

# Down with falls! Paramedicine scope regarding falls amongst older adults in rural and remote communities: A scoping review

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## Abstract

**Introduction:** Australian rural and remote areas are faced with the double burden of an ageing population paired with inequitable access to health resources due to the paradigm of major city centred health care. This complicates fall management within this space. Paramedics are a registered health profession, which provides mobile, equitable health care. However, this resource is not being effectively utilised in rural and remote areas where primary care access barriers may cause patient needs to go unmet.

**Objective:** To describe the existing literature and describe the international scope of current paramedicine practice in the out-of-hospital management of falls amongst older adults in rural and remote settings.

**Design:** Joanna Briggs Institute scoping review methodology was employed. CINAHL (EBSCO), MEDLINE (Ovid), EMBASE (Ovid), SCOPUS (Elsevier), Google Scholar and These Global were searched and Australian, New Zealand and the UK ambulance service guidelines were sought.

**Findings:** Two records met inclusion criteria. Currently, rural and remote paramedic fall management involves preventative health promotion through patient education, population-based screening and referrals.

**Discussion:** The use of paramedics to screen at-risk populations and refer is vital, as many rural adults had screened positive to fall risks and other unmet needs. There is poor recollection of physically printed education material and low acceptance of further in-home assessments following paramedic departure.

**Conclusion:** This scoping review has highlighted a significant knowledge gap on this topic. Further research is needed to effectively utilise paramedicine within areas where access to primary care is not possible to achieve downstream, risk reducing care in the home.

## KEYWORDS

emergency medical services, fall management, geriatrics, paramedicine, rural health

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## 1 | INTRODUCTION

Internationally, falls continue to manifest as a growing public health problem with an estimated 684 000 deaths and 37.3 million falls requiring medical attention annually.<sup>1</sup> Falls are the second leading cause of injury death internationally and are responsible for more disability-adjusted life years lost annual than the combination of transport injuries, drownings, burns and poisonings.<sup>1</sup> Falls are an especially prominent problem amongst the ageing populations, due to age-related physiological changes in physical, sensory and cognitive functioning alongside environments that are not modified to safely compensate for these changes.<sup>1</sup> The Global Burden of Disease study 2017 has found that nations with greater proportions of their population in rural areas had a greater incidence of falls, and nations with ageing populations had the greatest fall-related disability-adjusted life years rates.<sup>2</sup> Falls can result in physical injuries such as fractures<sup>3</sup> but can also cause deliberating financial and psychological stress due to an increased fear of falling with an associated loss of mobility and independence.<sup>2</sup> Falls also incur significant costs to health systems, with each episode amongst adults aged greater than 65 years resulting in a cost of \$1480 AUD in Australia.<sup>1</sup>

Australia has a significant ageing rural population, with a third of older Australians residing outside Australia's major cities, and a tenth in remote areas.<sup>4</sup> Currently, there is a greater age-standardised rate of hospitalised falls amongst older Australians in remote and very remote settings than major cities.<sup>3</sup> Additionally, with increasing remoteness, there is an increase in age-standardised fall injury death rate with insufficient data to publish the death rate in very remote communities.<sup>3</sup> Falls may be under-reported in remote and very remote areas due to access barriers, as well as both survivor bias, and nonsurvival bias.<sup>5</sup> Survival bias and nonsurvivor bias within this context refer to individuals who either survive and are able to report a fall, or who pass away and consequently are unable to report a fall, respectively.<sup>5</sup>

Currently within Australia, there is an increased fall injury hospitalisation and death rate that is paired with a significant decline in clinical full-time equivalent rate of employed health professionals per 100 000 population with increasing remoteness, with the exception of nurses and midwives.<sup>6</sup> However, the Australian Government through the Australia's Primary Health Care 10-Year Plan has committed to improve the rural health workforce, and also to implement local community developed and supported models of health care.<sup>7</sup> Australians living in rural, regional and remote areas have been identified as a priority population by the National Preventive Health Strategy, with an emphasis on a rural-specific approach.<sup>8</sup> Fall

### What this paper adds?

- Rural and remote paramedics are currently involved in screening older populations for referrals.
- There is a current knowledge gap on how best to utilise paramedics in rural and remote areas for fall management.

