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From the Editor

Dr Suzana Sukovic[1]
Editor-in-Chief

Our editorial team is pleased to present this second issue of the journal, which completes our first year of publication. The journal was launched on 8 May this year at the Health Education in Practice Symposium by Ms Elizabeth Koff, Secretary of NSW Health, who described it as a 'significant milestone in the HETI journey and a stepping stone in NSW health education'. Since the launch, the journal has been registered as an open-access publication and has continued to gain visibility among professionals and academics in health education. Online statistics from the journal website, a measure of journal visibility, indicate growing interest: on average, abstracts of articles published in the first issue were viewed around 640 times and full text versions approximately 270 times. The most frequently viewed article is fast approaching 900 abstract views and 400 views of the full text.

Image: Elizabeth Koff, Secretary of NSW Health, launching the journal at the Health Education in Practice Symposium, 8 May 2018

This second issue continues to showcase research and evaluation, which underpin and inform quality education. Considering the complexities of health education, it is hardly surprising that the interprofessional nature of collaboration, learning and research is emerging as a theme across the articles in this issue. The only article in our professional stream (Education-in-practice) titled *Curriculum resource co-design and development for a digital health workforce and digital health ready graduates* is a result of collaboration between NSW Health and the University of Sydney. McGregor et al. describe the

development of a curriculum resource based on extensive stakeholder consultation and co-design. A Massive Open Online Course (MOOC) is being created as part of a Digital Health Curriculum for NSW Health to support the development of foundational data capabilities of the NSW Health workforce and University of Sydney clinical health degree graduates. As an open access resource, the MOOC will be accessible to anyone who wishes to learn about data in health contexts.

The other three articles in this issue are published in the scholarly, Research and Evaluation stream. Nisbet et al. write about the process of developing an online interprofessional learning placement (IPL) resource. The authors used design research methodology to integrate a range of stakeholder perspectives, and to build and evaluate the online resource, which can support IPL across curricular and placement settings. The theme of interprofessional collaboration and learning continues in the article *Measured and perceived handover effectiveness among nurse, paramedic and medical students*. Hlushak et al. write about their study into measured and perceived handover effectiveness during two clinical simulations at Charles Sturt University. They discuss the loss of critical clinical and non-clinical data, and consider approaches to enhance education about handover in interprofessional teams.

Telehealth is well recognised for its potential to improve health care in rural Australia. Pit and Bailey researched medical students' understanding of and attitudes to healthcare as part of the preparation for their future professional work. The authors conducted focus groups at the end of a year-long rural placement and described a range of issues associated with telehealth, pointing out the need for rural clinicians to lead the development and use of telehealth.

With nine quality articles published, the journal is finishing its first year on a high note. On behalf of our editorial team and HETI as the publisher, I wish to thank all our authors. I also wish to thank all the reviewers, whose valuable advice ultimately improved the quality of the work published. Please see the following acknowledgment of reviewers who contributed to the journal this year. Members of the Editorial Board have also made an invaluable contribution and I wish to thank them all for their advice, promotion, reviews and support. I hope that our readers will enjoy the result of our collective work.

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REVIEWER ACKNOWLEDGEMENT

On behalf of the *Health Education in Practice: Journal of Research for Professional Learning* editorial team, I would like to thank all colleagues who have generously contributed to the journal as peer reviewers during 2018. This was the journal's first year of publication and we would like to acknowledge the efforts of reviewers, many of whom do so on personal time, to enhance the content of the journal. The reviewers' contributions were invaluable to the journal's first issues and enabled us a successful first year of publication. We appreciate their commitment to the journal and look forward to developing ongoing relationship with our reviewers.

Dr Suzana Sukovic, Editor-in-chief

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EDITORIAL NOTE

The journal editorial team acknowledges that the editor-in-chief, Dr Suzana Sukovic, is a co-author of the paper, 'Curriculum resource co-design and development for a digital health workforce and digital health ready graduates' (McGregor et al.). As outlined in journal polices, Dr Sukovic was not involved in any aspect of the editorial process. Blind peer-reviewing was managed by the Journal Manager and all other aspects of the publishing process were managed by the editorial team, excluding editor-in-chief. This practice follows the recommendations by COPE (https://publicationethics.org/).

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Education-in-practice article
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Curriculum resource co-design and development for a digital health workforce and digital health ready graduates

Deborah McGregor[1], Ida Rohne[2], Annette Solman[3], Tim Shaw[1], Wilson Yeung[2], Aaron Jones[4], Andrea Herring[3], Suzana Sukovic[3], Amanda Culver[3], Jane Shrapnel[5] and Tricia Linehan[6]

Abstract

Demand for an eHealth capable workforce is highlighting the need for eHealth education and training across tertiary education and workforce professional development contexts. NSW Health and the University of Sydney have collaborated to develop learning resources as a component of a comprehensive Digital Health Curriculum for NSW Health. Learning resource development is guided by the eHealth Capabilities Framework and the NSW Health Analytics Framework, to produce a Massive Open Online Course (MOOC) relevant to the health workforce and health degree graduates. A co-design process, involving broad stakeholder and subject matter expert consultation from across health, education, government and non-government organisations, is being applied to develop quality learning resources. Initial learning opportunities focus on the foundation level digital health capabilities anticipated of the health workforce. In addition, there is a focus on discussions regarding future curriculum development activities at the level of intermediate and advanced level capabilities relevant to workforce in leadership roles or seeking career opportunities specialising in the growing professional fields of digital health and data analytics.

Keywords: digital health, workforce education, graduate education, co-design

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INTRODUCTION

Digital health is rapidly being realised as the future of healthcare (Consumers Health Forum of Australia 2018). Demand for an eHealth ready and capable workforce (Department of Health and Aging 2011a, 2011b; Health Workforce Australia 2013) is highlighting the need for eHealth education and training across tertiary education (Gray, Dattakumar & Maeder 2014) and workforce professional development contexts (Australian Digital Health Agency 2018). Interactions around health, wellness and healthcare delivery increasingly incorporate digital technologies and systems that:

1. monitor, track and transmit health data, such as wearables and apps
2. support communication and interactions with and between healthcare providers and health consumers, such as telehealth services, and
3. capture, manage and provide access to data to inform quality healthcare, such as electronic medical records (eMR) (Shaw et al. 2017).

Ehealth is recognised as a key element in recent Australian health reforms, with the potential to improve the delivery of quality patient care and achieve better health outcomes (NSW Health 2016). As digital health technologies become more pervasive, health services and universities must consider coordinated approaches to education and training to ensure that the current and future health workforce is suitably prepared to practice within digital environments.

The recently published 'eHealth Capabilities Framework for Graduates and Health Professionals' (Brunner et al. 2018) describes the foundational level eHealth knowledge and skills expected of the current health workforce and of tertiary health degree students at graduation. The framework was developed as a component of the 'eHealthMap' project (McGregor et al. 2017) to guide health curriculum design, and is based on current evidence and qualitative research that identified stakeholder perceptions of eHealth capabilities. Stakeholders involved in this research had expertise or experience in eHealth education, practice, or policy, including widespread representation from NSW Health Organisations, Pillars and Local Health Districts. Adopted by NSW Health as an appropriate representation of the foundation capabilities for the health workforce, the framework outlines four high level capability domains, incorporating:

1. Digital Technologies, Systems and Policies
2. Clinical Practice and Applications
3. Data Analysis and Knowledge Creation, and
4. System and Technology Implementation.

A strategic collaborative project between NSW Health and the University of Sydney is overseeing the development of learning resources as a component of a comprehensive Digital Health Curriculum for NSW Health. The development of learning resources is guided by the eHealth Capabilities Framework and aligns with the

workforce expectations for clinical and non-clinical staff outlined in the NSW Health Analytics Framework (NSW Ministry of Health 2016):

1. Learners can carry out basic interpretation of data (e.g. assess strengths and weaknesses of data assets in the context of service delivery)
2. Learners have a minimum capability level to generate and interpret the specific reports that are required to make evidence-based decisions (e.g. policy, planning or clinical decisions).

Initiated in January 2018, the project is overseen by the NSW Health Workforce Skills and Training Working Group (WSTWG), which is responsible for providing direction, oversight and input into the development, implementation and ongoing review of priority actions allocated by the NSW Health Analytics Steering Committee. A subset of the WSTWG, the Curriculum Development Subgroup, is specifically responsible for providing the direction, review and contribution to curriculum and education resource development. The committee and working group include membership from the NSW Health Local Health Districts, eHealth NSW, Health Education and Training Institute (HETI) and the University of Sydney. As such, the project aligns with priority actions outlined by the NSW Ministry of Health to work with the relevant stakeholders in the health professional education and training sector to strengthen relevant curricula (NSW Ministry of Health 2016). It also contributes to efforts to embed research outcomes into educational practice.

MOOC DESIGN AND DEVELOPMENT

Initial project outputs include the development and delivery of a Massive Open Online Course (MOOC). A MOOC is an open access web-based learning resource aimed at large-scale participation. It has been asserted that online courses, such as MOOCs, can help experienced learners, including health workforce undertaking professional development, to deepen their knowledge and improve skills in a specific area (Harder 2013; Steffens 2015). The importance of self-development and lifelong learning is well acknowledged and learning increasingly takes place in virtual communities (Kesim & Altinpulluk 2015; Steffens 2015), where people can learn in digital networks and using open educational resources (Kop 2011). MOOCs have been situated in a diversity of learning theories (Anders 2015). Siemens (2005) proposed the theory of Connectivism applicable to the digital age, where learning knowledge is transformed and transferred through the interactions of people, especially in a web environment (Kop 2011). Others apply a more content-focused approach, delivering multimedia instructional content, and apply a cognitive-behaviorist or instructivist pedagogical approach (Rodriguez 2012).

Several examples exist where MOOCs have been used in medical and health sciences education (Harder 2013; Swigart & Liang 2016), including instances where MOOCs have been approved for academic credit and certified as eligible for continuing professional development (CPD) credit (Harder 2013). It has been suggested that MOOCs are potentially superior to other forms of distance education, such as

podcasts, because they can enable interaction, such as quiz taking and online discussions, that can reinforce mastery of learning material (Harder 2013). Research indicates that half of MOOC registrants are employed full-time, with a majority already holding a higher education qualification (Glass, Shiokawa-Baklan & Saltarelli 2016), which aligns with the profile of typical health workforce seeking CPD opportunities.

'Using clinical health data for better healthcare' is the second MOOC to be produced by the University of Sydney on the topic of eHealth. The inaugural MOOC, 'eHealth – More than just an electronic record' (Coursera 2018), has to date attracted more than three thousand active learners globally and generated enthusiasm for the development of further learning resources relevant to the NSW Health workforce, showcasing local digital health contexts and health data use.

The aim of 'Using clinical health data for better healthcare' is to enable learners to understand and perform information seeking, knowledge creation and decision making utilising health data contained within digital systems. The course provides insight into the use of healthcare data, including an overview of best practices and the practical realities of obtaining useful information from digital health systems, via the understanding of the fundamental concepts of health data analytics. Learners come to understand why data quality is essential in modern healthcare, as they are guided through various stages of the data life cycle, starting with the generation of quality health data, through to discovering patterns and extracting knowledge from health data using common methodologies and tools in the basic analysis, visualisation and communication of health data. In doing so, learners explore current healthcare delivery contexts, and future and emerging digital health data systems and applications that are rapidly becoming tomorrow's reality.

The MOOC comprises four learning modules targeting the following learning objectives:

1. Identify digital health technologies, health data sources, and the evolving roles of the health workforce in digital health environments
2. Understand key health data concepts and terminology, including the significance of data integrity and stakeholder roles in the data life cycle
3. Use health data and basic data analysis to inform and improve decision making and practice
4. Apply effective methods of communication of health data to facilitate safe and quality care.

Each MOOC module comprises multiple learning objects (LOs). While many definitions have been proposed (Churchill 2007), in simple terms, a LO is described as, 'any reusable digital resource that is encapsulated in a lesson or assemblage of lessons grouped in units, modules, courses, and even programmes' (McGreal 2004). The MOOC contains short videos (a maximum of seven to eight minutes each), which include: mini-lectures, subject matter expert interviews, role plays or animations, practice examples and case studies. Learning activities encourage an enquiry-based learning approach, such as

forums for discussion and debate to actively share knowledge, as well as self-assessments to enhance engagement. Modules contain both practice and graded quizzes, typically presented in multiple-choice question format, and short peer-assessment assignments.

Stakeholders in the design and development of the MOOC include clinical, administration, executive and academic subject matter experts (SMEs), health consumers, educational designers, media producers, library and copyright experts, and project managers. Subject matter experts are pivotal to the development of quality learning resources. This project has involved extensive consultation with SMEs across the health landscape, including NSW Health, universities and other government and non-government organisations. For example, SME consultations have included interviews and collaborative resource development with clinical leaders, information officers, eHealth implementation managers, data analysts and corporate system managers. Their expert subject knowledge and experience contributes to learning object design, scripting, and presentation of the learning content in the production of MOOC videos. This co-design approach ensures the development of relevant learning resources that are pitched at the right level for end users' needs; it is an approach that also addresses challenges commonly experienced in the implementation of online learning resources.

Intended learners include health care professionals, clinical support staff, managers, researchers and student health professionals. While the NSW Health workforce and University of Sydney clinical health degree graduates form the core intended audience, the MOOC will also be potentially relevant to a broader audience as a resource for global learners. Learners typically complete a total of 12–25 self-directed learning hours, comprising approximately three to five hours a week, completed over four to five weeks. Learning is asynchronous, meaning that learners can join the course and participate at any time. Access to the MOOC is free, with learners having the option to purchase a certification of completion. MOOC production is due for completion in early 2019, with a pilot involving NSW Health workforce of up to three of the learning objects anticipated in the first quarter of 2019. The evaluation of these piloted areas will further inform the production of material, both within the MOOC education design and within other online learning contexts.

