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REVIEW ARTICLE

Setting priorities for rural allied health in Australia: a scoping review

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ETHICS APPROVAL

This was a scoping review not requiring ethics approval

ABSTRACT:

Introduction: The allied health workforce is one of the largest workforces in the health industry. It has a critical role in cost-effective, preventative health care, but it is poorly accessible in rural areas worldwide. This review aimed to inform policy and research priorities for increasing access to rural allied health services in Australia by describing the extent, range and nature of evidence about this workforce.

Methods: A scoping review of published, peer-reviewed rural allied health literature from Australia, Canada, the USA, New Zealand and Japan was obtained from six databases (February 1999 – February 2019).

Results: Of 7305 no-duplicate articles, 120 published studies were included: 19 literature reviews, and 101 empirical studies from Australia (*n*=90), Canada (*n*=8), USA (*n*=2) and New Zealand (*n*=1). Main themes were workforce and scope (*n*=9), rural pathways (*n*=44), recruitment and retention (*n*=31), and models of service (*n*=36). Of the empirical studies, 83% per cent were cross-sectional; 64% involved surveys; only 7% were at a national scale.

Rural providers were shown to have a breadth of practice, servicing large catchments with high patient loads, requiring rural-specific skills. Most rural practitioners had rural backgrounds, but rural youth faced barriers to accessing allied health courses. Rural training opportunities have increased in Australia but predominantly as short-term placements. Rural placements were associated with increased likelihood of rural work by graduates compared with discipline averages, and high quality placement experiences were linked with return.
Recruitment and retention factors may vary by discipline, sector and life stage but important factors were satisfying jobs, workplace supervision, higher employment grade, sustainable workload, professional development and rural career options.
Patient-centred planning and regional coordination of public and private providers with clear eligibility and referral to pathways facilitated patient care. Outreach and telehealth models may improve service distribution although require strong local coordination and training for distal staff.
Conclusion: Evidence suggests that more accessible rural allied health services in Australia should address three key policy areas. First, improving rural jobs with access to senior workplace supervision and career options will help to improve networks of critical mass. Second, training skilled and qualified workers through more continuous, high quality rural pathways is needed to deliver a complementary workforce for the community. Third, distribution depends on networked service models at the regional level, with viable remuneration, outreach and telehealth for practice in smaller communities. More national-scale, longitudinal, outcomes-focused studies are needed using controlled designs.

Keywords:

access, allied health, Australia, policy, research, therapy, workforce.

FULL ARTICLE:

Introduction

The allied health workforce is large and growing in many countries. In Australia, this consists of around 195 000 allied health professionals, up to 25% of the registered health workforce[1,2]. However allied health services remain poorly accessible in Australia's rural and remote areas[3]. In 2016, 17% psychologists, 19% physiotherapists, 21% of optometrists, 23% pharmacists, and 25% podiatrists worked in rural locations, where 29% of the Australia population lives[3,4]. This article presents a contemporary review of the latest evidence about rural allied health services to inform policy, service development and research for addressing better access in the Australian context.

With respect to workforce planning, the term 'allied health' in Australia covers a wide range of health professional groups around the world, typically excluding medicine, nursing, midwifery, dentistry and emergency services (Table 1). Professionals are trained in universities[2,5], some through Australia's National Registration and Accreditation Scheme and several others through professional self-regulation[1].

The need for allied health services in rural and remote Australian communities is extensive based on complexity of needs within rural populations, in the areas of chronic disease, eye and ear health, maternal and child health, mental health, Indigenous health and access to medicines. A Delphi study identified allied health, mental health, oral health and rehabilitation as core primary care services needed in communities as small as less than 1000 people[6,7]. Hospitalisation and retrievals data reflect the urgent need to strengthen primary care. Hospitalisations for oral and dental conditions in 2011–2013 were significantly higher for Indigenous infants and primary school aged children from remote areas than age-matched metropolitan controls[8]. Over 1 year, remote clinic transfers numbered 789 children (aged <16 years; average age 4.4 years) and frequent aeromedical retrievals occurred for people with identified complex chronic diseases who could have been managed locally with multi-disciplinary shared clinical care[9,10].

Accessing early intervention and ongoing support is a challenge. Leach et al described otitis media commencing in Aboriginal infants within 3 months of birth, progressing to chronic suppurative otitis media in 60% of cases and not resolving throughout early childhood[11]. Lack of providers was considered by 85% of parents in rural New South Wales (NSW) as a key reason limiting access to paediatric speech pathology services[12]. Also described were long travel distances to access services, expensive travel costs, lack of public transport, poor awareness of speech pathology services and delays in treatment due to waiting lists[13]. Access to rehabilitation in rural and underserved areas is plagued by difficulties with funding, recruiting and retaining appropriately skilled staff[14,15].

Allied health policy and service transformation is rapidly developing in Australia. Both national and state/territory governments are engaged in policies – the former largely governing community (private) and the latter governing salaried roles[2,5,16-18]. In February 2018, the Australian Health Minister's Advisory Council (AHMAC) formally recognised the Australian Allied Health Leadership Forum as the appropriate forum for the AHMAC and the Health Service Principle Committee to seek allied health workforce advice. Expert advice is also provided by Allied Health Professions Australia.

Rural-specific allied health policy and advocacy started over 20 years ago, via a grassroots organisation called Services for Rural and Remote Allied Health. At a similar time, in 1997 and 2001, the Australian Government started funding University Departments of Rural Health (UDRH) and the Australian Rural Health Education Network respectively[19,20]. These groups are intended to coordinate multidisciplinary rural training opportunities, including in allied health.

Despite the policy momentum, there has been limited consolidation of the evidence for informing the key priorities for

the future of rural allied health policy and research. Although this is a challenging task given the multiplicity of professions, technical expertise, training pathways, sectors and professional governance frameworks, coordinated action is critical[5]. In 2018/19, Australia's National Rural Health Commissioner was asked by the National Rural Health Minister to consult with the sector and draw on the available literature to provide advice regarding the current priorities for improving the access, distribution and quality of rural and remote allied health services across Australia[21]. The aggregation of this literature was considered to have broad applicability for diverse stakeholders and countries and hence considered important to publish.

Methods

A scoping review was selected to allow a number of study designs to be included, and as the method of choice for establishing the extent, range and nature of material and outcomes for informing broad fields such as policy[22]. As opposed to systematic reviews, which are best suited for narrow research questions and particular types of evidence such as randomised controlled trials, scoping reviews are better suited for exploring broad topics and can include a range of study types. The five-stage framework by Arskey and O'Malley was applied[22].

Stage 1 – Identifying the research question

A broad question and key terms were defined to enable breadth of coverage of available local research. The research question was deliberated by a multidisciplinary research and policy team at regular meetings. It was 'What is known from the existing literature about the training and provision of allied health services to address rural and remote community needs?' A secondary issue was 'What is allied health?'

The disciplines included were informed by Table 1, excluding medicine, nursing, midwifery, dentistry and paramedicine, along with non-clinical roles such as biomedicine. Specifically to inform cost-effective and sustainable allied health service models suitable for geographically distributed populations, allied health assistants and oral therapists/hygienists along with Aboriginal and Torres Strait Islander health practitioners were included. Although allied health practitioners work across many sectors, such as health, justice, schools, aged care and disability, the main focus of this work was on the health sector.

Table 1: Different groupings of disciplines registered, included or managed by Australian jurisdictions under the term 'allied health'

Registered and self-regulated disciplines	AHPA disciplines	Disciplines in Victoria¶	Disciplines in New South Wales¶	Disciplines in Queensland¶
Chiropractic†	Audiology	Art therapy	Art therapy	Audiology
Medical radiation practice	Chiropractic†	Audiology	Audiology	Clinical measurement†
Occupational therapy	Creative arts therapy†	Biomedical science†	Child life therapy†	Exercise physiology
Optometry	Dietetics	Chiropractic†	Counselling	Leisure therapy†
Osteopathy	Exercise and sports science	Diagnostic imaging medical physics	Diversional therapy†	Music therapy
Pharmacy	Genetic counselling†	Dietetics	Exercise physiology	Neurophysiology
Physiotherapy	Medical imaging and radiation therapy	Exercise physiology	Genetic counselling†	Nuclear medicine technology
Podiatry	Music therapy	Medical laboratory science†	Music therapy	Nutrition and dietetics
Psychology	Occupational therapy	Music therapy	Nuclear medicine technology	Occupational therapy
Additional AHPA registered health workers potentially part of rural allied health teams	Optometry	Nuclear medicine	Nutrition and dietetics	Optometry
Dental hygienist†	Orthoptics	Occupational therapy	Occupational therapy	Orthoptics
Dental prosthetist†	Orthotics and prosthetics	Optometry	Orthoptics	Orthotics and prosthetics
Dental therapist	Osteopathy†	Oral health (not dentistry)†	Orthotics and prosthetics	Pharmacy
Oral health therapist†	Perfusionists†	Orthoptics	Pharmacy	Physiotherapy
Aboriginal and Torres Strait Islander health practitioner†	Physiotherapy	Orthotics and prosthetics	Physiotherapy	Podiatry
Allied health disciplines operating under self-regulation	Podiatry	Osteopathy†	Podiatry	Psychology
Audiology	Psychology	Pharmacy	Psychology	Radiation therapy
Dietetics	Rehabilitation counselling†	Physiotherapy	Radiation therapy	Radiography
Exercise science/physiology	Social work	Podiatry	Radiography	Rehabilitation engineering†
Orthoptics	Speech pathology	Psychology	Sexual assault†	Social work
Orthotics and prosthetics		Radiation oncology medical physics	Social work	Sonography†
Social work		Radiation therapy	Speech pathology	Speech pathology
Sonography†		Radiography	Welfare†	
Speech pathology		Social work		
		Sonography†		
		Speech therapy		

† May not be listed as 'allied health' by other entities (refs 1, 17, 18).
¶ Not all disciplines managed by these states are considered allied health but may be listed as they are managed by allied health advisors in these states.
AHPA, Allied Health Professions Australia.

Stage 2 – Identifying relevant studies

To be as comprehensive as possible in identifying primary studies, a selection of search terms was mapped, based on the review questions, and iteratively developed to maximise generalisability while balancing sensitivity to the range of disciplines and rural context of interest. Concepts covered were (Rural OR remote) AND ('health work*' OR 'rural generalist' OR 'allied health' OR 'community health worker' OR 'health assistant' OR 'therap*') AND (train* OR curricul* OR develop* OR course OR placement OR immersion OR skill OR education OR qualification OR competen* OR recruit* OR retention OR *care OR *access OR model OR telehealth OR outreach) AND (Australia OR New Zealand OR Japan OR Canada OR United States OR North America). A Boolean search was also done, based on the terms in each concept.

The search was restricted to high income countries where previous global scale literature reviews had identified the most evidence about primary care/allied health: Australia, Canada, Japan, USA and New Zealand[23,24].

Six databases, judged to be of the scope and relevance for the question, were used: Medline, Social Science Citation Index, CINAHL, ERIC, *Rural and Remote Health*, Informit Health Collection, and the Cochrane Database of Systematic Reviews. Articles were published between February 1999 and February 2019.

Other published material was identified by key informants as part of the Commissioner's concurrent national consultation process. The literature was entered into Endnote, duplicates removed, and articles sorted using inclusion and exclusion criteria, which had been iteratively developed through discussion between the authors (Table 2). No other quality criteria were applied to exclude articles because the literature was hypothesised to be emergent and the aim was to define the extent, range and nature of material.

Table 2: Inclusion and exclusion criteria applied to the scoping review

Inclusion	Exclusion
• Based in a rural or remote location • Empirical study or literature review about allied health disciplines or services in scope • Reported outcomes • Over 40% of results about allied health workforce • From Australia, Canada, USA, New Zealand, Japan • Between February 1999 and February 2019	• Low- or middle-income country • Discussion or perspective only • Clearly aged care, disability or education sectors • Virtual service models not specific to supporting rural workforce or rural access • <15 people in sample • Full text not available (via find full text using Endnote, Google or direct library searching)

Stage 3 – Selecting the studies

Study selection involved reviewing article titles and abstracts for inclusion. This involved weekly discussions with a reference team of mixed policy, research and clinical experience about the range of material in order to develop inclusion criteria. The authors then conducted full-text screening. Extraction criteria were developed based on the research question, pilot tested and refined until considered fit for purpose. Extracted material included country and location, year, health worker(s), study sample, practice context (hospital, community or both AND regional, rural or remote of both), research question (topic), area of clinical care, methods, outcome and enablers or barriers.

Stage 4 – Charting the data

Charting the key themes involved synthesising and interpreting the material by sifting, charting and sorting material according to key issues and themes. The extracted material was initially charted by recording preliminary ideas and thoughts, and discussing these between authors. After initial analysis, articles were re-read and progressively organised into consistent themes using inductive analysis, whereby the material was considered without using a pre-existing coding framework, within an Excel spreadsheet[25,26]. Articles covering a number of themes were categorised according to the main theme covered, but findings for all themes were presented in all relevant sections of the results and discussion.