### What is already known on this subject?

- Patient retention of printed health resources and engagement with fall-related referral programs is suboptimal.
- Rural and remote older adults have unmet needs and limited contact with the health system.

management amongst rural older adults is complicated by a lack of timely available health resources alongside an increased prevalence of lifestyle risk factors compared with a major city setting.<sup>6</sup> However, recent health policies highlight a shift away from the major city focus paradigm and towards a rural-specific approach.

Paramedics in emergency medical services are uniquely positioned as health care providers due to their mobility and exposure to the patient's individual behaviours, social and physical environment. From reviewing ambulance guidelines and protocols from Australia,<sup>9-14</sup> New Zealand<sup>15</sup> and the UK,<sup>16</sup> the current general paramedic scope of practice for fall management is to complete an assessment, provide immediate care, such as pain relief, and transport if appropriate or complete a fall risk screen for future review and management by primary care services.

Not all older adults who fall are conveyed to hospital following a request for emergency services. A systematic review has found that this nonconveyance rate is between 11% and 59% and that this population at risk with up to 49% of nonconveyed patients requiring another unplanned health care contact within 28 days of the initial fall.<sup>17</sup> Amongst this population in New South Wales, 58% were found to experience another fall, 40% sustained an injury following a later fall and 27% requested emergency ambulance care following a fall within 6 months of attendance.<sup>18</sup> Patients are typically not conveyed to hospital due to patient refusal or clinicians deeming transport not appropriate due to minor injuries.<sup>19</sup>

As paramedicine continues to develop as a health profession, paramedics are increasingly entering the primary care space to provide definitive care in the community.

This is especially apparent in rural areas where primary care services are lacking.<sup>20</sup> Community paramedicine has been implemented through using specialist paramedics to manage low acuity presentations in the community as opposed to an emergency department, using either a 'preventative/follow-up' or 'reactive' model in North America, the UK and Australia.<sup>21</sup> Compared with the standard paramedic, these specialised paramedics in New South Wales, Australia, have demonstrated a 2.8 times greater nontransport rate with an associated 10-to-20-min lower average case cycle time.<sup>22</sup>

A recent New South Wales Parliament investigation in rural health found that rural New South Wales residents are experiencing access barriers with limited health and hospital services and experiencing greater financial burdens in accessing these services when compared to their major city dwelling counterparts.<sup>23</sup> As such, the inquiry made recommendations to restore equity in accessing care. Relevant to this paper, recommendation 29 has requested that New South Wales Ambulance utilise paramedics to supplement lacking primary care services and an increase the presence of specialist paramedics in rural areas.<sup>23</sup> Similarly, the New South Wales Parliament investigation into ambulance ramping and access block at hospital emergency departments made a recommendation to New South Wales Ambulance to invest in and expand the community paramedicine model into rural and remote areas.<sup>24</sup> The paradigm of a major city focus when developing health policies for rural areas is outdated, to the detriment of rural communities. However, recommendations such as this signal the changing demands for paramedics highlighting recognition that rural Australians face challenges are not the same as those experienced by their major city dwelling counterparts.

As an act of restoring equity in care, further research is required to effectively utilise what limited health resources are available in rural settings. The aim of this study was to describe the available literature to describe the current international scope of practice amongst paramedics for fall management in specifically rural and remote areas amongst older adults. Falls are a complex issue with a wide variety of intertwining risk factors. To capture the complexity, the socioecological model of health promotion proposed by Green and Kreuter<sup>25</sup> will be used to frame this scoping review. This model has three dimensions: the individual and their behaviour, the physical environment and the social environment.<sup>25</sup> All three dimensions can be analysed at five levels: the intrapersonal level, the interpersonal level, the organisational level, the community level and societal.<sup>25</sup> This model addresses the complexity behinds fall management, as there are a multitude of risk factors stemming from both the individual and their environment.<sup>1</sup>

Paramedicine is a field of health care with significant variation in practice between ambulance services internationally<sup>21</sup> and limited literature.<sup>26</sup> As such, a scoping review is the most appropriate methodology for this research aim.