FUTURE DIRECTIONS AND OPPORTUNITIES

The MOOC presents opportunities to direct learners, via embedded resources, hyperlinks, and reference lists, to existing information and support services produced by stakeholders in digital health and data use, including eHealth NSW and the Australian Digital Health Agency. It also has the scope to direct relevant learners to further learning and development opportunities contained within the NSW Health state-wide Learning Management System, 'My Health Learning' (MHL), such as modules on privacy and the use of health data for analytics purposes, and specific digital health systems training, e.g. the eMR Learning Path.

Pedagogical designs and learning objects are being produced to standards appropriate for the re-use of resources across other learning platforms. This creates opportunities for individual resources to be repurposed across a variety of learning contexts. For example, videos may be used by health staff during in-services and staff orientation, or used by academics during lectures or the creation of online courses. Repurposing opportunities are multiple, including the following:

1. Incorporating materials into a larger national repository of education and training resources coordinated by a central managing body, such as the Digital Health Cooperative Research Centre (Digital Health CRC 2018)
2. Application of course pedagogy to the development of an 'Open Learning Environment' course for University of Sydney students, where learners can gain credit points towards their qualification and course completion appears on their academic transcript, and
3. Development of a learning pathway within the MHL Learning Management System, which would enable tracking of NSW Health staff learner analytics and course completion for continuing professional development (CPD) credit.

The resources will be of potential interest to professional associations, government agencies and other academic and health organisations for integration into workforce development programs.

This project has the potential to influence curricula in health education and professional development for the health workforce and health graduates. In line with the knowledge and skills outlined in the eHealth Capabilities Framework, learning opportunities move beyond a focus on digital and technical skills to consideration of much broader professional competencies and attributes relevant to working in digital health environments, including quality and safety, consumer-centeredness, critical thinking and evidence-based practice. Resources emphasise the ethos of lifelong learning and being improvement minded. They also include consideration of the integration of eHealth into clinical workflows, adopting new models of care, facilitating consumer empowerment, and using data to inform practice. The WSTWG are considering additional learning opportunities relevant to eHealth capability statement four, 'System and Technology Implementation', acknowledging that there are currently training gaps for the health workforce with regards to participation in eHealth implementation, evaluation and change processes.

The MOOC focuses on foundation capabilities. Future curriculum development work will focus on consideration of intermediate and advanced levels of capability, including support and training pathways for workforce members in leadership roles or seeking career opportunities specialising in the growing professional fields of eHealth and data analytics.

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University of Sydney, NSW Health, Digital Health Cooperative Research Centre, Monash Partners and Australian Research Data Commons.

Conflict of Interest

The authors declare no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

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Research & Evaluation **article** (double blind peer-review)

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Building interprofessional learning sustainability: development and evaluation of an interprofessional learning placement resource

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Abstract

The workplace setting is ideal for health care students on placement to develop interprofessional competencies through relevant, authentic and engaging interprofessional learning (IPL) experiences. Stand-alone structured IPL programs, where the primary focus is on IPL, are often labour intensive, logistically difficult to timetable and challenging to sustain. A practical, scalable and sustainable approach to promoting IPL is to build IPL experiences into each discipline's regular placements. Thus, IPL becomes part of usual placement practice, rather than being treated separately. This approach capitalizes on currently under-utilized informal IPL opportunities within the workplace. We have used an educational design research methodology to develop and evaluate a stakeholder-informed set of authentic, practical and relevant IPL activities for use by students and their educators when on placement. Through an iterative cyclic process utilizing surveys, focus groups, workshops and interviews with students, placement site educators and academics, we have developed a publicly available interactive website containing the IPL activities. Student learning data are captured via an online form at https://health-ipl.sydney.edu.au/. Importantly, we have extracted a set of design principles that enable others to build on the learnings from this study. Future analytic data collected from our website will enable this approach to IPL to have impact in the longer term.

Keywords: interprofessional learning, informal learning, clinical placement

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INTRODUCTION

Within health care curricula, interprofessional learning (IPL) is widely recognized as an essential graduate capability on entering the workplace (Frenk et al. 2010; World Health Organization 2010). We adopt the widely used definition of IPL to be when two or more students, 'learn about, from and with each other to enable effective collaboration and improve health outcomes' (World Health Organization 2010, p.13). On graduation, our health care students should understand, value and respect other professional roles, place the patient/client at the centre of health care delivery, and be confident and competent in integrating the skills, knowledge and perspectives of others when providing patient/client care (O'Keefe, Henderson & Chick 2017; Schmitt et al. 2011). Accreditation standards for many health professional courses now demand evidence that IPL has been incorporated within curricula (e.g. Australian Nursing and Midwifery Accreditation Council 2012, Medical School Accreditation Committee 2012, Physiotherapy Board of Australia and Physiotherapy Board of New Zealand 2015). However, these demands are not easily met. The challenges faced when embedding IPL within curricula are well documented. These include, for example, timetabling constraints, fitting IPL into an already crowded academic curriculum, and reliance on 'champions' to drive IPL activity (Lawlis, Anson & Greenfield 2014; Nisbet et al. 2011).

To date, the IPL literature has focused mainly on the delivery of more formal structured IPL programs, whether that is through campus-based classroom teaching (e.g. Kilminster et al. 2004), in the placement setting (e.g. Nisbet et al. 2008, Kent et al. 2018), as simulations (e.g. Gough et al. 2012, Kumar et al. 2018), or via online learning (e.g. Solomon et al. 2010). These structured IPL programs often require: timetabling well in advance to ensure the availability of students; substantial infrastructure development (for example with simulation or online platforms); and additional staff resources for teaching and program administration. Many remain as small, extra-curricular voluntary IPL experiences, and therefore fall short of meeting accreditation requirements for all students to have opportunities for IPL.

A complementary and potentially more practical, cost-effective and sustainable approach to incorporating IPL into the curriculum is to capitalize on those contexts where students *informally* interact with each other, for example the placement setting, and develop these as IPL opportunities. This builds on the notion of 'informal learning' found within the broader education literature (Eraut 2011; Marsick & Watkins 2015; Wolfson et al. 2018) and contextualized to the health setting by Nisbet, Lincoln and Dunn (2013). Although the term 'informal learning' is contested within the education literature (Billett 2004), we define it as the unstructured, experiential learning that occurs as part of everyday work practice (Marsick & Volpe 1999; Regehr & Mylopoulos 2008). Learners are actively engaged in the experience through interacting with others as they ask questions, observe practice, provide information, and/or give and receive feedback (Cerasoli et al. 2018; Noe, Tews & Marand 2013; Tannenbaum et al. 2010). This type of learning is not necessarily recognized as learning (Eraut 2004, 2011; Nisbet, Dunn & Lincoln 2015) as it is often implicit and forms part of our tacit knowledge (Eraut 2000). However, by adding some intentionality to the learning process, the implicit becomes more explicit. This is clearly captured through a typology for informal learning (Eraut 2000), where intention to learn is categorized across three levels:

1. implicit, unintended learning where there is no awareness of learning as it occurs
2. reactive learning where there is some awareness of learning but it is unplanned, taking place almost spontaneously in response to an event, and
3. deliberate learning where time is set aside for acquiring new knowledge and learning is an intentional component of the workplace activity.

Roxå and Mårtensen's work builds on Eraut to argue that informal learning is not just dependent on intentionality and reflection, but also upon the 'traditions, norms and habits of the local context' (Roxå & Mårtensson 2015, p. 194).

It is the third element of Eraut's typology for informal workplace learning, 'deliberate learning', that we draw on for this current study. This study aimed to develop and evaluate a stakeholder-informed set of authentic, practical IPL activities for use by students and educators on placement that can readily be built into each discipline's regular placements. Thus, rather than set up a separate IPL placement, IPL becomes part of a student's usual placement practice. Students invariably interact with students and staff from other professions as part of their everyday placement experience. For example: a speech pathology student may interact with a nutrition and dietetics student (or dietitian) to discuss the most appropriate diet and texture for a patient who has had a stroke; an occupational therapy student may work with a classroom teacher to make adjustments to the classroom environment for a student; a nursing student may attend a morning medical ward round, providing a nursing update on overnight care. These types of situation can provide opportunities for learning that may go largely unrecognized. We suggest they provide immense potential for IPL, particularly

if appropriate learning resources are available to make the learning process more intentional and hence more explicit.

Interprofessional learning on placement using existing workplace opportunities, as described above, can partly be theorized through Billet's work on affordance and engagement and the notion of learning as occurring through participation in everyday work practices (Billett 2001, 2009). Authentic learning activities and interactions afforded in the placement setting can support learning (Billett 2016). For instance: guidance from educators, interaction with peers and other health professionals, structuring and ordering of workplace experiences to match student ability. However, it is how the students elect to engage with these affordances that influences learning (Billett 2001, 2009). Reflective practice (Boud, Keogh & Walker 1985; Schon 1983) can also help conceptualize the learning process required to shift from unintentional to the more deliberate informal learning of Eraut's typology outlined earlier. Through deep reflection, new insights are likely developed, bringing about changes in understanding, perspectives or the way something is done or acted upon (Nisbet, Lincoln & Dunn 2013). In other words, learning becomes explicit.

Although the notion of informal workplace IPL for existing practitioners is gaining traction (Nisbet, Lincoln & Dunn 2013; Wagter et al. 2012), few researchers have considered its application for pre-registration students and how we might shift from the implicit to more explicit workplace IPL (Kent & Nisbet 2018; Rees et al. 2018). However, we can draw on the broader IPL literature to inform ways of building IPL into existing student placements so that IPL becomes part of usual placement practice. A literature scan of peer-reviewed and grey literature as part of this current project (available on request from the authors) identified a wide range of publicly available IPL resources from more structured IPL programs that could potentially be adapted to provide the necessary affordances to support workplace IPL. For example, we considered the length of time to complete the IPL activity, suitability for a range of placement settings and/or staff resources required. These included: case-based discussion and other joint student activities (Anderson & Thorpe 2010; Gilbee et al. 2014; O'Carroll et al. 2012; van Soeren et al. 2011); interprofessional shadowing (Lait et al. 2011; Riva et al. 2010); patient interview (Street et al. 2007); and reflection (Zarezadeh, Pearson & Dickinson 2009). What is missing though, is a resource specifically tailored and readily accessible to capitalize on informal IPL opportunities in the placement setting. Therefore, this study aimed to develop and evaluate a stakeholder-informed set of authentic, practical IPL activities for use by students and educators on placement. We sought to answer the research question, 'what are the essential elements for an IPL placement resource that will best engage students, placement site educators and academics in workplace IPL?'

METHODS

DESIGN

We used educational design research methodology for this project (Plomp & Nieveen 2013). Design research is '...the systematic analysis, design and evaluation of educational interventions with the dual aim of generating research-based solutions for complex problems in educational practice, and advancing our knowledge about the characteristics of these interventions and the processes of designing and developing them' (Plomp 2013, p.16). Design research focuses on understanding and improving the intervention (Van den Akker et al. 2006); in our case this is the IPL placement resource. Furthermore, involvement of users is critical to ensure relevance and successful future implementation of the intervention (Van den Akker et al. 2006). Typically, there are three phases to the methodology: a preliminary research phase that generates the conceptual framework; a prototyping phase involving cycles of development and evaluation; and an assessment phase, which evaluates how well the project outcome meets the initial specifications for the design (Plomp 2013). An overview of the phases of design research methodology as applied to our project is presented in Figure 1.

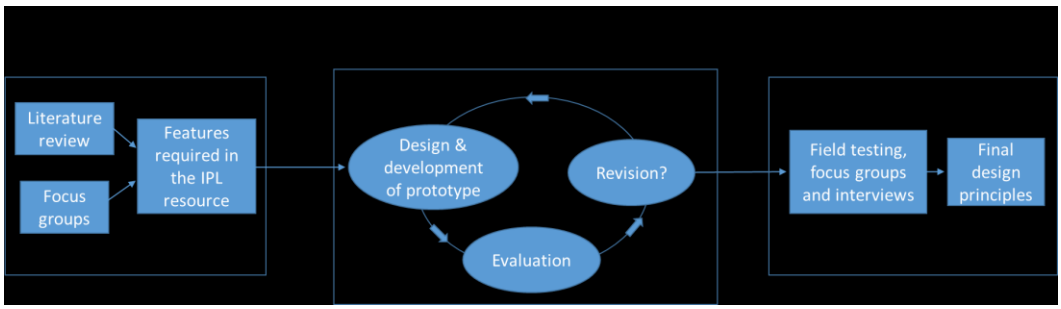

Figure 1: An overview of the design research methodology as applied to our project (adapted from Plomp 2013)

Due to the multiple phases and the cyclical nature of the methodology, where there is an iterative process of design, evaluation and revision of the design, the methods and results of this paper have been presented in one section so that the reader can identify how the findings of one stage informed the next.

PARTICIPANTS

Our participants for all phases of the study were health care students, placement site educators and/or academics from a range of health disciplines including: dentistry, diagnostic radiography, exercise physiology, medicine, nursing, occupational therapy, pharmacy, physiotherapy, social work and speech pathology. We used convenience sampling (Gravetter & Forzano 2012) to recruit to the study. Placement site educators (i.e. staff members responsible for supervising students on placement) were recruited from our study placement provider – a metropolitan tertiary referral teaching hospital. Students were recruited through emails sent to specific cohorts of students known to be on campus at the time of recruitment and/or at

our study placement provider. University academics and educators with a responsibility for placement learning were invited through project team members. Participation in the study was voluntary in all phases of the study. In total, 90 students, 29 site educators and 33 academics participated in the study across the various phases.

ETHICS APPROVAL

The study was approved by Sydney Local Health District Human Ethics Committee (Protocol number: X15—0399). All questionnaire responses were anonymous. Students were informed that participation had no bearing on their placement assessments or relationship with their placement site or their university.

DESIGN RESEARCH PHASES

PHASE 1: PRELIMINARY RESEARCH PHASE

Phase 1 set out to answer the following questions:

1. Is there a need for an IPL resource for use by students and educators on placement?
2. If so, what would this resource contain, how might it be presented and how could it be used?