Stage 5 – Collating, summarising and reporting the results

The results were organised into a thematic narrative that made sense for informing policy and research priorities. Although not the main focus of scoping reviews, the findings about quality of evidence (key study design and sample issues) were briefly appraised as this was considered important for informing research directions.

Ethics approval

This study used published data and so did not require ethics review.

Results

Overall, 9086 articles were identified from databases and 1657 duplicates were removed (Fig1). Abstract and title screening was done for 7429 articles, including two articles identified by key informants (other articles that key informants identified had already been included). Of these, 205 articles were retained after screening titles and abstracts. After full-text review 120 publications met the inclusion criteria: 101 empirical studies and 19 literature reviews (Appendix I). In total, 83 (70%) of the articles included were published in the last 10 years. Of all included literature, most was from Australia (*n*=97), Canada (*n*=8), USA (*n*=2), New Zealand (*n*=1) and several other high-income countries (*n*=12).

The main themes of the 120 included articles were workforce and scope of practice (*n*=9), rural training pathways (*n*=44), recruitment and retention (*n*=31), and models of service (*n*=36).

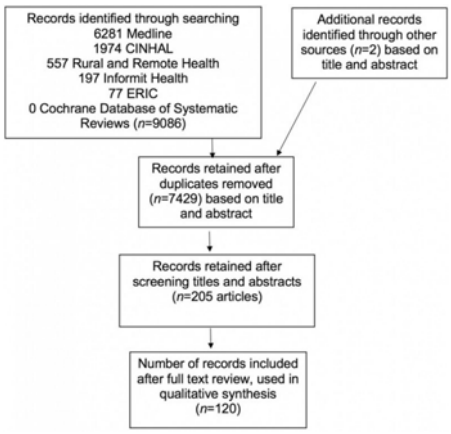

Figure 1: Prisma flow chart of study selection.

Scope of practice

The findings about scope of practice (Appendix II) suggest that at least half of rural allied health professionals work publicly. More privately based groups were optometrists, podiatrists, pharmacists, physiotherapists and psychologists[27-30]. Rural jobs involved multi-site practice across large catchments, juggling several roles[31-36]. An extended scope of practice was used to address the diverse community needs, including particular skills in paediatrics, Indigenous health, chronic diseases, health promotion/prevention, primary care and health service management[31,33,34,37-41]. To manage high service demand within limited staffing and clinical resources, skills in service prioritisation and networking were required[33,35,39,42]. Assistants were perceived to have the potential to buffer around 17% of allied health workload[43]. However, these roles were challenging to implement due to issues with professional trust and governance[44]. In small communities and regions with only intermittent access to allied health providers, training local workers to undertake allied health tasks may improve early and ongoing access, service coordination and culturally safe care[31,45-48].

Rural training pathways

The findings about rural training pathways (Appendix III) suggested that 40–66% of rural allied health clinicians had a rural origin and about half had had some rural training experience[30,49-51]. Accessing allied health university courses was challenging for rural people (limited visibility of the professions, course eligibility, cultural barriers and cost reasons)[52,53]. Rural training opportunities have expanded in Australia over the past 20 years but generally occur as short placements, restricted to particular disciplines[54-56]. One univariate study identified that of allied health students who experienced up to 12 months rural training, 50% worked rurally as early career graduates compared with an average for the same disciplines, which was 24%[57]. Another study that controlled for rural background identified 2–18-week rural placements were associated with 25% of first-year graduates working in rural areas, 42% of whom had rural background. After controlling for rural background, rural placement was significantly associated with rural work, and student perceived quality of placement was an important factor[58]. The literature identified rural hospital and community settings were potentially suited for allied health curriculum-based learning[59,60]. UDRHs were described as important organisations for supporting rural clinical training, research and career development[61]. Upskilling and professional development exemplars included the delivery of advanced paediatric training in a region, rural-specific allied health curriculum, educational modules (online and face-to-face) and professional exchange programs to address specific local service goals[62-68].

Recruitment and retention

The recruitment and retention evidence (Appendix IV) suggested that 56% of international physiotherapist graduates would consider working in a rural location[69]. Tertiary scholarships with rural return of service requirements have the potential to increase the uptake of rural work[70]. One study quantified the retention in public health services, showing a median turnover of 18 months for dieticians, 3 years for physiotherapists and 4 years for social workers. Reduced turnover was predicted by employment at higher grade (Grade 2 or 3 (highest), compared with Grade 1 (entry level)) or age more than 35 years[71]. Factors considered important for retention had substantial overlap across the literature and included having a strong local career path (access to senior supervision in the workplace, access to relevant professional development (topic, time and cost)), a supportive practice environment (clearly documented role, orientation to workplace, culturally safe, collegiality, involved in decision-making) and satisfying work (independence in role, variety of work, its community focus and feasible workload)[28,29,33,72-78]. Various mentorship models may also be of value[79]. More (84%) private allied health clinicians expressed intention to stay in their rural position for 2 or more years than public allied health clinicians (53%)[28].

Models of service

Appendix V summary evidence about models of service suggests that health services prioritise physiotherapy services for regions based on number of public and private allied health professionals available, their skills and community need[42]. Patient-centred planning and partnerships between different rural public hospitals

as well as between public and private providers and in line with other interventions occurring in the community was a way to increase regional access to a more comprehensive range of services[80-85]. Additionally, clear eligibility criteria, patient referral, shared care and education for staff were considered relevant to increase accessible patient pathways across geographic catchments[36,82,86,87]. In one review, individual and home-based cardiac rehabilitation (phone and internet) were found to be as effective as hospital-based programs[88]. Online consultations for allied health were well utilised by doctors, with potential clinical and cost parity with face-to-face services in areas such as diabetic foot healing, rehabilitation and speech pathology[89-92]. Some providers and clients preferred face-to-face services and considered education services had the highest utility for telehealth[90,91,93]. Service models delivered by virtual and physical outreach increased access but required strong community engagement and ongoing coordination by trained local workers[94,95]. Viable business models were considered important for distributing services in small communities[32].

Quality of studies

Of the empirical evidence there were only seven national studies, 19 with a whole state or territory focus and 75 based at a community or regional level. Most studies defined allied health but there was no consistency regarding this definition, with important implications for generalisability of the evidence. Empirical studies used a range of methods individually or in combination: 64% surveys, 33% interviews, 12% existing data, 11% focus groups, 4% Delphi process and workshops, 3% environmental scans and 3% descriptive narratives. Most (83%) used cross-sectional designs. Only 8% controlled for confounders and only 14% of studies used control groups.

Across empirical studies, most (55%) had sample sizes greater than 50. The response rate range was 22–100% where reported (mean 46%). Non-response bias was assessed in one study.

Discussion

This review uniquely draws on the most up-to-date published evidence about rural and remote allied health services. By including a diverse range of disciplines and contexts, the findings may provide a more comprehensive backdrop for informing Australia's priorities and guiding future research than if the review was more restricted. Nineteen other literature reviews were identified but the present study included the largest volume and range of material.

Several policy implications are notable for increasing access to high quality, rural allied health services.

First, the literature describes juggling high demands with a limited number and range of providers. This is a common theme in the broader rural workforce evidence, an issue that increases with remoteness, and has major implications for primary healthcare workforce supply and retention[96-98]. This suggests that there are not enough of the required allied health disciplines to support rural populations. Rural health workforce planning for this must reorientate away from disciplinary siloes and focus on complementary services, shared roles and broader roles that address the needs of entire rural regions. Jobs growth may also need to occur in a way that covers both hospital (public) sector and private sector roles. Focusing on hospitals alone will limit the potential for building a private sector that has been shown to complement the overall platform of regional service delivery, and underpin growth of particular fields such as optometry, podiatry, pharmacy, physiotherapy and psychology. Notably, the private sector plays a critical role in strengthening primary care and preventative approaches, reducing pressure on hospitals. It is possible that underwriting a critical mass of relevant public and/or private positions in regions and building hubs could help to offset private business and administration costs, which are often high in relation to the income of solo or small practices. Another consideration with respect to growing rural allied health jobs is the development of more senior positions, essential for providing supervision and support to junior staff. The review identified that employing higher grade staff may improve retention and, in turn, create career paths to retain emerging graduates. Plans for growth in rural allied health workforce capacity need to accommodate enough staff to allow time for teaching, outreach, telehealth, professional development and working with a more complex client base across a wide geography.

The second issue is that a more robust rural training and support pathway is urgently needed to achieve a workforce with the right skills and wanting to stay. This pathway needs to support the development of not only a workforce fit for rural hospital work, but also community-based roles, including in primary care, and culturally able to work in Indigenous health. This is similar to the rural generalist pathway in medicine, which aims to develop practitioners with the breadth of skills to practise across hospital and community settings[99]. The barriers for rural youth accessing allied health university-level training may be harder than in medicine, where rural background quotas are used[100]. In line with global evidence about rural workforce development, this relies on individual universities embracing rural selection policies, delivering training in rural areas using a rural-facing curriculum to train clinicians adept within a rural practice context and including a range of quality placements (covering preventative, acute and chronic care in hospital and the community, similar to longitudinal integrated clerkships in medicine)[101,102]. The available evidence suggests that increasing the duration of rural training is urgently needed, specifically targeting the key disciplines that regions need. The evidence in medicine goes further to point out that remoteness and number of rural placements also make a difference to rural work outcomes[103]. This pathway needs to articulate with graduate positions that have clear orientation processes, regular career check-in and professional development sessions, collegial practice and senior staff supervision. Bundled incentives have been identified as optimal for rural primary care retention as they are adaptable to the wide range of professional and personal factors that have the potential to impact retention in various communities, by rural career and life stages[77,98].

Finally, promoting access in more remote locations starts with

fostering hubs and engaging in clear business planning for extending clinical service further afield. In thinner, more remote markets, sustainable remuneration packages (or more salaried positions), complementary outreach and telehealth strategies, and networked service models (various hospital clinicians and primary care teams working together) may be fruitful but require policy and coordinated service leadership focused on an overall regional platform beyond any one town. Services operating in remote settings are likely to require more coordination and administrative support, including engaging and supporting geographically dispersed patients to receive early intervention and follow-up care. Ensuring outreach and telehealth services run efficiently is complicated and demands that testing and treatment are primed for clinic clinics on pre-set days. Locally trained personnel need supervision and support to manage patients according to care plans using real-time support when needed. Remote training experiences for allied health students may provide excellent insight into distributed practice models and help to stimulate an allied health workforce that confidently serves more remote populations.

Future research directions

The quality and size of the studies in this review suggest that improved rural allied health research infrastructure (data and research teams) may be required to produce more scalable longitudinal evidence about outcomes. More multivariate studies using controlled designs is warranted for isolating important factors. Priorities for future research include understanding the effects of interventions in education, workforce and service models on access and quality.

Limitations

The review was time-limited, and even though the search was comprehensive (covering 20 years and using six databases), it is possible that some published or in-press material was missed, particularly due to the breadth of disciplines included. This research may not be applicable for informing individual disciplines because allied health was considered at an aggregate level. Most of the evidence was from Australia, which was useful relative to the research objective. However, Australia has different rural and remote health training and service contexts than other high income countries. This, along with the breadth of this review, may mean that care needs to be taken when applying the findings to other countries, specific services, disciplines or rural contexts.

Conclusion

This scoping review of the past 20 years of published rural allied health evidence provides a substantial backdrop for establishing future policy and research priorities for Australia. Findings suggests that although there is a need for more national-scale, longitudinal, outcomes-focused studies, there is a current evidence base to support three key policy areas for more accessible rural allied health services. First, increasing rural allied health public and private sector jobs, coupled with senior workplace supervision and career paths, is needed for retention. Second, training skilled workers through more continuous, high quality rural pathways and across hospital and community settings is likely to support an appropriate workforce for rural communities. Finally, for distribution, critical success depends on regionally based, networked service models incorporating outreach and telehealth, with viable remuneration reinforcing practice in smaller communities.

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Declaration of interest

Professor Worley is the National Rural Health Commissioner, an independent statutory officer. The views and opinions expressed in this article are those of the authors and do not represent an official position of the Commonwealth Department of Health or the Australian Government.

REFERENCES:

1 Australian Institute of Health and Welfare. *Australia's allied health workforce growing.* 2014 . Available: https://www.aihw.gov.au/news-media/media-releases/2014/2014-dec/australia-s-allied-health-workforce-growing (Accessed 31 October 2019).

2 Allied Health Professions Australia. *What is allied health?* 2019. Available: https://ahpa.com.au/what-is-allied-health (Accessed 31 October 2019).

3 Australian Government Department of Health. *Health workforce data: fact sheets.* 2016. Available: https://hwd.health.gov.au/publications.html#alliedh16 (Accessed 31 October 2019).

4 Australian Bureau of Statistics. *Regional population growth Australia.* 2016. Available: http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/3218.02014-15?OpenDocument (Accessed 31 October 2019).

5 Department of Health and Human Services Victoria. *Allied Health Workforce.* 2018. Available: https://www2.health.vic.gov.au/health-workforce/allied-health-workforce (Accessed 31 October 2019).