## 2 | RESEARCH QUESTION

What is the current scope of practice of paramedics managing falls amongst older adults in rural and remote areas specifically?

## 3 | METHODS

This scoping review was conducted in line with the JBI methodology for scoping reviews,<sup>27</sup> and the protocol was registered on Open Science Framework (<https://osf.io/24vme>) on 10 May 2022.

A preliminary search of Cochrane Database of Systematic Reviews and *JBI Evidence Synthesis* was conducted on 1 April 2022, and no current or underway systematic reviews or scoping reviews on the topic were then identified.

### 3.1 | Search strategy

The search strategy attempted to locate both published and unpublished studies. An initial limited search of MEDLINE (Ovid) was undertaken to identify articles on the topic. The text words contained in the titles and abstracts of relevant articles, and the index terms used to describe the articles were used to develop a full search strategy for CINAHL (EBSCO), MEDLINE (Ovid), EMBASE (Ovid) and SCOPUS (Elsevier) (see Appendix S1). The search strategy, including all identified keywords and index terms, was adapted for each included database and/or information source. The reference lists of all included sources of evidence were screened for additional studies. Studies selected were in English, had no restrictions on nation or year of publication and were searched until 25 September 2022.

The databases searched included CINAHL (EBSCO), MEDLINE (Ovid), EMBASE (Ovid) and SCOPUS (Elsevier). Sources of unpublished studies or grey literature were gathered through Google Scholar, Theses Global and an online library database (see Appendix S2). Guidelines from New South Wales Ambulance, Australian Capital Territory Ambulance Service, Ambulance Victoria, Queensland Ambulance Service, St John Ambulance Western Australia, Ambulance Tasmania, the

United Kingdom Joint Royal Colleges Ambulance Liaison Committee and St John Ambulance New Zealand were obtained to supplement literature. These ambulance services were selected as they all follow the British model of a separate third-party, public-sector ambulance service as opposed to fire service model utilised in the majority of Asia, Europe and North America.<sup>28</sup> To further supplement paramedicine-related literature, nonindexed journals specifically the International Paramedic Practice, the Journal of Paramedic Practice and the Irish Journal of Paramedicine, were searched (see Appendix S2). The reference lists of appropriate articles were screened as well to further search for the literature.

## 3.2 | Eligibility criteria

### 3.2.1 | Participants

Older adults, who were aged greater than or equal to 65 years as per the Australian Institute of Health and Welfare convention,<sup>4</sup> community dwelling and living independently. Older adults living in assisted living, or residential aged care, were excluded due to the inherent availability of primary care. The focus of this scoping review is on immediate management by paramedics.

### 3.2.2 | Concept

Accidental fall management. The World Health Organization<sup>1</sup> defines a fall as an individual unexpectedly descending to the ground or a lower level. Falls from a height are distinguished by rapid deceleration. A fall from standing, seated, or lying position is also deceleration but not as 'rapid'. Nonaccidental falls from interpersonal violence were excluded as well.

Paramedicine is a relatively new health profession, and paramedics have only recently become registered health professionals in Australia in December 2018.<sup>29</sup> Currently, nomenclature within paramedicine has no international consistency and there are significant differences between local naming conventions and scopes of practice between various ambulance services worldwide.<sup>21</sup> Globally, paramedicine can be defined according to the literature as a domain of health professional and practice that involves emergency and primary care, and paramedics may practice either under medical supervision or independently often in an unknown environment.<sup>21,30</sup> Within Australia, there is no formal requirement for paramedics to operate within an ambulance service.<sup>29</sup> Due to significant geographical variation in definitions, all formal variations of paramedics, including emergency medical services, were

accepted in this review. Given the limited literature associated with paramedicine,<sup>26</sup> there was no limitation on country of publication provided that the context of paramedic, or paramedicine had been met.