We adopted a qualitative approach to answer these questions. Focus groups were held with each of the stakeholder groups (students, placement site educators, academics), with all but one facilitated by the same two project team members. All focus groups were audio-taped and detailed written notes taken throughout. In total, eight focus groups were held to capture the perspectives of each of the participant stakeholder groups (four with students; two with educators; two with academics). This was to ensure the views of all stakeholders were heard. A description of the participants in the focus groups is provided in Table 1. All but three focus groups comprised mixed professions. Logistics necessitated three focus groups being discipline specific and the need for additional student focus groups. At the end of the focus groups, participants were invited to register to participate in the next phase of the project.

Table 1: Phase 1 focus group participants

Stakeholder group	Number of focus groups	Number of participants	Professions included
Academics	2	15	Diagnostic Radiography Exercise Physiology Medicine Nursing Occupational Therapy Pharmacy Physiotherapy Speech Pathology

Stakeholder group	Number of focus groups	Number of participants	Professions included
Students	4	42	Medicine * Nursing * Occupational Therapy Physiotherapy Social Work Speech Pathology
Placement educators	2	17	Nursing Occupational Therapy Physiotherapy Radiation Therapy Social work Dentistry*

* Focus groups held with that profession only (all others comprised of mixed professions)

Two members of the research team analyzed the focus group data. Each separately listened to the audio-tapes and added further detail to the written notes. Notes were independently coded for units of meaning and codes with similar meaning were grouped under key concepts. Each participant stakeholder group was analyzed separately then across the groups, to determine any similarities. We deliberately did not attempt to draw out higher order themes as this was not the objective of this phase.

Four unique concepts were identified from the student focus group data: self-motivation; confidence; role of placement site educator; and relevance. These concepts are explained below:

Self-motivation

Students described IPL experiences as inherently valuable for future collaborative practice and patient/client care and this meant that motivation to complete these activities was intrinsic. Because of this intrinsic motivation, they did not need to be explicitly assessed on each individual IPL activity, but rather recommended that completion of the IPL activities be used as evidence towards existing overarching placement assessments.

Confidence

While some students had sought IPL experiences on placement, many students indicated that they would be unlikely to approach students or health professionals from other disciplines if they had not been previously introduced, or if it was not an expected explicit part of their placement. Overall, students indicated that placement IPL resources might help them to gain confidence by giving license to approaching or interacting with staff and students from other professions who were on placement at the same time and location as them (for example a speech pathology student and nursing student who happen to be placed on a neurology inpatient hospital ward at the same time).

Role of placement site educator

Students talked about the importance of their placement site educator's skills (e.g. teaching skills), qualities and attitudes towards interprofessional learning and practice in how a particular placement unfolded. An IPL experience could be more or less valuable depending on the educator leading it, their teaching skills and their understanding of the student's level of ability and experience.

Relevance

Students emphasized the importance of working with real patients/clients on real cases, and expressed an unwillingness to spend placement time on activities that might take them away from authentic placement tasks. The IPL activities therefore had to be relevant and to add value to their placement learning experience.

Whilst overall, academics and placement site educators were positive about the value of an IPL placement resource for student learning, four similar concepts were identified from the academic and placement site educator focus groups: capacity; quality and educational outcome; collaborative practice student skills and qualities; and culture of workplace. These are outlined below:

Capacity

Almost all educators and academics spoke of the capacity limitations of practitioners who educate students on placement, whether that be because of the number of students on placement or the workload expected of them while they are also taking students. Time pressures were frequently cited, with the implication that IPL resources must be easy to use and implement, and cannot take more time to organize than they might free up while students are independently engaged on a quality IPL activity. Some educators also raised the issue of student capacity with their own professional learning while on placement; that is, fitting these IPL activities into an already packed placement. It was noted that some courses have highly structured placement programs where it would be difficult to find long periods of time (for example, more than 1 hour) for IPL activities.

Quality and educational outcome

There was a strong view amongst participants that the IPL activities needed to be of high quality and to have professional as well as interprofessional relevance. It was felt this could be achieved by ensuring that the educational outcomes related to general placement competencies, and that outcomes were measurable, in a context where placements are increasingly governed by legal agreements between education and placement providers. Activities should also be person-centred and promote a person-centred outlook in student practice. Participants also emphasized that the best quality placement experiences are those where students are directly engaged with, or at least relating to, real-life issues and real patients or clients.

Collaborative practice student skills and qualities

Educator and academic participants were asked about the skills and qualities they thought important to develop in students to be able to work collaboratively. The most prominent of these was general communication skills. In addition, other important capabilities included initiative and self-directed learning, teamwork, respect for other professions, listening skills, curiosity and a 'switched on' attitude to learning opportunities.

Culture of workplace

Placement site educators noted that a culture of interprofessional collaboration does not exist in all placement workplaces. In these contexts, students may miss out on interprofessional role modelling and other IPL opportunities. However, it was also noted that IPL introduced at the student level could potentially have a positive influence on overall culture in these workplaces. Participants suggested an IPL resource package could be transformative in some placement contexts, promoting access to IPL experiences that might otherwise be considered too difficult or not worthwhile.

Findings from the focus groups were combined with our previous scan of the published and grey IPL literature (as outlined in the Introduction) to determine a set of features required for the IPL placement resource. These included the following:

- authenticity and relevance
- anticipated learning outcomes
- potential to prepare students for interprofessional placements
- integration within placements
- ease of implementation.

PHASE 2: PROTOTYPING PHASE

Phase 2 set out to answer the following questions:

1. What are the elements/characteristics of an IPL placement resource which will best engage students, placement site educators and academics in informal workplace IPL?
2. What characteristics best support functionality and usability?

Both survey and qualitative approaches (using focused workshops) were adopted in this phase.

PROTOTYPE 1: THE IPL PLACEMENT RESOURCE (PAPER-BASED PDF VERSION)

Prototype 1 of the IPL resource was a paper-based version containing five IPL activities, with a series of instructions and prompt questions to facilitate the task, and reflective questions to consolidate student learning. The five IPL activities (Table 2) were either developed by the team or adapted from other activities identified through the grey literature search. This was a collaborative and iterative process, with members of the project team taking into consideration the features required that were identified in Phase 1.

Table 2: IPL activities

IPL activity	Description of activity
Interprofessional Observation Experience	Student takes part in a structured observation of an area of practice of a student or staff member from a different profession.
Joint Patient/Client Activity	Students from different professions interact with a patient/client in providing a component of care.
Shared Workplace Debrief	Students from different professions constructively critique the collaborative care elements of interprofessional practice in a workplace
Patient/Client Experience Activity	Students from different professions listen to a patient/client's story of their interactions with multiple health or community service professionals
Interprofessional Handover or Referral Activity	Students conduct a client handover or referral to one another and give mutual feedback.

Participants who had registered their interest for Phase 2 during Phase 1 (30 students, 14 placement site educators, 14 academics) were emailed Prototype 1 with a link to an online survey developed by the research team, requesting feedback on each of the activities within the resource package. The survey comprised 5-point Likert scale questions and open-ended responses (see Appendix 1) relating to the features required for the IPL placement resource from Phase 1.

Closed question survey data were analyzed descriptively. Open-ended responses were grouped and categorized under common content. In total, 13 participants completed the survey: 6 students (20% response rate); 3 educators (21% response rate); 4 academics (28% response rate). Table 3 presents the participant responses to the closed questions and indicates that the content was well received. Activities were considered authentic and relevant, manageable (in terms of clear instructions to implement and time allocated to complete) and well-aligned to expected learning outcomes. However, there was greater variation in responses about the ease of integrating the activities into placements. Qualitative comments indicated potential barriers relating to fitting the IPL tasks within busy placement schedules, organizational aspects of finding other students on placement to complete the IPL activity, and a potential de-prioritizing by educators of the value of IPL and hence of completing the IPL activities. The visual design and layout of the resource was also considered poor.

Table 3: Initial evaluation of IPL placement resource package: percentage of responses in strongly agree/agree band for each activity

		IPL Resource Activity									
		IP observation		Patient/client interaction		Shared debrief		Patient/client experience		Structured IP communication	
		Student	Placement educator/ academic	Student	Placement educator/ academic	Student	Placement educator/ academic	Student	Placement educator/ academic	Student	Placement educator/ academic
Phase 1 features required in IPL resource	Authentic & relevant	100	100	100	87.5	100	100	100	100	100	100
	Integration with placement	50	100	83.3	87.5	100	100	66.6	71.4	83.3	100
	Manageable: clear instructions	100	100	83.3	87.5	100	100	100	100	83.3	85.7
	Alignment of learning outcomes to activity	100	87.5	83.3	87.5	100	100	83.3	100	100	100
	Relevance for preparedness to IPP	100	100	100	100	100	85.7	100	100	83.3	100
	Manageable: time	83.3	100	83	87.5	100	85.7	83.3	100	83.3	100

PROTOTYPE 2: A WEB-BASED IPL PLACEMENT RESOURCE

Consideration of the survey feedback by the research team led to a second prototype of the IPL resource, which was now housed on a web-based platform (Prototype 2). Educational designers were employed to build a web platform that enabled easy access and navigation for users, was engaging and had online functionality to complete and submit IPL activities. Small changes to the five IPL activities were also made in response to the evaluation of Prototype 1, these being mainly around clearer instructions for completing the IPL activities.

Refinement of Prototype 2 was an iterative process: participant feedback was used to create and further refine subsequent iterations until a final version was reached that met the majority of stakeholder needs. A focused workshop format was used to seek student, placement site educator and academic views on the various iterations of the prototype. Participants were provided with the website address in advance and asked to navigate through the various pages. Facilitated discussion focused on website functionality, design, engagement, and usability. Detailed notes were taken during the workshops.

In total, ten focused workshops of approximately 1 hour each were held (four with students; three with placement educators and three with academics). Four individual interviews were conducted with academics who could not attend a workshop. Nine placement

educators, 30 students, and 14 academics participated in the development and refinement of Prototype 2.

The website can be accessed at https://health-ipl.sydney.edu.au/ . It has a number of features as a result of stakeholder input:

1. a consistent layout design that enables efficient navigation on a range of IT devices
2. guidelines for students and placement site educators for making the most of placement IPL opportunities
3. guidelines outlining preparation required for each activity and steps to complete post activity
4. example responses/exemplars for each IPL activity
5. functionality for online entry of responses which are then converted to a PDF and emailed to the student.

PHASE 3: ASSESSMENT PHASE

Students on placement at our study placement provider were invited to participate in the field testing of the website-based IPL resource. Participation was voluntary. Students were asked to complete one of the IPL activities on the website and then attend a focus group or individual interview to discuss their experience of using the website. All focus groups/interviews were audio-taped and detailed written notes were taken throughout. In total, three focus groups and two individual interviews were held with students from occupational therapy (2), physiotherapy (4), speech pathology (2) and nursing (4) degree programs. Analysis followed a similar process to Phase 1, where written notes were coded for units of meaning and codes with similar meaning grouped under key concepts.

While, overall, the final website received positive feedback from students on its aesthetics, content and functionality, three key concepts emerged that were considered important for functionality and usability:

IMPORTANCE OF ORIENTATION TO WEBSITE AND STUDENT REQUIREMENTS

Although the website was originally designed to be self-directed in its use, students strongly recommended an orientation to the website and its purpose prior to using it. Clear expectations were needed around when, why and how students should engage with the website. For example, it was unclear to some students that activities could be completed through engagement with other students and/or through interactions with staff from other professions.

ASSESSMENT DRIVES LEARNING

Despite recognizing the rationale for IPL, a strong driver of student engagement with the resources was assessment – that is how would completion of the activities 'count'? Similar to earlier focus groups, students did not want a formal assessment of the individual activities, but rather that their efforts in completing the activities would be

acknowledged as part of their overall placement assessment. Completion needed to be embedded as a mandatory component of the course, otherwise it would not be prioritized.

PLACEMENT SITE EDUCATOR ENGAGEMENT AND SUPPORT

Successful engagement of students with the website relies on educator awareness and support. At times there was confusion as to the role of the educator, with many students not realizing the importance of discussing the activity when completed with their educator. Educators appeared unaware of their role in the process. This raises the need for the IPL resources to be explained to educators as well as to the students themselves.

DESIGN PRINCIPLES – FINAL

As a final step in the design research process, the design principles were further refined to reflect the new insights gained. Table 4 provides the final design principles that underpin the development of this learning resource.

Table 4: Design principles – final

1	The IPL placement resource should build on IPL activities already established and tested but adapted as necessary for the placement context.*
2	Where possible, IPL activities should be person-centred, reflecting the patient/client's role in the team, and the ultimate aim of collaborative care.*
3	IPL activities should be flexible and applicable to a variety of placement settings including those outside of traditional health care settings, professional combinations of students, and range of student experience levels (e.g. 1st year and 4th year).*
4	Learning outcomes should be made explicit for each IPL activity, increasing the intentionality of the learning process and clearly linked to overall placement learning outcomes and professional competencies.*
5	Steps for completing the activities should be clearly described for students *and* for placement educators, easy to implement and not too time-consuming for educator or students.*
6	Reflection should be built into each IPL activity.*
7	The structure and process for engaging with the IPL resource package should be flexible to allow students to seek IPL opportunities that are interesting and relevant to them*. These may include student-student interactions and/or student-staff interactions. ‡
8	Students AND educators should be orientated to the website, its purpose and their respective role in completing the activities so that they make the most of placement IPL opportunities. Where possible, use of the website and the IPL activities should be included in any educator training ‡

9	Completion of the IPL activities should be a mandatory part of curriculum to encourage prioritizing of activities. ‡
10	Assessment should be formative with completion of IPL activities informing a student's overall placement performance.*
Website aesthetics and scaffolding	
11	The website should use a consistent layout design that enables efficient navigation on a range of IT devices. †
12	There should be guidelines outlining preparation required for each activity and steps to complete post activity and example responses for each IPL activity. †
13	Functionality for online entry of responses which are then converted to a PDF and emailed to the student. †

* From Phase 1; † From Phase 2; ‡ From Phase 3

DISCUSSION

We have developed an IPL placement resource that provides an evidence-based means for effectively and efficiently incorporating IPL into student placements. Through our extensive stakeholder engagement process, we have developed a set of IPL activities that are relevant, authentic, accessible, and engaging. Moreover, the resource meets an unmet need and is accessible through one public website. Importantly, we have identified a set of design principles that enable others to design and implement workplace IPL activities following a set of tested principles. These principles ensure that resources developed optimize engagement of students, placement site educators and academics in workplace IPL.

