The nature of paramedic practice in rural and remote locations: A scoping review

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Abstract

Introduction: Access to emergency healthcare services and specialist care – particularly paramedic services – is more restricted in the rural and remote areas of Australia, and this disparity is amplified further as remoteness increases. This review aims to investigate the availability of current research regarding both the expanding nature of paramedicine roles in rural environments, and the impacts of rurality on the quality of out-of-hospital care provided to patients.

Methods: Arksey and O’Malley’s six-step methodological approach was used to perform a scoping review to assess the availability of literature. Key words including paramedic*, regional, rural, remote and role were inputted into the search engines Scopus, CINAHL and PubMed. Titles and abstracts of the 864 results were screened by all authors and inclusion/exclusion criteria applied, resulting in 13 remaining articles.

Results: The final 13 articles comprised differing data collection types and methodologies from nine separate studies conducted in either Canada, Australia, the United Kingdom, the United States, Saudi Arabia or Qatar. Approximately 2.5 million patients, 534 paramedics, 331 other healthcare professionals and 35 case studies were included in the total combined results of these studies.

Conclusion: Rural communities demonstrated increased mortality rates in out-of-hospital patients due to several factors including rostering, specialist service locations and limited resource availability. Factors which were beneficial to the outcomes of patients in rural settings included enhanced paramedic scopes of practice, the implementation of community paramedicine programmes and wider roles within the community for paramedics. A lack of research on the exact nature of these changing roles in rural paramedicine is evident.

Keywords

paramedic; emergency medical technicians; health resources; emergency medical services; rural population; scope of practice

INTRODUCTION

In Australia, 7 million people – or nearly a third of the population – reside in rural areas,(1) and rural communities have statistically higher rates of chronic illness, mortality rates, and higher participation in avoidable health risk factors when compared to urban communities.(2) However, access to healthcare services and specialist care is more restricted in rural areas – this disparity is amplified further as remoteness increases,(2) and is similar internationally.(3,4) Where gaps in healthcare services exist in rural communities, we can seek to address this by conducting research into effective strategies to improve healthcare access.

Paramedicine has long been identified as a unique occupation due to the dynamic caseload and evolving nature of the profession. The responsibilities of a paramedic and the types of cases encountered can vary between practice settings and geographical locations. Regional, rural and remote locations may pose unique differences in terms of healthcare provision otherwise unlikely in urban areas, with significant potential to negatively impact on patient outcomes.(5)

While no universal definition for ‘rural’ has been agreed upon among academic disciplines, it is commonly measured either quantifiably with population data, or associated with features such as lack of services, agriculture and underdevelopment.(6,7) With such variance in the possible features of a rural town, it can be difficult to determine a universal definition applicable to regional, rural and remote locations internationally. Due to the variance in definitions across classification systems, the term ‘rural’ in this article will be used in its adjective form as a reference to any non-metropolitan...
region. For the purpose of this review, ‘rural healthcare’ refers to healthcare services delivered in locations outside metropolitan and urban areas, where there is limited access to specialist services and where human and material resources are less available due to locality.

In order to address the research question – How does the role of a paramedic differ depending on the degree of rurality? – this review investigated the availability of current research surrounding the roles of rural paramedics. It focused on the impacts of rurality on the standard of out-of-hospital care delivered to patients, highlighting paramedics’ perspectives of their role and discussed the expanding nature of paramedicine roles in rural environments.

METHODS

Methodological framework and reporting
This research adheres to the preferred reporting items for systematic reviews and meta-analyses extension for scoping reviews (PRISMA-ScR),(10) and the protocol has been registered with the Open Science Framework.(11)

Eligibility
To be included in this literature review, papers must have met a set of pre-determined inclusion and exclusion criteria, which can be seen in Table 1. These criteria were discussed and decided upon between all authors.

