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

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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.

Knowledge & Interest	Exposure to Telehealth	Telehealth Benefits	Policies, Procedures, Systems, Technology and Trained Staff	Challenges	The Future
•Reasonable knowledge •Limited interest	•Telehealth type •Who is involved •Equipment utilised	•Access benefits for both patients and clinicians •Access and use overcomes clinical isolation •Increased availability of specialist services •Reduced travel •New business models	•When it works well all of these elements are strong •When it doesn't work well some or all of these elements are weak	•Technology issues •Organisational issues •Lower patient rapport & quality of care •Lack of confidence •Preference for face to face medicine •Legal/liability issues •Urban doctors expanding their patient base into rural areas	•Driven by rural clinicians •Orientation and induction for new clinicians •Framework and guidelines for use •Telehealth in the home

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...'
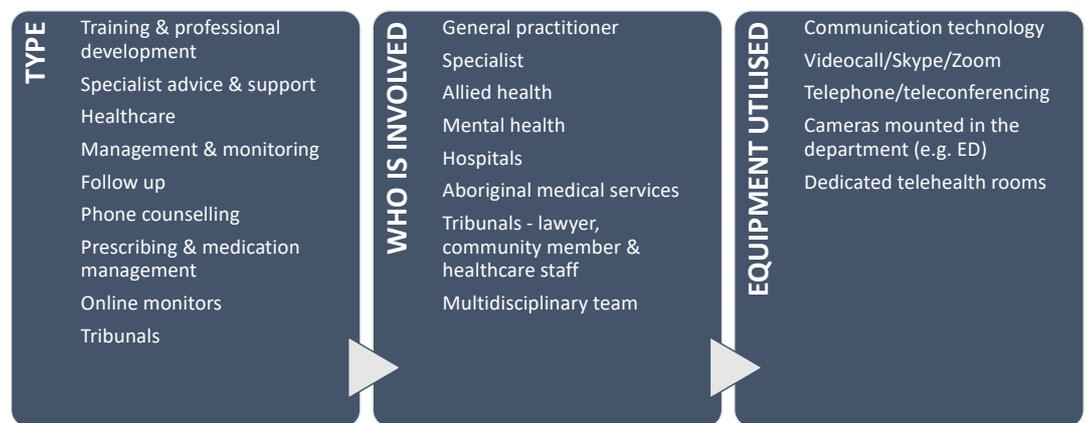
EXPOSURE TO TELEHEALTH

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.'

TYPE	WHO IS INVOLVED	EQUIPMENT UTILISED
Training & professional development	General practitioner	Communication technology
Specialist advice & support	Specialist	Videocall/Skype/Zoom
Healthcare	Allied health	Telephone/teleconferencing
Management & monitoring	Mental health	Cameras mounted in the department (e.g. ED)
Follow up	Hospitals	Dedicated telehealth rooms
Phone counselling	Aboriginal medical services	
Prescribing & medication management	Tribunals - lawyer, community member & healthcare staff	
Online monitors	Multidisciplinary team	
Tribunals		

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.

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.

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

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

groups. Both authors contributed to revising the manuscript and have read and approved the final manuscript.

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