### 3.2.3 | Context

This review focused on the rural and remote context. The United Nations<sup>31</sup> has highlighted that there is no single international definition of remoteness, so the review accepted all formal definitions of non-urban, rural, remote and regional in the literature.

### 3.2.4 | Study selection

Following the search, all identified citations were collated and uploaded into Endnote X9 (Clarivate Analytics, PA, USA) and duplicates were removed. All sources were then imported into the Covidence management system, and three independent reviewers (AP, DL, NN) screened titles and abstracts against the inclusion criteria. Disagreements that arose between reviewers were resolved with discussion. The search process was presented in the Preferred Reporting Items of Systematic Reviews and Meta-analyses Extension for scoping review (PRISMA-ScR) flow diagram.<sup>32</sup>

### 3.2.5 | Types of sources and studies

To capture all relevant literature, this scoping review considered both experimental and quasi-experimental study designs including randomised controlled trials, nonrandomised controlled trials, before and after studies and interrupted time-series studies. In addition, analytical observational studies including prospective and retrospective cohort studies, case-control studies and analytical cross-sectional studies will be considered for inclusion. This review also considered descriptive observational study designs including case series, individual case reports and descriptive cross-sectional studies for inclusion. Qualitative studies were also considered that focus on qualitative data including, but not limited to, designs such as phenomenology, grounded theory, ethnography, qualitative description, action research and feminist research. In addition, systematic reviews that meet the inclusion criteria were considered, depending on the research question. Text and opinion papers were also considered for inclusion in this scoping review. Sources were limited to English, and sources concerning domestic or interpersonal violence or that fail to state an age range of participants were excluded.

TABLE 1 Characteristics of selected studies.<sup>35,36</sup>

Authors	Year of publication	Number of participants	Paramedic protocol	Ambulance services involved	Type of study
Shah et al. <sup>35</sup>	2006	401	Screening for falls risk, environmental hazards, pneumococcal vaccine and influenza vaccine	Intervention arm: Genesee Fire Department Ambulance Control arm: Livonia Fire Department Ambulance	Nonrandomised controlled trial
Shah et al. <sup>36</sup>	2010	1231	Screening for medication management, falls and depression	Genesee Valley Health Partnership	Nonrandomised single-arm intervention

### 3.2.6 | Data extraction and analysis of evidence

Data were extracted by two independent reviewers (AP, DL, NN) using the JBI Data Extraction Form,<sup>33</sup> which was modified to reflect the socioecological model used to frame the review (see Appendix S3). The data extracted included specific details regarding participants, concepts, context, study methods, interventions and key findings based on the socioecological model. In line with JBI scoping review methodology, there was no critical appraisal of individual sources and data analysis was restricted to demographic frequencies with results presented in a descriptive tabular format without any synthesis. Table 1 outlines the characteristics of included studies, Table 2 categorises interventions from included studies into domains of the Green and Kreuter socioecological model<sup>25</sup> and Table 3 further categorises these interventions into levels of the model.<sup>25</sup> A narrative summary describing how the results related to the review objective and question was also included.

## 4 | RESULTS

A total of 594 records were identified using the search strategy, with 75 removed as duplicates. Ambulance guidelines were gathered but did not meet inclusion criteria due a lack of rural, remote or regional focus.<sup>9-16</sup> Twenty-eight studies were identified as potentially eligible after initial screening by title and abstract, with 26 studies failing to meet inclusion criteria after full-text review with exclusion details available in Figure 1. Two studies were included in the review.