6 Thomas SL, Wakerman J, Humphreys JS. What core primary health care services should be available to Australians living in rural and remote communities? *BMC Family Practice* 2014; **15:** 143. https://doi.org/10.1186/1471-2296-15-143 PMid:25143194

7 Thomas SL, Wakerman J, Humphreys JS. Ensuring equity of access to primary health care in rural and remote Australia – what core services should be locally available? *International Journal for Equity in Health* 2015; **14:** 111. https://doi.org/10.1186/s12939-015-0228-1 PMid:PMid:26510998

8 Caffery L, Bradford N, Meurer M, Smith A. Association between patient age, geographical location, Indigenous status and hospitalisation for oral and dental conditions in Queensland,

Australia. *Australian Journal of Primary Health* 2017; **23(1):** 46-52. https://doi.org/10.1071/PY15105 PMid:27418405

9 Barker CL, Ross M. Paediatric aeromedical retrievals in the 'Top End' of the Northern Territory. *Australian Journal of Rural Health* 2014; **22(1):** 29-32. https://doi.org/10.1111/ajr.12087 PMid:24460997

10 Garne D, Perkins D, Boreland F, Lyle D. Frequent users of the Royal Flying Doctors Service primary clinic and aeromedical services in remote New South Wales: a quality study. *Medical Journal of Australia* 2009; **191(11):** 602-604. Available: https://doi.org/10.5694/j.1326-5377.2009.tb03344.x PMid:20028276

11 Leach AJ. Otitis media in Australian Aboriginal children: an overview. *International Journal of Pediatric Otorhinolaryngology* 1999; **49(Suppl. 1):** S173-S178. https://doi.org/10.1016/S0165-5876(99)00156-1

12 O'Callaghan AM, McAllister L, Wilson L. Barriers to accessing rural paediatric speech pathology services: health care consumers' perspectives. *Australian Journal of Rural Health* 2005; **13(3):** 162-171. https://doi.org/10.1111/j.1440-1854.2005.00686.x PMid:15932486

13 Bristow S, Jackson D, Shields L, Usher K. The rural mother's experience of caring for a child with a chronic health condition: an integrative review. *Journal of Clinical Nursing* 2018; **27(13-14):** 2558-2568. Available: https://doi.org/10.1111/jocn.14360 PMid:29575208

14 Mitsch V, Curtin M, Badge H. The provision of brain injury rehabilitation services for people living in rural and remote New South Wales, Australia. *Brain Injury* 2014; **28(12):** 1504-1513. https://doi.org/10.3109/02699052.2014.938120 PMid:25093407

15 Jesus TS, Landry MD, Dussault G, Fronteira I. Human resources for health (and rehabilitation): six rehab-workforce challenges for the century. *Human Resources for Health* 2017; **15(1):** 8. https://doi.org/10.1186/s12960-017-0182-7 PMid:28114960

16 Australian Allied Health Leadership Forum. 2019. Available: https://aahlf.com (Accessed 31 October 2019).

17 NSW Health. *Allied health portfolio North Sydney.* 2018. Available: https://www.health.nsw.gov.au/workforce/alliedhealth/Pages/default.aspx (Accessed 31 October 2019).

18 Queensland Health. *Allied Health Brisbane.* 2017. Available: https://www.health.qld.gov.au/employment/work-for-us/clinical/allied-health (Accessed 31 October 2019).

19 Urbis. *University Departments of Rural Health Program.* 2008. Available: https://www.health.gov.au/internet/main/publishing.nsf/Content/A3760E61F341B7F5CA257BF0001D73AB/$File/udrh4.pdf (Accessed 31 October 2019).

20 Australian Rural Health Education Network. 2019. Available: http://arhen.org.au (Accessed 31 October 2019).

21 Australian Government Department of Health. *National Rural Health Commissioner.* 2019. Available: https://www1.health.gov.au/internet/main/publishing.nsf/Content/National-Rural-Health-Commissioner (Accessed 31 October 2019).

22 Arksey H, O'Malley L. Scoping studies: towards a methodological framework. *International Journal of Socical Research Methodology* 2005; **8:** 19-32. https://doi.org/10.1080/1364557032000119616

23 Berndt A, Murray CM, Kennedy K, Stanley MJ, Gilbert-Hunt S. Effectiveness of distance learning strategies for continuing professional development (CPD) for rural allied health practitioners: a systematic review. *BMC Medical Education* 2017; **17(1):** 117. https://doi.org/10.1186/s12909-017-0949-5 PMid:28701199

24 Dolea C, Stormont L, Braichet J-M. Evaluated strategies to increase attraction and retention of health workers in remote and rural areas. *Bulletin of the World Health Organization* 2010; **88(5):** 379-385. https://doi.org/10.2471/BLT.09.070607 PMid:20461133

25 Braun V, Clarke V. Using thematic analysis in psychology. *Qualitative Research in Psychology* 2006; **3(2):** 77-101. https://doi.org/10.1191/1478088706qp063oa

26 Strauss AL, Corbin JM. *Basics of qualitative research: techniques and procedures for developing grounded theory.* Thousand Oaks: Sage, 1998.

27 Smith T, Cooper R, Brown L, Hemmings R, Greaves J. Profile of the rural allied health workforce in northern New South Wales and comparison with previous studies. *Australian Journal of Rural Health* 2008; **16(3):** 156-163. https://doi.org/10.1111/j.1440-1584.2008.00966.x PMid:18471186

28 O'Toole K, Schoo A, Stagnitti K, Cuss K. Rethinking policies for the retention of allied health professionals in rural areas: a social relations approach. *Health Policy* 2008; **87(3):** 326-332. https://doi.org/10.1016/j.healthpol.2008.01.012 PMid:18336949

29 Williams E, D'Amore W, McMeeken J. Physiotherapy in rural and regional Australia. *Australian Journal of Rural Health* 2007; **15(6):** 380-386. https://doi.org/10.1111/j.1440-1584.2007.00931.x PMid:17970901

30 Keane S, Smith T, Lincoln M, Fisher K. Survey of the rural allied health workforce in New South Wales to inform recruitment and retention. *Australian Journal of Rural Health* 2011; **19(1):** 38-44. https://doi.org/10.1111/j.1440-1584.2010.01175.x PMid:21265924

31 Boshoff K, Hartshorne S. Profile of occupational therapy practice in rural and remote South Australia. *Australian Journal of Rural Health* 2008; **16(5):** 255-261. https://doi.org/10.1111/j.1440-1584.2008.00988.x PMid:18808482

32 Merritt J, Perkins D, Boreland F. Regional and remote occupational therapy: a preliminary exploration of private occupational therapy practice. *Australian Occupational Therapy Journal* 2013; **60(4):** 276-287. https://doi.org/10.1111/1440-1630.12042 PMid:23888978

33 Bent A. Allied health in Central Australia: challenges and rewards in remote area practice. *Australian Journal of Physiotherapy* 1999; **45(3):** 203-212. https://doi.org/10.1016/S0004-9514(14)60351-2

34 Adams J, de Luca K, Swain M, Funabashi M, Wong A, Pagé I, et al. Prevalence and practice characteristics of urban and rural or remote Australian chiropractors: analysis of a nationally

representative sample of 1830 chiropractors. *Australian Journal of Rural Health* 2019; **27:** 34-41. https://doi.org/10.1111/ajr.12447 PMid:30719793

35 Hoffmann T, Cantoni N. Occupational therapy services for adult neurological clients in Queensland and therapists' use of telehealth to provide services. *Australian Occupational Therapy Journal* 2008; **55(4):** 239-248. https://doi.org/10.1111/j.1440-1630.2007.00693.x PMid:20887476

36 Kingston GA, Williams G, Judd J, Gray MA. Hand therapy services for rural and remote residents: results of a survey of Australian occupational therapists and physiotherapists. *Australian Journal of Rural Health* 2015; **23(2):** 112-121. https://doi.org/10.1111/ajr.12141 PMid:25616064

37 Colles SL, Belton S, Brimblecombe J. Insights into nutritionists' practices and experiences in remote Australian Aboriginal communities. *Australian & New Zealand Journal of Public Health* 2016; **40:** S7-S13. https://doi.org/10.1111/1753-6405.12351 PMid:25903118

38 Smith JD, O'Dea K, McDermott R, Schmidt B, Connors C. Educating to improve population health outcomes in chronic disease: an innovative workforce initiative across remote, rural and Indigenous communities in northern Australia. *Rural and Remote Health* 2006; **6(3):** 606. Available: https://www.rrh.org.au/journal/article/606 (Accessed 11 May 2020).

39 Thomas Y, Clark M. The aptitudes of allied health professionals working in remote communities. *International Journal of Therapy & Rehabilitation* 2007; **14(5):** 216-220. https://doi.org/10.12968/ijtr.2007.14.5.23539

40 Roots RK, Brown H, Bainbridge L, Li LC. Rural rehabilitation practice: perspectives of occupational therapists and physical therapists in British Columbia, Canada. *Rural and Remote Health* 2014; **14(1):** 2506. Available: https://www.rrh.org.au/journal/article/2506 (Accessed 11 May 2020).

41 Wielandt PM, Taylor E. Understanding rural practice: implications for occupational therapy education in Canada. *Rural and Remote Health* 2010; **10(3):** 1488. Available: http://www.rrh.org.au/journal/article/1488 (Accessed 11 May 2020).

42 Adams R, Jones A, Lefmann S, Sheppard L. Rationing is a reality in rural physiotherapy: a qualitative exploration of service level decision-making. *BMC Health Services Research* 2015; **15:** 121. https://doi.org/10.1186/s12913-015-0786-3 PMid:25880469

43 Somerville L, Davis A, Elliott AL, Terrill D, Austin N, Philip K. Building allied health workforce capacity: a strategic approach to workforce innovation. *Australian Health Review* 2015; **39(3):** 264-270. https://doi.org/10.1071/AH14211 PMid:25844538

44 Stute M, Hurwood A, Hulcombe J, Kuipers P. Pilot implementation of allied health assistant roles within publicly funded health services in Queensland, Australia: results of a workplace audit. *BMC Health Services Research* 2014; **14:** 258. https://doi.org/10.1186/1472-6963-14-258 PMid:24935749

45 Tan ACW, Emmerton LM, Hattingh HL. Issues with medication supply and management in a rural community in Queensland. *Australian Journal of Rural Health* 2012; **20(3):** 138-143. https://doi.org/10.1111/j.1440-1584.2012.01269.x PMid:22620478

46 Stuart J, Hoang H, Crocombe L, Barnett T. Relationships between dental personnel and non-dental primary health care providers in rural and remote Queensland, Australia: dental perspectives. *BMC Oral Health* 2017; **17(1):** 99. https://doi.org/10.1186/s12903-017-0389-y PMid:28629349

47 Durkin SR. Eye health programs within remote Aboriginal communities in Australia: a review of the literature. *Australian Health Review* 2008; **32(4):** 664-676. https://doi.org/10.1071/AH080664 PMid:18980562

48 Newman CS, Cornwell PL, Young AM, Ward EC, McErlain AL. Accuracy and confidence of allied health assistants administering the subjective global assessment on inpatients in a rural setting: a preliminary feasibility study. *Nutrition and Dietetics* 2018; **75(1):** 129-136. https://doi.org/10.1111/1747-0080.12370 PMid:28748600

49 Whitford D, Smith T, Newbury J. The South Australian Allied Health Workforce survey: helping to fill the evidence gap in primary health workforce planning. *Australian Journal of Primary Health* 2012; **18(3):** 234-241. https://doi.org/10.1071/PY11027 PMid:23069367

50 Smith T, Fisher K, Keane S, Lincoln M. Comparison of the results of two rural allied health workforce surveys in the Hunter New England region of New South Wales: 2005 versus 2008. *Australian Journal of Rural Health* 2011; **19(3):** 154-159. https://doi.org/10.1111/j.1440-1584.2011.01202.x PMid:21605229

51 Winn CS, Chisholm BA, Hummelbrunner JA. Factors affecting recruitment and retention of rehabilitation professionals in Northern Ontario, Canada: a cross-sectional study. *Rural and Remote Health* 2014; **14(2):** 2619. Available: https://www.rrh.org.au/journal/article/2619 (Accessed 11 May 2020).

52 Durey A, McNamara B, Larson A. Towards a health career for rural and remote students: cultural and structural barriers influencing choices. *Australian Journal of Rural Health* 2003; **11(3):** 145-150. https://doi.org/10.1046/j.1440-1584.2003.00481.x PMid:12950398

53 Spiers M, Harris M. Challenges to student transition in allied health undergraduate education in the Australian rural and remote context: a synthesis of barriers and enablers. *Rural and Remote Health* 2015; **15(2):** 3069. Available: https://www.rrh.org.au/journal/article/3069 (Accessed 11 May 2020).

54 Laurence C, Wilkinson D. Towards more rural nursing and allied health services: current and potential rural activity in the Division of Health Sciences of the University of South Australia. *Rural and Remote Health* 2002; **2(1):** 105. Available: https://www.rrh.org.au/journal/download/pdf/105 (Accessed 11 May 2020).