Data sources and search strategy
Data sources utilised included the databases Scopus, CINAHL and PubMed, which were chosen to allow for an optimal range of results. These databases were selected as they are key repositories of nursing and allied health research. Searching across databases ensured a broad range of literature was identified which was important in this scoping review where the coverage of the existing body of literature on a topic was unknown.

A scoping review was performed following Arksey and O’Malley’s six-step methodological approach (12) to determine the availability of current literature, as well as to verify and elaborate on the findings through expert consultation.(13) Several key search terms were identified in peer-reviewed research as specific search terms for sensitivity: these included ambulance*, emergency medical technicians, air ambulances, emergency medical services, paramedic*, EMS, EMT, prehospital, pre-hospital, first responder, emergency services, HEMS, field triage and out-of-hospital.(14)

Other key search terms included regional, rural, remote, isolat*, as well as role* or responsibility*. These key words were agreed upon by authors, who believed they reflected a generalised search approach that could provide a broad range of articles which still related specifically to the research goal.

Initial key words were expanded upon to include synonyms and similar relevant terms linked by Boolean search methods, for example ‘paramedic’ became “Ambulance* or emergency medical technicians or air ambulances or emergency medical services or paramedic* or EMS or EMT or prehospital or pre-hospital or first responder or emergency services or HEMS or field triage or out-of-hospital”. These were decided upon after reviewing PubMed’s medical subject headings, including both exact matches and fragments. Further expansions of phrases inputted into databases can be seen in Table S1, which highlights one database’s search process as an example.

Study selection
The literature search and screening process is demonstrated in Figure 1. The initial search of Scopus, CINAHL and PubMed resulted in 2237 articles, before limitations were applied – results were limited to publications from the past five years to ensure currency of literature, as paramedicine is a rapidly evolving profession with frequent developments. Applying these date limiters ensured relevance to the present operational nature of paramedicine. An additional limitation of articles published in the English language only was applied to assist with ease of access; this also alleviated concerns of key findings potentially becoming lost through translation. After applying these additional parameters, 1373 articles were excluded and titles and abstracts of the combined 864 remaining results were screened by all authors against the inclusion and exclusion criteria (Table 1). Full article access was

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Table 1. Inclusion and exclusion criteria

| Criteria for inclusion                                                                 | Criteria for exclusion                                                                 |
|----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Relating to out-of-hospital healthcare provided by paramedics, community first responders, retrieval/military medics or other primarily out-of-hospital healthcare professionals | The nature of the research was not focused on RRR locations, and the RRR location of participants was coincidental |
| Relating to RRR areas                                                                    | Relating to out-of-hospital healthcare provided by GPs, nurses or other healthcare professionals whose primary work location is in-hospital |
| English language                                                                        | Concerning consumer perspectives                                                       |
| Concerning the roles of paramedics in RRR locations                                      | Concerning the role of treatments or assessments                                        |
| RRR: regional, rural or remote.                                                          | Perspective pieces or recommendations                                                 |
Figure 1. PRISMA flowchart detailing the search and screening process (15)
obtained for the remaining 89 articles, and full text screening was conducted to ensure relevance to the review. Of the articles, 78 were subsequently excluded, with the 11 remaining articles included in the literature review. Additionally, screening reference lists of the remaining 11 articles identified a further seven articles as potentially relevant; of these, two articles met inclusion criteria and were included in the review. The most recent literature search was conducted on 15 February 2022. An expert in the field of rural paramedicine was consulted during the final drafting of this literature review in March 2022.

Synthesis of results

Full texts of the articles were then read and analysed by all authors in a manual process, and major themes and findings were noted.(12) Authors compared the major themes which they individually identified, and similarities between these findings were noted. Furthermore, similarities between articles were recorded in addition to limitations and implications.

Data charting

Data charting was conducted independently by one reviewer, and moderated and revised as required by the other two reviewers. Variables charted included location of study, participants, aim, data collection methods, findings and limitations of the study.