### 4.1 | Location

Both papers were conducted in the rural county of Livingston County, New York.<sup>35,36</sup> Livingston County had an entire population of 61 834 in April 2020<sup>37</sup> but is classified as a rural county as the population surrounding census places within the county is <2500.<sup>38</sup>

### 4.2 | Population

A total of 1631 participants were screened by paramedics between all included studies. All participants were older adults aged over 65 years, were community dwelling, spoke English, resided in Livingston County in the United States and requested assistance from emergency services.<sup>35,36</sup>

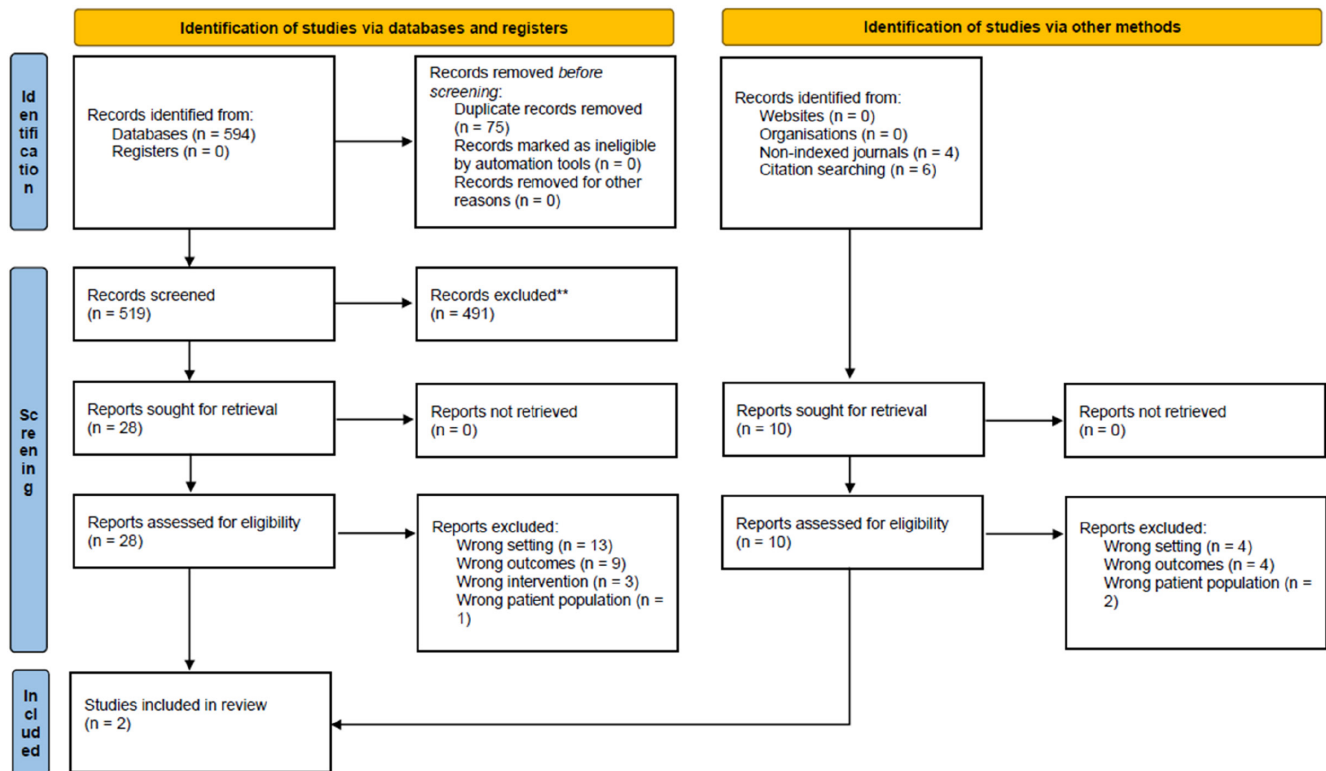


TABLE 2 Domains targeted by selected studies<sup>35,36</sup> differentiated using the socioecological model.<sup>25</sup>