The final product of this project (resource package and website) provides an alternative approach to addressing the sustainability of IPL. Our findings support Eraut's notion of adding some intentionality to the learning process, whereby the implicit becomes more explicit (Eraut 2000). However, for this to occur and for students to fully engage, certain affordances are required to ensure learning is embedded through participation in the workplace activity (Billett 2001, 2009). These are: curriculum changes to embed the IPL activities within curriculum, adequate orientation to the IPL resource and the support of placement site educators to assist students in making connections with other students. The resources must also be easily accessible to students through various ICT technologies and applicable to health as well as non-health placement settings.

Student views on assessment of the workplace IPL activities were interesting and link closely with how they engaged with the IPL activities (Billett 2001, 2009). While students did not want to introduce summative assessment of the IPL activities, they did want to make sure their efforts were externally rewarded: internal motivation was not strong enough to prioritize the learning activities over other tasks. The students' view may reflect the position of IPL within university

education. While there is much attention given to devising ways to incorporate IPL into curricula, and its profile has been raised, IPL is still largely seen as peripheral to the 'core business' of the individual health professions. 'Assessment 2020' (Boud & Associates 2010) advocates seven propositions to improve assessment and hence student learning. One of these is learning in the workplace. Coupled with this is the need to involve students in assessment design, to provide authentic activities, to incorporate peer learning, to give and receive feedback and to engage students in the assessment process. We have included elements related to each of these in our final principles, thus ensuring that we maximize the learning potential of the IPL resource.

Consistent with the work of Roxå and Mårtenson (2015), we found that context was an important element in engaging placement site educators in workplace IPL. First, by engaging with the complex 'microcultures' of each particular IPL situation, students find themselves embedded in the social practices and 'the ways things are done'. Second for an educational initiative such as the one described to succeed in a workplace, it needs the multifaceted support of those involved in the setting. Without that kind of support, particularly from their educators, students were unable to take full advantage of the learning opportunities available. This knowledge suggests we need to consider ways to better engage educators in orientating them to the rationale for workplace IPL and the supporting resources, and reinforces the value of the inclusion of a broad group of stakeholders in all of the project phases – from design to repeated implementation to evaluation. Furthermore, any curricula changes to embed workplace IPL require close collaboration between academics and placement site educators. This process requires connection among the parties and both formal and informal contact to keep the lines of communication open. One way to achieve this might be to incorporate the resource into existing education programs aimed at upskilling educators.

Our findings on educator capacity to introduce the IPL activities on placement are interesting. On the one hand, educators recognize the value of IPL in preparing students for collaborative practice. Yet, IPL was still viewed as an 'add-on' by some educators and as something that competes with, rather than complements, professional competency development. This is despite many of the interprofessional capabilities identified by participants being generic work-readiness capabilities (Caballero, Walker & Fuller-Tyszkiewicz 2011; Walker et al. 2013). We acknowledge the real time pressures on educators. However, our findings suggest that an added value emerging from introducing IPL through innovations such as those described in this paper may be a change in workplace collaborative practice more generally. Varpio et al. (2014) in their study exploring the informal learning of medical and nursing staff found that only 15% of informal learning was interprofessional, the rest being intraprofessional. Through the introduction of our IPL activities with students, there is scope to influence this ratio to favour workplace IPL more generally. This warrants further investigation.

The flexibility of the IPL activities developed as part of this project to incorporate student-student interactions and/or student-staff interactions supports the work of Rees et al. (2018), who found clinicians did engage informally with students from other professions.

However, their findings indicate that interactions with students were not viewed as positively by clinicians as by students. The authors suggest that this may reflect a limited awareness by clinicians of informal IPL opportunities. This again highlights the need for greater collaboration between university and placement sites in promoting workplace IPL.

STRENGTHS AND LIMITATIONS

A clear strength of this project is our use of design research methodology to systematically integrate the perspectives of all stakeholders in extracting the final design principles. Goodyear (2018), an advocate of design research, argues that learning is complex and that it is no longer enough to know what works but, more importantly, it is necessary to know what works, for whom and in what circumstances. We have achieved this through the inclusion of students, educators and academics as well as through the professional diversity of our project team: our team comprised academics and placement educators from ten professional backgrounds and an educational designer. This has enabled us to develop design principles that are practical and relevant to others developing similar resources.

One limitation of this project is the narrow context for recruitment of placement site educators – a metropolitan tertiary referral teaching hospital. Field testing of the IPL resource by students was also completed in the same context, with only four professions undergoing this final step. This was done mainly for pragmatic reasons. While the diverse professional and work experience background of the project team kept us cognizant of the need to make the resource applicable to a range of settings (health and non-health) and professions, further research is required to test the design principles in other contexts; for example, in schools and community services such as non-government organizations.

This project developed and evaluated five IPL activities – a somewhat arbitrary figure based on what was manageable for the project and what was gleaned from the literature scan. This process could be seen as a limitation. However, this did not surface as an issue in any phase of the project. We did not attempt to investigate the impact on learning of the IPL activities, but rather focused on the essential elements for engagement, functionality and usability.

CONCLUSION

We have applied our knowledge of informal workplace learning and existing IPL literature to develop a sustainable means by which universities can take a whole-of-faculty approach to IPL. The IPL activities developed can be readily introduced at any stage of curricula across a range of placement settings, ensuring an efficient and effective means of providing IPL opportunities to students. We are not suggesting this as the only way that universities embed IPL within curricula. Rather, the resources developed and evaluated as part of this project may form part of a larger IPL curricula strategy.

Our final design principles provide guidance for others in how best to further this work to engage students, placement site educators and academics in workplace IPL. However, the long-term success and uptake of the IPL placement resource is dependent on the affordances identified in this paper, specifically that universities embed the resource within curricula and that there is 'buy-in' from placement site educators. As with any website, it will be important to ensure that systems are in place to maintain and further develop this website's functionality. Analytic data collected from the website in the future will enable evaluation of the long-term impact of the resources on learning. For example, there is potential to analyse student responses for each activity against anticipated learning outcomes and to subsequently track the development of interprofessional capability across a student's degree program. We welcome a collective approach between universities and placement sites to explore how this is best achieved.

APPENDIX

APPENDIX 1: PROTOTYPE 1 EVALUATION SURVEY

(Questions to be asked for each IPL activity)

STUDENT SURVEY QUESTIONS

1. This IPL activity is authentic and relevant to the workplace, that is, it reflects and builds on the type of scenarios and situations I may face when working.

[Strongly agree | agree | neither agree nor disagree | disagree | strongly disagree]

Please use the text box below to elaborate on your response (optional)

2. This IPL activity could readily be incorporated into student placements/professional placements/fieldwork.

[Strongly agree | agree | neither agree nor disagree | disagree | strongly disagree]

Please use the text box below to elaborate on your response (optional)

3. The instructions in the resource provide enough guidance for me to complete the activity.

[Strongly agree | agree | neither agree nor disagree | disagree | strongly disagree].

Please use the text box below to elaborate on your response (optional)

4. The suggested approach to assessment for this IPL activity is appropriate.

[Strongly agree | agree | neither agree nor disagree | disagree | strongly disagree]

Please use the text box below to elaborate on your response (optional)

5. By completing this IPL activity, I am likely to be better prepared for collaborative practice (working with other professions) on graduation

[Strongly agree | agree | neither agree nor disagree | disagree | strongly disagree]

Please use the text box below to elaborate on your response (optional)

6. Time allocated to complete activities is achievable / appropriate

[Strongly agree | agree | neither agree nor disagree | disagree | strongly disagree]

Please use the text box below to elaborate on your response (optional)

7. What if any, would be the barriers to you implementing this IPL activity whilst on placement?

Please use the text box below to respond.

SUPERVISORS AND ACADEMICS SURVEY QUESTIONS

1. This IPL activity is authentic and relevant to the workplace, that is, it reflects and builds on the type of scenarios and situations students may face when working

[Strongly agree | agree | neither agree nor disagree | disagree | strongly disagree]

Please use the text box below to elaborate on your response (optional)

2. I could readily incorporate this IPL activity into student placements.

[Strongly agree | agree | neither agree nor disagree | disagree | strongly disagree]

Please use the text box below to elaborate on your response (optional)

3. The instructions in the resource provide enough guidance to implement the activity.

[Strongly agree | agree | neither agree nor disagree | disagree | strongly disagree]

Please use the text box below to elaborate on your response (optional)

4. The expected student learning outcomes for this IPL activity are aligned to the activity (i.e. are well matched, realistic and achievable).

[Strongly agree | agree | neither agree nor disagree | disagree | strongly disagree]

Please use the text box below to elaborate on your response (optional)

5. By completing this IPL activity, students are likely to be better prepared for collaborative practice (working with other professions) on graduation

[Strongly agree | agree | neither agree nor disagree | disagree | strongly disagree]

Please use the text box below to elaborate on your response (optional)

6. Time allocated to complete activities is achievable/appropriate

[Strongly agree | agree | neither agree nor disagree | disagree | strongly disagree]

Please use the text box below to elaborate on your response (optional)

7. What if any, do you see as barriers to you or others implementing this IPL activity with students?

Please use the text box below to respond.

Acknowledgements

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Conflict of Interest

The authors declare no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

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Measured and perceived handover effectiveness among nurse, paramedic and medical students

Amanda Hlushak [1], Alexander MacQuarrie [1], Clare Sutton[1], Georgina Pickering[1], Patricia Logan[1] and Caroline Robertson [2]

Abstract

Objective: This study aimed to measure the effectiveness of student handovers in simulation and examine perceptions of handover effectiveness.

Methods: A mixed-methods crossover study involving inter-professional teams of nursing students (NS), paramedic students (PS) and medical students (MS). Students participated in two medical clinical simulations, which involved handovers, completion of self-reflection questionnaires (SRQ) and pre-post simulation questionnaires: Readiness for Interprofessional Learning Scale (RIPLS) and Attitudes Towards Health Care Teams Scale (ATHCT).

Results: 18 handovers were observed. Outbound simulation (n=9): 61% of all data items were transferred by the MS, 60% by NS, and 63% by PS. Inbound simulation (n=9): 80% of all data items were transferred by PS, 64% by NS and 50% by MS. Information handed over was most variable when broken down into categories. Data most likely to be handed over were patient demographics, clinical impression and treatment. Least likely to be handed over were additional background and response to treatment. The RIPLS questionnaire showed significant differences between student groups and a change in score between pre-post questionnaires, with NS and PS scoring higher than MS: 6.33 ± 3.51, 4.71 ± 4.37 and -2.67 ± 2.3, respectively ($p < 0.05$). No differences were noted between the pre- and post-ATHCT questionnaire. Comparison of actual and perceived data transferred showed the percentage of non-clinical data actually transferred to be higher than students' perceived ($p < 0.05$).

Conclusion: In simulation, a significant amount of critical patient information was lost in subsequent handovers. The greatest loss of data occurred from additional background information and response to treatment. There was also an imbalance between students' perceptions of, and actual, data transferred. Our results indicate that students require increased opportunities for handover practice and clarification on what constitutes an accurate handover. Amalgamation of current handover tools to a single tool that can be used in pre-hospital and hospital environments may be beneficial.

Keywords: simulation, handover, undergraduate, interprofessional education

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INTRODUCTION

Clinical handover, used to concisely relay patient information during transfer from one professional to another (Yu & Kang 2017), is a vital skill to understand and employ in the delivery of patient care (Wood et al. 2015). It demands an understanding of patient condition to enable communication to other care providers, while ensuring patient-specific material is delivered, received and encoded (Jeffcott et al. 2009). To contribute to optimal patient outcomes, the most pertinent material should be delivered promptly (Abraham, Kannampallil & Patel 2014; Foronda, MacWilliams & McArthur 2016).

While research exists on different handover tools, especially in nursing and paramedicine, there is no standardised tool used between nurses, paramedics and doctors (Patterson & Wears 2010). The tools used are generally facility specific, such as SBAR: situation, background, assessment, recommendation, which is used predominantly in hospitals; and IMIST: identification, mechanism, injuries, signs/symptoms and treatment, predominately used in the pre-hospital environment (Bost et al. 2012; Gordon and Findley 2011; Jeffcott et al. 2009; Merten, Van Galen & Wagner 2017). This lack of a standardised tool impacts handover effectiveness and patient care (Evans et al. 2010; Ye et al. 2007). Additionally, it has been identified that professional, social, environmental and human factors, beyond handover structure, influence its effectiveness (Wood et al. 2015). Unsurprisingly, during multiple interdisciplinary handovers, loss of information is well recognised (Evans et al. 2010). This is likely to be compounded by the fact that disciplines learn and work independently, existing as their own 'tribes' (Weller 2012) and ultimately contributing to breakdowns in communication and patient care outcomes (Foronda, MacWilliams & McArthur 2016).

Barriers to handover effectiveness may be overcome by increased interprofessional education (IPE). IPE is known to be an important process that assists in role identification, differentiating scope of practice, and understanding differences in professional languages (Stow et al. 2017). There have been various calls for increased IPE in student populations to enable them, as graduates, to work more effectively in a clinical environment (Tunstall-Pedoe, Rink & Hilton 2003). However, there is little research available examining IPE effectiveness in student populations. Simulation is a useful medium for

promotion of IPE as it offers opportunities for health care professionals to work together in a clinically safe environment and to experience the value of other disciplines (Angelini, 2011), whilst providing opportunities for shared learning. Consequently, it is being increasingly used as a medium for collaborative practice and for building cohesion in the team environment (Angelini 2011; Furseth, Taylor & Kim 2016; Havrilla-Smithburger, Kane-Gill & Seybert 2012).

Training together is important for health professionals, but something done infrequently with health students at the undergraduate level. Increasing the opportunity for IPE in this population may help to improve the skills required for providing effective handovers. There is limited research examining IPE and handover effectiveness between students, specifically nursing (NS), paramedic (PS) and medical students (MS). Such research may help to improve understanding of the current status of undergraduate handover skill level. The aims of this study were, therefore, to measure how effectively undergraduate medical, nursing and paramedical students give and receive handover information and to measure student perceptions of their own handover effectiveness.