55 Johnston C, Newstead C, Sanderson M, Wakely L, Osmotherly P. The changing landscape of physiotherapy student clinical placements: an exploration of geographical distribution and student performance across settings. *Australian Journal of Rural Health* 2017; **25(2):** 85-93. https://doi.org/10.1111/ajr.12302 PMid:27184770

56 Smith T, Cross M, Waller S, Chambers H, Farthing A,

Barraclough F, et al. Ruralization of students' horizons: insights into Australian health professional students' rural and remote placements. *Journal of Multidisciplinary Healthcare* 2018; **11:** 85-97. https://doi.org/10.2147/JMDH.S150623 PMid:29430183

57 Brown L, Smith T, Wakely L, Wolfgang R, Little A, Burrows J. Longitudinal tracking of workplace outcomes for undergraduate allied health students undertaking placements in rural Australia. *Journal of Allied Health* 2017; **46(2):** 79-87.

58 Playford D, Larson A, Wheatland B. Going country: rural student placement factors associated with future rural employment in nursing and allied health. *Australian Journal of Rural Health* 2006; **14(1):** 14-19. https://doi.org/10.1111/j.1440-1584.2006.00745.x PMid:16426427

59 Leys J, Wakely L, Thurlow K, Hyde Page R. Physiotherapy students in rural emergency departments: a NEAT place to learn. *Australian Journal of Rural Health* 2017; **25(2):** 130-131. https://doi.org/10.1111/ajr.12262 PMid:26694768

60 Thomasz T, Young D. Speech pathology and occupational therapy students participating in placements where their supervisor works in a dual role. *Australian Journal of Rural Health* 2016; **24(1):** 36-40. https://doi.org/10.1111/ajr.12238 PMid:26360797

61 Smith T, Brown L, Cooper R. A multidisciplinary model of rural allied health clinical-academic practice: a case study. *Journal of Allied Health* 2009; **38(4):** 236-241.

62 Lin IB, Beattie N, Spitz S, Ellis A. Developing competencies for remote and rural senior allied health professionals in Western Australia. *Rural and Remote Health* 2009; **9(2):** 1115. Available: https://www.rrh.org.au/journal/article/1115 (Accessed 11 May 2020).

63 Williams EN, McMeeken JM. Building capacity in the rural physiotherapy workforce: a paediatric training partnership. *Rural and Remote Health* 2014; **14(1):** 2475. Available: https://www.rrh.org.au/journal/article/2475 (Accessed 11 May 2020).

64 Ducat WH, Burge V, Kumar S. Barriers to, and enablers of, participation in the Allied Health Rural and Remote Training and Support (AHRRTS) program for rural and remote allied health workers: a qualitative descriptive study. *BMC Medical Education* 2014; **14:** 194. https://doi.org/10.1186/1472-6920-14-194 PMid:25238872

65 Parkin AE, McMahon S, Upfield N, Copley J, Hollands K. Work experience program at a metropolitan paediatric hospital: assisting rural and metropolitan allied health professionals exchange clinical skills. *Australian Journal of Rural Health* 2001; **9(6):** 297-303. https://doi.org/10.1046/j.1038-5282.2001.00383.x PMid:11998265

66 Blayden C, Hughes S, Nicol J, Sims S, Hubbard IJ. Using secondments in tertiary health facilities to build paediatric expertise in allied health professionals working in rural New South Wales. *Australian Journal of Rural Health* 2017; **25(6):** 376-381. https://doi.org/10.1111/ajr.12347 PMid:29231287

67 Aoun S, Johnson L. Capacity building in rural mental health in Western Australia. *Australian Journal of Rural Health* 2002; **10(1):** 39-44. https://doi.org/10.1046/j.1440-1584.2002.00407.x PMid:11952521

68 Cox R, Hurwood A. Queensland Health trial of an allied health postgraduate qualification in remote health practice. *Australian Journal of Rural Health* 2005; **13(3):** 191-192. https://doi.org/10.1111/j.1440-1854.2005.00681.x PMid:15932490

69 Foo J, Storr M, Maloney S. The characteristics and experiences of international physiotherapy graduates seeking registration to practise in Australia. *New Zealand Journal of Physiotherapy* 2017; **45(3):** 135-142. https://doi.org/10.15619/NZJP/45.3.05

70 Devine SG, Williams G, Nielsen I. Rural allied health scholarships: do they make a difference? *Rural and Remote Health* 2013; **13(4):** 2459. Available: https://www.rrh.org.au/journal/article/2459 (Accessed 11 May 2020).

71 Chisholm M, Russell D, Humphreys J. Measuring rural allied health workforce turnover and retention: what are the patterns, determinants and costs? *Australian Journal of Rural Health* 2011; **19(2):** 81-88. https://doi.org/10.1111/j.1440-1584.2011.01188.x PMid:21438950

72 Keane S, Lincoln M, Smith T. Retention of allied health professionals in rural New South Wales: a thematic analysis of focus group discussions. *BMC Health Services Research* 2012; **12:** 175. https://doi.org/10.1186/1472-6963-12-175 PMid:22726758

73 Roots RK, Li LC. Recruitment and retention of occupational therapists and physiotherapists in rural regions: a meta-synthesis. *BMC Health Services Research* 2013; **13:** 59. https://doi.org/10.1186/1472-6963-13-59 PMid:23402304

74 Keane S, Lincoln M, Rolfe M, Smith T. Retention of the rural allied health workforce in New South Wales: a comparison of public and private practitioners. *BMC Health Services Research* 2013; **13:** 32. https://doi.org/10.1186/1472-6963-13-32 PMid:23351491

75 Bond A, Barnett T, Lowe S, Allen P. Retention of allied health professionals in Tasmania. *Australian Journal of Rural Health* 2013; **21(4):** 236-237. https://doi.org/10.1111/ajr.12039 PMid:24033527

76 Lai GC, Taylor EV, Haigh MM, Thompson SC. Factors affecting the retention of Indigenous Australians in the health workforce: a systematic review. *International Journal of Environmental Research and Public Health* 2018; **15(5):** 914. https://doi.org/10.3390/ijerph15050914 PMid:29734679

77 Cosgrave C, Maple M, Hussain R. An explanation of turnover intention among early-career nursing and allied health professionals working in rural and remote Australia – findings from a grounded theory study. *Rural and Remote Health* 2018; **18(3):** 4511. Available: http://www.rrh.org.au/journal/article/4511 (Accessed 11 May 2020). https://doi.org/10.22605/RRH4511 PMid:30173537

78 Manahan CM, Hardy CL, MacLeod MLP. Personal characteristics and experiences of long-term allied health professionals in rural and northern British Columbia. *Rural and Remote Health* 2009; **9(4):** 1238. Available: http://www.rrh.org.au/journal/article/1238 (Accessed 11 May 2020).

79 Bourke L, Waite C, Wright J. Mentoring as a retention strategy

to sustain the rural and remote health workforce. *Australian Journal of Rural Health* 2014; **22(1):** 2-7. https://doi.org/10.1111/ajr.12078 PMid:24460993

80 O'Toole K, Schoo AM. Retention policies for allied health professionals in rural areas: a survey of private practitioners. *Rural and Remote Health* 2010; **10(2):** 1331. Available: http://www.rrh.org.au/journal/article/1331 (Accessed 11 May 2020).

81 Dew A, Bulkeley K, Veitch C, Bundy A, Gallego G, Lincoln M, et al. Addressing the barriers to accessing therapy services in rural and remote areas. *Disability and Rehabilitation* 2013; **35(18):** 1564-1570. https://doi.org/10.3109/09638288.2012.720346 PMid:23009191

82 Dow B, Moore K, Dunbar JM, Nankervis J, Hunt S. A description and evaluation of an innovative rural rehabilitation programme in South Eastern Australia. *Disability and Rehabilitation* 2010; **32(9):** 781-789. https://doi.org/10.3109/09638280903295482 PMid:20302445

83 Battye KM, McTaggart K. Development of a model for sustainable delivery of outreach allied health services to remote north-west Queensland, Australia. *Rural and Remote Health* 2003; **3(3):** 194. Available: https://www.rrh.org.au/journal/article/194 (Accessed 11 May 2020). https://doi.org/10.22605/RRH194 PMid:15882095

84 Adams R, Jones A, Lefmann S, Sheppard L. Decision making about rural physiotherapy service provision varies with sector, size and rurality. *Internet Journal of Allied Health Sciences and Practice* 2015; **13(2):** 1-15.

85 Taylor J, Carlisle K, Farmer J, Larkins S, Dickson-Swift V, Kenny A. Implementation of oral health initiatives by Australian rural communities: factors for success. *Health and Social Care in the Community* 2018; **26(1):** e102-e110. https://doi.org/10.1111/hsc.12483 PMid:28714134

86 Bambling M, Kavanagh D, Lewis G, King R, King D, Sturk H, et al. Challenges faced by general practitioners and allied mental health services in providing mental health services in rural Queensland. *Australian Journal of Rural Health* 2007; **15(2):** 126-130. https://doi.org/10.1111/j.1440-1584.2007.00866.x PMid:17441822

87 Field PE, Franklin RC, Barker RN, Ring I, Leggat PA. Cardiac rehabilitation services for people in rural and remote areas: an integrative literature review. *Rural and Remote Health* 2018; **18(4):** 1-13. Available: https://www.rrh.org.au/journal/article/4738 (Accessed 11 May 2020). https://doi.org/10.22605/RRH4738 PMid:30403491

88 Clark RA, Conway A, Poulsen V, Keech W, Tirimacco R, Tideman P. Alternative models of cardiac rehabilitation: a systematic review. *European Journal of Preventive Cardiology* 2015; **22(1):** 35-74. https://doi.org/10.1177/2047487313501093 PMid:23943649

89 McKellips F, Keely E, Afkham A, Liddy C. Improving access to allied health professionals through the Champlain BASE™ eConsult service: a cross-sectional study in Canada. *British Journal of General Practice* 2017; **67(664):** e757-e763. https://doi.org/10.3399/bjgp17X693125 PMid:28993307

90 Iacono T, Stagg K, Pearce N, Hulme Chambers A. A scoping review of Australian allied health research in ehealth. *BMC Health Services Research* 2016; **16(1):** 543. https://doi.org/10.1186/s12913-016-1791-x PMid:27716325

91 Guilfoyle C, Wootton R, Hassall S, Offer J, Warren M, Smith D. Preliminary experience of allied health assessments delivered face to face and by videoconference to a residential facility for elderly people. *Journal of Telemedicine and Telecare* 2003; **9(4):** 230-233. https://doi.org/10.1258/135763303322225571 PMid:12952695

92 Hassall S, Wootton R, Guilfoyle C. The cost of allied health assessments delivered by videoconference to a residential facility for elderly people. *Journal of Telemedicine and Telecare* 2003; **9(4):** 234-237. https://doi.org/10.1258/135763303322225580 PMid:12952696

93 Cohn RJ, Goodenough B. Health professionals' attitudes to videoconferencing in paediatric health-care. *Journal of Telemedicine and Telecare* 2002; **8(5):** 274-282. https://doi.org/10.1177/1357633X0200800506 PMid:12396856

94 Fairweather GC, Lincoln MA, Ramsden R. Speech-language pathology telehealth in rural and remote schools: the experience of school executive and therapy assistants. *Rural and Remote Health* 2017; **17(3):** 1-13. Available: https://www.rrh.org.au/journal/article/4225 (Accessed 11 May 2020). https://doi.org/10.22605/RRH4225 PMid:28918643

95 Mathu-Muju KR, McLeod J, Walker ML, Chartier M, Harrison RL. The Children's Oral Health Initiative: an intervention to address the challenges of dental caries in early childhood in Canada's First Nation and Inuit communities. *Canadian Journal of Public Health* 2016; **107(2):** e188-e193. https://doi.org/10.17269/cjph.107.5299 PMid:27526217

96 McGrail MR, Humphreys JS, Joyce CM, Scott A, Kalb G. How do rural GPs' workloads and work activities differ with community size compared with metropolitan practice? *Australian Journal of Primary Health* 2012; **18:** 228-233. https://doi.org/10.1071/PY11063 PMid:23069366

97 Russell D, McGrail M. How does the workload and work activities of procedural GPs compare to non-procedural GPs? *Australian Journal of Rural Health* 2016; **25(4):** 219-226. https://doi.org/10.1111/ajr.12321 PMid:27600557

98 Russell D, McGrail M, Humphreys J. Determinants of rural Australian primary health care worker retention: a synthesis of key evidence and implications for policymaking. *Australian Journal of Rural Health* 2017; **25:** 5-14. https://doi.org/10.1111/ajr.12294 PMid:27087590

99 Worley P, O'Sullivan B, Ellis R. From locum-led outposts to locally-led continuous regional learning networks: the National Rural Generalist Pathway. *Medical Journal of Australia* 2019; **211(2):** 57-60. https://doi.org/10.5694/mja2.50225 PMid:31250926

100 Australian Government Department of Health. *Rural Health Multidisciplinary Training Program Canberra.* 2019. Available: http://www.health.gov.au/internet/main/publishing.nsf/Content/rural-health-multidisciplinary-training (Accessed 14 February 2020).

