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ORIGINAL RESEARCH

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Responding to rural allied health workforce challenges in the public health system: Evaluation of the Allied Health Rural Generalist Pathway pilot in western New South Wales

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Abstract

Objective: The Allied Health Rural Generalist Pathway pilot aimed to improve consistent access to physiotherapy services in rural communities using the "grow own" workforce strategy and existing resources.

Design: A summative evaluation of the quality improvement project used to implement the Allied Health Rural Generalist Pathway was completed. A mixed method design was used and included focus groups and a framework analysis.

Participants: The temporary redesign of specific workforce resources created "development" positions. A shared same-discipline supervisor resource supported five early-career physiotherapists, the participants.

Setting: The project was undertaken in rural New South Wales in the public health system.

Main outcome measures: The main outcome measures included a number of chronically vacant physiotherapy positions and stakeholder satisfaction.

Results: Targeted vacancies were filled, services sustained with minimal service gaps and mean retention rate of 2.9 years. A statistically significant increase in service activity to patients in rural locations occurred as a result of the intervention (R-squared 29%, $P < .05$). Four out of five early career physiotherapists fulfilled terms of their contract and secured senior positions within the region. Whilst participants developed professionally, they did not complete the tertiary education component.

Conclusions: The Allied Health Rural Generalist multi-factorial approach supported recruitment, retention and capacity building within the targeted discipline of the allied health workforce. Patient need was met. The rural pipeline capacity was developed. The pathway was complementary of existing NSW Health systems. Systemic change is needed to overcome inefficiencies experienced during implementation and to ensure sustainability. Further research to develop discipline-specific clinical training guidance through the stages of a rural allied health professionals' career may be helpful.

KEYWORDS
access, allied health, health service access, physiotherapy, rural workforce development

1 | INTRODUCTION

An Allied Health Rural Generalist (AHRG) is a generalist practitioner who lives and works in a rural location in their own allied health discipline and practices across a broad range of clinical settings.[1] The rural practice has a unique set of parameters influenced by the geographic, demographic, socio-economic and cultural factors of rural communities. This includes isolated practice, varying local governance and service models, and service access challenges.[2] The rural generalist practises within the scope of their training and experience, but in their commitment to rural patients, this scope of practice gradually broadens rather than narrowing to an area of specialty, which often occurs in more populous locations. It is not uncommon for the rural generalist to be a sole practitioner in their discipline, and not have ready access to all the members of the multidisciplinary team. Limited opportunity for career advancement is a recognised barrier for retaining allied health professionals (AHPs) in rural practice.[3,4]

Recruitment and retention of AHPs in rural Australia is a well-documented challenge that impacts patient care and might be contributing to poorer health outcomes in these areas.[4-6] There are many factors that influence the development, maintenance and sustainability of the rural allied health workforce on the continuum from student to proficient clinician.[4,7] The 'Allied Health Rural Generalist Pathway' (AHRGP) provides a fully resourced professional development pathway to create a 'rural-ready' allied health workforce for rural and remote areas in Australia.[1,7-9] Skills such as project management, leadership, and rural community engagement were identified as requirements for AHPs entering rural practice. Other attributes, essential in rural practice, might require years of experience to develop such as the ability to practise independently, to be innovative, adaptable and resilient. Providing support and supervision whilst working in the rural context can accelerate such skill acquisition safely.[4,10-14]

The AHRGP had not been trialled in New South Wales at the time of this study. There are different demographics and health policy and system structures across states. However, the challenges of recruitment and retention of the allied health workforce are apparent across rural and remote areas.[4,15] The need for clinical supervision and same-discipline support for AHPs in western New South Wales was identified in a project led by Charles Sturt University in 2015.[16] In the Local Health District (LHD), traditional recruitment strategies had repeatedly failed to attract suitable experienced staff to Level 3 (senior) physiotherapy positions in 5 regional communities in the LHD. Early-career physiotherapists were, at times, applying for these roles but could not be appointed as they did not have the required skills and experience for independent rural practice according to the NSW Health State Award interpretation. In cases where early-career professionals were appointed to sole practitioner roles, there was difficulty supporting inexperienced staff. Turnover was high. This workforce pathway failure was affecting patient care and combined with the developing body of evidence identifying the AHRGP as a potential workforce development strategy for early-career health professionals[9,17] provided a case for change. This study explores the implementation of the AHRGP within the LHD. Service gaps that are not funded were out of scope of this paper.

The Allied Health Rural Generalist Pathway was implemented in the rural health district using quality

What is already known on this subject:

- Recruitment and retention of experienced clinicians in rural areas is challenging
- The Allied Health Rural Generalist Pathway, an existing evidence-informed workforce and training strategy, supports rural allied health workforce development in Queensland, Northern Territory, South Australia, Western Australia, and Tasmania
- Recruitment and retention of allied health staff in rural regions of New South Wales continues to be problematic and impacts on delivery of evidence-based, best practice health care equitably in rural areas

What this study adds:

- The Allied Health Rural Generalist Pathway can be applied in the public health system in rural New South Wales to support early-career health professionals (physiotherapists) to recruit to vacant positions and develop competence in rural practice
- Allied Health Rural Generalist 'development positions' required the right resources, which, in turn, enabled the right care, at the right time, in the right place

improvement methodology. Existing public health workforce resources for specific vacant physiotherapy positions were redirected for a fixed period to create temporary 'training' positions and a temporary part-time same-discipline supervisor position. Same-discipline clinical supervision was not readily available in these rural locations prior to this pilot. The AHRGP principles[1] and New South Wales (NSW) Health operational systems, policies and procedures were used to guide practice in the public health context. Initially, the redesign project was for 3 locations in which high need was established at a service level and where operational governance supported the pilot initiation (Phase A). Two additional positions repeatedly failed to recruit during the first phase of the pilot. The pilot was extended to include these 2 sites as participants from the first phase began to transition to the Level 3 positions and resource demands changed (Phase B).

This paper evaluates the NSW Health experience of implementing the AHRGP at an operational level using existing systems and resources.

2 | AIM

The overall aim was to:

> Evaluate the effectiveness of the 'Allied Health Rural Generalist Pathway' pilot in addressing chronic allied health recruitment and retention problems in 'difficult to recruit to' physiotherapy positions in the rural hospital context in western NSW.

3 | METHOD

The research design used summative evaluation research methodology drawing on a mixed-methods data collection approach of quantitative and qualitative methods. The evaluation was undertaken by the clinician researcher.

3.1 | Program implementation

Implementation of the AHRGP pilot commenced with successful recruitment of the first physiotherapist and the senior supervisor physiotherapist in February 2017. Recruitment was led by operational managers and progressed along a flexible time line that suited each location. Progression along the pathway was planned to occur at the conclusion of each participants' two-year contract and appropriate professional development. Funds for three positions were required to achieve a critical fund for the senior same-discipline clinical supervisor position. This staff member also fulfilled the project manager role. This initial phase was labelled Phase A (Figure 1). An additional two physiotherapy positions remained vacant, and recruitment remained problematic as Phase A advanced to career pathway progression for the participants. The AHRGP pilot was re-costed, and resources were revised due to creep of workforce costs. The senior advisor resource was reduced from 0.8 FTE to 0.3 FTE to remain cost-neutral, and the pilot was extended in February 2019. This second phase was labelled Phase B.