METHODS

PARTICIPANTS AND ETHICAL APPROVAL

Fourth-year undergraduate MS (*n*=4) from Western Sydney University (WSU), first-year undergraduate NS (*n*=3) and third-year undergraduate PS (*n*=8) from Charles Sturt University (CSU) participated. Third-year nursing students were targeted to participate, but were unavailable, and so first-year students were recruited. Students were recruited based on their being an undergraduate student of the nominated year within the required discipline. They also had to be from the nominated universities to ensure that the scenarios were of an appropriate scope of practice. Ethical approval was obtained from the CSU Human Research Ethics Committee (H17162) and reciprocally from WSU Human Ethics Committee (RH12439). Informed written consent was obtained from all participants.

STUDY DESIGN

Using a mixed-method, crossover design, students participated in a clinical simulation day held at the high-fidelity simulation centre at CSU. Student names were randomly drawn and assigned to multidisciplinary (PS [*n*=2], NS [*n*=1], MS [*n*=1–2]) teams (*n* = 4–5), which performed two clinical simulations: outbound and inbound, These were video recorded for analysis. Crossover occurred whereby both paramedic and medical students acted as the handover provider and receiver, crossing between the inbound and outbound scenarios. Two validated questionnaires were administered pre and post simulation to examine participant's attitudes towards health care teams (ATHCT) and their readiness for interprofessional learning (RIPLS) (Kim & Ko 2014; Reid et al. 2006). Additionally, following delivery of the first handover, within both the inbound and outbound scenarios (as described below),

the respective student (PS or MS) completed a self-reflective questionnaire (SRQ) examining their learnings about handover.

SCENARIOS

Scenarios were created using the Emergency Medicine Simulation Workbook (Thoureen & Scott 2013). The scenarios were adapted to fit the location, scope of practice, and equipment available. Scenarios were designed for optimal intergroup cooperation, aiming to maintain equal group status, common goals and ascertaining a collaborative approach using Allport's theory (Bridges & Tomkowiak 2010). Final scenarios were agreed upon by all discipline educators. The disciplines included: nursing, paramedic, and medical educators. Participants were briefed on the simulations and equipment and familiarisation was undertaken prior to beginning the scenarios.

INBOUND

A patient with asthma was assessed by the inbound PS team at home. The PS transferred their patient to an ambulance for a simulated transfer time (20 min.) handing over the patient to the NS at the emergency department (ED). The NS completed an assessment (20 min,) before handing over to the MS who completed their assessment (20 min.) before final handover via phone to a medical consultant (Figure 1). Following the PS handover to the NS, as previously described, the PS completed the SRQ.

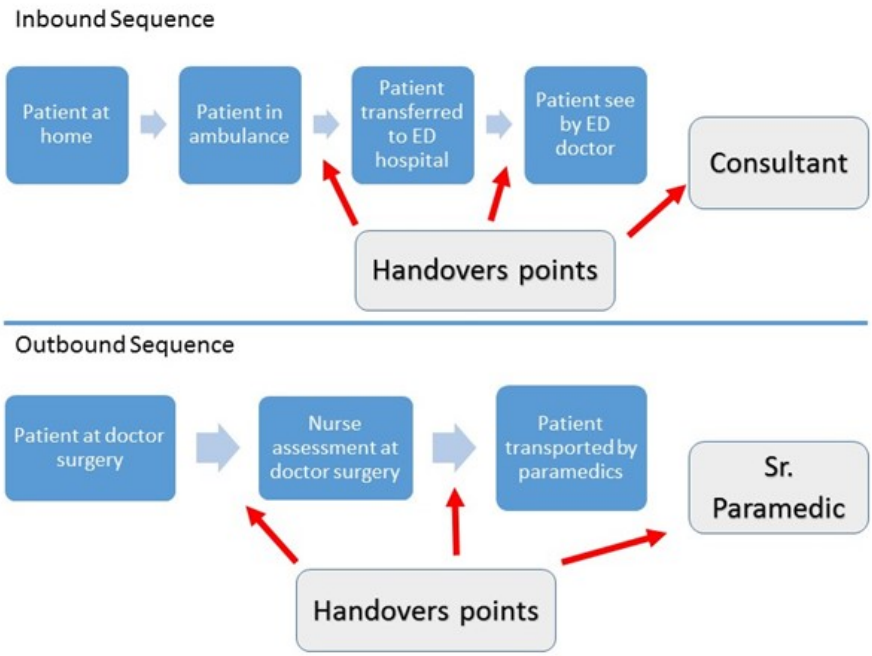

Figure 1: Handover sequence for inbound and outbound simulations

OUTBOUND

A patient with query sepsis was assessed at a doctor's surgery by the MS (20 min.). The patient's presentation required transfer to hospital. The MS was then called to the waiting room for another collapsed patient (decoy) enabling the NS who received the initial handover to continue the patient assessment (20 min.). The PS crew arrived for transport, moving the patient to the ambulance (20 min.) simulating the transport period before final handover to a senior paramedic (Figure 1). Following the MS handover to the NS, as previously described, the MS completed the SRQ.

DATA COLLECTION

QUESTIONNAIRES

The ATHCT questionnaire was used to examine general attitudes towards interprofessional health care teams. Students scored 21 statements on a 6-point Likert scale (1–strongly disagree, 6–strongly agree). The RIPLS questionnaire was used to examine readiness for interprofessional learning, with 19 statements scored on a 5-point Likert scale (1–strongly disagree, 5–strongly agree).

HANDOVERS

The two scenarios (inbound and outbound) were run three times. Within each scenario there were three handovers, giving a total of nine inbound and nine outbound handovers completed (total n=18). These were recorded using a handheld camera.

REFLECTIVE QUESTIONNAIRES

Student reflective data were collected by the completion of an SRQ containing five visual analogue scales (VAS) (Okitsu et al. 2014) and two open-ended questions. The VAS was scored on a 10 cm long line and asked about handover effectiveness, amount of clinical and non-clinical data points transferred. The open-ended questions required students to watch the second handover (live) in the control room of the simulation centre on the built-in video recording system, and then respond to the following questions: 'What do you think was effective about the handover and why?' and 'What did you learn by watching?'

HANDOVER CHECKLIST

To our knowledge, no generalised validated handover checklist tools currently exist. Therefore, a handover checklist was created using the information presented in the scenarios, which resulted in seven categories, following a similar structure to the handover tools IMIST and SBAR. Categories were: Identification, Background, Additional Background (non-clinical), Clinical Impression, Medical Information, Treatment, and Response to Treatment (clinical). Two clinical academics (a paramedic and a nurse) independently developed a handover checklist of categories and content based on the scenarios. Whilst it was not validated, this checklist was compared to the lead investigators' handover checklist and found to be identical.

DATA ANALYSIS

HANDOVERS

The total handover score (%) was calculated based on data available to the relevant student. If some data points from the checklist were not transferred from one student to another during the handover, this was taken into account and the student delivering the handover was not scored lower for missed information. For example, if a student did not perform a 12-lead and therefore did not pass the ECG information onwards, no loss was recorded on their handover checklist score. Students did not have points deducted if they did not have the information to pass on. Data points transferred were scored by review of the video footage against the inbound and outbound checklists. This process was performed independently by two experienced clinicians, both with more than five years of clinical practice and a minimum of three years' academic experience. Inter-rater reliability was assessed by intraclass correlation coefficient with raters showing moderate agreement with an r value of 0.73 ($p = 0.002$) (Koo & Li 2016).

RIPLS AND ATHCT QUESTIONNAIRES

The questionnaire Likert responses were scored and summed for a total score. Pre- and post-test differences were calculated for each participant.

REFLECTIVE QUESTIONNAIRES

The SRQs were scored as percentages of the VAS anchor points from 0–100%. The open-ended question responses were analysed using manifest content analysis.

STATISTICAL ANALYSIS

Continuous data were inspected for normality and model assumptions checked prior to analysis. RIPLS and ATHCT data were analysed as changes from pre to post using a weighted least-squares ANOVA. Handover, data were analysed as changes between and within clinicians, time (inbound/outbound) and information lost using ANOVA. Following significance in ANOVAs, pairwise differences were identified using Tukey's HSD post-hoc test. Interrater reliability was calculated using Cronbach's alpha coefficient. All data were analysed using the Statistical Package for the Social Sciences (SPPS version 24, IBM) with significance set at $p < 0.05$. Results are presented as mean ± SD or confidence intervals (CI) where appropriate.

RESULTS

HANDOVER DATA TRANSFER

During the outbound clinical simulation, 61% of all data items were transferred by the MS, 60% by the NS, and 63% by the PS (Figure 2a).

During the inbound clinical simulation, 80% of all data items were transferred by the PS, 64% by the NS and 50% by the MS (Figure 2b).

Equal amounts of data were transferred in both inbound and outbound scenarios. There was also no difference in handover performance for each student group comparing inbound and outbound scenarios. Comparisons of handover were significantly different between the mean score for MS to consultant handover (D2C) (48.5 ± 8.5) and the PS to NS handover (P2N) (79.3 ± 7.1) (p = 0.001). Handovers between NS to PS (N2P) and NS to MS (N2D) demonstrated no significant difference. There were significant interactions between the percentage of complete total data points handed over and the information delivered when broken down by categories (Table 1).

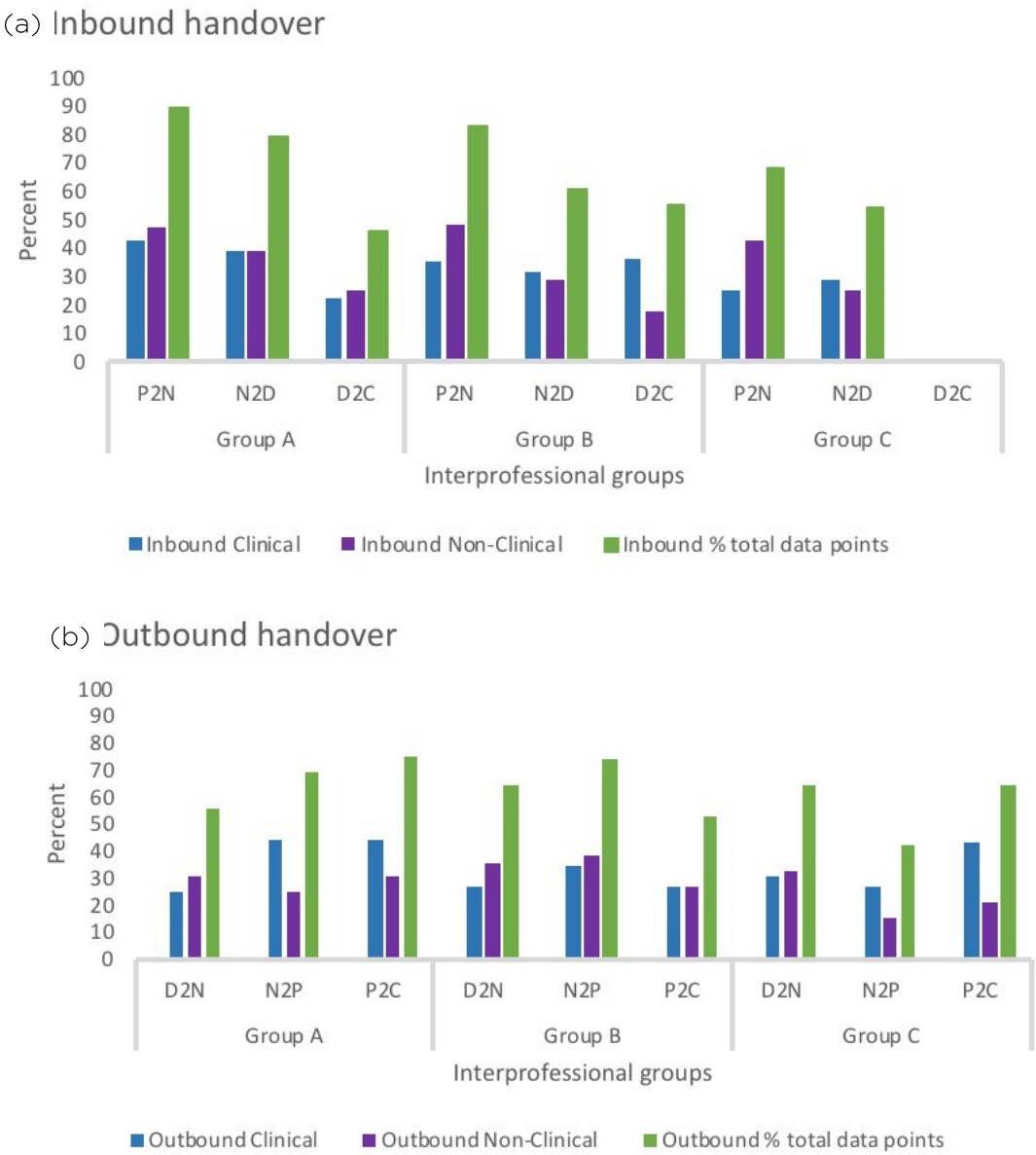

Figure 2. Percentage of clinical and non-clinical data points handed over within professions, between groups: (a) inbound and (b) outbound scenarios.

Table 1: Total of all completed handover points (%) of each clinical and non-clinical data set

	Information	Means ± SD	Post hoc
Non-clinical	Identification	92.65 ±17.56	1 > 2,3,6*
	Additional Background	49.41 ±17.56	2 < 4,1,5*
	Medical Information	57.65 ±24.87	3 < 1,4*
Clinical	Clinical Impression	70.75 ±17.56	4 > 2,6*
	Treatment	77.21 ±20.41	5 > 2,6*
	Response to Treatment	38.43 ±29.86	6 < 1,6*

*$p < 0.05$

REFLECTIVE QUESTIONNAIRES

Analysis of the SRQs, showed the actual non-clinical data transferred to be higher than the perceived non-clinical data transferred by 36.5 ± 26% (p=0.019) (see Table 2). There was no difference between actual and perceived clinical data transferred (see Table 2).