101 World Health Organization. *Increasing access to health workers in remote and rural areas through improved retention.* 2010. Available: http://apps.who.int/iris/bitstream/10665/44369/1/9789241564014_eng.pdf (Accessed 8 January 2020).

102 Walters L, Greenhill J, Richards J, Ward H, Campbell N, Ash J, et al. Outcomes of longitudinal integrated clinical placements for students, clinicians and society. *Medical Education* 2012; **46(11):** 1028-1041. https://doi.org/10.1111/j.1365-2923.2012.04331.x PMid:23078680

103 O'Sullivan B, McGrail M. Effective dimensions of rural undergraduate training and value of national training policies for encouraging rural work. *Medical Education* 2020; **54(4):** 364-374. https://doi.org/10.1111/medu.14069 PMid:32227376

APPENDIX I:

Appendix I: Articles used in the review (n=120)

Adams J, de Luca K, Swain M, Funabashi M, Wong A, Pagé I, et al. Prevalence and practice characteristics of urban and rural or remote Australian chiropractors: analysis of a nationally representative sample of 1830 chiropractors. Australian Journal of Rural Health. 2019;27:34-41.

Adams R, Jones A, Lefmann S, Sheppard L. Decision making about rural physiotherapy service provision varies with sector, size and rurality. Internet Journal of Allied Health Sciences and Practice. 2015;13(2):1-15.

Adams R, Jones A, Lefmann S, Sheppard L. Rationing is a reality in rural physiotherapy: a qualitative exploration of service level decision-making. BMC Health Services Research. 2015;15:121.

Adams R, Jones A, Lefmann S, Sheppard L. Service level decision-making in rural physiotherapy: development of conceptual models. Physiotherapy Research International. 2016;21(2):116-126.

Adams R, Jones A, Lefmann S, Sheppard L. Towards understanding the availability of physiotherapy services in rural Australia. Rural and Remote Health. 2016;16(2):3686.

Agha A, Liu-Ambrose TYL, Backman CL, Leese J, Li LC. Understanding the experiences of rural community-dwelling older adults in using a new DVD-delivered Otago exercise program: a qualitative study. Interactive Journal of Medical Research. 2015;4(3):e17.

Aoun S, Johnson L. Capacity building in rural mental health in Western Australia. Australian Journal of Rural Health. 2002;10(1):39-44.

Bambling M, Kavanagh D, Lewis G, King R, King D, Sturk H, et al. Challenges faced by general practitioners and allied mental health services in providing mental health services in rural Queensland. Australian Journal of Rural Health. 2007;15(2):126-130.

Bartik W, Dixon A, Dart K. Aboriginal child and adolescent mental health: a rural worker training model. Australasian Psychiatry. 2007;15(2):135-139.

Battye KM, McTaggart K. Development of a model for sustainable delivery of outreach allied health services to remote north-west Queensland, Australia. Rural and Remote Health. 2003;3(3):194.

Bennett-Levy J, Singer J, DuBois S, Hyde K. Translating e-mental health into practice: what are the barriers and enablers to e-mental health implementation by Aboriginal and Torres Strait Islander health professionals? Journal of Medical Internet Research. 2017;19(1):e1.

Bent A. Allied health in Central Australia: challenges and rewards in remote area practice. Australian Journal of Physiotherapy. 1999;45(3):203-212.

Berndt A, Murray CM, Kennedy K, Stanley MJ, Gilbert-Hunt S. Effectiveness of distance learning strategies for continuing professional development (CPD) for rural allied health practitioners: a systematic review. BMC Medical Education. 2017;17(1):117.

Blayden C, Hughes S, Nicol J, Sims S, Hubbard IJ. Using secondments in tertiary health facilities to build paediatric expertise in allied health professionals working in rural New South Wales. Australian Journal of Rural Health. 2017;25(6):376-381.

Bond A, Barnett T, Lowe S, Allen P. Retention of allied health professionals in Tasmania. Australian Journal of Rural Health. 2013;21(4):236-237.

Boshoff K, Hartshorne S. Profile of occupational therapy practice in rural and remote South Australia. Australian Journal of Rural Health. 2008;16(5):255-261.

Bourke L, Waite C, Wright J. Mentoring as a retention strategy to sustain the rural and remote health workforce. Australian Journal of Rural Health. 2014;22(1):2-7.

Brockwell D, Wielandt T, Clark M. Four years after graduation: occupational therapists' work destinations and perceptions of preparedness for practice. Australian Journal of Rural Health. 2009;17(2):71-76.

Brown L, Smith T, Wakely L, Wolfgang R, Little A, Burrows J. Longitudinal tracking of workplace outcomes for undergraduate allied health students undertaking placements in rural Australia. Journal of Allied Health. 2017;46(2):79-87.

Campbell A. The evaluation of a model of primary mental health care in rural Tasmania. Australian Journal of Rural Health. 2005;13(3):142-148.

Campbell N, McAllister L, Eley D. The influence of motivation in recruitment and retention of rural and remote allied health professionals: a literature review. Rural and Remote Health. 2012;12(3):1900.

Chang AB, Grimwood K, Maguire G, King PT, Morris PS, Torzillo PJ. Management of bronchiectasis and chronic suppurative lung disease in indigenous children and adults from rural and remote Australian communities. Medical Journal of Australia. 2008;189(7):386-393.

Charles G, Bainbridge L, Copeman-Stewart K, Kassam R, Tiffin S. Impact of an interprofessional rural health care practice education experience on students and communities. Journal of Allied Health. 2008;37(3):127-131.

Chisholm M, Russell D, Humphreys J. Measuring rural allied health workforce turnover and retention: what are the patterns, determinants and costs? Australian Journal of Rural Health. 2011;19(2):81-88.

Clark RA, Conway A, Poulsen V, Keech W, Tirimacco R, Tideman P. Alternative models of cardiac rehabilitation: a systematic review. European Journal of Preventive Cardiology. 2015;22(1):35-74.

Cohn RJ, Goodenough B. Health professionals' attitudes to videoconferencing in paediatric health-care. Journal of Telemedicine and Telecare. 2002;8(5):274-282.

Colles SL, Belton S, Brimblecombe J. Insights into nutritionists' practices and experiences in remote Australian Aboriginal communities. Australian and New Zealand Journal of Public Health. 2016;40:S7-S13.

Cosgrave C, Malatzky C, Gillespie J. Social determinants of rural health workforce retention: a scoping review. International Journal of Environmental Research and Public Health. 2019;16(3):314.

Cosgrave C, Maple M, Hussain R. An explanation of turnover intention among early-career nursing and allied health professionals working in rural and remote Australia – findings from a grounded theory study. Rural and Remote Health. 2018;18(3):4511.

Cox R, Hurwood A. Queensland Health trial of an allied health postgraduate qualification in remote health practice. Australian Journal of Rural Health. 2005;13(3):191-192.

Devine SG, Williams G, Nielsen I. Rural allied health scholarships: do they make a difference? Rural and Remote Health. 2013;13(4):2459.

Dew A, Bulkeley K, Veitch C, Bundy A, Gallego G, Lincoln M, et al. Addressing the barriers to accessing therapy services in rural and remote areas. Disability and Rehabilitation. 2013;35(18):1564-1570.

Doherty G, Stagnitti K, Schoo AMM. From student to therapist: follow up of a first cohort of Bachelor of Occupational Therapy students. Australian Occupational Therapy Journal. 2009;56(5):341-349.

Dow B, Moore K, Dunbar JM, Nankervis J, Hunt S. A description and evaluation of an innovative rural rehabilitation programme in South Eastern Australia. Disability and Rehabilitation. 2010;32(9):781-789.

D'Souza R. A pilot study of an educational service for rural mental health practitioners in South Australia using telemedicine. Journal of Telemedicine and Telecare. 2000;6(Suppl1):S187-S189.

Ducat WH, Burge V, Kumar S. Barriers to, and enablers of, participation in the Allied Health Rural and Remote Training and Support (AHRRTS) program for rural and remote allied health workers: a qualitative descriptive study. BMC Medical Education. 2014;14:194.

Ducat WH, Kumar S. A systematic review of professional supervision experiences and effects for allied health practitioners working in non-metropolitan health care settings. Journal of Multidisciplinary Healthcare. 2015;8:397-407.

Durey A, Haigh M, Katzenellenbogen JM. What role can the rural pipeline play in the recruitment and retention of rural allied health professionals? Rural and Remote Health. 2015;15(3):3438.

Durey A, McNamara B, Larson A. Towards a health career for rural and remote students: cultural and structural barriers influencing choices. Australian Journal of Rural Health. 2003;11(3):145-150.

Durkin SR. Eye health programs within remote Aboriginal communities in Australia: a review of the literature. Australian Health Review. 2008;32(4):664-676.

Fahey A, Day NA, Gelber H. Tele-education in child mental health for rural allied health workers. Journal of Telemedicine and Telecare. 2003;9(2):84-88.

Fairweather GC, Lincoln MA, Ramsden R. Speech-language pathology telehealth in rural and remote schools: the experience of school executive and therapy assistants. Rural and Remote Health. 2017;17(3):1-13.

Field PE, Franklin RC, Barker RN, Ring I, Leggat PA. Cardiac rehabilitation services for people in rural and remote areas: an integrative literature review. Rural and Remote Health. 2018;18(4):1-13.

Fisher KA, Fraser JD. Rural health career pathways: research themes in recruitment and retention. Australian Health Review. 2010;34(3):292-296.

Foo J, Storr M, Maloney S. The characteristics and experiences of international physiotherapy graduates seeking registration to practise in Australia. New Zealand Journal of Physiotherapy. 2017;45(3):135-142.

Fragar LJ, Depczynski JC. Beyond 50. Challenges at work for older nurses and allied health workers in rural Australia: a thematic analysis of focus group discussions. BMC Health Services Research. 2011;11:42.

Greenstein C, Lowell A, Thomas DP. Improving physiotherapy services to Indigenous children with physical disability: are client perspectives missed in the continuous quality improvement approach? Australian Journal of Rural Health. 2016;24(3):176-181.

Guilfoyle C, Wootton R, Hassall S, Offer J, Warren M, Smith D. Preliminary experience of allied health assessments delivered face to face and by videoconference to a residential facility for elderly people. Journal of Telemedicine and Telecare. 2003;9(4):230-233.

Hassall S, Wootton R, Guilfoyle C. The cost of allied health assessments delivered by videoconference to a residential facility for elderly people. Journal of Telemedicine and Telecare. 2003;9(4):234-237.

Hill AJ, Miller LE. A survey of the clinical use of telehealth in speech-language pathology across Australia. Journal of Clinical Practice in Speech-Language Pathology. 2012;14(3):110-117.

Hill ME, Raftis D, Wakewich P. Strengthening the rural dietetics workforce: examining early effects of the Northern Ontario Dietetic Internship Program on recruitment and retention. Rural and Remote Health. 2017;17(1):4035.

Hoffmann T, Cantoni N. Occupational therapy services for adult neurological clients in Queensland and therapists' use of telehealth to provide services. Australian Occupational Therapy Journal. 2008;55(4):239-248.

Iacono T, Stagg K, Pearce N, Hulme Chambers A. A scoping review of Australian allied health research in ehealth. BMC Health Services Research. 2016;16(1):543.

Johnston C, Newstead C, Sanderson M, Wakely L, Osmotherly P. The changing landscape of physiotherapy student clinical placements: an exploration of geographical distribution and student performance across settings. Australian Journal of Rural Health. 2017;25(2):85-93.

Keane S, Lincoln M, Rolfe M, Smith T. Retention of the rural allied health workforce in New South Wales: a comparison of public and private practitioners. BMC Health Services Research. 2013;13:32.

Keane S, Lincoln M, Smith T. Retention of allied health professionals in rural New South Wales: a thematic analysis of focus group discussions. BMC Health Services Research. 2012;12:175.

Keane S, Smith T, Lincoln M, Fisher K. Survey of the rural allied health workforce in New South Wales to inform recruitment and retention. Australian Journal of Rural Health. 2011;19(1):38-44.

Kingston GA, Williams G, Judd J, Gray MA. Hand therapy services for rural and remote residents: results of a survey of Australian occupational therapists and physiotherapists. Australian Journal of Rural Health. 2015;23(2):112-121.

Kuipers P, Hurwood A, McBride LJ. Audit of allied health assistant roles: suggestions for improving quality in rural settings. Australian Journal of Rural Health. 2015;23(3):185-188.

Kumar S, Osborne K, Lehmann T. Clinical supervision of allied health professionals in country South Australia: a mixed methods pilot study. Australian Journal of Rural Health. 2015;23(5):265-271.

Lai GC, Taylor EV, Haigh MM, Thompson SC. Factors affecting the retention of Indigenous Australians in the health workforce: a systematic review. International Journal of Environmental Research and Public Health. 2018;15(5): 914.

Laurence C, Wilkinson D. Towards more rural nursing and allied health services: current and potential rural activity in the Division of Health Sciences of the University of South Australia. Rural and Remote Health. 2002;2(1):105.

Leys J, Wakely L, Thurlow K, Hyde Page R. Physiotherapy students in rural emergency departments: a NEAT place to learn. Australian Journal of Rural Health. 2017;25(2):130-131.