3.2 | Data sources

3.2.1 | Statistical analysis of service activity with patients

Service activity data were collected and reported by the data analysis team. See Table 1 for calculation of the National Weighted Activity Unit data analysis method that was used. This method is used for calculating hospital funding allocation.

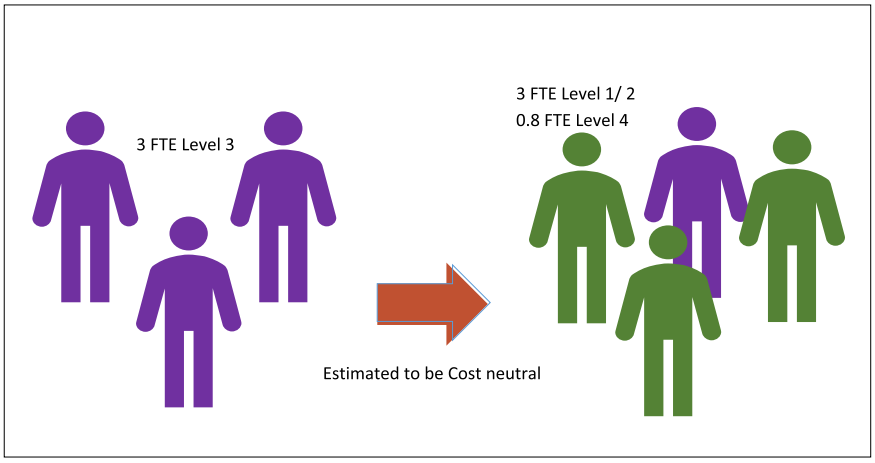

FIGURE 1 Graphic representation of the temporary workforce redesign model used to apply the AHRGP. Three senior positions were reallocated to three full-time less senior roles and one more senior role operating at 0.8 full-time equivalents. At the end of Phase A, these were reverted (arrow points to the left). Phase B was comprised of two Level 3 positions and 0.3 FTE of the Level 4 position

Data source	NAP data mart
Date	11/09/2019
Parameters	Financial year—2018/19
	Facilities—Town A, Town B, Town C
	Provider Type—physiotherapist
	Service units—all service units with reported provider of physiotherapist
Measures	Occasions of service
	Service events
	National Weighted Activity Unit
Calculation	NWAU x 1819 State Price

TABLE 1 Methodology: The National Weighted activity Unit is used in New South Wales (NSW) Health to determine funding of hospitals using the activity-based funding model (NSW Health, 2012)

3.2.2 | Event log

The number of adverse events relating to physiotherapy services reported via an incident report to the managers of staff was logged and reported.

A log and research journal was recorded by the project manager/senior physiotherapist and used as a source of data.

3.2.3 | Evaluation survey

An evaluation survey was distributed to stakeholders directly involved with working with the AHRGP staff. Recruitment was via email to the purposive sample with a link to the SurveyMonkey online survey. The survey format included a combination of open-ended and ranked responses on a 7-point Likert scale (Figure 2). A response was required for each question to move on to the next question (Figure 2). Results were collated by the SurveyMonkey data analysis system.

3.2.4 | Focus groups

An independent researcher from the local University Department of Rural Health facilitated two focus groups with project participants. Invited participants were the early-career physiotherapists involved in Phase A and the two supervisory staff. Semi-structured questions were used to guide key topic area discussions. Data were voice-recorded and transcribed verbatim. One participant was unable to attend the focus group at the time of evaluation. Transcribed data were sent to that participant for confirmation of accuracy and content. Thematic analysis of the data was completed by the independent researcher and reviewed by the project team for accuracy of content and meaning.

3.2.5 | Framework analysis: Benchmarking against an established tool

The Allied Health Professions' Office of Queensland (AHPOQ) evaluation framework and tool has evolved with the Queensland Workforce Development strategy and is designed to ensure accountability for significant funds distributed throughout the Queensland Health Services. This tool was applied to the NSW pilot using an Excel Spreadsheet to benchmark the NSW pilot against. Key similarities and differences were discussed.

3.3 | Data analysis

The qualitative evaluation data were collected at the conclusion of Phase A in December 2019. Reporting was interrupted by the clinician researcher's involvement with the NSW Health response to the COVID-19 pandemic. Relevant data were updated for the final report revised in June 2021.

Quantitative data analysis included descriptive data analysis and service activity comparison pre- and post-intervention (Phase A only) as captured from the electronic medical record reporting tools. To evaluate the effect of the intervention, a linear random-effects regression model was used. The outcome variable was the annual number of consults. The predictor variable was a binary intervention variable. To account for the repeat observations, site was included as a random effect. All statistical analysis was performed in R.[18]

Non-admitted patient (NAP) service activity data were extracted using NAP data mart data source on 11 September 2019 using the parameters shown in Table 1.[19]

Qualitative methods included a summary of patient-reported outcome data from quality improvement initiatives that provided a snapshot of patient outcomes and satisfaction with the service. A research journal was recorded by the primary researcher. These data were used

Survey Question 4(i): How successful has the AHRGP project team been in:

a) Addressing the service gap/s in physiotherapy service in your site/service/district?

1 2 3 4 5 6 7

Not at all Extremely well

Comments:

b) Providing a physiotherapy service that is responsive and meets patients' needs?

1 2 3 4 5 6 7

Not at all Extremely well

Comments:

c) Supporting and developing the clinical skills of the early career physiotherapist known to you?

1 2 3 4 5 6 7

Not at all Extremely well

Comments:

d) Supporting management to sustain/develop the physiotherapy service during the project eg maternity leave, early resignation, explore new opportunities:

1 2 3 4 5 6 7

Not at all Don't know Extremely well

Comments:

e) Contributing to the multidisciplinary team for comprehensive patient care

1 2 3 4 5 6 7

Not at all Extremely well

Comments:

f) Delegating to and working with Allied Health assistants to optimise services?

1 2 3 4 5 6 7

Not at all Extremely well

Comments:

g) Using technology to support staff and develop clinical services eg telehealth

1 2 3 4 5 6 7

Not at all Extremely well

Comments:

h) Communicating about the Allied Health Rural Generalist Pathway as it evolved and progressed?

1 2 3 4 5 6 7

Not at all Extremely well

Question 5: What are the positive aspects of the AHRGP physiotherapy service you have noticed since Feb 2017?
Question 6: (For referrers and discharge planners): How have the AHRGP physiotherapists impacted on your clinical decision-making?

Question 7: In your opinion, what are aspects of the MLHD Allied Health Rural Generalist Pathway that need to be improved upon? What does this look like?

FIGURE 2 Survey questions

to assist with tracking adverse and key events during the course of the project.

The evaluation stakeholder survey data were analysed using descriptive data and thematic analysis of qualitative data.

Focus group data were transcribed and analysed using thematic analysis.

The framework analysis against the Queensland Health reporting tool was completed by the project team in detail and analysed.