RESULTS

From the initial 864 articles identified, 13 articles remained which met the inclusion criteria. These 13 articles were derived from 12 separate studies, as two articles included results from the same study. Table 2 provides an overview of the selected articles; the studies reported in the selected articles include a total of approximately 2.5 million patients, 534 paramedics, 331 other healthcare professionals and 35 case studies. Research was conducted in either Australia, the United Kingdom, Canada, the United States, Saudi Arabia or Qatar, and two studies utilised results from a combination of countries. The most common methodology used was semi-structured interviews; other methodologies included case study analysis, retrospective analysis, direct observation, focus groups, document review, narrative review, literature review, informal discussions and mixed-method surveys. Studies were published between 2009 and 2021, reflecting a 12-year period of paramedic practice.

In the 13 relevant articles identified through this scoping review, three main themes were consistently highlighted: factors affecting out-of-hospital care in rural environments, perspectives of the paramedic role in rural environments, and the expanding role of paramedicine in rural locations.

The literature reviewed identified an increased mortality rate of rural out-of-hospital patients compared to urban patients. While one research study based in Qatar disagreed and did not find an increased mortality rate,(17) the majority of the research papers covering this topic did.(21,22,25–27) The suspected causative factors of this varied, however some factors were presented as being unique to rural paramedicine. These factors can be divided into environmental factors and organisational factors.

Environmental factors unique to rural locations which contributed to patients’ outcomes included adverse terrain conditions creating extrication difficulty, and prolonged response times of ambulance services due to distance.(19,21,24,28) Organisational factors were more commonly discussed in articles and included staffing, rostering and resource availability – these factors contributed to issues including fatigue and skill erosion.(19,24,28) The need for increased access to education opportunities was the most frequently mentioned theme across the studies, with nine articles discussing how beneficial this is for paramedics, particularly in preventing skill erosion.(16,18–21,24,26–28)

Strategies designed to address these key organisational and environmental challenges inform discussions on the other two main themes identified in this review.

The need to increase available staffing resulted in the recruitment of additional volunteer and paid community responder roles in conjunction with the implementation of community paramedic programmes. However, this change in the service delivery model impacted on the perspectives of paramedics working in those communities with eight articles focusing on the perspectives of paramedics, community first responders and community paramedics on their role.(16,18,19,21,23,26–28) Overall, implementation of new roles was consistently highlighted as a positive step towards getting rural communities access to healthcare more promptly.(20,22,23,27) However a note of caution is that volunteering is dependent on the motivation and altruism of volunteers (21–23) who consistently reported feeling misunderstood and underappreciated by their paramedic colleagues.(20,23)

The need to overcome organisational and environmental factors impacting on out-of-hospital healthcare in rural environments is addressed by the third main theme, the expanding role of paramedicine. Eight of the 13 articles discussed how the role of paramedicine has evolved beyond the traditional focus on emergency care and expanded to encompass primary care activities such as wound care, catheters and vaccinations that were traditionally performed by other healthcare professionals.(16,19–21,25–28) Even the terminology has evolved from pre-hospital to out-of-hospital to better reflect the complexities of the paramedic domain of practice.(29) One limitation noted for expanding the paramedic scope is the potential for skill erosion, which becomes a more significant issue with more advanced skills, however this can be addressed by continuous professional development and interdisciplinary learning opportunities.(21) Overall, the consensus among the articles reviewed was that the expanded role of paramedicine was incredibly beneficial for rural patients.
Table 2. Overview of articles included