Lin IB, Beattie N, Spitz S, Ellis A. Developing competencies for remote and rural senior allied health professionals in Western Australia. Rural and Remote Health. 2009;9(2):1115.

Mackenzie L, O'Toole G. Profile of 1 year of fieldwork experiences for undergraduate occupational therapy students from a large regional Australian university. Australian Health Review. 2017;41(5):582-589.

Maloney P, Stagnitti K, Schoo A. Barriers and enablers to clinical fieldwork education in rural public and private allied health practice. Higher Education Research and Development. 2013;32(3):420-435.

Manahan CM, Hardy CL, MacLeod MLP. Personal characteristics and experiences of long-term allied health professionals in rural and northern British Columbia. Rural and Remote Health. 2009;9(4):1238.

Mathu-Muju KR, McLeod J, Walker ML, Chartier M, Harrison RL. The Children's Oral Health Initiative: an intervention to address the challenges of dental caries in early childhood in Canada's First Nation and Inuit communities. Canadian Journal of Public Health. 2016;107(2):e188-e193.

McAuliffe T, Barnett F. Factors influencing occupational therapy students' perceptions of rural and remote practice. Rural and Remote Health. 2009;9(1):1078.

McKellips F, Keely E, Afkham A, Liddy C. Improving access to allied health professionals through the Champlain BASE™ eConsult service: a cross-sectional study in Canada. British Journal of General Practice. 2017;67(664):e757-e763.

McLeod S, Barbara A. Online technology in rural health: supporting students to overcome the tyranny of distance. Australian Journal of Rural Health. 2005;13(5):276-281.

Merritt J, Perkins D, Boreland F. Regional and remote occupational therapy: a preliminary exploration of private occupational therapy practice. Australian Occupational Therapy Journal. 2013;60(4):276-287.

Nagel T, Robinson G, Condon J, Trauer T. Approach to treatment of mental illness and substance dependence in remote Indigenous communities: results of a mixed methods study. Australian Journal of Rural Health. 2009;17(4):174-182.

Nancarrow SA, Young G, O'Callaghan K, Jenkins M, Philip K, Barlow K. Shape of allied health: an environmental scan of 27 allied health professions in Victoria. Australian Health Review. 2017;41(3):327-335.

Newman CS, Cornwell PL, Young AM, Ward EC, McErlain AL. Accuracy and confidence of allied health assistants administering the subjective global assessment on inpatients in a rural setting: a preliminary feasibility study. Nutrition and Dietetics. 2018;75(1):129-136.

O'Brien M, Phillips B, Hubbard W. Enhancing the quality of undergraduate allied health clinical education: a multidisciplinary approach in a regional/rural health service. Focus on Health Professional Education. 2010(1):11-22.

O'Hara R, Jackson S. Integrating telehealth services into a remote allied health service: a pilot study. Australian Journal of Rural Health. 2017;25(1):53-57.

O'Toole K, Schoo A, Hernan A. Why did they leave and what can they tell us? Allied health professionals leaving rural settings. Australian Health Review. 2010;34(1):66-72.

O'Toole K, Schoo A, Stagnitti K, Cuss K. Rethinking policies for the retention of allied health professionals in rural areas: a social relations approach. Health Policy 2008;87(3):326-332.

O'Toole K, Schoo AM. Retention policies for allied health professionals in rural areas: a survey of private practitioners. Rural and Remote Health. 2010;10(2):1331.

Pacza T, Steele L, Tennant M. Development of oral health training for rural and remote Aboriginal health workers. Australian Journal of Rural Health. 2001;9(3):105-110.

Parkin AE, McMahon S, Upfield N, Copley J, Hollands K. Work experience program at a metropolitan paediatric hospital: assisting rural and metropolitan allied health professionals exchange clinical skills. Australian Journal of Rural Health. 2001;9(6):297-303.

Playford D, Larson A, Wheatland B. Going country: rural student placement factors associated with future rural employment in nursing and allied health. Australian Journal of Rural Health. 2006;14(1):14-19.

Prout S, Lin I, Nattabi B, Green C. 'I could never have learned this in a lecture': transformative learning in rural health education. Advances in Health Sciences Education: Theory and Practice. 2014;19(2):147-159.

Richardson I, Slifkin R, Randolph R, Holmes GM. A rural-urban comparison of allied health professionals' average hourly wage. Journal of Allied Health. 2010;39(3):e91-e96.

Roots RK, Brown H, Bainbridge L, Li LC. Rural rehabilitation practice: perspectives of occupational therapists and physical therapists in British Columbia, Canada. Rural and Remote Health. 2014;14(1):2506.

Roots RK, Li LC. Recruitment and retention of occupational therapists and physiotherapists in rural regions: a meta-synthesis. BMC Health Services Research. 2013;13:59.

Russell D, McGrail M, Humphreys J. Determinants of rural Australian primary health care worker retention: a synthesis of key evidence and implications for policymaking. Australian Journal of Rural Health 2017;25:5-14.

Sartore GM, Kelly B, Stain HJ, Fuller J, Fragar L, Tonna A. Improving mental health capacity in rural communities: mental health first aid delivery in drought-affected rural New South Wales. Australian Journal of Rural Health. 2008;16(5):313-318.

Schmidt D, Kurtz M, Davidson S. Creating rural allied health leadership structures using district advisors: an action research project using program logic. Journal of Allied Health. 2017;46(3):185-191.

Smith JD, O'Dea K, McDermott R, Schmidt B, Connors C. Educating to improve population health outcomes in chronic disease: an innovative workforce initiative across remote, rural and Indigenous communities in northern Australia. Rural and Remote Health. 2006;6(3):606.

Smith T, Brown L, Cooper R. A multidisciplinary model of rural allied health clinical-academic practice: a case study. Journal of Allied Health. 2009;38(4):236-241.

Smith T, Cooper R, Brown L, Hemmings R, Greaves J. Profile of the rural allied health workforce in northern New South Wales and comparison with previous studies. Australian Journal of Rural Health. 2008;16(3):156-163.

Smith T, Cross M, Waller S, Chambers H, Farthing A, Barraclough F, et al. Ruralization of students' horizons: insights into Australian health professional students' rural and remote placements. Journal of Multidisciplinary Healthcare. 2018;11:85-97.

Smith T, Fisher K, Keane S, Lincoln M. Comparison of the results of two rural allied health workforce surveys in the Hunter New England region of New South Wales: 2005 versus 2008. Australian Journal of Rural Health. 2011;19(3):154-159.

Somerville L, Davis A, Elliott AL, Terrill D, Austin N, Philip K. Building allied health workforce capacity: a strategic approach to workforce innovation. Australian Health Review. 2015;39(3):264-270.

Speyer R, Denman D, Wilkes-Gillan S, Chen YW, Bogaardt H, Kim JH, et al. Effects of telehealth by allied health professionals and nurses in rural and remote areas: a systematic review and meta-analysis. Journal of Rehabilitation Medicine. 2018;50(3):225-235.

Spiers M, Harris M. Challenges to student transition in allied health undergraduate education in the Australian rural and remote context: a synthesis of barriers and enablers. Rural and Remote Health. 2015;15(2):3069.

Stagnitti K, Schoo A, Dunbar J, Reid C. An exploration of issues of management and intention to stay: allied health professionals in South West Victoria, Australia. Journal of Allied Health. 2006;35(4):226-232.

Stagnitti K, Schoo A, Reid C, Dunbar J. Access and attitude of rural allied health professionals to CPD and training. International Journal of Therapy and Rehabilitation. 2005;12(8):355-362.

Stagnitti K, Schoo A, Reid C, Dunbar J. Retention of allied health professionals in the south-west of Victoria. Australian Journal of Rural Health. 2005;13(6):364-365.

Stuart J, Hoang H, Crocombe L, Barnett T. Relationships between dental personnel and non-dental primary health care providers in rural and remote Queensland, Australia: dental perspectives. BMC Oral Health. 2017;17(1):99.

Stute M, Hurwood A, Hulcombe J, Kuipers P. Pilot implementation of allied health assistant roles within publicly funded health services in Queensland, Australia: results of a workplace audit. BMC Health Services Research. 2014;14:258.

Sutton K, Maybery D, Moore T. Bringing them home: a Gippsland mental health workforce recruitment strategy. Australian Health Review. 2012;36(1):79-82.

Sutton KP, Maybery D, Patrick KJ. The longer term impact of a novel rural mental health recruitment strategy: a quasi-experimental study. Asia-Pacific Psychiatry. 2015;7(4):391-397.

Sutton KP, Patrick K, Maybery D, Eaton K. Increasing interest in rural mental health work: the impact of a short term program to orientate allied health and nursing students to employment and career opportunities in a rural setting. Rural and Remote Health. 2015;15(4):3344.

Tan ACW, Emmerton L, Hattingh HL. A review of the medication pathway in rural Queensland, Australia. International Journal of Pharmacy Practice. 2012;20(5):324-339.

Tan ACW, Emmerton LM, Hattingh HL. Issues with medication supply and management in a rural community in Queensland. Australian Journal of Rural Health. 2012;20(3):138-143.

Taylor J, Carlisle K, Farmer J, Larkins S, Dickson-Swift V, Kenny A. Implementation of oral health initiatives by Australian rural communities: factors for success. Health and Social Care in the Community. 2018;26(1):e102-e110.

Thomas Y, Clark M. The aptitudes of allied health professionals working in remote communities. International Journal of Therapy and Rehabilitation. 2007;14(5):216-220.

Thomasz T, Young D. Speech pathology and occupational therapy students participating in placements where their supervisor works in a dual role. Australian Journal of Rural Health. 2016;24(1):36-40.

Walker D, Tennant M, Short SD. An exploration of the priority remote health personnel give to the development of the Indigenous Health Worker oral health role and why: unexpected findings. Australian Journal of Rural Health. 2013;21(5):274-278.

Watanabe-Galloway S, Madison L, Watkins KL, Nguyen AT, Chen LW. Recruitment and retention of mental health care providers in rural Nebraska: perceptions of providers and administrators. Rural and Remote Health. 2015;15(4):3392.

Watson J, Gasser L, Blignault I, Collins R. Taking telehealth to the bush: lessons from north Queensland. Journal of Telemedicine and Telecare. 2001;7(Suppl2):20-23.

Whitford D, Smith T, Newbury J. The South Australian Allied Health Workforce survey: helping to fill the evidence gap in primary health workforce planning. Australian Journal of Primary Health. 2012;18(3):234-241.

Wielandt PM, Taylor E. Understanding rural practice: implications for occupational therapy education in Canada. Rural and Remote Health. 2010;10(3):1488.

Willems J, Sutton K, Maybery D. Using a Delphi process to extend a rural mental health workforce recruitment initiative. Journal of Mental Health Training, Education and Practice. 2015;10(2):91-100.

Williams E, D'Amore W, McMeeken J. Physiotherapy in rural and regional Australia. Australian Journal of Rural Health. 2007;15(6):380-386.

Williams EN, McMeeken JM. Building capacity in the rural physiotherapy workforce: a paediatric training partnership. Rural and Remote Health. 2014;14(1):2475.

Winn CS, Chisholm BA, Hummelbrunner JA. Factors affecting recruitment and retention of rehabilitation professionals in Northern Ontario, Canada: a cross-sectional study. Rural and Remote Health. 2014;14(2):2619.