Table 2: Mean difference between actual and perceived handovers of clinical and non-clinical data points

	Clinical		Non-clinical	
	Actual (%) A	Perceived (%) P	Actual (%) A	Perceived (%) P
D	55	78	72	43
P	68	73	93	50
Mean diff (A - P)	13.83 ± 19.6		-36.5 ± 26.03 p = 0.019	

OPEN ENDED REFLECTIVE QUESTIONS

Responses to both questions were combined due to the similarity in learnings. Analysis showed students felt the following were important in an effective handover: notes and writing 67%; systematic, structured and detailed approach 50%; clear and succinct information 50%; closed-loop communication 67%; and addition of new patient assessment information 50% (n=6).

ATHCT

Overall pre-post ATHCT scores were not different between professionals (p > 0.05). However, within questions, 13 and 18 demonstrated statistical significance. There was a negative change in 13: 'Should physicians have the final word in decision making made by health care teams'; and a positive change in 18: 'In my opinion, physicians are natural team leaders'. Significant positive changes (p < 0.05) were evident for questions 9, 11 and 14 (Figure 3): 'In my opinion developing a patient care plan with other team members avoids errors in delivering care'; 'Health professionals working on teams are more

responsive than others to the emotional and financial needs of patients'; and 'The give and take among team members help them to make better patient care decisions'.

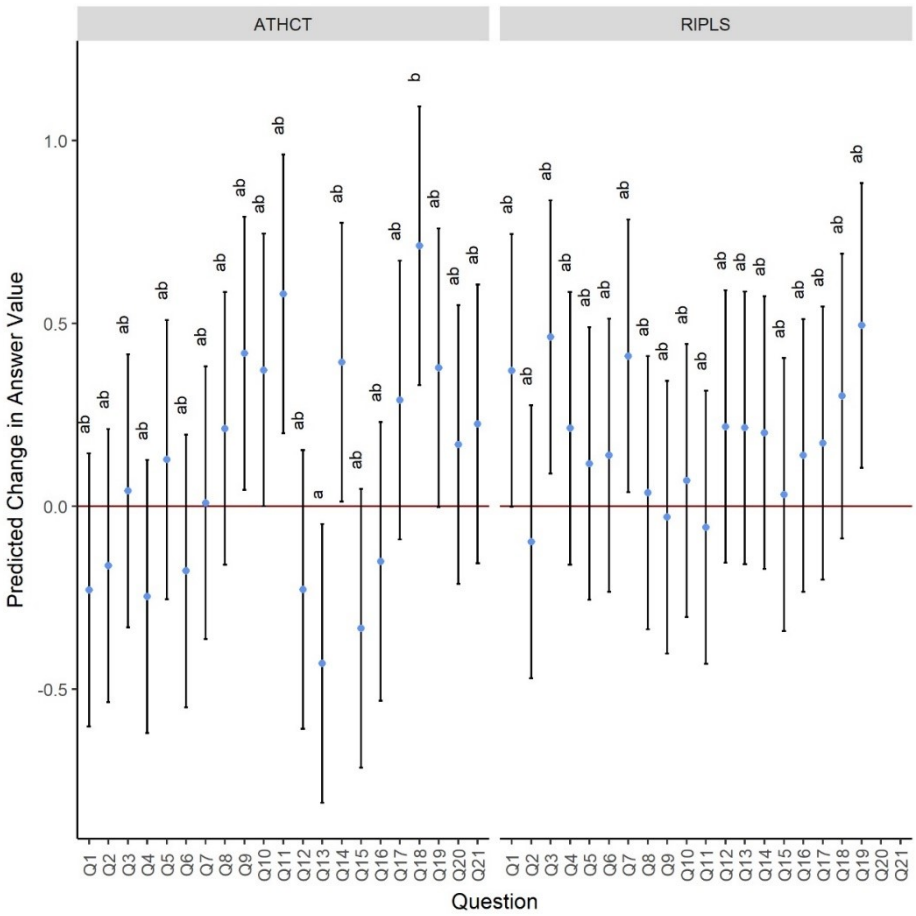

Figure 3: Post-hoc analysis of main interactions between predicted change in answer pre and post for ATHCT and RIPLS questionnaires

RIPLS

There was a difference between professionals ($p < 0.05$) in pre-post questionnaires. Nurses (6.33 ± 3.51) and paramedics (4.71 ± 4.37) were significantly higher than doctors (-2.67 ± 2.3) in post-hoc comparison. There were no significant differences between the nurses and paramedics (Figure 3).

There were no significant differences between questions, however three questions, 3, 7, and 19, had positive changes in predicted answer value (see Figure 3): 'Shared learning with other health and social care students/professionals will increase my ability to understand clinical problems'; 'Learning between health care students before qualification would improve working relationships after collaborative practice'; 'I have to acquire much more knowledge and skill than other students in my own faculty'.

DISCUSSION

The aims of this study were to measure handover effectiveness and perceptions of handover effectiveness among medical, nursing and paramedic students. The results demonstrate several important findings. With regards to effectiveness, there was an increase in information lost across multidisciplinary handovers. Students showed a poor awareness of patient assessment, with the most frequently lost data being from additional background and response to treatment. Furthermore, the students' own perceptions of handover performance did not match their actual performance.

INFORMATION LOST ACROSS HANDOVERS

Medical error(s) associated with handovers is a well-known phenomenon (Starmer et al. 2014) and has been demonstrated in this study. Transfer of information across disciplines resulted in loss of data. Previously noted challenges to successful handovers are: the ability to perform a cognitively demanding task in a limited time period, lack of note taking, and reliance on memory, and inconsistent use of mnemonics (Fitzpatrick et al. 2018). These challenges may explain our results. Similar findings were reported in this study by the student reflections, with note taking and use of a systematic/structured approach highlighted as being effective in reducing such information loss and achieving successful handovers.

Within an educational, rather than clinical, setting more patient assessment education may be required to better facilitate accurate handovers (Ye et al. 2007; Yong, Dent & Weiland 2008). Whilst a lack of handover education and experience may have played a role in the ability to convey or perform a patient assessment, it was noted in the student reflections that using closed-loop communication was important for handover effectiveness. This closed loop communication would assist in clarification of the message, which would help to remove assumptions about patient data and therefore ensure a better handover. Information synthesis by receiver has previously been suggested as a method that can reduce medial errors in handovers (Starmer & Landrigan 2015); however, it is yet to be integrated within more well-known acronyms. This technique would also be important with disciplines using different medical language.

KNOWLEDGE OF HANDOVER CONTENTS

When the seven handover categories were examined, all three student disciplines were effective at handing over patient demographic information, observations and treatments. However, there was a significant loss of information from additional background and response to treatment. This highlights specific non-clinical and clinical data omitted from handovers, which has the potential to cause catastrophic medical errors impacting on patient outcomes. This may represent the lack of use of a structured system or common mnemonic across the student groups, and/or that students are not yet fully aware of the key constituents required for a successful handover. This latter point is supported by the difference between students' actual non-clinical and perceived non-clinical data transferred,

highlighting a discrepancy in their knowledge base about what may form non-clinical data. This underlines important considerations for education: a lack of expertise and consequent misunderstanding of the clinical and non-clinical context of both the patient and the content required in a handover can, potentially influence the amount of information transferred (Thakore & Morrison 2001).

When examining the data lost from 'additional background' and 'response to treatment' it is apparent that, in comparison to familiar handover tools used in the prehospital and hospital environments (IMIST and SBAR), the categories are not clearly discernible. Despite background in the second half of IMIST-AMBO, there was discordance between what information should be included (the checklist) and what students thought they handed over. This suggests a misunderstanding by students of the current tools, with the need to enhance education on handover content. This may be mitigated by designing a single handover tool that incorporates these handover categories. The previously created tool I-PASS (illness severity, patient summary, action list, situation awareness and contingency plans, and synthesis by receiver) (Starmer et al. 2014) may help to address some of these issues, but this tool does not yet appear to have made it into the health care domain worldwide, nor into education.

HANDOVER APPROACHES

In the videos, the nurses took a more thorough and standardised approach to handover than the other disciplines. Their approach utilised written notes and a standard adult general observation chart (SAGO). Nurses learn in first year to use documentation to support their patient assessments, which may account for their handover effectiveness (Drach-Zahavy, Goldblatt & Maizel 2015). Interestingly, written documentation was identified by the student paramedics and doctors in their reflections as a tool that should be used for handover success. Disparity across student disciplines in handover knowledge and ability, particularly amongst final-year students who are close to practicing in a clinical environment, indicates that students require better educational practices to enable skill development for real-world practice, where handovers are a key aspect of patient care.

INTERPROFESSIONAL EDUCATION IN STUDENTS

Nurses and paramedics showed a positive change in their readiness for interprofessional learning (RIPLS), however no change was observed for the doctors in either questionnaire (ATHCT/RIPLS). Previous work examining attitudes and readiness for IPE in students has shown that year of study may influence these parameters (Maharajan et al. 2017). Since the medical students had one or two more years of study than the nurse or paramedic students, this may have influenced these scores. Additionally, changes in attitudes of some students following IPE have been shown to be less variable in medical students compared to other health care students (Tunstall-Pedoe, Rink & Hilton 2003) and may highlight preconceptions of one profession towards another (Tunstall-Pedoe, Rink & Hilton 2003). Similar findings were shown in our study with changes in the following statements: 'Should physicians have the final word in decision making made by health care teams'

(negative change); and, 'In my opinion, physicians are natural team leaders' (positive change). Finally, the positive changes in responses seen from both questionnaires included positive group interactions, improving individual skills, and working towards a holistic patient care model for positive patient health outcomes. IPE therefore appears to be an effective tool to improve collaborative health care practice.

According to Allport's theory, positive IPE experiences are achieved when participants in different professional groups, such as different health disciplines (nursing, paramedic, medical), have an equal level of education and scope of practice, usually from the same year of study (Bridges & Tomkowiak 2010; Gierman-Riblon & Salloway 2013). This collaborative paradigm seeks to improve patient outcomes by increasing the respect and positive attitudes of students involved in interprofessional education by removing potential confusion when trying to work collaboratively with another health discipline in a higher or lower level of study. Although from a different student year group, the ability of the nursing students to handover information was not affected, with no difference in data transfer compared to paramedic and medical students. Whilst their ability to interpret some medical information may have been impaired, this highlighted to other students the importance of clear communication during handovers, including understanding students' scope of practice. This data shows there is merit in introducing IPE in earlier years of undergraduate programs.

LIMITATIONS

The current study had a number of limitations. First, the sample size was small and so results need to be interpreted with caution. Simulation realism can impact participant performance (Berkenstadt et al. 2008); however, based on student performance, we suggest the simulations were authentic, supporting an appropriate and immersive environment. A cross-over design for scenarios was used to minimise learning effect.

Additionally, given the simulations were videoed, there was potential for the Hawthorne effect to influence student performance. No difference was found between scenarios, therefore this is deemed not to have been an issue.

Finally, we acknowledge the use of first-year undergraduate nursing students does not align with Allport's theory of IPE, and using some less experienced students may have affected our results. However, many important observations were made as a result of using first-year students, and further research is needed.

CONCLUSION

To our knowledge this is the first study looking at the current status of handover performance and perceptions of handover effectiveness with student doctors, nurses and paramedics. Student reflections identified key learnings from undertaking handovers and from multidiscipline teamwork. Whilst more evidence is required, this study goes some way towards indicating that students benefit from IPE as early as in their first year of study. Deficiencies in current handover tools were identified, indicating that some aspects are poorly defined. These

results, in conjunction with existing literature, highlight the importance of developing a tool that promotes a gold standard in handover that is universally understood and supported in undergraduate education.

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Conflicts of interest

The authors declare no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

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Authors' contributions

Amanda Hlushak was responsible for the literature review, data collection and analysis and is the primary author of this manuscript. Caroline Robertson contributed to the study design, data collection and data analysis. Clare Sutton and Georgina Pickering designed the scenarios, undertook data collection and manuscript preparation. Alex (Sandy) MacQuarrie contributed to the study design, data collection, analysis and manuscript preparation. Patricia Logan assisted with data analysis and undertook key revisions to the manuscript.

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Medical students' exposure to, knowledge and perceptions of telehealth technology: is our future workforce ready to embrace telehealth service delivery?

Sabrina Winona Pit[1] **and Jannine Bailey**[2]

Abstract

Background: Having a workforce ready to embrace telehealth is key to improving healthcare access and equity in rural Australia. Known barriers to uptake amongst health professionals include: liability/law issues; traditional attitudes; business models; time constraints; and lack of workforce support, incentives, billing, funding, information technology (IT) skills, and patient rapport. Whether medical students share the same perspectives is currently unclear. This study sought to explore medical students' knowledge of, exposure to and attitudes towards telehealth.

Methods: Focus groups were conducted upon completion of a 12-month rural placement. Questions focused on students' exposure to and experiences with telehealth, their perspectives on those experiences, their desire to learn more about telehealth, and their perspectives on who should drive the implementation of telehealth services. Thematic analysis was conducted to identify key themes.

Results: Exposure to telehealth consults varied and appeared ad hoc. Overall interest in telehealth appeared to be low, but the students recognised its value in specific circumstances, such as for scripts, complicated/rare cases and to reduce social isolation for patients and doctors. Students identified the following as key barriers to telehealth use: legal/liability issues, technology, organisational issues, patient rapport, potential lower quality of care, lack of confidence in clinical ability, and a preference for 'face-to-face' medicine. Overall, students felt that rural, rather than urban-based, clinicians need to drive the telehealth agenda and further telehealth skills training and guidelines are required. Some students felt that some urban doctors used telehealth to expand their own patient base.

Conclusion: Medical students' 'real life' experience influences their current knowledge and perceptions of telehealth, which in turn has implications for the future of telehealth work and education of the workforce. Enhancing telehealth education and training during medical school training through increased exposure, experience and capability building will make medical students more workforce ready, so they are able to develop and work in new models of telehealth care.