| Authors and year of publication | Aim | Participants | Location | Methods | Key findings | Limitations |
|---------------------------------|-----|--------------|----------|---------|--------------|-------------|
| Alanazy, Fraser & Wark (2021)   | Aimed to gain a greater understanding of how organisational factors may affect the performance of urban and rural EMS. | 20 paramedics | Saudi Arabia | Semi-structured interviews | Identified key issues affecting EMS performance in both rural and urban areas of this region. Identified that more improvements are needed in rural regions to improve performance than in urban areas. | This study was localised to one geographic region in Saudi Arabia. The findings of this research may not be generalisable to other areas in Saudi Arabia, or to other countries, due to differing systematic challenges and resource availability. |
| Al-Thani, Mekkodathil, Hertelendy, Frazier & El-Menyar (2021) | Aimed to gain a greater understanding of urban and rural pre-hospital trauma care and in-hospital patient outcomes in Qatar. | 1761 patients | Qatar | Retrospective analysis | While there were significant differences in on-scene time and total pre-hospital time between urban and rural areas, there were no significant differences identified in response time, hospital length of stay, mortality, and certain treatments. | Several patients had missing information from pre-hospital records. Many patients transported from rural areas may be travellers engaging in leisure activities, and therefore not representative of the local population. The retrospective quality of the study was also noted as a limitation. |
| Martin, Lewis, Clark, Murphy, Edvardsson, Stub, et al. (2020) | Aimed to explore perceived barriers to effective STEMI management, as well as how these barriers differ between professions and between rurality. | 333 paramedics and emergency nurses | Australia | Online survey | Barriers to effective and timely STEMI management are present in the out-of-hospital environment and differ significantly between geographical location. Methods of overcoming this include improved access to continuing professional development and expert advice. | There are no validated survey questions which address the research objective resulting in researchers needing to develop their own survey tool. Voluntary participation may have resulted in a self-selection bias. Higher proportion of regional and rural clinicians responded to this survey. The study was localised to one state in Australia, thus may have limited generalisability. |
| Adams, Lazarsfeld-Jensen & Francis (2019) | To understand further the experience of remote medical workers in mining organisations through qualitative examination. | Seven remote nurses and paramedics | Australia | Face-to-face and telephone interviews | Physical isolation related to the occupation resulted in emotional isolation, decreased socialisation with peers and professionals, and reduced opportunities for both informal and formal learning. | The group of participants was relatively small, and all were derived from the same international mining organisation. Scopes of practice were not taken into consideration. |
| Martin & O’Meara (2019) | To identify the motivations, job satisfaction and challenges of community paramedics in independent rural programmes. | 15 community paramedics in two countries | US and Canada | Informal discussions, semi-structured interviews, focus groups and direct observation of practice | The expansive role of community paramedics can result in both feeling misunderstood by paramedic peers, and a greater understanding with other disciplines. Motivation to make a difference was found to be a key factor in programme participation. | There was an inability to follow up with participants to confirm findings. Additional interviews were not always possible due to a limited availability. The expansive role of community paramedics can result in tensions in professional identity with participants reporting closer alignment to, and understanding of other healthcare disciplines, while at the same time feeling misunderstood by paramedic peers. |
Table 2. Overview of articles included (continued)