3.4 | Ethics approval

The LHD Research Governance team and regional Human Research Ethics Committee representative were consulted. The project was considered low risk. Exemption from further ethics application was approved, and publication of the evaluation was dependent on approval from the executive of the health district and the editor of the journal (GWAHS 2018-110). Data management, patient consent and participation in research adhered to NSW Health policy and procedures.

4 | RESULTS

4.1 | Descriptive and workforce data

Thirteen staff participated in the pilot over the 4-year period to cover the three training positions and one senior physiotherapist role. This indicated a high level of turnover, which required a high level of operational effort and coordination to maintain rural allied health services. Various methods were used to address temporary service gaps. The advantages and disadvantages of these are outlined in Table 2.

The net effect of the pilot resulted in all of the full-time physiotherapy positions in rural locations outside of the Base Hospitals in the LHD being filled (Figure 3) from July 2019, which was when recruitment was completed for Phase B until February 2021.

Three participants completed the 'development position' in Phase A and two participants in Phase B. Four of the five participants met the time and competency criteria, and one completed the Rural Generalist Program (RGP) certificate course. All participants continue to work in rural areas in Australia. Four progressed along their career pathway in situ and remain in the LHD with one relocation to another site.

By June 2021, at the conclusion of the four-year project, two of the five positions have been vacated. The supervisor resource and operational structure that developed during the pilot have ended. The risk of returning to status quo is high.

Filling short-term gaps during the course of the pilot was also necessary and provided an opportunity to build capacity of the rural generalist team. Two additional staff were involved directly in the pilot as temporary backfill staff for a period of >12 months, and one early-career and one senior physiotherapist. These persons were not included in the data analysis as they were not direct participants in the project.

Four periods of maternity leave were required during Phase A. Early staff changes and maternity leave required an extension of the planned project time frames that were able to be accommodated using usual NSW Health processes and flexible project resources and time frames.

Four early-career locum staff were on-boarded at different stages to fill service gaps. The operational structure that developed to support the AHRGP participants was able to be used to support other early-career staffing options.

Of the five early-career participants who stayed >12 months, three were female and two were male. The mean age of participants at commencement was 25.7 (SD ± 1.7-3.3). At entry level into the pilot, the mean number of years of work experience as a physiotherapist was 1.75 years (SD ± 0.75-2.35).

The senior physiotherapist was employed via a secondment from another position in the organisation. The vacated rural position created service deficits elsewhere in the organisation for the majority of the project time frame.

Participation in the 12 module Level 1 RGP, a graduate certificate course offered by the James Cook University, was a requirement of the AHRGP.[1] Completion was achieved by one participant, and all participants attempted to engage with this online study recommendation (mean = 6 modules completed, range 0-12 modules). Participation was encouraged once the pilot was established but not mandated as funding was not allocated for this pilot. The onus was on the participant and the supervisor to source funding for the tertiary course.

In the early phase of the project, significant staffing changes occurred as described above. Senior staff and managers worked collaboratively to attempt to sustain essential patient services. Data indicated 12 months was required to stabilise staffing across the three locations in Phase 1 (Figure 3).

The average retention period was 2.9 years (range 0.25-3.83 years) in December 2020.

Temporary service gaps occurred during the pilot. Annual leave and sick leave were not backfilled. When service gaps occurred, various models were used to address these (Table 2). Methods included public-private partnerships, locum services, temporary position recruitment and senior physiotherapist providing a small amount of physiotherapy service.

TABLE 2 Methods used to fill service gaps during staffing changes

Method of addressing temporary service gaps	Number of times used	Advantage	Disadvantage
Public-private partnership contract	1	Reliable Fixed cost, low workforce-related overheads	Not available in all cases No service level agreement set up with some practices Skeleton service only on minimum hours No outreach possible Unable to meet requirements for mandatory training due to time and cost
Early-career locums	4	Services maintained AHA very helpful in this scenario Positive rural experience for other early-career clinicians Able to use supervision and support structures that were in place with AHRGP Lower cost than experienced locum but still high cost = $650 per week on top of employment costs	Some locum staff required a significant level of supervision and support Risk of incompetence with low level of supervision (not suitable for new grads)
Early-career temporary staff member	1	Recruitment easy Supervision and support structures in place Slotted right into the AHRGP. Has remained with LHD in rural practice and achieved AHRGP status	Might have worked without the supervisor but participant stated she would not have taken the role on if there had not been discipline-specific support with the role
Senior AHRG Physiotherapist provided physiotherapy input	8 different blocks of time	Building capacity to use Telehealth. Working collaboratively with AHA and nursing staff via telehealth and site visits Able to support recruitment processes with manager easier when on site Senior physiotherapist gained an understanding of workflows at each location and developed rapport with the health service teams	Not a comprehensive service Limited availability Additional travel for senior physio to provide some face-to-face services for inpatients, and AHA supervision, high-priority non-admitted patients

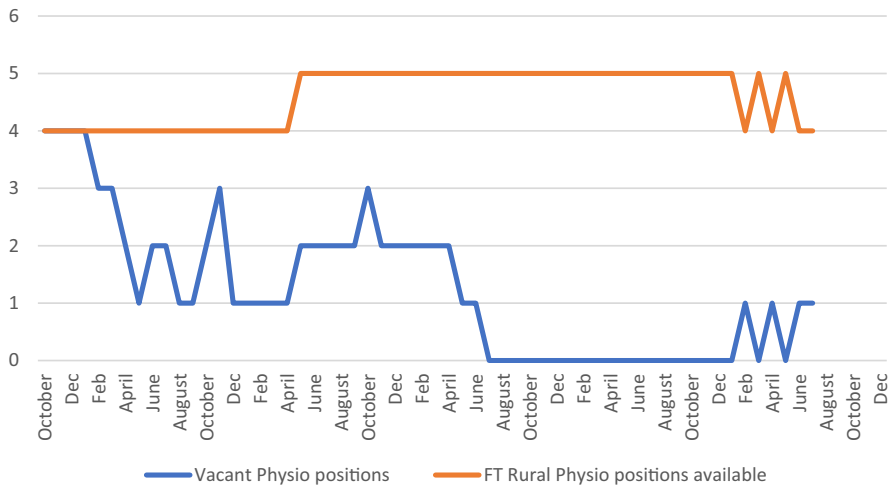

FIGURE 3 Number of part-time permanent physiotherapy positions available (lower/blue line) and staffed (upper/orange line) in the rural locations October 2016-December 2020. All vacant positions have active recruitment processes in progress

4.2 | Statistical analysis of service activity with patients

There was a significant difference in service contacts in physiotherapy as a direct result of the implementation of the AHRGP (*R*-squared 29%, $P < .05$). The regression model used allowed for random effect (LR = 19.47, $P < .0001$) to allow for random effects such as data collection changes (Figure 4). Services were delivered to the patients in the rural locations.

Figures 4 and 5 illustrate the variation in consults at sites before and after the intervention. There were some significant outliers in the data, both data sets of which were recorded as outpatient activity at one location, a particularly busy outpatient service with high uptake of group activity. Rigorous data analysis procedures allowed for possible error in data collection procedures.

