email: Mark.Gooding@health.qld.gov.au

⁵Corresponding author. Email: susan.stoikov@health.qld.gov.au

Abstract

Objective. The aim of the present study was to determine the clinical activity profile of preregistration physiotherapy students during clinical placements and their clinical activity contribution to health service delivery.

Methods. Clinical activity data for 2014 were obtained from five Queensland public sector hospitals providing preregistration physiotherapy students clinical education in three key clinical areas (cardiorespiratory, musculoskeletal and neurological) over four 5-week placement blocks. Data regarding the number of student occasions of service (OOS) and the length of the OOS (LOOS) were collected to determine the average OOS and LOOS per student in each clinical area.

Results. Twenty weeks of student data were collected from each hospital in each clinical area, representing 29.1% of cardiorespiratory, musculoskeletal and neurorehabilitation student placements. Students completed 19 051 OOS. The average OOS per student per block for cardiorespiratory, musculoskeletal and neurorehabilitation placements was 98.3, 74.0 and 72.4 respectively. Two-way ANOVA revealed a main effect of weeks (F=402.1, P<0.001) and clinical area (F=1331.5, P<0.001) for LOOS.In addition, an interaction was found between clinical placement week and clinical area for LOOS (F=8.4, P<0.001).

Conclusions. Student clinical activity data are useful for understanding the student contribution to health services. Student contribution appears to increase throughout the clinical placement and consideration should be given to the clinical educator: student ratio to enhance overall student contribution.

What is known about the topic? Quantitative data describing physiotherapy student clinical care activity during placements are limited.

What does this paper add? This paper profiles physiotherapy student clinical care activity and the changes occurring over 5-week placements.

What are the implications for practitioners? Physiotherapy students provide clinical activity for health services that changes over their 5-week placement. Student clinical activity should be considered when responding to placement demand and planning service delivery.

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Introduction

Preregistration physiotherapy student clinical education within clinical practice settings is a core component of developing competent, effective and safe clinicians.¹ The physiotherapy profession requires a significant level of clinical training before registration, with clinical placements needing to occur in various health settings and clinical areas.² Accreditation requirements for entry-level physiotherapy programs in Australia indicate that students must complete placements that provide opportunities to develop competence in the key areas of physiotherapy (cardiorespiratory, musculoskeletal and neurological physiotherapy).¹ Providing clinical placements can result in many benefits and challenges to healthcare services. Benefits include encouraging staff to engage in reflective practice³ and increased exposure to evidence-based practice and current knowledge.⁴ Reported barriers include managing time constraints and coping with challenging students.⁵ Although early physiotherapy research identified that student clinical placements within healthcare services enhance overall productivity,⁶ quantitative data identifying student contribution to service delivery are limited. These data would be valuable to inform health policy, planning and resourcing requirements of clinical placements, as well as enhancing capacity and skill to provide quality clinical education.

One aspect of student contribution that has attempted to be quantified is student productivity. Clinical educator (CE) and student occasions of service (OOS) and time spent treating patients have been measured, with comparisons made before, during and after student clinical placements.^{7,8} However, to date, no study has investigated the volume of, or changes in, physiotherapy student OOS or length of OOS (LOOS; treatment time) throughout a clinical placement across different clinical areas. Another factor that may affect student contribution is the CE : student ratio. A systematic review found that there was little quantitative evidence to suggest the most effective or productive CE : student ratio.⁹ Further research is required to inform best practice clinical education.

The present study investigated the quantitative contribution preregistration physiotherapy students make to physiotherapy service delivery in Queensland public sector hospitals. The primary aim of the study was to determine the profile of student clinical care activity, including identifying the volume of and changes in student OOS and LOOS across a placement in three key clinical areas of physiotherapy practice and hospitals. The secondary aim of the study was to identify the effect of CE : student ratios on student clinical activity.

Methods

Participants

Five Queensland public sector hospitals participated in the present study (three metropolitan and two regional hospitals). Hospitals were selected based on hospital type and location, the hospital's information management system and the volume of physiotherapy students undertaking clinical placements in the three clinical areas at each hospital. The type of hospital was determined using the peer group descriptions 'principal referral hospital' and 'public acute Group A hospitals'.¹⁰ Principal referral hospitals are large tertiary teaching hospitals that, on average, complete 74 631 acute weighted separations and have

a wide variety of speciality areas.¹⁰ A public acute Group A hospital completes, on average, 27 155 acute weighted separations, but does not have the same breadth of speciality areas as a principal referral hospital.¹⁰ The present study was approved by the Metro South Health Human Research Ethics Committee (HREC/15/QPAH/133).