| Authors and year of publication | Aim | Participants | Location | Methods | Key findings | Limitations |
|---------------------------------|-----|--------------|----------|---------|--------------|-------------|
| McManamny, Jennings, Boyd, Sheen & Lowthian (2018) (21) | To gain a greater understanding of the role of paramedic-initiated health education within Australia in metropolitan, rural and remote locations. | Four databases | Australia | Literature review | Paramedics in Australia have a key role in local communities that has broadened over time. This is particularly amplified in rural and remote communities, who benefit from expanded scopes of practice. | A lack of high-level evidence was noted, particularly papers evaluating interventions and models of care. Research gaps were evident due to the unpredictable nature of paramedic practice. |
| O’Meara, Wingrove & Nolan (2018) (22) | To investigate paramedic models of service delivery in frontier and remote populations. | Two databases and multiple paramedic-specific journals | Australia, US and Canada | Narrative review | The use of paramedic practitioner models in frontier and remote settings can raise issues of differing designs of education programmes, self-regulation of paramedics, and changed scopes of practice. Community paramedics can fill the gap in remote healthcare access. | The findings of this literature review could be enhanced through recommendations on strategic research priorities. |
| Phung, Trueman, Togher, Ørner & Siriwardena (2018) (23) | To explore the perceptions and experiences of community first responders regarding their role. | 16 community first responders | UK | Semi-structured interviews | Altruistic motivation was a key factor noted of participants. Training was highly valued to maintain and improve skills. Participants felt undervalued by ambulance staff due to misunderstandings of their role. | The sample was limited to one rural community first responder scheme. |
| DeSoucy, Shackelford, Dubose, Zveben, Rush, Kotwal, et al. (2017) (24) | To investigate factors impacting prolonged field care outcomes in the pre-hospital military environment. | 54 cases | US | Mixed-method survey | Compared and analysed presentations of and treatments for patients in prolonged field care, as well as negative impacts on patient treatment. | Most surveys not accompanied by specific presentation measures, including vital signs and appropriate patient care records. Difficult to prove the extent to which the study is reflective of total prolonged field care cases. |
| Patterson, Coulthard, Garberson, Wingrove & Larson (2016) (25) | To examine the goals, activities and outcomes of current community paramedicine programmes in rural communities. | 31 rural community paramedicine programmes | US | Mixed-method: structured interviews and document review | Pre-hospital services can be seen as successfully deployed in community paramedicine programmes to provide multiple kinds of services outside of traditional scope. | No comprehensive list of community paramedicine programmes available, therefore some programmes potentially missed. Findings based on self-report measures. |
| Pennel, Tamayo, Wells & Sunbury (2016) (26) | To assess how the ‘care coordination’ programmes utilised by EMS address the health and social needs of rural and underserved populations. | 18 staff and 17 patients in three rural programmes | US | Semi-structured interviews and focus groups | The shift in the paramedic role from acute care to ongoing support was found to be beneficial to filling a healthcare gap seen in rural areas. Improved use of preventative healthcare and self-management of disease was observed as a result. | Limited locations were studied in the sample. All of the programmes were new, and thus long-term outcomes of patients were unable to be studied. |
Table 2. Overview of articles included (continued)

| Authors and year of publication | Aim | Participants | Location | Methods | Key findings | Limitations |
|---------------------------------|-----|--------------|----------|---------|--------------|-------------|
| O’Meara, Tourle, Stirling, Walker & Pedler (2012) (27) | To examine the evolution of rural paramedicine. | Four case studies from four services | Australia | Qualitative case study analysis and semi-structured interviews | Paramedics are becoming more advanced healthcare providers in small rural communities and professional responsibilities are continuously developing. | Relied on willingness of ambulance services to participate in study – potential exists that only exemplar case studies may have been offered. |
| Mulholland, O’Meara, Walker, Stirling & Tourle (2009) (28) | To describe the expanded role of a rural paramedic implemented in the study, and to determine what facilitates this role. | 17 interviewees and data from one site of a study | Australia | Semi-structured interviews, direct observation and document review | Identified community involvement, organisational support, professional support and appropriate training as factors that facilitate the expanded roles of rural paramedics studied. | The paper focuses on one site of a multi-site study, and thus results could be enhanced by considering all sites. |

EMS: emergency medical services; STEMI: ST-elevation myocardial infarction.
and communities, as well as for the professional identity of paramedics.(27)

The expansion of the paramedic role and associated shifts in perception of what the paramedic role is, should and could be, promotes discussion on opportunities for further development of the role. For example, several studies explored the involvement of healthcare professionals in new technologies such as telemedicine and while only two of the articles discussed this in the context of out-of-hospital care, this provides another avenue worthy of further exploration, with remote assessments potentially improving use of paramedic resources in non-emergency situations.(19,24)

**DISCUSSION**

**Factors affecting out-of-hospital care in rural environments**

In considering environmental factors, DeSoucy et al. further stated that ambulance service providers could improve their paramedics’ abilities in managing difficult environments through extended training and the implementation of contingency plans.(24) This is a line of thought that has been further supported by related research regarding rural paramedicine.(19,28) Other variable factors which contributed to patients’ outcomes and were unique to rural locations included people driving at faster speeds on rural roads and other risky driving behaviours, and an increased incidence of farming-related accidents due to the higher prevalence of agricultural industries.(21,24)