APPENDIX II:

Appendix II: Key findings about workforce and scope of practice

Text ref	Author and year	Sample and method	Major findings
(49)	Whitford D et al 2012	An allied health workforce survey in South Australia in 2009 included 17 disciplines and achieved 1539 respondents (response rate could not be calculated).	Proportion of allied health workers practising in rural locations varied by discipline (35–11%).
(27)	Smith et al 2008	A cross-sectional survey in 2005 of 451 rural allied health workers in NSW, including 12 disciplines to which 49% responded.	More than half of respondents worked exclusively in the public sector, although about 11% said that they worked in both public and private sectors. Highest proportions of privately based workers in optometry, podiatry, pharmacy, physiotherapy and psychology.
(28)	O'Toole et al 2008	Survey of allied health workers in rural western Victoria in 2003 to which 28% (*n*=138) responded.	69% worked in public sector positions.
(29)	Williams et al 2007	A 2003 survey of 84 rural physiotherapists working in Shepparton, Benalla and Wangaratta (response rate 79%).	Two-thirds worked part-time with most in the public sector (70%), with one-third holding more than one position. One-third considered themselves generalists and one-third specialists.
(30)	Keane et al 2011	The 2008–09 NSW rural allied health survey from 21 different allied health occupations, 1879 (around 44%) responded.	84% worked in towns >10, 000 population, employed publicly 46%, privately 40% or in both public and private sectors (11%).
(31)	Boshoff and Hartshorn e 2008	A survey of rural and remote occupational therapy managers (44% response, *n*=18) in South Australia in 2005.	Prevalent services were rehabilitative, health promotion, preventative, remediation. Many serviced large catchments (89% over 100 km), with long travel time and distance. Challenges included wide range of services for diverse client groups, high client-to-therapist ratio and limited human resources.
(32)	Merritt et al 2013	A national survey of 64 outer regional and remote private occupational therapists identified through business listings, with 37 completed responses.	One-quarter of respondents visited at least five towns each week and one-third had other paid employment.
(42)	Adams et al 2015	19 in-depth interviews and 39 surveys with physiotherapists, colleagues, managers working in public and private work in a large region of rural Queensland in 2012.	The scope of services was rationalised around the overall size and skills of the available workforce in both public and private sectors of the region.
(33)	Bent 1999	In 17 interviews with speech therapy, occupational therapy and physiotherapy professionals working in Alice Springs hospital.	Significant Aboriginal health clients, a large caseload (needing prioritisation) and geographic catchment, addressing a wide range of client ages and conditions, advising and supporting clinic staff, bush nurses and Aboriginal health assistants in schools.
(37)	Colles et al 2016	Semi-structured survey of 33 of 40 eligible nutritionists who worked in remote Northern Territory Aboriginal communities in past decade, identified through the Department of Health and by snowballing participated in 2012–2013.	Scope of their work not supported by nutrition pedagogy of their training. Working across public health approaches with limited training in cultural awareness and relying on materials not appropriate for Aboriginal concepts of health and healthy eating.
(34)	Adams et al 2019	National cross-sectional survey of 4684 registered chiropractors to	22.8% (*n*=435) practising in rural or remote areas and 4.0% (*n*=77) also in metropolitan. Associations with rural work were more
		which 41.7% responded and indicated their practice location.	patients per week, working in more than one location, no imaging facilities, often treating degenerative spinal conditions, migraine, people over 65 years and Aboriginal and Torres Strait Islander people.
(35)	Hoffmann and Cantoni 2008	A self-administered questionnaire by contacting 608 occupational therapists (to select adult neurological rehabilitation workers) in rural Queensland, resulting in 39 relevant respondents (not possible to calculate exact response rate).	Work involved mainly home visits and modifications, equipment prescription, client/family education. Included long travel to see clients, large workloads and working within limited resources.
(38)	Smith et al 2006	Consensus building of Northern Territory and Queensland governments who brought stakeholders together (35 key	Little difference identified in the training and skills for chronic diseases work by discipline, though few professionals had population health skills. More scope of work in

(38)	Smith et al 2006	Consensus building of Northern Territory and Queensland governments who brought stakeholders together (35 key informants) using surveys with remote staff to identify their current scope of work and help to identify relevant chronic diseases curriculum for remote settings.	Little difference identified in the training and skills for chronic diseases work by discipline, though few professionals had population health skills. More scope of work in prevention and early intervention (upstream) needed as opposed to management (downstream).
(39)	Thomas and Clark 2007	Interviews and focus groups with 18 participants from 8 disciplines in allied health in a remote northern Australia in around 2013.	Remote work relied on being organised but flexible, exhibiting cooperation and mediation, being culturally aware, knowing the community, showing resourcefulness and resilience and reflectivity.
(86)	Bambling et al 2007	Interviews with 37 GPs, 19 Queensland Health mental health staff and 18 community organisation participants and general practices from eight rural Queensland towns to reach consensus.	Significant problems with inter-service communication and liaison in mental health services across the region.
(36)	Kingston et al 2015	A national survey of 184 public hand therapists (physiotherapists and occupational therapists, identifiable in rural and remote public hospitals through direct contact), 64 responded (17.2% physiotherapists).	Over half of rural/remote respondents reported that their scope of work involved providing initial splinting and exercise prescriptions and over 85% reported that they administered exercise protocols. Barriers to services in smaller towns included transport, travel time, limited staff and lack of expert knowledge.
(40)	Roots et al 2014	Interviews with 6 occupational therapists and 13 physiotherapists, serving 15 rural communities of population <15 000 participants.	Their generalist practice considered 'a specialty' requiring advanced skills in assessment. 'Stretching their role' and 'participating in, and partnerships with, community' were ways to overcome resource shortages and remain consumer focused.
(41)	Wielandt and Taylor 2010	A self-completed survey of rural occupational therapists in working in rural Alberta and Saskatchewan, in around 2007.	More than half worked in sole therapy positions, with challenges related to managing the generalist nature of rural occupational therapy practice. Management and organisational skills were considered important skills.
(43)	Somerville et al 2015	A Victorian survey and focus groups with allied health professionals in public health and community service positions (2009–2011), (783 rural and 1666 metropolitan respondents).	Allied health professionals spent up to 17% of time on tasks that could be delegated to an assistant (highest in podiatry, speech, exercise physiology), over half of which is clinical tasks. No difference between rural or metropolitan context of work. Tasks included exercise sessions, hydrotherapy, slings, community outings and functional therapy.
(44)	Stute et al 2014	In Queensland in 2009, 51 new allied health assistant roles were implemented in hospitals at three levels of trainee, full scope, advanced scope (with three generic position descriptions and task lists) for 6–9 months and then audited over a 2-month period by trained allied health professionals working in pairs with systematic data collection.	Tailored (not generic) 'assistant' position descriptions were needed (for different disciplines, work context and assistant training), along with supervision frameworks. Not enough delegation from allied health professionals to the roles, partly related to this requiring trust, clear role delineation and regular discussion and agreement about roles.
(48)	Newman et al 2018	A global nutrition assessment (SGA) was applied to 45 patients by Certificate IV trained assistants (n=5), compared with the test by three qualified dieticians.	Equivalent results. Assistants reported significantly lower confidence than dietitians (t=4.49, p<0.001), the mean confidence for both groups was quite high (AHA=7.5, dietitians=9.0).
(45)	Tan et al 2012	An exploratory interview based study of 49 rural healthcare workers (including pharmacists) about access to community medicines in rural areas (<1500 population).	Maintaining continuity of medicines access challenging due to patient mobility between hospital and community and generalist nurses and doctors were overloaded placing pressure on their time to also manage medications supply and management. 'Extended community medication roles' warranted.
(46)	Stuart et al 2017	Interviews with 32 health staff attending or working in remote clinics to provide oral care 2005–2008.	Strong support for Indigenous Health Worker oral health role to stem late intervention and reduce the demand on the visiting dental team along with aeromedical retrievals. The massive impact of oral health disease in the community was considered potentially preventable.
(47)	Durkin 2008	A literature review about Indigenous eye health models.	Indigenous eye health roles could improve early intervention, coordination and culturally appropriate services. Recognition, training and support for the role are needed.

APPENDIX III:

Appendix III: Key findings about rural training pathways

Reference	Author and year	Sample and method	Major findings
(49)	Whitford et al 2012	1539 respondents to an allied health workforce in South Australia, as surveyed in 2009 (17 disciplines, response rate could not be calculated).	Rural allied health workers included 41% with rural background and 17%, metropolitan background.
(50)	Smith et al 2011	Repeated cross-sectional survey of rural allied health workforce in one NSW region (spanning 12 disciplines) in NSW (around 50% responded to first survey; >200 respondents).	Two-thirds in both surveys had rural origin and about half had some rural experience during training.
(30)	Keane et al 2011	A 2008–09 NSW wide survey of regional, rural and remote allied health professionals from more than 21 different allied health occupations contacted via diverse communication channels, 1879 responded (approximately 44% response rate).	60% had a rural background.
(51)	Winn et al 2014	A cross-sectional survey study of 605 rehabilitation professionals living and working in Northern Ontario – occupational therapy, physiotherapy, speech–language pathology and audiology – in 2009, to which 345 responded.	Nearly two-thirds were originally from Northern Ontario (rural region).
(52)	Durey et al 2003	Interviews of 126 students (years 10–12), 52 parents and 10 grandparents along with 76 teachers and 4 Aboriginal and Islander Education Officers from 15 secondary schools in rural and remote Western Australia in 2000.	Barriers include cost and information about the training and cultural barriers included feeling capable and seeing allied health role models in the community.
(53)	Spiers and Harris 2015	A national integrative review (up to 2012) of rural allied health training (14 disciplines) access by rural secondary students.	No frame of reference for rural allied health work. Subject choices not available, financial capacity to participate, daunting social isolation, separation from families and support systems. Rural training pathways vague.
(54)	Laurence and Wilkinson 2002	A survey of University of South Australia Division of Health Sciences Schools (training a range of allied health disciplines) in 2000.	5–20% of all students in any allied health tertiary training did rural training of any type, usually as a fieldwork placement in the final 2 years of the qualification, with identified potential to grow these opportunities.
(55)	Johnston et al 2017	A University of Newcastle study of physiotherapy placement locations and results over a 12-year period.	3964 placements completed. Between 2003 and 2005, average proportion occurring in metropolitan areas (MMM1) was 78% and in rural areas, 22%. In 2014 these proportions had changed to 59% and 40% respectively. Lower assessment marks for students trained in MMM1 than other categories.
(57)	Brown et al 2017	98 students who completed 257 end-of-placement surveys (most had done 1 year of rural training) as of June 2014.	73% intended to work rurally at the end of the placement and, by 1 year after graduation, 50% were working rurally compared with an average figure of 24% of graduates from the same disciplines.
(58)	Playford et al 2006	429 students from 12 health disciplines, who did a rural placement of 2–18 weeks in the last year of university in Western Australia; did a follow-up survey in first year of practice.	25% of the students were working rurally, 42% of whom had rural background. After controlling for rural background, rural placement was significantly associated with rural work, and quality of placement was a highly significant factor.
(61)	Smith et al 2009	Describe the value of the University Department of Rural Health model in 2009.	Facilitated clinical work, teaching and research to come together under one umbrella, creating more rural placement opportunities for tertiary students, research opportunities for rural clinicians and career paths for mid-career rural allied health professionals.
(56)	Smith et al 2018	University Department of Rural Health at University of Newcastle, total student weeks	Increased from around 300 overall in 2003 to nearly 800 in 2008.

			and career paths for mid-career rural allied health professionals.
(56)	Smith et al 2018	University Department of Rural Health at University of Newcastle, total student weeks delivered for rural placements in dietetics, occupational therapy, radiography, pharmacy and physiotherapy.	Increased from around 300 overall in 2003 to nearly 800 in 2008.
(59)	Leys et al 2017	Scope of learning outcomes of physiotherapists learning musculoskeletal in rural emergency department.	No impact on the time it took to care for patients, and it provided an appropriate case-mix where the students gain experience managing a range of conditions that are common in physiotherapy practice.
(60)	Thomasz and Young 2016	Outcomes (focus groups and interviews) of occupational therapists and speech pathologists learning in brain injury rehabilitation unit of regional hospital with supervisors with dual roles of clinical work and case management.	Students gained a broad perspective holistic care but there was a need to balance case management work with the discipline-specific training.
(62)	Lin et al 2009	A literature review and consensus building with senior rural allied health professionals in Western Australia. Covered audiology, dietetics, occupational therapy, podiatry, physiotherapy, social work and speech pathology.	A new health worker competency framework released in 2009 covering 88 areas of practice (service delivery, equity, professional practice, ethical practice, development and support, quality and safety and clinical skills).
(63)	Williams and McKeeken 2014	Postgraduate specialist paediatrics physiotherapy training implemented over 12 months in regional Victoria, in 2008. Training involved weekly tutorials, case studies and presentations and clinical rotations between hospital outpatients, specialist school and the disability sector.	Increased referrals in the target group. Increased clinician paediatric knowledge and confidence, promoting workforce retention by providing a career pathway.
(64)	Ducat et al 2014	An Allied Health Rural and Remote Training Scheme implemented in Queensland in 2010 for rural allied health using distance-based and face-to-face delivery in eight domains of practice, coupled with access to an education program allowing clinical up-skilling placements with experienced practitioners. Reviewed the program with 55 participants using semi-structured interviews.	Flexible (online as well as face-to-face) delivery was important (some people like to get away from work, others couldn't access it unless online options were available), support from employers, particularly line managers and time to participate.
(65)	Parkin et al 2001	Educational secondment in 2001 in Queensland, involving 29 rural Queensland speech pathologists, occupational therapists and dieticians spending time in a tertiary paediatrics specialist practice environment for two weeks over a 2–6-month period was reviewed through action research.	Enhanced clinical skills (through observation, sharing ideas, consolidating clinical skills and knowledge, and providing the opportunity to work in clinical areas of interest), networking increased between rural and metropolitan participants. Participants valued the general support and the locum coverage provided by the program.
(66)	Blayden et al 2017	A new educational secondment model developed to enable rural allied health professionals to experience (5 days) tertiary-level hospitals relevant to scope of practice in paediatric care – 'Allied to Kids'. Learning outcomes were assessed using pre- and post- evaluations to determine the effect of the experience on practitioner knowledge and confidence.	Of 106 expressions of interest over 2011–2014, 89 were completed. Secondments improved skills and confidence, extended networks and resulted in participants developing resources for their local units.
(79)	Bourke et al 2014	Literature review of 39 articles, to discern models of mentorship that would be applicable to rural and remote settings to inform training in a University Department of Rural Health.	Four models included cloning, nurturing, friendship and apprenticeship, but the latter three were considered applicable to rural and remote early professional learning.
(67)	Aoun and Johnson 2002	Distance education program in mental health, delivered by technology in 1999 across 10 rural sites to 31 health professionals (including nursing, allied health and Aboriginal health workers) and involving a week of local clinical community placements. Post-course learning outcomes were assessed by survey.	At 4 months, participants reported more clinical practice in liaison with the mental health team.
(68)	Cox and Hurwood 2005	A new Graduate Certificate in Health (Remote Health Practice – Allied Health) was introduced in 2000s in Queensland. A review of the course via teleconference, email feedback and a written survey.	Strong support and participants considered that it helped them to make improvements in skills in primary care in which they had limited previous exposure and learn culturally safe practice.