Study	Individual behaviours	Social environment	Physical environment
Shah et al. 2006 <sup>35</sup>	Patient education	N/A	N/A
Shah et al. 2010 <sup>36</sup>	Medication management strategies Patient education	Referrals to appropriate social services	Referral to in-home assessments

TABLE 3 Analysis of which level is targeted by interventions using the socioecological model.<sup>25</sup>

Study	Intrapersonal	Interpersonal	Organisational	Community	Society
Shah et al. 2006 <sup>35</sup>	Patient education	N/A	N/A	N/A	Paramedic education
Shah et al. 2010 <sup>36</sup>	Medication management Patient education	In-home assessment referral	N/A	N/A	Referral to government social services Paramedic education

FIGURE 1 PRISMA flowchart.<sup>34</sup>

### 4.3 | Educative interventions to build capacity

All included studies required paramedics to receive additional training to be able to reliably conduct the population-based screen. This additional training varied from an initial 90-min-long case-based discussion about caring for older adults with monthly training sessions<sup>35</sup> to a 1-day training program centred around geriatric care

with additional specific content relating to the application of the screen.<sup>36</sup>

### 4.4 | Screening outcomes

Within the 2006 study,<sup>35</sup> paramedics in the intervention arm screened patients on fall risk, home environmental hazards, as well as pneumococcal and influenza

vaccination status. No rationale between vaccination status was falls was suggested by the authors. Screening questions were determined by the authors, with no external screening tools or instruments being utilised. Risk of falls was determined by questioning patients on number of falls in the last year, whether in home care was available or not, and paramedic assessment of potential environmental hazards. Vaccination status was determined on a yes/no binary.

Within the 2010 study,<sup>36</sup> the focus was on screening for fall risk, potential medication management issues and signs of depression. Fall risk was determined by asking how many falls the patient had in the last year accompanied by and paramedic assessment of any immediate fall risk in the home. Medication management was aimed at patients who were taking five or more medications and determining what strategy was being used to manage self-administration. The Patient Health Questionnaire-2<sup>36</sup> was used to evaluate depression. Screening questions were reviewed and piloted prior to release, and paramedics were able to complete the full screen within 2 min.

#### 4.5 | Education materials for patients

Paramedics in the 2006 study<sup>35</sup> provided patients with identified risk factors printed education material from the Centers for Disease Control and Prevention about falls and both influenza and pneumococcal vaccinations. This material was provided to patients to encourage beneficial changes in their individual behaviour at the intrapersonal level to minimise future risks.

Paramedics in the 2010 study<sup>36</sup> did not provide patients with any education materials directly, but case managers did provide patient education during follow-up.

#### 4.6 | Application of screen

The application of data gathered through the applied screen varied between studies. The 2006 study<sup>35</sup> relayed this information to the patient's designated primary care physician directly through the researchers for review either via facsimile or email for review. In the 2010 study,<sup>36</sup> these data were conveyed to case managers, who would then complete a holistic in-home assessment of various domains including fall risk using evaluated and validated measures such as the Patient Health Questionnaire-9. These assessments took between 90 min to 120 min to conduct. The case managers would then refer patients to appropriate social and primary care services and provide patient education as required.

#### 4.7 | Recommendations for future studies

It was found that utilising electronically sending screening outcomes to primary care physicians had a greater efficacy compared to using paper fax machines.<sup>35</sup> Few patients remembered receiving printed education materials possibly due to the chaotic nature of emergency ambulance care,<sup>35</sup> which prompts future studies to not so heavily rely on printed materials for patients. Patient recollection of being provided with pneumococcal, influenza and fall education material was 23%, 44% and 21%, respectively.<sup>35</sup> A multidisciplinary approach between paramedics, physicians and case managers was found to be highly beneficial, with overall program satisfaction at 92%, satisfaction with case manager follow-up at 90%, and satisfaction with case manager responsiveness at 96%.<sup>36</sup> Engaging with the targeted community has been suggested for future studies to determine barriers to accepting in-home assessments so that acceptance rates can be improved.<sup>36</sup>