Organisational factors have also been noted as being influential on patients’ outcomes, including factors such as staffing, rostering, limited resource availability and age of equipment.(16,24) Paramedics in rural areas experience increased levels of fatigue when compared to their urban counterparts, reportedly due to pressures of working on-call and having extended transport times.(16,17,28) This can have detrimental effects on the pre-hospital care delivered, leading to impairment in decision making which can impact on fine motor skills, drug calculation, and driving competency.(19) This poses significant risk not only to the patient and wider community, but also to the paramedic themselves as it can result in motor vehicle accidents, incorrect drug administration and near misses.(19) One study reflected on how their rural participants were more likely to be using older vehicles and equipment, which were more prone to failure.(16) Furthermore, limited access to primary healthcare and specialist services – particularly major trauma services – was a factor which was presented to have impacted on patient outcomes, substantially increasing rural patient mortality rates.(25–27) While the majority of articles supported this conclusion, one study conducted in Qatar conversely found that nil changes in mortality rates were noted when comparing rural and urban patient outcomes.(17)

The literature also identified a number of factors associated with rurality that contributed to a positive perspective on patient care; a focus on community engagement was found to be beneficial for rural and remote paramedics as it allowed for improved health literacy of rural citizens, as well as a stronger community trust in the ambulance service.(27,28)

Another concern posed by rural paramedics was the potential for skill erosion. While cases in rural locations were of varied nature with a contrasting mix of major trauma and primary healthcare, the frequency of exposure to some types of call-outs may have been limited when compared to urban areas.(27) For instance, major trauma in rural areas is more commonly due to agricultural machinery and high-speed motor vehicle accidents, whereas in urban areas major trauma may involve stabbing or occupational injuries from construction sites.(27) In addition to attending fewer call-outs, a strong positive correlation was found between the frequency of procedural skills practice and the confidence paramedics had in the application of these skills.(23,28) Reduced opportunities to practice vital skills, particularly those of an advanced or complex nature such as trauma management or intubation, showed a direct correlation to decreased performance in these skills.(22) The need for increased access to continuous professional development opportunities, in particular opportunities specific to rural environments and experiences, was highlighted multiple times.(16,18) One potential solution offered within the literature was the use of regular simulations to practice and maintain key clinical skills.(23,27) Rural paramedics highly favoured frequent simulation use, and demonstrated a significant increase in confidence of their clinical skills even when performing these under simulation and not on real patients.(23)

**Perspectives of the paramedic role in rural environments**

Overall, the role of paramedics in rural communities is reported to go beyond the traditional realm of pre-hospital emergency healthcare and blends with a more non-urgent primary healthcare role.(21) Australia has a dynamic make-up of out-of-hospital healthcare providers, with 22,563 qualified ambulance officers,(30) – 25% of whom are estimated to be working outside of the jurisdictional ambulance services (31) – 7428 volunteer ambulance operatives, and 6716 community first responders.(32) While community first responders deliver advanced first aid prior to ambulance arrival, volunteer ambulance operatives refers to those who deliver ambulance services on an unpaid basis, without the backup of paid registered paramedics.(32) Community paramedics, while not referred to in the report on government services, are paramedics employed to provide primary care and public health services – such as immunisation and chronic disease management – to rural and remote communities.(20,25,33)

While not all ambulance services recruit for all of these positions, and roles and terminology differ between services both nationally and internationally, these are commonly understood definitions of these roles. The implementation of many of these roles has been effected to address the health disparities and challenges noted in regional, rural and remote communities due to limited
access to both primary and emergency healthcare.(28) Additionally, community first responders and community paramedics reported that their dynamic and multi-faceted role facilitated an improved relationship and understanding with other allied health professionals encountered.(20,23)