Keywords: workforce, rural health, telehealth, education, future, clinical training

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BACKGROUND

There is a need to increase the rural medical workforce to meet the future demands of rural and remote populations (Bradford, Caffery & Smith 2016). The Australian government funds rural clinical schools as part of the Rural Health Multidisciplinary Training (RHMT) Program to attract young health professionals to rural areas. Training, experiencing the rural lifestyle and socialising are linked to students being more likely to want to return to a rural area to practice (Isaac, Pit & McLachlan 2018; Smith et al. 2018a). Furthermore, medical students who have a rural background (AMSA 2016), long-term program placements (Smith et al. 2018b) and early exposure to rural practice (AMSA 2016) report higher levels of intention to practice rurally. On the other hand, research has shown that urban first-year graduates have reported that they are worried about being 'forced' to work in non-metropolitan hospitals during their postgraduate years (Brodribb, Zadoroznyj & Martin 2016). Anxiety and concern about working in non-metropolitan locations is created by lack of communication through short notice of where to practice and clinical placement expectations, coupled with perceptions of there being a lower level of support in non-metropolitan placements (Brodribb, Zadoroznyj & Martin 2016). Brodribb and colleagues concluded that 'adequate professional support and supervision in rural placements' is vital to promote rural medicine to doctors in training. Some of the main challenges of providing healthcare and training in rural and remote Australia include issues such as: health care access, waiting times (Bradbury et al. 2014, p. 655), distance, and travel costs (Bradford, Caffery & Smith 2016). Telehealth has the ability to solve some of the challenges of providing healthcare and training in rural and remote Australia (Wade, Eliott & Hiller 2014).

DEFINITIONS OF TELEHEALTH

The International Organisation for Standardisation defines telehealth as:

> **'use of telecommunication techniques for the purpose of providing telemedicine, medical education, and health education over a distance', while drawing a distinction between this and telemedicine, which is defined as the 'use of**

> **advanced telecommunication technologies to exchange health information and provide health care services across geographic, time, social and cultural barriers.'**
>
> (Department of Health 2015)

Furthermore, the federal government asserts:

> **'Telehealth services use information and communications technologies (ICTs) to deliver health services and transmit health information over both long and short distances. It is about transmitting voice, data, images and information rather than moving care recipients, health professionals or educators. It encompasses diagnosis, treatment, preventive (educational) and curative aspects of healthcare services and typically involves care recipient(s), care providers or educators in the provision of these services directed to the care recipient.'**
>
> (Department of Health 2015)

USE OF TELEHEALTH MEDICARE FUNDED SERVICES IN AUSTRALIA

There are a variety of telehealth MBS items available for health professionals including medical practitioners, nurse practitioners, midwives, practice nurses, Aboriginal Health Workers optometrists, psychologists, social workers and occupational therapists. Telehealth Medicare rebate claims are growing; rising from 1,808 telehealth claims in July-September 2011 to 40,510 claims in April–June 2006 (Department of Health 2016). Additionally, billing of specialist telehealth services rose from approximately $2.6 million in 2011/2012 to about $23 million per year in 2017/2018, whilst patient-end telehealth support services rose from less than $1 million in 2011/2012 to approximately 4.1 million in 2017/ 2018 (Department of Human Services 2018; MBS Online 2016). Despite this, telehealth is still underused.

At the time of writing, in Australia, Medicare rebates are available for patients to have video consults with specialists from general practices, eligible Aboriginal Medical Services and residential aged care facilities, provided the patient is at least 15 kilometres away from the specialist. The patient can receive clinical support during the consultation from a General Practitioner (GP), other medical practitioner, nurse practitioner, midwife, an Aboriginal health worker or a practice nurse (Department of Health 2012). New funding for telehealth will be provided by the government over time. To encourage telehealth uptake, the Australian government announced in the 2017-18 Federal Budget that it would provide $9.1 million over four years, to allow rural Australians to access up to ten consultations from the Better Access psychological services program via video conferencing (Department of Health 2018a). Previously, clinicians needed to provide one of the first

four sessions face-to-face to enable a deeper connection (Department of Health 2017). However, since 1 September 2018, eligible patients in rural and remote areas now have the option of accessing all of their sessions via videoconference. These telehealth services can be provided by psychologists, occupational therapists, and social workers. GPs are not currently eligible to deliver services under the Better Access Telehealth initiative (Department of Health 2018b).

Telehealth is a growing service model (Wade, Eliott & Hiller 2014) that the future workforce will increasingly use. Particularly in rural and remote Australia, telehealth services may be able to improve patient centred care through reduced travel time and expenses for rural patients needing to travel to larger centres or urban areas (Wade, Eliott & Hiller 2014). A systematic review of telehealth services delivery in rural Australia concluded that telehealth has the potential to solve barriers to providing healthcare in rural Australia (Bradford, Caffery & Smith 2016). The authors further concluded that successful telehealth services could be scaled up and replicated. As Brodribb and colleagues (Brodribb, Zadoroznyj & Martin 2016) pointed out, expectations, professional support and supervision each play a key role. It is therefore helpful to explore, amongst rural medical students, what their attitudes are towards telehealth services, what exposure they have had, and what their expectations are in terms of professional and supervisory support in relation to telehealth education and training. Exposure to telehealth services business models, and practicing telehealth skills, may assist medical students in being open to using telehealth services when they enter the workforce, and may increase the likelihood of their providing telehealth services in rural or urban areas. Wade, Eliott and Hiller (2014) found that clinician acceptance was the main driver for the uptake of telehealth services. An understanding of students' exposure to and attitudes towards telehealth can be used by health programmers and rural clinical schools to improve the acceptance of telehealth services. Additionally, increased understanding may contribute to the development and recruitment of a confident and skilled telehealth workforce. Despite this, there appears to be a lack of research investigating student readiness to adopt telehealth (Bull et al. 2016), particularly amongst medical students.

APPLICATION IN RURAL EDUCATION AND BUILDING THE RURAL HEALTH WORKFORCE

The attitudes of final-year rural medical students towards telehealth has, to our knowledge, not previously been explored, despite telehealth being a growing and vital component of future rural healthcare. It is also unknown whether medical students are exposed to telehealth during their rural clinical placements and what their attitudes are towards rural telehealth care. Additionally, this information can inform the development of telehealth training and education programs for rural medical students and postgraduate medical trainees.

More specifically, this study aimed to gain a deeper understanding of telehealth by exploring rural medical students' understanding of, perceptions of and exposure to telehealth during medical training and in rural healthcare. It also examined their educational needs and their perspectives on the future of telehealth services.

METHOD

The study design was a qualitative study using focus groups. The focus groups comprised two main topic areas: living and working in a rural setting, and telehealth. This paper reports on telehealth only.

PARTICIPANTS AND RECRUITMENT

Participants comprised final-year medical students who had completed a year-long clinical placement in two rural clinical schools in New South Wales, Australia. All participants had given consent to take part in the focus group. Two focus groups were conducted with 31 medical students (*n*=15 and *n*=16 per group).

All students at the two rural clinical schools (*n*=32) were invited to take part in the project via an email from the student coordinator with a Participant Information Sheet attached, to remove the researchers from the initial recruitment contact.

DATA COLLECTION

The discussion guide for the focus group was developed using semi-structured open-ended questions. The guide was developed from the literature and in consultation with medical education staff at the respective rural clinical schools. The following telehealth questions were asked:

1. What do you think Telehealth is? We will give you two minutes to write down what you think it does. We will collect this at the end, no names please.

   <provide ISO definition>

   'use of telecommunication techniques for the purpose of providing telemedicine, medical education, and health education over a distance', while drawing a distinction between this and telemedicine, which is defined as the 'use of advanced telecommunication technologies to exchange health information and provide health care services across geographic, time, social and cultural barriers'.

2. Have you been exposed to telehealth during your medical training or elsewhere? (Whom, what, where)

3. Can you explain if it would be beneficial to learn more about telehealth during your training?
   - rural clinical placement year
   - undergraduate
   - postgraduate.

4. How and where do you think this could maybe be built into your training?
    - undergraduate
    - postgraduate.

5. Do you see a lead role for rural clinicians in telehealth services? Why/Why Not?

Focus groups were conducted by SWP and a research assistant in April and May 2018. Participants signed a consent form prior to taking part. Participants were first asked to record their definition and knowledge of telehealth anonymously on paper. After hearing the formal definition of telehealth, students were asked during the focus group a series of questions about their exposure to and experiences with telehealth during their medical degree, their perspectives on those experiences, their desire to learn more about telehealth, and their perspectives on who should drive the implementation of telehealth services. The interactive focus group discussion allowed participants to show their concurrence or disagreement with the responses of others, whilst also allowing them to build upon each other's responses, resulting in the generation of data that might not have been produced in multiple individual interviews (Richie & Lewis 2003). Focus groups lasted for 70–90 minutes. The focus groups were recorded by digital audio-recorders and transcribed verbatim.

DATA ANALYSES

Reflective notes were made during and after the focus groups and discussed between the researchers. An inductive thematic analysis was applied according to Braun and Clarke (2006). First, both authors read the transcripts to identify commonalities and differences. Secondly, a draft code book was developed by SWP, which was further adapted by JB. Reflective notes were drawn on during this coding process. Thirdly, this was followed by a discussion and refinement of the codebook between both authors. Microsoft Word was used to organise the data and identify themes. Finally, themes were identified by JB and refined by SWP. The transcripts and findings were not confirmed with the participants after the focus groups, but were confirmed during the discussion. The facilitators build rapport with the students to elicit honest responses and, where appropriate, restated or summarised their answers, prompted them for more detail and asked them for clarification if needed to determine accuracy. Direct quotes were used to demonstrate evidence of the findings. It is unknown whether data saturation was achieved.

ETHICS

Ethics approval for this project was granted by the Western Sydney University Human Research Ethics Committee (HREC No: H9989).

RESULTS

The main themes and key subthemes are displayed in Figure 1.

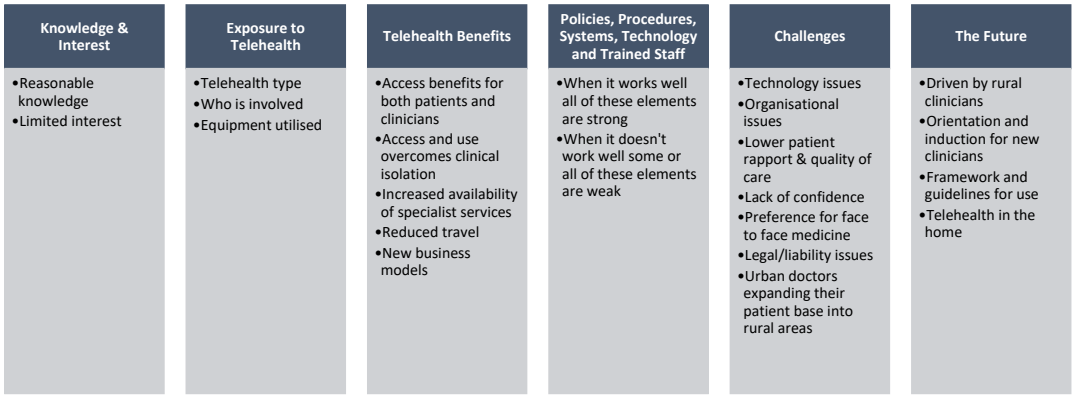

Figure 1. Key themes and related subthemes that emerged regarding medical students' perceptions of telehealth

KNOWLEDGE AND INTEREST

Most, but not all, students were able to provide a relatively accurate definition of telehealth and showed knowledge of what telehealth involves. However, overall interest in telehealth appeared to be low, with many seeing it as something more relevant in their future specialist training years. Students felt they needed more experience with face-to-face patient contact and still had a lot to learn. On the other hand, they did recognise the value of telehealth in specific circumstances.

> **'I think sometimes it is a good thing though. If it means people are accessing health care that they wouldn't otherwise access…'**

EXPOSURE TO TELEHEALTH

Exposure to telehealth varied amongst the students, in terms of both frequency and type or purpose. Most had had some form of exposure, however overall exposure was ad hoc, and limited in frequency and content. Key concepts that emerged here related to: purpose and type of telehealth activity, whom the telehealth activity involved, and the hardware and software utilised (Figure 2). It is apparent that students had observed a wide variety of health professionals and non-health professionals, such as lawyers, conducting telehealth services in a variety of locations such as Aboriginal Medical Services, general practices or mental health clinics.

> **'Especially in the oncology clinic. Even really, really remote areas get zoomed into, say, the consultants here'**

Students had experienced different software and hardware, ranging from high quality well-functioning dedicated telehealth rooms to poorly managed Skype consultations with specialists.

> **'They have the camera on the roof of the ED area. So, if there's a massive trauma or something that happens, they can get specialist support – cut here, do this, do that – which is really terrifying,'**

> **'…in the GP practice they had a room set up for telehealth. It was used a lot. It was really good.'**

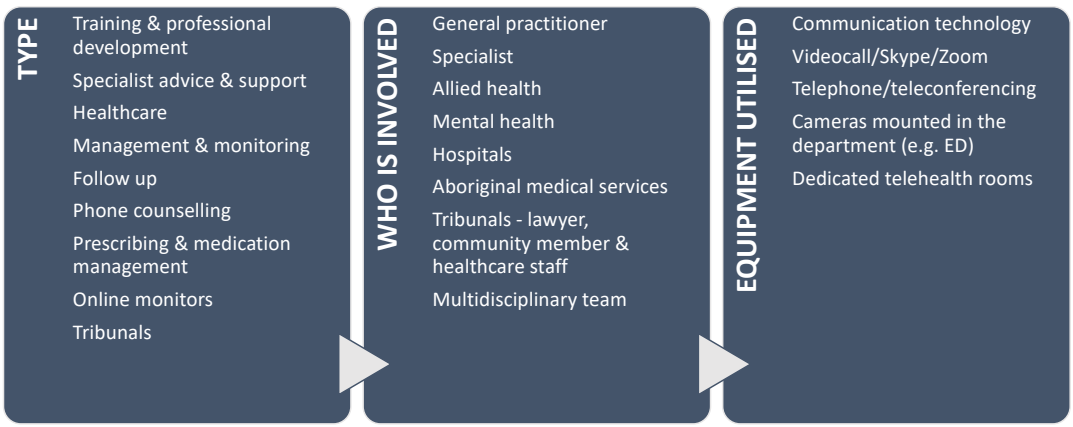

Figure 2. Exposure to telehealth during the rural clinical placement

TELEHEALTH BENEFITS LINKED TO ACCESS AND USE

Students perceive telehealth to have a dual role in accessibility for both clinicians and patients. Firstly, for rural clinicians it provides access to metropolitan clinicians, hence overcoming clinical isolation. This type of support for rural clinicians was seen as a requirement for complicated, highly specialised cases. In particular, it was perceived as especially useful for specialist follow-up consultations and for rare conditions, where specialists are unlikely to reside in rural areas.