On average, the intervention (successful recruitment to redesigned AHRG training positions) produced a statistically significant increased number of consults per annum at each site by 553 ($P < .05$; 95% CI, 68.4-1037.5). Figure 5 plots the actual change at the three sites over the years observed. Annual consults rose from 365 consults per year to 919 or a rise of 151% (95% CI, 18.7%-283.9%). The regression model demonstrated a significant difference (*R*-squared value 29.0, $P < .05$) for the intervention. This significant increase in service activity indicated unmet community need when the position was vacant progressing to high uptake of the physiotherapy service when it was available.

Non-admitted patient activity of the 3.8 staff on this project in Phase A contributed to the generation of 127.397 National Weighted Activity Units (NWAU) valued at $600,423 (based on the NWAU 1819 State Price) in one financial year (Table 1, Figures 4 and 5).

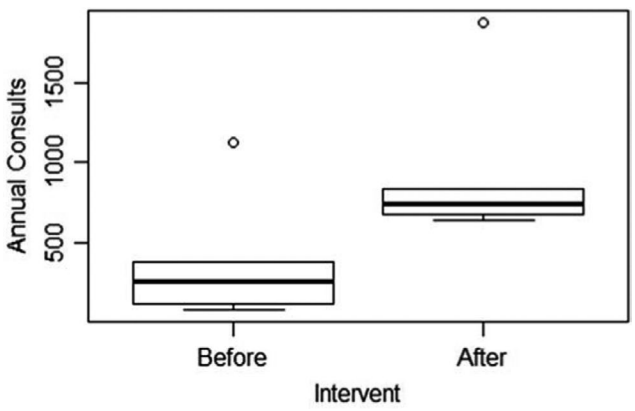

FIGURE 4 Boxplot of annual variation in annual number of consults before and after the introduction of the intervention

4.3 | Patient-reported outcome and event register

There was one adverse event reported to the project team that related to physiotherapy services over the four-year period. Risk management strategies were in place with no adverse patient outcome.

Patient-reported outcome measures were taken as part of usual practice in physiotherapy. Data indicated patients achieved appropriate treatment outcomes such as reduced fall risk and were satisfied with the service. Service development and quality improvement projects were undertaken such as the development of a virtual fracture clinic, development of maternity resources, and community-based strength and reconditioning groups.

4.4 | Evaluation survey

Twenty-seven participants completed the online survey. Participants included facility managers, operational managers, allied health and nursing staff who worked with the AHRGP staff.

Themes that emerged included satisfaction with the service provided, improved patient flow between large and small sites with improved communication and comprehensive person-centred care provided.

The presence of a physiotherapist at the rural hospital supported clinical decision-making as part of the multidisciplinary team regarding patient outcomes and safety when planning discharge from the main rural referral hospital to the regional sites. Evaluation survey data supported this in the following quote from a senior physiotherapist from the main rural referral hospital in the region,

> 'The AHRGP has facilitated patient transfers from [the main referral hospital] to smaller towns' and 'The staff in these positions are meeting patient need within their given resources.'
>
> [Manager]

Positive aspects of the AHRGP identified in the data included support of early-career clinicians, improved awareness of physiotherapy by patients in the rural community, improved access and delivery of timely care, and a long-term approach:

> Having a senior clinician available for the junior physio's to ask for advice on a regular basis

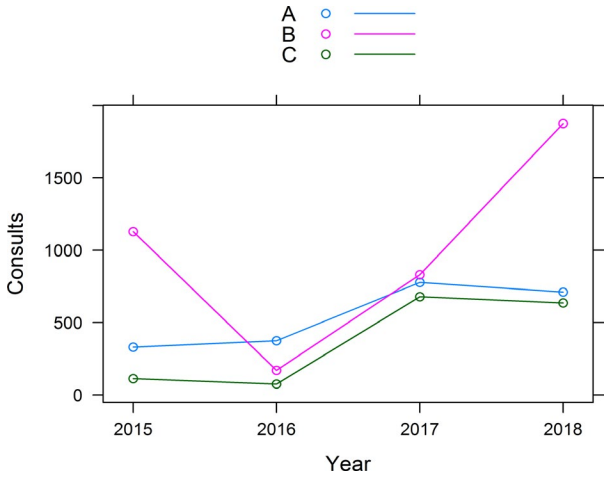

FIGURE 5 Annual time series plot of number of consults delivered at each site and regression model notes

Physiotherapy Service activity at three rural hospitals (A, B and C). The regression model containing the intervention variable was significantly different from the null model containing only the random effect (LR = 18.47, $P < 0.0001$). The R squared of the model was 29.0%. On average the intervention produced a statistically significant ($P = 0.0301$) increasing the number of consults per annum at each site by 553 (95% CI, 68.4-1037.5). Annual consults rose from 365 consults per year to 919 or a rise of 151% (95% CI, 18.7%-283.9%).

The regression parameters for the fitted model are shown below.

```
================================================
                        Dependent variable:
                    ---------------------------
                               Consults
------------------------------------------------
Intervent                     553.000**
                              (210.129)

Constant                       365.500
                              (214.109)

------------------------------------------------
Observations                     12
Log Likelihood                -76.100
Akaike Inf. Crit.             160.200
Bayesian Inf. Crit.           161.410
================================================
Note:                *P<.1; **P<.05; ***P<.01
```

Increase in awareness of physiotherapy in rural areas

Physiotherapy gaps filled, patients seen in timely manner, more clients being able to access service;

...supported long term vacancy, skill development, "grow our own" recruitment, networking opportunities.

The ongoing challenges relating to service gaps was a strong theme. One participant observed,

leave days + training days + study days + outreach days can create a situation where there is no PT [physiotherapy] available for an entire week or more.

A general comment summarised an observation of the impact of the AHRGP,

A great program providing support for less experienced Physios to allow them to have the skills to meet the needs of the community. Has allowed many patients to have their care closer to home. Dedicated time for clinical skill development and quality initiatives have improved the service provided.

Stakeholder surveys had a bias towards physiotherapy due to the high number of responses from the physiotherapy and allied health teams within the organisation. The forced response and exclusion of an 'unknown' response option might have slightly reduced the validity of some responses by some of the participants (Figure 6). Open questions provide insightful data from multiple perspectives.