Procedures

Student clinical activity data from 2014 were obtained from each participating hospital in three key clinical areas: cardiorespiratory, musculoskeletal and neurorehabilitation. For each clinical area, data were obtained from four clinical placement blocks, each of 5 weeks in length, providing 20 weeks of clinical activity data for each clinical area for each hospital. Placement blocks were selected to ensure all Queensland universities providing physiotherapy programs were represented for each clinical area and data were available across the calendar year to capture seasonal variation and student prior clinical placement experience.

In the present study, 'clinical activity data' refers to the reported clinical care activities provided to patients and other activities related to the delivery of health services. Clinical activity data used in the present study were obtained from hospital-specific information management systems in which students recorded this information as part of routine practice. Data were then imported into Microsoft (Armonk, NY, USA) Excel format for analyses. Information regarding the total number of 2014 clinical placements, CE: student ratio at each hospital and the total number of Queensland public sector hospital physiotherapy clinical placements in the three key clinical areas in 2014 was also obtained from the Queensland Physiotherapy Placement Collaborative.¹¹

Measures

Student clinical activity was determined by student-documented OOS and LOOS. For the purposes of the present study, an OOS was defined as a single interaction between a student physiotherapist and patient to deliver care that affected patient health outcomes. Due to different information management systems recording group data differently, groups were recorded as one OOS. LOOS describes the time, in minutes, to provide an OOS.¹²

Analysis

All data were deidentified before being pooled and analysed. Descriptive statistics were used to describe total student OOS, combined hospital student OOS and the average OOS per student in each placement week by clinical area. Percentage changes for each week of the placement, as well as overall change from Week 1 to Week 5 were calculated. No *P*-values are reported for OOS data due to deidentified data resulting in a count of OOS.

LOOS data were examined for outliers with upper and lower limits for an OOS set at 210 and 10 min respectively. The lower limit represents the minimum LOOS as defined by governing rules for clinical activity data recording.¹¹ An upper limit of 210 min was selected because a longer student treatment time for a single OOS would be unreasonable. Data falling outside this range were removed for LOOS analysis, but were included for OOS analysis. Two-way analysis of variance (ANOVA) was used to examine the effects of clinical area and placement week on LOOS. Hospital variability in each clinical area was described by the average OOS per student per block to account for the different number of students at each hospital in the three clinical areas. The average OOS per student per block was determined by calculating the total OOS in each hospital and correcting for the total number of students in the clinical area.

Total OOS completed by a group of students during a clinical placement and an individual student were compared for different CE : student ratios. Comparison between total OOS could only be performed in musculoskeletal and neurorehabilitation placements due to some limitations in the cardiorespiratory data. Combined student data at two hospitals hosting separate cardiorespiratory clinical placements simultaneously could not be separated for accurate data analysis. A Welch two-sample *t*-test was used to determine the differences in CE : student ratios within each clinical area. Statistical analyses were performed using SPSS v23 (IBM Corp, Armonk, NY) with significance set at two-tailed P < 0.05.

Results

Four of the five participating hospitals are considered principal referral hospitals (Hospitals 1, 2, 3 and 5), with the fifth a public acute Group A hospital.¹⁰ Four different information management systems were used in the five hospitals to collect student clinical activity data.

In all, data were collected for 300 weeks of student clinical activity data from all hospitals, representing 29.1% of all 2014 Queensland public sector hospital clinical placements in the key clinical areas. This represented 27.6% of all 2014 cardiorespiratory placements, 28.1% of all 2014 musculoskeletal placements and 31.9% of all 2014 neurorehabilitation placements. Students at the five hospitals produced 19 051 OOS across these three clinical areas.

Occasions of service

Across all clinical areas, total OOS increased, on average, by129% across the 5 weeks of the clinical placement. Weeks 1-3 saw the most growth in OOS in all clinical areas, with 100%, 70% and 80% increases in OOS in cardiorespiratory, musculoskeletal and neurorehabilitation placements over this time frame. Figure 1 illustrates the average OOS per student per week in each key clinical area, with growth observed from Week 1 to Week 4, plateauing in Week 5. When all clinical placements are considered for each clinical area, cardiorespiratory students, on average, produced the most OOS for a block (98.3 OOS per student per block). The average number of OOS per student per block was similar for musculoskeletal and neurorehabilitation placements (74.0 and 72.4 OOS per student per block respectively). Cardiorespiratory placements also produced more OOS than musculoskeletal and neurorehabilitation placements in each week of a clinical placement.