Motivation was a key factor in multiple articles featuring the perceptions of community first responders and community paramedics towards their role.(20,23) The role of community first responders usually entails unpaid volunteers who are trained to a certain level of first aid – lower than a paramedic’s scope of practice – and frequently operate in rural and remote locations which have significantly reduced access to paramedics and other healthcare practitioners.(21,22) Due to the nature of this volunteer role, high levels of motivation noted in participants were unsurprising. In the 2018 study by Phung et al., participants reported that their primary motivation for volunteering as a community responder was altruism, allowing personal satisfaction to be derived from helping others and supporting their community.(23) Secondary motivators for volunteering related to a sense of personal satisfaction derived from helping others, and the valuable training that the role may provide for participants intending to progress into careers within the healthcare system.(23) Similarly, community paramedic motivations noted by Martin and O’Meara also included altruistic values, as well as an attraction to a more innovative role which facilitated the delivery of preventative care to rural patients.(20)

Despite the benefits they bring to the rural locations in which they work, both community paramedics and community first responders reported feeling misunderstood, unsupported and undervalued by their paramedic peers.(20,23) Participants attributed this to a general confusion and lack of knowledge as to what their roles actually entailed,(20) as well as flawed communication between the control centre, community first responders and the ambulance service.(23) A common perception among participants was that a better understanding of their roles and responsibilities by the local paramedics was needed in order to strengthen interprofessional relationships and improve the quality of work achieved.(20,29) Community first responders studied in Phung et al.’s research also identified misunderstanding of their roles as a barrier, and several participants were unable to clearly articulate the scope of their own roles, demonstrating the challenges of conveying role clarity to others.(23) This demonstrates that clearly outlining the roles and expectations of rural first responders of all types may be likely to improve communication, interprofessional relationships and patient treatment.

**Expanding role of paramedicine in rural locations**

Due to the unique nature of working as a paramedic in regional, rural and remote locations, the profession has evolved throughout the years to meet the needs of the community served.(21,25) Factors which have been identified as examples of the evolution of paramedicine include enhanced scopes of practice, the implementation of community paramedicine programmes, and increased responsibilities in non-emergency environments.(21,27)

A concept viewed as highly beneficial to rural communities impacted is that of community paramedicine. This refers to the process of addressing gaps in healthcare through an increased scope of practice enabling paramedics to meet the primary healthcare needs of the community,(25) as well as training community members to a basic level of first aid.(27) This involves a shift in focus of the paramedic role from that of an emergency responder targeted towards acute presentations towards a more holistic approach focused on primary health, low acuity and chronic or ongoing healthcare provision in out-of-hospital environments.(26) This was found to have a positive impact on the community by increasing a patient’s access to healthcare services, saving on costs associated with lengthy transport, keeping ambulances in their assigned zones to allow rapid response for future call-outs, and improving patients’ use of preventative healthcare and self-management of disease.(25,26) Additionally, the application of community paramedicine programmes also led to reduced emergency department visits and hospital admissions, which further benefits healthcare facilities financially.(34,35) O’Meara et al. provided examples where this had already been successfully implemented in Australia, with significant collaboration between rural paramedics and hospitals to ensure adequate staffing when possible.(27) Patterson et al.’s research in numerous states of the United States found exclusively positive outcomes among those services which had utilised community paramedics rurally.(25) Additionally, having paramedics with increased scope of practice such as extended care paramedics – those trained specifically to provide more extensive at-home care including wound dressings and chronic illness management – has been reported as being particularly beneficial for rural residents.(21,25,27)

Several ambulance services expressed reliance on community first responders to deliver pre-hospital care in rural locations, where difficulty with recruitment and retention of paramedics is increasingly prevalent.(20,23) This has been identified in research as being advantageous to rural communities where the existing relationships volunteers have with the community results in increased trust in the services provided.(27) Furthermore, the use of community first responders to assess patients, provide first aid and transport as needed has been demonstrated to be beneficial in increasing accessibility of healthcare for rural and remote communities, further narrowing the gap in healthcare disparities.(22)