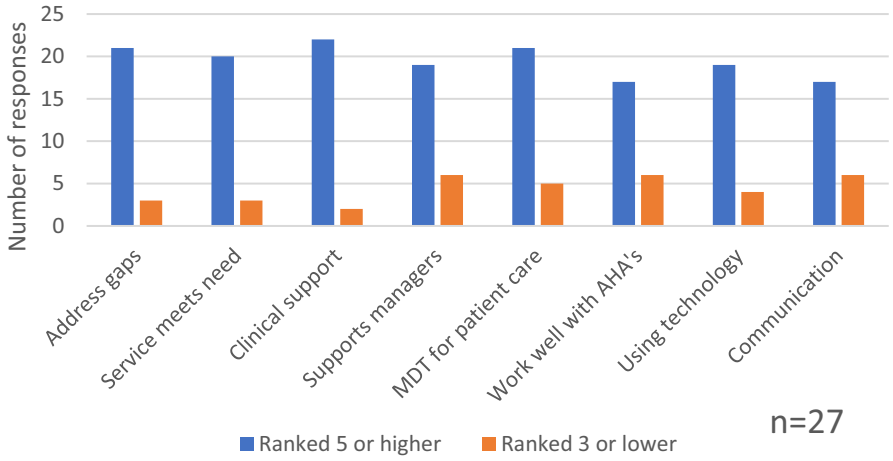

FIGURE 6 Stakeholder survey results as ranked on a 7-point Likert scale

4.5 | Focus groups

Qualitative analysis of the participants' experience was informed by focus group discussion and thematic analysis of transcripts. Themes identified in the data included challenges with re-establishing services that had been vacant for extended periods, managing the workload once services were re-established and the challenges this posed with protecting professional development time with no co-located supervisor, broad scope of practice required in rural practice, professional isolation, and importance of access to individualised professional development that meets the needs of the clinician in the rural context.

> The referrals keep coming in for outpatients and the inpatients keep coming in to hospital, so I'm doing less service development and more just maintaining the role of a physio...
>
> [Participant 1]

Participants commented on the benefits for communities in which there is now a physiotherapist employed. Having health professionals in rural communities meant that people and families did not have to travel to access a physiotherapy service. Also, by ensuring vacant positions are filled, earlier transfer from the large regional hospital to receive treatment in the rural hospital closer to home was possible. The service providers were known and trusted in the community. Clinicians that actively listen and develop rapport with patients, and who can assist with problem-solving might be confided in and able to assist with access to other services such as mental health services,

> a lot of people have mental health issues and psychological issues and there is not necessarily mental health services (in town), but if you seek help for a physical problem.... well, they're a clinician and they look at the person holistically...
>
> [Senior physiotherapist]

A combination of different modes of delivery of support and supervision was used. Face-to-face contact remained essential for connection, particularly for the participants who worked as sole physiotherapists in their sites. Participant 1 described professional isolation:

> It's hard being by yourself ... but on Tuesday, I'm the only one in that building, so I have lunch by myself....there's no sense of teamwork because you're the only physio and then everyone's got their own roles and doing their own thing...

Sustaining the services once established was a challenge. Leave, especially maternity leave, posed unexpected changes to implementation, and contingency planning was needed. Having the additional senior staff person whose priority was allied health promoted proactive recruitment planning,

> having the supervision and support structures in place that has enabled us to have an early career locum come in as well. So we're providing opportunities for other people to have a positive rural experience and at a lower cost to the organisation...
>
> [Senior physiotherapist].

Opportunities to strengthen the pathway were identified, particularly in shared understanding of the physiotherapist's role, communication between stakeholders as an

ongoing concern, and reasonable expectations of capacity for outreach services when there is no allied health assistant support (in one case). The physiotherapists highlighted some important differences in rural practice:

> ...it's about ownership and being accountable for that job and that position. I want to have a good name for the physio at the hospital because that's me...
>
> [Participant 2]

and,

> Just because you are a generalist doesn't mean you have to do everything. Yes I'm a sole practitioner but I still have access to those specialised people.
>
> [Participant 1]

Participants felt good about the service they had been able to develop and deliver in their community.

> I definitely feel like I have made a difference and feel like I am part of the community for sure, even just the work community itself.
>
> [Participant 1]

There was uncertainty about job security as the project neared completion. Concerns about what would happen to the service when they move on were expressed.

4.6 | Framework analysis: Benchmarking against an established tool

The Queensland AHRGP Evaluation provided a framework from which to assess the outputs of the AHRGP strategy.[9,20] Results were summarised (Table 3).

Completion of the RGP is a key deliverable of the AHRGP recommended by the peak body in 2020.[1] This was not able to be mandated in the pilot. Participation was achieved by 100 per cent of participants although one participant did not complete any modules. Feedback about the course was provided. All participants agreed the course did not meet all their discipline-specific clinical professional development needs, and they often found it difficult to schedule the required time needed to complete assessment tasks within their busy and unpredictable work schedules in the rural sole practitioner context. The value of the rural context study tasks was appreciated, and participants indicated this would be particularly helpful for new graduate AHPs with no rural experience or on-site supervision available to support workload.

Other significant outcomes of the project included the following:

- Career pathway progression for nine staff achieved (included are three senior staff)
- Seven early-career physiotherapists had the opportunity to work in rural locations provided services for nine hospitals/multipurpose services
- Hospitals in which the AHRGP team started outreach services that were later continued by other physiotherapy staff: one
- Four early-career locums worked in the LHD with support and supervision mechanisms in place
- Early-career student supervisors' skills for supervising rural student placements were achieved by all participants. This opened up five new rural student placements
- Physiotherapy student placements achieved (cumulative totals) = three by December 2019, and six by April 2020, 13 by December 2020 and 18 placements by June 2021 across five locations since beginning the pilot. Previously, none were possible

5 | DISCUSSION

Positive workforce outcomes were achieved. Recruitment to the five full-time regional hospital physiotherapy positions that existed outside the two base hospitals and that had been chronically vacant was filled. Physiotherapy services stabilised and continued to provide patient care in hospitals in nine rural communities on a regular basis. This change enabled quality physiotherapy interventions across a broad range of clinical areas, age groups, and settings where previously there was none or periodic, short-term, limited scope, high-cost alternatives. Data indicated physiotherapy services were safe and effective, and of high quality.

Early-career physiotherapists were supported with their clinical work and professional development in rural sites by traditional line management and interdisciplinary teams with the addition of same-discipline support. The mode of delivery of the same-discipline support and supervision used a combination of in-person and virtual modalities, as well as the opportunity to participate in the formal tertiary education course via applied online learning. The need for high-quality, efficient ways of working in a small team drove service development and quality improvement activity as the skills of the clinician developed. Innovative models of patient care were trialled in response to community need within the limits of system and human resources. Each participant progressed along their career pathway whilst they remained in a rural location. There was an increase in availability of rural student placements

TABLE 3 Framework analysis summary using the Allied Health Rural Generalist Education Framework to summarise key performance domains[20]