Length of OOS

Identification of outliers resulted in 138 (0.72%) LOOS outside the limits set, which were removed for analysis. Two-way ANOVA revealed a main effect of weeks (F=402.1, P<0.001) and clinical area (F=1331.5, P<0.001) for LOOS. The average LOOS over 5 weeks was 49.6 min (95% confidence interval (CI) 49.0–50.2) for cardiorespiratory placements, 58.0 min (95%CI 57.2–58.8) for musculoskeletal placements and 74.4 min (95%CI 73.7–75.1) for neurorehabilitation placements. A significant interaction was found between clinical placement week and clinical area (F=8.4, P<0.001) on LOOS. Further, LOOS differed significantly between all clinical areas in each week (P<0.01), with cardiorespiratory placements having the shortest LOOS in each week and neurorehabilitation placements having the longest LOOS over the 5 weeks (Fig. 2).

Hospital variability

Across the three key clinical areas, average OOS per student varied between hospitals (Fig. 3). There was a 110% variation in cardiorespiratory OOS across the different hospitals, ranging from 62.9 to 132.0 OOS per student per block (in Hospitals 1



Fig. 1. Average occasions of service (OOS) per student per block in each clinical area (cardiorespiratory, musculoskeletal and neurological) for different placement weeks.



Fig. 2. Average $(\pm 95\%$ confidence interval) length of occasion of service (LOOS) by placement week in each clinical area (cardiorespiratory, musculoskeletal and neurological).



Fig. 3. Average number of occasions of service (OOS) per student per block in each of the five hospitals.

and 5 respectively). Similarly, there was a 113% variation in neurorehabilitation OOS, ranging from 50.0 to 106.4 OOS per student per block (in Hospitals 2 and 3 respectively). However, there was only a 20% variation in average OOS per student per musculoskeletal block, ranging from 66.7 to 80.1 OOS per student per block (in Hospitals 5 and 3 respectively).

Comparisons of CE : student ratios

CE : student ratios in participating hospitals ranged between 1 : 2 and 1 : 4. For musculoskeletal placements, there was a significant difference (P < 0.001) between total OOS per block for students in a 1 : 3 CE : student ratio (221.3 OOS per block; 95%CI 205.6–237.0) compared with those in a 1 : 4 ratio (294.9 OOS per block; 95%CI 282.8–306.9). In the case of neurorehabilitation placements, there was no significant difference (P=0.28) between total OOS per block for students in a 1 : 2 CE : student ratio (162.2 OOS per block; 95%CI 141.2–183.1) compared with those in a 1 : 3 ratio (191.8 OOS per block; 95%CI 142.6–240.8). However, when the average OOS per student per block was compared between difference in the average number of OOS an individual student could produce per block in any clinical area.

Discussion

Student contribution to physiotherapy service delivery has not been quantified and investigated previously. To date, it has been unclear as to the number of OOS and the LOOS physiotherapy students complete while on 5-week clinical placements. The present study found that student OOS increased throughout a placement, with a concomitant reduction in LOOS. Students on cardiorespiratory placements completed a higher number of OOS than in other clinical areas. The CE : student ratio had some effect on the student contribution to service delivery, although this was not consistent across all clinical areas. This information can be useful to CEs, health service managers, universities and





Fig. 4. Average occasions of service (OOS) per student per block in each clinical area (cardiorespiratory, musculoskeletal and neurological) according to different clinical educator (CE): student ratios. Data are the average \pm s.e.m.

physiotherapy professional governance to benchmark student clinical activity, plan health service delivery and the associated resource requirements of clinical placements.

Not surprisingly, student OOS increased across Weeks 1–5 of the placement block. This is in contrast with findings in previous studies,^{8,13} where no change in OOS during clinical placements was reported for the student–supervisor team in the case of occupational therapy and dietetic students. Although the differences were not statistically significant, Rodger *et al.*¹³ demonstrated that the number of OOS had periods of growth during placements of longer length (10–14 weeks), with the main growth occurring between Weeks 1 and 3. This early period of growth was also present in the present study up to Week 4. This may suggest that the early weeks of clinical placements allow students to apply theoretical knowledge and gain a foundation in the clinical area.