> **'So, if you're a doctor out here who doesn't feel very supported, you should have the option to talk to someone senior or just a colleague even to discuss a case with them.'**

The implications for health services and clinics in being able to facilitate telehealth and the delivery of new business models by clinicians were seen as beneficial.

> **'It is a really valuable tool for the GP just to be able to book a time with this specialist where they can discuss it and come up with like a management plan, which is what I have seen**

them used for.'

Secondly, patient benefits mirrored those of clinician benefit, including increased access and use of health services, regardless of where patients are based and the increased availability of specialist services using telehealth. Other important benefits for patients were reduced travel time and associated financial costs.

'Patients don't have to travel all the way down to Sydney…'

The ability of telehealth to overcome the isolation of the patient was also seen as a key benefit.

TELEHEALTH SUCCESS FACTORS

The students had clear views that the success of telehealth is determined by good processes, procedures, systems, technology and trained staff. Students described having witnessed both good and bad experiences. Students reported that they had seen it work well in the following instances: the use of a dedicated room and technology, protocols are followed to prepare for the meeting prior to beginning, (e.g. microphones were tested), all members introduce themselves, and a support person is present for the patient.

'It's a good room, and the technology – it's the only thing that that room is basically used for.

And, they really make sure it's set up first at the start. Everyone has to introduce themselves, and they test the microphones and then it's all set up.'

Students also had experience in seeing telehealth work not so well. This may reduce students' interest in and attitudes towards using telehealth services once they enter the workforce.

'It was very short, very impersonal. Nobody knew when it was then their turn to speak. And, it just seemed quite isolating and no rapport build up between the doctor and the patient.'

'The connection would drop out sometimes. It would lag and pause.'

'The screen didn't even work.'

TELEHEALTH CHALLENGES

Students identified a number of key challenges associated with telehealth, not least of which was the reliability of the technology, including unreliability of internet access and its associated speed,

which links back to the theme of 'telehealth success factors'. Students described a lack of confidence in their clinical ability to conduct patient consults via telehealth and a preference for 'face-to-face' medicine at this stage of their career. Other key barriers to telehealth that were identified included: organisational issues, lack of patient rapport, potential lower quality of care, and the inability to conduct physical examinations.

> **'I would find it hard to have a trusting relationship with my treating doctor if I was just speaking to them on the phone.'**

> **'It seems unsafe. If a patient brings something up and you don't examine them – you should always examine. That's what my GPs say. What are you going to do? Just not examine the patients that come to you? That seems unsafe.'**

Some students also felt that some urban doctors used telehealth to expand their own patient base, and hence saw the financial implications of telehealth from a negative perspective.

> **'My experience of it is it's urban-based specialists looking to find new customers in a rural setting.'**

> **'And, it seems like a bit of a cop out and a bit of a way for them to get access to a larger client base I felt.'**

Lastly, students expressed fear and uncertainty around the legal/liability issues of not seeing the patient face to face.

> **'I think also I'd be interested in understanding the legal requirements involved in not actually seeing a patient face to face, because I'm sure that that's a minefield of litigation if someone says – I need an examination.'**

The challenges mentioned by the students suggest that, overall, students did not feel capable or well prepared to provide telehealth services and were unclear about how to manage telehealth.

> **'Even for management after you, say they need a script for something. What are the rules around that? Would you mail it to them or email them the script?'**

> **'I would be more interested in knowing how to protect myself if I found myself in a position that I had to do it. I would really like to have a framework and guidelines to work with.'**

THE FUTURE OF TELEHEALTH

There appears to be some consensus amongst the students that rural rather than urban-based clinicians need to drive the telehealth agenda.

> **'It's...their [rural clinicians] responsibility to advocate for it, because you're not going to...have people in the city saying, "We need telehealth".'**

The students felt that orientation to and introduction to available telehealth services are important for new clinicians. Importantly, they also felt that a framework and guidelines on how to protect oneself and how to use telehealth in practice are needed for students.

> **'Comes with that orientation we were talking about before, of when you come to a regional setting, like, knowing beforehand what sort of access you do have via telehealth.'**

When prompted as to whether telehealth services could be conducted from patients' homes, rather than in a healthcare facility, students thought that was possible in some instances, such as for repeat scripts, blood pressure measurements, follow-ups, implemented management strategies and mental health consultations. However, overall, they were not in favour of this approach. Students also saw variabilities in internet speed and computer access in patient's homes as obstacles.

> **'Yeah. And, like [student name] said, some specialties it could work. If you're purely checking blood tests, that's fine. But as soon as they say there's this problem or that problem – so I think having them come into a GP or at least to some sort of health care facility or where they can access it is a really good idea.'**

DISCUSSION

Despite some positive experiences and reporting of benefits, our students overall did not feel capable or well prepared to provide telehealth services. Students identified technology issues, organisational issues, lack of patient rapport, potential lower quality of care, lack of confidence in clinical ability, preference for 'face-to-face' medicine, and the inability to conduct physical examinations as key barriers to telehealth. They had strong views that telehealth services should preferably be conducted from a healthcare facility, rather than a patient's home. Additionally, some students felt that some urban doctors used telehealth to expand their own patient base. When designing curricula for students, educators should address these concerns to increase students' capability to provide telehealth services. Finally, another major challenge that needs addressing is students' fear around litigation.

The limitations mentioned by the students could be overcome by increasing the students' acceptance of telehealth services (Wade, Eliott & Hiller 2014). Despite the variability in telehealth exposure, students had some knowledge of telehealth and its application in medicine, but they showed little interest in providing telehealth services themselves. Positive experiences are important to increase interest in telehealth and to increase the likelihood of medical students implementing telehealth services in the future. Our students reported both good and bad experiences. The challenges of integrating telehealth into mainstream practice are well known, but the elements that may positively stimulate implementation and sustainability of telehealth services are not well-known (Wade, Eliott & Hiller 2014). Wade and colleagues conducted a systematic review and identified six key drivers that determined the success and sustainability of services in rural and remote Australia: vision, ownership, adaptability, economics, efficiency and equipment. Overall, our students believed that clear processes, procedures, systems, technology and capable staff were important for telehealth to be successful. This aligns with the findings of Wade and colleagues. Other benefits identified by the students were: telehealth having a dual role in accessibility for clinicians and patients in terms of being able to access highly specialised care, reducing clinical and social isolation, and decreased travel time and cost for patients.

As identified by the medical students, telehealth models can play a key role in improving access to rural health services and patient-centred care, yet, despite this, their interest in utilising telehealth was low. Two essential rural graduate workforce attributes that will assist in medical students being able to work with telehealth care models are: (1) graduates' ability to improve health care equity in rural areas through system and practice change; and (2) innovation ability. There is an opportunity to combine these two attributes with health professional education and telehealth to develop new rural healthcare systems and future practice change for several reasons:

1. telehealth is still underused
2. exposing rural health professional students to telehealth is likely to increase their adoption of telehealth in their own future practice, thereby reducing health inequity through increased access and increasing innovation in rural areas.

Importantly, Brunner and colleagues (2018) recently acknowledged that, despite workforce eHealth competency frameworks evolving for specific professions, there is a lack of knowledge and consensus about what the key eHealth competencies should be for tertiary graduates. They rightly point out that a competency-based framework may not be the best approach to teach telehealth skills, because of the rate of technological change and the lack of speed and strict rules around developing new competency standards, university courses and curricula. Brunner and colleagues (2018) suggest the use of a capability approach, which includes lifelong learning, the ability to identify the need for change and being adaptable to new situations, and the ability to work collaboratively. The capability approach thus moves beyond the technical skills and competencies only form one part of this approach. Importantly, the authors of this paper set out to develop an eHealth Capability Framework that can be applied to training tertiary

health graduates. They based the framework on current evidence, and stakeholder perceptions. Stakeholders included mainly academics and health services and government representatives. Only two recent health professional graduates and one current student were included. Our study can potentially add the views of medical students who have both rural and urban training experience, as there is currently a paucity of literature in this space (Bull et al. 2016). Bull and colleagues found that students were likely to adopt telehealth for the following reasons:

1. the system worked efficiently
2. the convenience of telehealth, and
3. access to health services.

But students were less likely to adopt telehealth because of: trust issues (security/privacy), a perception that telehealth was less personal, and concerns around major system errors. Glinkowski, Pawlowska and Kozlowska (2013) found that 66% of 308 Polish nursing students would definitely use a telehealth device in their future careers, and 70% thought that telenursing should be integrated into the educational curriculum. Another study (Boyers et al. 2016) explored among 16 medical students how useful teledermatology was as an educational tool for teaching in six core clinical competencies. Of these medical students, (88%) 'strongly agreed' or 'agreed' that teledermatology is an important educational tool. The study participants were least satisfied with the competencies focusing on interpersonal and communication skills and professionalism, and were most satisfied with the competencies of practice-based learning and improvement and medical knowledge.

There appears to be a general consensus amongst the study participants that rural, rather than urban-based, clinicians need to drive the telehealth agenda. Certainly, recent literature supports the notion that preparing students for rural practice involves preparing them for telehealth, more so than for metropolitan students (Rienits et al. 2016). The incorporation of telehealth into rural clinical school teaching curricula could be seen as the most relevant starting point. However, whilst metropolitan-based clinicians may not be the drivers of telehealth, many will need to be involved at some point as the access point for rural clinicians and patients. Thus teaching comprehensive telehealth communications skills to all medical students should become a focus.

STRENGTHS AND LIMITATIONS

This research has to be placed in context of the busy schedules of medical students within rural clinical schools. Hence, we were only able to conduct two focus groups with relatively large groups. An advantage of this approach was that all medical students took part, except for one. We cannot be certain that we achieved data saturation and a lack of data saturation is likely due to large focus group size. However, empirical data to determine sample sizes for qualitative research is rising (Guest & Namey, 2017). Contrary to traditional recommendations and beliefs around data saturation and number of focus groups required, a recent study by Guest, Namey and McKenna, (2017) found that more than 60% of all themes were found in the first

focus group and 73% within two focus groups. Guest and Namey (2017) recognise that each study needs to be placed into context and offer some recommendations to guide the likelihood of 'speed of data saturation' that can be applied to our study. First, the more structured the questions, the faster data saturation will be achieved. We provided structured questions. Secondly, the more homogeneous the participant group is, the faster saturation will be reached. Our students were all final-year rural clinical school medical students who had shared a year living in the same house and studying together in a rural area away from home. Lastly, for simple and targeted subjects, data saturation is more likely to be reached quickly.

We gave the students definitions of telehealth to ensure that the group had a mutual understanding of telehealth. This strengthens the likelihood of having reached a relative level of data saturation.

The potentially limited diversity of views within our sample is also a study limitation. Our findings may differ from those that might be found at other rural clinical schools, universities and disciplines; readers should take this into account when interpreting the study results in the light of developing their own telehealth education and training courses. For example, medical students that have received more exposure to telehealth may be more comfortable to express positive attitudes towards the uptake of telehealth services upon graduation. Similarly, allied health students who enter the workforce without further hospital training requirements may be more interested in the uptake of new models of care, such as telehealth, to create new work opportunities for themselves.

Given that telehealth is a fast-advancing field, and the fact that technology often moves faster than acceptance rates (Barlow 2013) we believe our results should be communicated in a timely manner to add to the debate on telehealth training in health education.

Lastly, social desirability bias may have been present to conform to the group, however, opposing views were presented during the focus groups.

IMPLICATIONS AND RECOMMENDATIONS

Medical students' 'real life' experience influences their current knowledge and perceptions of telehealth. This, in turn, has implications for the future of telehealth work and the education of the workforce. Enhancing telehealth education and training during medical school training through increased exposure, experience and capability building will make medical students more workforce ready to be able to develop and work in new models of telehealth care. Exposure to telehealth to increase student experience and confidence should be a focus as telehealth becomes more widely dispersed. Furthermore, student education around guidelines, litigation issues with telehealth, promotion of sustainable telehealth business models and the practicalities of using telehealth is needed to increase their confidence with telehealth. This, in turn, may increase uptake of telehealth in rural areas and among new clinicians. The accompanying impact of this increased confidence and knowledge with telehealth might influence a graduate's willingness to work rurally, leading to an increased health workforce in these regions. This can be explored in future research in

the context of the support that telehealth can provide clinicians to overcome clinical isolation. Telehealth can improve patient care, but the hardware, software and people's telehealth communication skills need to be further improved. The eHealth Capabilities Framework for Graduates and Health Professionals designed by Brunner and colleagues could be used as a first step (Brunner et al. 2018). We also recommend that medical students are involved in the design of new models of telehealth care. Future research could also explore the issue of urban doctors building their patient base in rural areas, as this may further jeopardise the move of new doctors into rural and remote areas. Future policy may look into providing telehealth services from the patient's home, rather than from a healthcare facility, where appropriate. This could potentially be incorporated into medical student education and increase services in rural and remote areas.

CONCLUSION

Student education around guidelines, litigation issues with telehealth, promotion of sustainable telehealth business models and practicalities of using telehealth is needed to increase the uptake of telehealth in rural areas and among new clinicians. Providing telehealth services from the patient's home rather than from a healthcare facility is not currently seen as acceptable. Clinicians, policy makers and educators should develop strategies to increase the level of comfort among young clinicians to work in telehealth business models to be able to better serve rural Australia.

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Availability of data and materials

The datasets are not available from the corresponding author due to the sensitive nature of the data and the consent being provided for participation in the specific study.

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Authors' contributions

SWP and JB designed the study, analysed the study, drafted and wrote the manuscript. JB drafted the data analyses section. SWP drafted the introduction, methods and discussion and conducted one of the focus

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