Key area	Benchmark	NSW pilot
Funding and implementation	Dedicated state-based funding and clear coordinated strategy to develop the rural and remote allied health workforce in place	No clear state-based strategy, plan or funds for rural and remote allied health workforce development to be accountable to Funds that were available for existing positions were temporarily repurposed successfully Outcome: vacant positions filled
	Local implementation strategies	Yes
	Trainee engagement/satisfaction	Yes. Identified areas to improve clarity of training requirements and funds for this sourced from outset, more structure expected for training Facility managers satisfied with the service. Communication and clear strategy needed to assist local operationalisation of the AHRGP
	Manager engagement/support/satisfaction	Supervisor: engaged, ongoing professional development in teaching and training for rural generalist clinician supervisors
Workforce development and sustainability	Improved sustainability of the rural and remote allied health workforce through the AHRGP's 'Own grown' capacity building approach	Recruitment and retention outcomes achieved No ongoing plan. Pilot end in June 2021. Without systems, change will potentially revert back to baseline (predicted attrition over 5 years) Supervisor not co-located for 50% of the time. Problematic for workload and dedicating time to regular PD activity when the physio was the sole physio in a busy hospital. Less suitable for new graduates Trainees applied for Level 3 positions in a rural area: 100%
	Rural employment intentions	4/5 stayed in the LHD 2 physios started their families/married to local farmers. Flexible ways of working/managing the service whilst maternity leave is required/job sharing to keep young Mums in the workforce /the right employment advice is important. = Build social capital in rural communities
Training and practitioner development	Trainees have increased clinical and non-clinical rural generalist capabilities and at the conclusion of the AHRGP can practise consistently as a 'proficient rural generalist' in the relevant profession	Funds sourced through HETI scholarships by Oct 2018 for Level 1 only. Unable to mandate. Level 1 not suitable for more experienced clinician 100% participated in RGP + other relevant PD activity. Supported experiential learning in context was the primary key deliverable
	Qld Target 100% completion of Level 1 and Level 2 Rural Generalist education programs	RGP was a good option to provide targeted learning when supervisor not on site except protecting PD time difficult
	Stakeholders perceive benefits of AHRGP implementation—trainees - Supervisors/managers	Focus groups and surveys Key areas to improve • Communication (note the pilot occurred during a period of organisation restructure with significant senior staffing changes which required additional communication pitched at the managerial level and used valuable resources) • AHA/support staff availability—not equitable • Travel burden on senior supervisor was high but provided the advantage of an understanding of the culture of each community. The model of having 2 part-time supervisors—one in the main rural referral hospital and one rurally based worked very well from the viewpoint of: team dynamics, clinical expertise and skill mix, logistics, communication strategies, program development and supervision cover for leave and training, and later, student supervision and placement coordination

(Continues)

TABLE 3 (Continued)

Key area	Benchmark	NSW pilot
Outputs and outcomes for rural generalist service development	Service development projects are developed and implemented Service developments improve access, effectiveness, quality, efficiency and cost-effectiveness, of allied health services for rural and remote customers	All participants led quality improvement and service development projects. Final written reports of quality improvement initiatives were not provided to the clinical governance unit in the LHD. Projects were presented to executive(various), local teams One district-wide project was implemented (the first successful virtual fracture clinic—improved access and brought specialist services closer to home for many patients). Interrupted by COVID and staff member relocation Delegation to AHAs—excellent processes in the locations where AHAs are available. AHRGP staff supported AHA recruitment, training and service developments. Strong professional bonds developed 5 locations established strength and conditioning groups—goal-oriented, outcome measured, evidence-based 2 projects nominated for Awards of Excellence Presentations of AHRGP pilot or project work: 6 Participation in local projects (3) Rural physiotherapy student placements (Cumulative totals) Year 0:0 Year 1:0 Year 2:3 Year 3:13 Year 4:18 Future goal: To achieve final report submission to CE, journal publication
Leadership and education capacity building strategy	Leadership/education capacity building strategy places are taken up by rural and remote allied health professionals (higher Level) towards a formal qualification in leadership/management or clinical education	Not currently part of the AHRGP strategy in NSW Leadership development opportunities offered to all NSW Health staff Staff completing pilot were encouraged to consider the clinical leadership professional development in the near future
	Participants engage in a mentoring program	Senior supervisor—achieved incidentally, through participation in the NSW Health rural research capacity building program, which aligns with ongoing professional development of experienced clinicians. And provided backfill resource (additional staff member aware of AHRGP operationalisation)
	Senior health professional leadership development and capacity building strategy	The AHRGP team partnered with the new pilot of a Rural Clinical School of Physiotherapy, a new initiative that relied on physiotherapists in rural sites to launch. This partnership has contributed to the structured and successful placement of students across the LHD Opportunity to consider this in a strategic plan for rural and remote allied health in the future Instability of allied health leadership in the LHD resulted in 7 different operational managers during the course of the project as executive sponsors.

(Continues)

TABLE 3 (Continued)

Key area	Benchmark	NSW pilot
Costs associated with implementation from the perspective of the health system	Cost of the AHRG training position strategy is quantified and distinguished from regular positions in rural and remote locations	Apart from workforce costs and 2 snapshots to calculate the funds available for the supervisor's hours, no further costing data were captured for this pilot Clarity of sole practitioner allowance interpretations when remote supervision models are used is needed (NSW State Award) Costs were assumed to be the same as a usual practitioner at each of the facilities COVID prevented the usual access to work placements and face-to-face professional development, which is highly valued by remote allied health professionals

Abbreviations: AHRGP, Allied Health Rural Generalist Pathway; LHD, Local Health District; NSW, New South Wales; RGP, Rural Generalist Program; PD, Professional Development.

as a direct result of the pilot. Partnering with the regional University Department of Rural Health (UDRH) and a local university provided additional support for this aspect of staff development, ensuring placements were of high quality and compliant with the required systems and teaching methods.

The temporary redesign of the existing allocated workforce resources and a collaborative approach, across jurisdictions within the public health system as a whole-of-district approach, enabled the implementation of the AHRGP into NSW Health systems in the rural health district. The AHRGP provided a foundational structure from which to build the service that the community required within existing NSW Health systems that also met the needs of the early-career AHP. Engagement with external stakeholders was also pivotal to success at the service delivery level. External stakeholders included patients and community groups, local schools via their work experience programs, local Aboriginal community elders and cultural groups, local doctor groups, the local UDRH and universities, the local Technical and Further Education institution, and the Rural Doctors Network. Involvement of these groups was on a small scale and evolved organically based on need and guided by the AHRGP principles. Aspects of this model of implementation align with the Service and Learning Consortium concept described in the National Rural Health Commissioners report.[21]

5.1 | Service development

There was a statistically significant increase in service activity as a result of addressing the workforce challenge. An additional 3499 occasions of service were provided across three sites studied in Phase A compared with a previous 12-month period. This level of activity was sustained. Patient flow from large, congested hospitals to the regional hospitals was enhanced by access to necessary physiotherapy services in the hospital closer to patients' homes. Service activity also generated government funding units for the hospital system.[22] In the 12-month period comparison, activity-based funds generated as part of the multidisciplinary team were equivalent to the wages of the three Level 2 physiotherapy staff plus the supervisor on the program for the 12-month period.

Service activity data increased significantly with the implementation of the AHRGP. Patients were able to access appropriate individualised and group-based care in their own community that provided comprehensive care across all health settings. Group-based interventions changed with the impact of COVID-19, as did many other health care aspects. Services adapted with minimal interruption indicating a high level of resilience.

The rural generalist physiotherapists remain true to their discipline always. However, liaising with other AHP disciplines, working with the allied health assistant and facilitating patient care in a timely manner when access to all the disciplines is not possible were a part of usual business.

> Just because you are a generalist doesn't mean you have to do everything. Yes I'm a sole practitioner but I still have access to those specialised people.
>
> [Participant 1]

Development of professional networks was a vital strategy to minimise the sense of professional isolation, build clinician capability, and ensure sustainable clinical practices.