As the number of OOS increased, LOOS decreased. It is expected that students develop a variety of skills and refine these throughout their clinical placements, fostered by experiential learning and CE facilitation. One strategy that CEs may use to increase student learning is to increase the number of OOS undertaken by students as a way of preparing students for entry into the profession. Hughes and Desbrow⁷ reported similar findings, with a significant reduction in LOOS over 10-week dietetic student placements with a trend for increasing OOS each week. A reduction in the clinical educator supervision of students over the 10 weeks was also found,⁷ suggesting that students develop some level of independence during clinical placements that increases over the duration of the placement. Thus, it would seem reasonable to assert that student OOS increase and LOOS decreases as a result of increasing experience in a clinical area as the placement weeks progress, enhancing student contribution to the health service in the later weeks of placements. Therefore, shorter placements may affect the ability of a group of students to maintain the required service requirements of a clinical area.

Variation between clinical areas in the number of OOS offers some insight into the difference in LOOS in each clinical area and likely reaffirms what is informally understood by the physiotherapy profession. Neurological patients often take longer to treat than in-patient cardiorespiratory patients and musculoskeletal out-patients with designated appointment times. The results of the present study indicate that clinical areas that provided fewer student OOS tended to spend more time per OOS, such as in neurorehabilitation. Due to the increased length per OOS in neurorehabilitation, the total number of student OOS may be limited compared with other clinical areas. Therefore, it is imperative to consider clinical areas separately when analysing clinical placements due to the varying needs and clinical requirements of patients.

Hospital variance in the average OOS per student per block in the cardiorespiratory and neurorehabilitation clinical areas is an interesting finding and requires careful consideration. Selection of clinical placement blocks ensured that all universities were represented, which aimed to achieve a balance between those students who were attending their first placement and those who had completed several clinical placements previously. These data are representative of the 2014 calendar year and include a spread of placements across months in an attempt to accommodate any seasonal changes in service delivery demands. This suggests that the hospital variability is due to individual hospital factors, which may include clinical placement structure and culture, CEs' preferences and the amount of learning and other activities students undertake that do not directly produce OOS. Musculoskeletal placements demonstrated more consistency in average OOS per student per block, and this may be due to the nature of musculoskeletal placements that use appointment scheduling.

It appears that changing CE: student ratios had little effect on the average OOS produced by an individual student over the course of a placement. This suggests there is no ceiling effect on patient OOS with a CE : student ratio up to 1 : 4. Thus, increasing student numbers per CE could potentially result in increased OOS for the health service. This is supported by a previous study investigating a CE : student ratio of 1 : 2 model, where two students were more productive than one student or a physiotherapist alone.¹⁴ In contrast, a US study found no change in productivity with between four and eight students,¹⁵ suggesting that student, facility and workplace needs are important when considering total student numbers. Despite this, there appears to be agreement that students do not reduce the productivity of a health service. Therefore, it is reasonable to assert that increasing student numbers per CE can result in increased OOS for the health service. Thus, consideration should be given to the CE: student ratio to potentially enhance the student contribution and as a method of managing placement demand.

Study limitations

Although the present study provides an understanding of student contribution to physiotherapy clinical activity, it does have some limitations. The use of retrospective clinical activity resulted in limited ability to check the accuracy of data collected and entered. However, health services would regularly use these data to inform service delivery and thus the present study provides an analysis on real-world clinical activity data. Furthermore, due to differences in data information management systems, group OOS were allocated a single OOS. At those hospitals and in clinical areas where groups are frequently held, OOS may have been underestimated.

Conclusion

Hospitals that actively engage in providing clinical placements for preregistration physiotherapy students should consider using student clinical activity data when planning both service delivery and placement demand. Understanding student contribution to service delivery allows for effective workload management and, in fact, with careful consideration of hospital logistics may enhance the overall clinical care activity of the service. Furthermore, the results of the present study should encourage hospitals to consider their CE : student ratio and clinical education resourcing. Although the present study has provided valuable information, in order to fully appreciate and understand the student contribution to service delivery, further research is necessary to understand placement models and the effect a group of students has on service delivery compared with a registered physiotherapist.

Competing interests

The authors have no competing interests.

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Susan Stoikov, Lyndal Maxwell, Jane Butler, Kassie Shardlow, Mark Gooding & Suzanne Kuys

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