	Harwood 2005	(Primary Health Practice – Allied Health) was introduced in 2000s in Queensland. A review of the course via teleconference, email feedback and a written survey.	make improvements in skills in primary care in which they had limited previous exposure and learn culturally safe practice.

APPENDIX IV:

Appendix IV: Key findings about recruitment and retention

Reference	Author and year	Sample and method	Major findings
(69)	Foo et al 2017	A survey was conducted of international physiotherapy graduates (Victoria) seeking to be assessed on the Standard Pathway to become registered for practice in Australia.	Of 57 (of 73) participants who responded to the question on work location, 56% said that they would consider working in a rural location (>100 km from central business district). Of those not open to working in a rural location, 12 participants cited family reasons.
(70)	Devine et al 2013	A 2010 review of the Queensland Health Rural Scholarship Scheme (Allied Health) (of 2 years of university scholarship funding valued at $21,000 per year for applicants agreeing to a 2-year rural return of service period upon graduation. Data about 146 participants and semi-structured interviews with participants – 69% completed/completing rural return of service period.	Of respondents who had entered service period, 86% were working rurally. Only 14% broke return-of-service obligations.
(72)	Keane et al 2012	Six focus groups with a total of 30 individuals from nine allied health professionals and some managers in rural NSW (who had self-nominated from a 2008 NSW rural allied health workforce survey), consensus about recruitment and retention factors.	Factors included personal (from rural area or attracted to rural life); workload (breadth of clinical work is a factor coupled with demand for services being high, requiring priority setting); access to professional development, impact of management including their effort to recruit vacant positions, career progression and recognition.
(29)	Williams et al 2007	A survey of rural physiotherapists based in Shepparton, Benalla, Wangaratta.	Issues were lack of career path, professional support, professional development and postgraduate education, costs, travel/distance to access courses and inadequate resources. Positive elements of rural practice were part-time employment opportunities, independence, variety of work and community recognition.
(73)	Roots and Li 2013	A review of international literature (up to 2009) about recruitment and retention of occupational therapy and physiotherapy rural workforce identified 12 included articles.	The biggest factors related to recruitment and retention were practice support and career growth.
(74)	Keane et al 2013	Data from the NSW rural allied health workforce survey inclusive of 833 public and 756 public allied health workers. Multivariate analysis.	High clinical demand predicted intention to leave rural work both public and private allied health models (odds ratio 1.4 and 1.6 respectively) and professional isolation and participation in community (odds ratio 1.4 and 1.6) also contributed to private practitioner intention to leave.
(27)	Smith et al 2008	A cross-sectional survey in 2005 of 451 rural allied health workers (12 disciplines) in NSW, (50% response rate).	Mean time in current position was 10 years and half intended to leave in 5 years.
(75)	Bond et al 2013	Questionnaire distributed to 2736 allied health professionals across Tasmania identified from registration boards, professional associations, directories and via the Principal Allied Health Advisor in 2008.	44.8% responded, univariate analysis showed retention (intention to stay) is multifactorial, although job satisfaction was the strongest independent predictor (multivariate analysis) of intention to stay for the next 2 years (odds of staying six times higher if satisfied).
(76)	Lai et al 2018	A literature review up to 2017 (including 15 articles) identified that the factors that are important for the retention of Indigenous health workers have some similarities and differences with those of non-Indigenous health workers.	Notable factors for the Indigenous health workforce were supportive and culturally safe workplaces; clear documentation and communication of the role, scope of practice and responsibilities; and being appropriately supported and remunerated.
(71)	Chisholm et al 2011	Eighteen Victorian health services were invited and 11 participated by providing de-identified individual-level employment entry and exit data for allied health workers employed between 1 January 2004 and 31	Median survival time 18 months to 4 years depending on discipline. Proportional hazards modelling indicated profession and employee age (over 35) and grade (2 or 3)

	et al 2011	invited and 11 participated by providing de-identified individual-level employment entry and exit data for allied health workers employed between 1 January 2004 and 31 December 2009 (total of 901 allied health workers).	4 years depending on discipline. Proportional hazards modelling indicated profession and employee age (over 35) and grade (2 or 3) upon commencement were significant determinants of lower turnover risk (better retention). Turnover was not associated with part-time employment.
(33)	Bent 1999	Based on interviews with 17 of 20 invited participants in a remote health service in 1997 – (physiotherapists, speech therapists, occupational therapists).	Barriers were supportive management, absence of orientation, delays in recruiting positions, high turnover from poor professional development/support. 40% staff intended to leave in next 3 months.
(77)	Cosgrave et al 2018	26 nursing and allied health professionals in their first 5 years of work in community mental health services in rural NSW.	Workplace conditions, career advancement opportunities and social and personal determinants were related to retention. A 'turnover theory' was developed.
(78)	Manahan et al 2009	Qualitative interviews with 26 long-term employed allied health workers in rural Canada about the reasons for working rurally.	Rural education in the field they currently work in within the region, rural background, positive rural experiences and community need for healthcare professionals as drivers. Variety and challenge of work, as well as enjoyment of adventure were other reasons.
(28)	O'Toole et al 2008	A survey of allied health workers in south-western Victoria in 2003 to which 28% (*n*=138) responded.	69% worked in public sector positions. Only 53% (*n*=50) of public sector employed intended to stay more than 2 years in their present position, compared with 84% (*n*=27) of the professionals who worked privately. Turnover related to lack of professional support, management, lack of career structure and personal. Receiving orientation increased intention to stay.

APPENDIX V:

Appendix V: Key findings about models of service

Reference	Author and year	Sample and method	Major findings
(84)	Adams et al 2015	A 2012 survey (*n*=39) and in-depth interviews (*n*=19) with physiotherapists and health service managers in rural, regional and remote services in Queensland.	Decisions about services to provide were related to the available skills and expertise of public and private practitioners in the region along with the patient and community needs. Organisational priorities impacted decisions in the public sector whereas financial viability was the main consideration in the private sector.
(31)	Boshoff and Hartshorne 2008	A South Australian survey of rural and remote occupational therapy managers (44% response, *n*=18) in 2005.	To cope with large geographic catchments, diverse needs and high client-to-occupational-therapist ratios, less labour-intensive service delivery models were needed along with multi-skilling of staff (recruiting the right range of people skilled in different areas), networking (to manage waiting lists and access enough support for diverse client needs) and applied problem-solving.
(81)	Dew et al 2013	One NSW study of 78 carers and 10 adults needing rehabilitation, based on interviews and focus groups.	Experience involved regularly travelling to access therapy, waiting a long time to get therapy and getting limited access to therapy past early childhood. A person-centred model was proposed.
(80)	O'Toole and Schoo 2010	In Victoria, a survey of private rural rehabilitation therapists (physiotherapists, occupational therapists and speech pathologists) (*n*=72 responded, 40% response rate) about policies to support access to rural services identified that more partnerships between private and public practice in rural and regional areas was a key solution.	More regional partnerships between public and private sector were considered to increase comprehensiveness of programs (wider skills base), improve access, allow more supervision and mentoring and provide for more coordination of services across the regional rehabilitation workforce.
(82)	Dow et al 2010	South-western Victorian rehabilitation model involving five rural services collaborating for local assessment, and rehabilitation delivery across different sites, with project leadership, medical and nursing involvement, staff education, team meetings, and early intervention and discharge planning.	112 admissions (2005–2006) compared with nil before. Clients improved functionally at least as well as the Victorian state average for similar client groups (Modified Barthel Index change 26.5 compared with 22.3 points, $p<0.001$), with a shorter length of stay (13.8 compared with 22.3 days) but more were discharged to residential aged care (16.1% compared with 6%). Enablers were an approachable team leader and cross-community referral pathway systems.
(83)	Battye and McTaggart 2003	Outreach service planning for allied health chronic disease management across a large geographic catchment in Queensland.	A regular, reliable outreach service with case conferences, in-service education and support for local workers and a planning matrix for health services and communities.
(89)	McKellips et al 2017	Ottawa, Canada, e-consults were made available for 12 allied health disciplines across a whole region (metropolitan and rural) 2011–2016, submitted through an online platform called e-consult (run by a local health network). The system was accessed by primary care providers and allied health workers had 7 days to respond.	127 consults with good resolution of the referral problem. The main services accessed were clinical pharmacy (1.5 consults per month), addiction support and musculoskeletal services. A response median of 2 days.
(90)	Iacono et al	Scoping review of Australian literature (44	An equivalence of services

		local health network). The system was accessed by primary care providers and allied health workers had 7 days to respond.	musculoskeletal services. A response median of 2 days.
(90)	Iacono et al 2016	Scoping review of Australian literature (44 studies published up to 2015).	An equivalence of services provided by e-consultations with those provided by allied health face-to-face, in the areas of diabetic foot healing, rural rehabilitation and speech pathology. Some aspects of allied health work are not amenable to online delivery.
(91)	Guilfoyle et al 2003	Five allied health disciplines who undertook a health assessment on each of 12 patients in a high-dependency nursing home through video-consultation and the following week, the same assessment face-to-face.	On 35 cases out of 60, two independent raters agreed that the therapists' care plans via both assessment modes were the same. Face-to-face work preferred (based on Likert scale agreement).
(92)	Hassall et al 2003	Costs of video-consultation delivery were estimated based on fixed and variable annual real costs of face to face delivery of 1000 occasions of service (estimated based on 3 months services), for speech, podiatry, physiotherapy, occupational therapy and dietetics from metropolitan centre to aged care facility in Queensland.	Each video-conference assessment was identified to cost $84.93, compared with $90.25 for face-to-face assessments.
(86)	Bambling et al 2007	Interviews with 37 GPs, 19 Queensland Health mental health staff and 18 participants from community organisations related to mental health.	Earlier service models including GP shared care management were needed involving integrated intervention would prevent many patients from deteriorating to the point of being in crisis.
(87)	Field et al 2018	Integrative review to identify barriers, enablers and pathways to cardiac rehabilitation for rural residents (16 included studies).	Access was facilitated by being referred and knowing about the cardiac rehabilitation.
(88)	Clark et al 2015	Systematic review critiquing the international evidence for the effectiveness of alternative models of cardiac rehabilitation (including 83 articles published since 1999).	Only telehealth addressing multiple risk factors and individualised assessment and risk factor modification along with community/home-based cardiac rehabilitation were considered effective as alternative models with similar reductions in risk factors compared with hospital-based programs.
(36)	Kingston et al 2015	A national survey of 184 public hand therapists (physiotherapists and occupational therapists, identifiable in rural and remote public hospitals through direct contact), 64 responded (17.2% physiotherapists).	Service models that were flexible and involved realistic goal-setting and interventions and a shared care approach between metropolitan/regional and rural/ remote therapists were needed to enable access to appropriate hand therapy in rural areas.
(93)	Cohn and Goodenough 2002	A cross-sectional survey of 600 clinicians in around 2000 based in metropolitan and rural NSW working in paediatrics (allied health, nursing, medicine) to understand attitudes to telemedicine, with 31% response rate.	Highest application for education. Medical staff and private practitioners considered telehealth had lowest utility. No differences in attitudes by rural clinicians. Telehealth had limited capacity to replace traditional methods of face-to-face contact, phone and letter.
(94)	Fairweather et al 2017	Interviews with school executives and therapy assistants to review 'Come N See', a video-conferenced speech therapy from Sydney to rural and remote school children in NSW, with email follow-up, delivered over 12 week periods.	The program addressed a number of unmet needs for speech services, children enjoyed it and the local staff were important for collaboration; however, more cross-sector communication was needed.
(95)	Mathu-Muju et al 2016	Program to screen and treat children aged 5–7 years, pregnant women and parents/caregivers in Indigenous and First Nations communities, using therapists and locally trained (not qualified) community health workers who engaged people in the program.	Piloted in 41 communities in 2004 and rolled out to 55% Indigenous and First Nations communities nationally achieved treatment for more than 23 000 children by 2012.
(85)	Taylor et al 2018	Co-implementation with rural communities of tooth brushing, service information and oral health advice during vaccinations.	Successful community participation in implementation of oral health initiatives worked if viable project and trusting

(85)	Taylor et al 2018	Co-implementation with rural communities of tooth brushing, service information and oral health advice during vaccinations.	Successful community participation in implementation of oral health initiatives worked if viable project and trusting relationships with 'the right people' involved and sustained funding.
(32)	Merritt et al 2013	A national survey of 64 outer regional and remote private occupational therapists identified through business listings, receiving 37 complete responses.	Half of outer regional/remote occupational therapists said their main income was the Chronic Diseases Management items.