5.2 | Recruitment and retention

Staff turnover and changes that occurred during the pilot were challenging but represented usual workforce flow.[23-26] Single clinician services are particularly sensitive to a single staff member change with one hundred per cent of the service interrupted for the duration of the absence or service gap. With the resource set available in this project, collaborative contingency planning to minimise service interruptions was possible. Maintaining services ensured continuity of patient care and maintained the developing service infrastructure already invested in the pilot. The hospital managers and AHRGP senior physiotherapist worked closely and more intensely during these stress points in the pilot.

The average retention period of 2.9 years is high for retention of early-career allied health personnel in rural practice.[4] Some reduced hours and job share arrangements due to maternity leave made retention calculations complex. However, this is an indicator that physiotherapists, as a family member, were settling in rural areas and contributing social and economic capital within the rural community with a vested interest in health services that will be sustainable beyond the time frames of this pilot. The pilot enabled capacity building within rural areas as was evident with a temporary staff member backfilling a maternity leave position and remaining with the organisation.

Workforce outcomes seen in this pilot might not be wholly attributable to the intervention. Extraneous variables might have impacted results such as a participant's decision to relocate to a rural community that coincidentally occurred at the time of the project initiation. It was not possible to control these variables in the live rural clinical environment. However, there was high level of internal and external validity within this project. Confirmation bias was also a possible source of error in this paper. Hospital managers, who worked with a staff member that resigned, might not share the same optimism of success as when considering the larger impact of the workforce development strategy and the comparative extended period of staffing that was achieved. Qualitative data informed us that the aspects of the AHRGP that significantly contributed to participants' decision to take up the positions included access to a senior supervisor and the allocation of work time for professional development. Additional intrinsic rewards, such as the sense of ownership and responsibility towards their service, appeared to have contributed to their decision to stay as was indicated by one participant in the focus groups.

> ...it's about ownership and being accountable for that job and that position. I want to have a good name for the physio at the hospital because that's me...

These findings are consistent with the literature.[4,27]

Recruitment selection was used to manage the risk of having only visiting same-discipline supervision on-site in this pilot. New graduates with no rural experience were not the preferred applicants for the 'development positions' in the pilot due to the nature of the roles and limited access to the clinical supervisor. Staff exited due to career progression outside the organisation, family (extended leave), and incongruence with the position as they progressed professionally. Flexibility with time frames for the project and employment arrangements that supported the employee with their personal and career pursuits, such as family and study, were critical for success.

The extension of the pilot to include two additional sites in Phase B indicated the demand for this flexible way of adapting resources was high and success evident to operational managers. Recruitment for an experienced clinician for the two positions ran concurrently with the AHRGP pilot (Phase A) for seven months with no success. This indicated the recruitment problem for experienced staff persisted. The situation acted as an unplanned, small, and temporary control group.

The rural allied health assistant (AHA) workforce was identified as a strongly positive influence on workload capability, support, and satisfaction in the roles. Physiotherapy services were developed with a focus on using technology and working with the AHA workforce when available. The AHA workforce distribution was variable.

5.3 | Professional development

The additional time allocation of twenty per cent for professional development was an attractive incentive for early-career personnel to take on these rural generalist positions. Planning the use of this time, managing the clinical workload, and collaboratively developing an individualised plan to upskill the clinician in the key clinical areas identified in the rural context were identified as key elements for future success. Opportunities exist to develop a strategic communication, professional development and funded training plan for 'rural development positions.'

The primary professional development method used was regular supported reflective practice and experiential learning for the fully qualified early-career physiotherapists. The RGP Level 1 offered by the James Cook University (Queensland) is pitched at clinicians with minimal rural experience who are in their first or second year of practice in the profession.[1] Two participants did not meet those criteria and would have been better suited for the RGP Level 2 postgraduate diploma. Resources for either tertiary course were not included in this pilot, and the onus

was on the senior physiotherapist to source funds once the workforce was established. NSW Health has a wide range of clinical education resources readily available to employees. However, the RGP is specifically designed to support a rural-ready allied health workforce and was the training option required for this pilot to align with the evidence-supported AHRGP. Scholarship programs offered through NSW Health were able to be sourced 12 months into the pilot. Timing of scholarship, an understanding of the expectation of the study commitment from the outset, and suitability of the study for the individual clinicians were factors identified that affected participation and levels of engagement. Participation in specific modules that complemented the clinicians' skills was undertaken. Success in the pilot was not able to be measured by completion of the tertiary course. A skills-based informal assessment of key discipline-specific practical competencies required in the rural hospital locations was completed by the clinical supervisor. Individuals' success with a competitive recruitment process was also an indicator of success for progression along the career pathway in this pilot.

A benefit of the RGP demonstrated in Phase B of the project was that it provided direction and clear goals for professional development time allocation from the outset when the clinical supervisor was not co-located. The RGP was readily accessible in any location via the online delivery. Project work within the course promoted local community engagement in a structured way at a level that the clinical supervisor or operational management was not able to. In the long term, this equipped clinicians with skills that they perhaps did not prioritise as highly at the time when their need for clinical knowledge building in general practice was high. Another advantage was seen during the COVID pandemic where study was able to continue uninterrupted. The ability to study remained dependent on other factors such as preference, workload prioritisation strategies and work-life balance.

During COVID, a surge in the availability of quality online clinical content occurred. This added an element of choice, and the need to navigate to the most suitable training courses for enthusiastic early-career rural clinicians. There is an opportunity to develop discipline-specific learning pathways for future Allied Health Rural Generalist clinicians with the RGP university course a beginning point for a solid grounding in the rural allied health practice.

5.4 | Supervision

The shared supervisor resource covered a wide geographic area, as well as multiple functions including project manager, coordinator, ad hoc clinical support and clinical supervisor, recruitment assistance, and a small intermittent clinical role. Logistics restricted the coverage of a caseload at each of the 'development position' sites to assist with quarantining professional development time for the trainees. This position was pivotal in the success of the pilot.

Professional isolation was a theme that emerged from the data. The need to connect with a same-discipline health professional who was invested in the work they were doing was consistently prioritised highly by the participants despite some areas for improvement being identified. The availability of a dedicated senior physiotherapist resource was an important factor in the participants' decision to accept rural positions and was valued throughout the pilot. The areas identified for improvement relating to clinical supervision were in the areas of planning, structure, resourcing, and communication about the program across the organisation.

Capacity building for telehealth use amongst engaged staff members took place regularly during the pilot. The 'virtual' team created in this project was pivotal in developing the telehealth readiness skills of a large portion the physiotherapy workforce in the district through regular practice connecting for meetings and shared professional development opportunities that commenced in 2017, prior to the global pandemic. Supervision delivery using a hybrid model of videoconferencing and on-site delivery was acceptable to participants, patients, and other staff at the rural locations.