Paramedics have an increased role in the delivery of telemedicine, which has been noted to have a positive impact in pre-hospital care through providing key diagnostic capabilities. As an evolving profession, the use of technology in paramedicine is expanding and telemedicine is being utilised more frequently, although
it remains predominately a hospital-based service. DeSoucy et al. observed that telemedicine is a useful tool for rural paramedics who may be frequently treating patients in locations far from hospitals and specialist services.(24) It allows real-time consultation between patients and specialists facilitated by paramedics to improve diagnostic and treatment capabilities; the ability to transmit diagnostic information, assess a patient’s presentation and guide advanced interventions from a remote location. These features were found to positively impact on the patient’s outcome.(24) While telemedicine use has already been implemented in some services internationally with resources such as poisons contact lines and electrocardiograph transmission, a more extensive use of telemedicine in rural regions has been suggested to benefit these communities further.(19)

**Implications**

There has been significant research into the advantages and limitations of community paramedicine programmes and the promotion of an expanded scope of practice for rural paramedics. However, there was a limited amount of research investigating the paramedics’ perspectives of their roles in regional, rural and remote communities, and no research was identified that explored if and how these roles may differ depending on the environment. The majority of articles located had conducted their research in North America, further identifying Australian rural research as a developing topic in need of further investigation. While some Australian literature was identified, most of it was not current and so the relevance of it to contemporary paramedic practice is debatable. In order to address this gap in the literature, future research into paramedics’ roles in regional, rural and remote communities in Australia should be prioritised.

**Limitations**

When investigating this topic, limited research was found that focused specifically on the role of paramedics in rural environments. While the benefits and challenges of rural healthcare overall were well researched, there was limited research addressing the unique issues relating to paramedics working in non-metropolitan locations. Furthermore, while paramedicine is an emerging profession, sample sizes of participants in the articles reviewed were generally small. Limitations noted by the authors of the original articles reviewed include insufficient documentation and difficulty accessing generalisable samples. Additionally, some articles discussed the limitations of voluntary participation with no incentives, as this may have decreased the sample size. This potentially skewed the results, as participants may have had an increased interest in the research and stronger opinions regarding the topics discussed.

**CONCLUSION**

Paramedics working in rural, regional and remote locations have been observed to experience changing roles, and subsequent responsibilities, due to the perceived and demonstrated need to bridge an observable gap in healthcare access. This change benefits regional, rural and remote communities through increasing their access to both primary healthcare and specialist services. There is a significant need for rural-specific continuous professional development opportunities. While both community paramedics and community first responders were highly valued due to their essential role in rural and remote communities, both groups reported feeling unsupported by their paramedic colleagues. Paramedics undertaking an expanded scope of practice were perceived as highly beneficial to the communities that they served, with the broader role allowing for improved access to primary healthcare. A lack of research on the experience of these paramedics and the nature of the changing roles in rural paramedicine, and how these differ with an increase in rurality, is evident, and should be a priority area for future research.

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**COMPETING INTERESTS**

The authors declare no competing interests. Each author of this paper has completed the ICMJE conflict of interest statement.

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### Table S1. Initial search strategy of CINAHL

| Search # | Search terms                                                                 | Location  | Results   |
|----------|------------------------------------------------------------------------------|-----------|-----------|
| S1       | Ambulance* or emergency medical technicians or air ambulances or emergency medical services or paramedic* or EMS or EMT or prehospital or pre-hospital or first responder or emergency services or HEMS or field triage or out-of-hospital | Abstract  | 44,666    |
| S2       | Regional or rural or remote or isolat*                                         | Abstract  | 194,802   |
| S3       | Role* or responsibilit*                                                        | Abstract  | 433,203   |
| S4       | S1 + S2 + S3                                                                  |           | 505       |