An environment of perpetual change, high cognitive demand, professional isolation, and the nature of rural health work carries great rewards but has an emotional burden.[27,28] Providing a safe place to debrief and learn is important for staff well-being in any setting.[29,30] The line manager is primarily responsible for employee well-being and immediate operational supervision. Part of the value of the senior physiotherapist was the availability to support and build the participants' ability to cope with change, challenges, and adversity. This skill or resilience in the rural context is needed to endure rural practice and increase the probability of staff being able to stay and thrive. A safe professional relationship outside the hierarchy of direct 'non-allied health' line management, in addition to the same-discipline professional development support, was provided by the senior physiotherapist and might have contributed to the importance of the role throughout the project. This dynamic is often not available in the rural context.

5.5 | Communication

Communication about the project was highlighted as an area for improvement. Operational management of the participants was a different hierarchical branch within the organisation to that of the senior physiotherapist, and change was being driven by the project team across

jurisdictions. Demands on all stakeholders for time efficiency within this pilot and their other priority areas of responsibility across broad clinical and geographic areas sometimes resulted in communication errors.

No precedent for an AHRGP strategy in NSW and the absence of a state-wide framework might have contributed to the perceived communication deficit. Given the climate of organisational change during this pilot, and the part-time shared supervisor resource across a geographic area of over a large portion of 125 000 km^2 area of the LHD, supporting change, a high level of collaboration was necessary and also logistically challenging and might reflect a resourcing deficit. The structure within the AHRGP demonstrated a robustness that enabled workforce development despite all the challenges posed.

5.6 | Policy and systems

The MLHD pilot was aligned with the NSW Rural Health plan. The strategic approach and action plan within the pilot was informed by the AHRGP National Strategy led by SARRAH.[1] Significant differences exist between the MLHD application and the multifaceted fully resourced approach used in Queensland and other States and Territories. The method used in MLHD for application of the AHRGP could more accurately be labelled as 'Allied Health Rural Generalist Development Positions' as there are targeted positions, and contract-based and time-based criteria to an end date with potential career progression through a competitive recruitment process. Further development of an AHRGP strategy within NSW Health systems to continue to work towards sustainable allied health workforce solutions is recommended.

The framework analysis from AHPOQ evaluation framework and tool had limited validity in the NSW pilot at this time but was used to benchmark on the key deliverables of the AHRGP as a national initiative to guide practice. The tool highlighted that the MLHD pilot had a significantly different resource set, governance, and policy structures and lacked a coordinated approach for rural areas within NSW Health systems. These areas and the strategy towards resourcing the formal tertiary training aspect of the pathway were identified opportunities for further development in NSW. Good progress was made towards other domains on the tool, such as service and professional development.

5.7 | Sustainability

Early-career staff placed in rural locations benefitted from the use of resources to provide a same-discipline support mechanism and to enhance professional and competency development in this study. The AHRGP applied in the LHD demonstrated a high level of success with medium-term workforce development outcomes. The next step might be for these recommendations to be embedded into NSW Health systems for the pathway to have utility in the public health system as part of long-term sustainability strategy.

Project time frames assumed that each hospital would progress allied health recruitment promptly, that recruitment would progress unimpeded, that all participants would remain on the pilot in continuous full-time employment for the agreed time frames, and that no significant event such as droughts, bushfires and a global pandemic would impact health services. This was not the case and highlighted the need for flexible ways of adapting systems in rural health settings.

The development of the early-career clinician to be sufficiently competent and confident in their clinical skills to then be able to supervise physiotherapy students for rural placements was achieved by each of the participants. The number of placements increased from zero in the first two years to 18 placements achieved across the five locations since the pilot began, a four-year period. This time frame included the period when the pandemic was taking place. Placements were risk-managed and safe for students, staff and patients. This was a key performance indicator of the success of the AHRGP pilot. Physiotherapy students are the future physiotherapy workforce.[4] Other factors might have influenced this success. The implementation of a coordinated student program at the major teaching hospital was able to partner with the AHRGP team members to ensure each student had the opportunity to experience a rural placement. A functioning rural training pipeline in the region might contribute to the sustainability of the rural allied health workforce.

One of the potential goals of the pilot was to extend to other allied health disciplines. At the time of implementation, physiotherapy was the only discipline with a 'Critical mass' of vacant senior resources that would enable the reallocation of resources needed to meet the staffing requirements that included a dedicated same-discipline supervisor. At several time points in the project, senior clinicians in several of the other allied health disciplines reported saturation of available positions, no recruitment difficulty, or no funded positions to recruit to. This is noted in this paper to highlight there are differences between the allied health professions and one solution might not suit all. Setting up the human and training resources required, and guidance for appropriate professional development options and systems that support the application of the AHRGP, seem to be appropriate steps towards a more sustainable rural allied health workforce for the early-career members of the rural health pipeline.

The evaluation indicated the AHRGP is one method of addressing rural allied health workforce recruitment and retention challenges that had a favourable effect on medium-term service sustainability in the rural context. The risk of a return to the baseline state is identified as workforce resources have reverted to their original configuration. New vacancies have appeared, recruitment is again problematic, and the pilot has now ended. Effective systemic change with local rural allied health coordination occurred but was not able to be sustained due to the ongoing need for these resources that were made temporarily available for the pilot.

6 | CONCLUSION

The Allied Health Rural Generalist multifactorial approach supported recruitment, retention, and capacity building within the allied health workforce in the rural health district. Key elements included the professional development time allocation and resources, and guidance for service development projects, combined with same-discipline supervision and a focus on using technology and the allied health assistant workforce. Operational support within the organisation was also a key component to success. Service development was innovative, effective, and driven by the needs of each rural community using NSW Health operational guidelines and available resources. Professional development using supported reflective practice, experiential learning complemented by formal tertiary training to meet the need of the individual clinician resulted in the development of a rural-ready workforce and career progression opportunities in the rural context. The rural pipeline capacity was developed with the increase in availability of rural student placements. Access to physiotherapy services improved in nine rural communities as a direct result of this project. The method used to implement this pilot was effective and low cost. The pathway was complementary to existing NSW Health systems and allowed a high level of flexibility, often required in the rural context. Systemic change is needed to overcome inefficiencies experienced during implementation and to ensure sustainability. Further research to develop discipline-specific clinical training guidance through the stages of a rural AHPs' career might be helpful. Extraneous variables might have impacted some of the outcomes of this pilot but that is the reality of the rural health context.

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CONFLICT OF INTEREST

I declare there were no pecuniary conflicts of interest in conducting this study. As primary researcher, one competing interest to declare is that one of the co-authors is a family member. I would like to declare that this person was under separate management and contributed independently and significantly as an author. The primary author, as a rural clinician, has worked as a rural and remote clinician in the public and private sector for over thirty years. There is an acknowledgement that this work might be affected by confirmation bias due to this insight and experience. Risk management was undertaken by periodic

evaluation with input from stakeholders, reporting objectively and project team accountability procedures.

AUTHOR CONTRIBUTIONS

EM: Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Validation, Visualization, Writing-original draft, Writing-review & editing. TR: Project administration, Supervision, Validation, Writing-review & editing. EF: Conceptualization, Data curation, Project administration, Resources, Supervision, Visualization, Writing-review & editing. DM: Data curation, Resources, Validation, Writing-review & editing. DB: Data curation, Formal analysis, Writing-review & editing. EG: Formal analysis, Investigation, Validation.

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