#### 4.8 | Clinical endpoints

All included studies had a focus on screening the identified target population. Paramedics were able to successfully screen pneumococcal vaccination status for 79% of patients, influenza vaccination status for 76%, fall history for 81% and environment hazards for 87%.<sup>35</sup> Patients receiving the screen and education from attending paramedics had a greater engagement with their primary care provider regarding pneumococcal vaccination and fall risk but not influenza vaccination.<sup>35</sup> Depression was screened in 59% of patients, fall risk in 66% and medication management strategies in 77%.<sup>36</sup> A significant portion of screened adults highlighted unmet needs, with 33% screened positive for depression, 68% for risk of falls and 90% for medication management risks.<sup>36</sup> Referrals from the case manager included education programs (16%), social services (25%) and primary care physicians (52%). After contact with a case manager, there was a 73% refusal rate for a further in home assessment. Of those who refused, 47% did so due to a lack of interest, and 41% because they believed the assessment was not required.<sup>36</sup>

#### 4.9 | Limitations

The authors comment that the nature of emergency care can be restrictive on the application of low acuity nonlife-saving interventions.<sup>35,36</sup> Amongst those eligible patients who were not screened, half were not screen due to the

need for immediate interventions based on the patient's condition.<sup>35</sup> Additionally, a lack of statistical significance was experienced possibly due to a combination of incomplete screening, patient remaining at risk due to refusing interventions, possible inaccurate patient recollection of risk status and physicians not providing identified interventions.<sup>35</sup> Additionally, there was no further investigation into the long-term impacts of the interventions to patients and consequently no clear improvements in health outcomes were displayed.<sup>36</sup> Furthermore, all included studies created a study-specific screen that was not validated for use in the out of hospital environment.<sup>35,36</sup>

## 5 | DISCUSSION

Through conducting a universal screen of eligible patients, both studies found a large cohort of older adults who had unmet needs and risk factors that could potentially be addressed.<sup>35,36</sup> Risk factors associated with fall stem from physiological changes as part of the ageing process paired with a static unchanging environment that fails to compensate for these changes.<sup>1</sup> Specific risk factors include a reduction in balance, muscle mass and bone density alongside alcohol use, vision impairment and hazardous environments.<sup>4</sup> The use of paramedics to screen patients for risk factors amongst at-risk populations is the status quo in the majority of Australian, New Zealand and the UK ambulance services<sup>9-16</sup> and has seen to be an effective intervention to identify at-risk patients in the community.

The application of universal screening amongst paramedics has been shown to be beneficial in a rural context,<sup>35,36</sup> where there is less engagement with primary care networks.<sup>6</sup> Within the included studies, despite a lack of baseline capacity amongst paramedics to administer rural specific interventions, the relatively short additional training required for emergency medical services providers highlights the flexibility of paramedicine.<sup>35,36</sup> Rural-specific interventions in the included studies were an additional screen not applied in a metropolitan area.<sup>35,36</sup> More broadly, within this review, rural-specific interventions can be defined as additional interventions conducted to bridge rural and remote specific primary care access barriers. The Australian Health Practitioner Regulation Agency requires registered paramedics to maintain continued professional development,<sup>29</sup> thus allowing further upskilling of rural and remote practicing paramedics to be feasible and contribute towards ongoing registration requirements.

The Ottawa Charter highlights that advocacy, equity, and cooperation are fundamentals in improving health promotion.<sup>39</sup> The first-hand exposure to a patient's living

environment allows paramedics to be uniquely and primely positioned to advocate for their patients and engage in health promotion. Paramedics offer equitable care through standardised ambulances, and national registration requirements regardless of geographical area of practice.<sup>40</sup> Furthermore, both selected studies were conducted to utilise emergency medical services as an opportunity to engage patients with other health services.<sup>35,36</sup> Paramedicine within Australia has all the building blocks readily available to engage in health promotion, and paramedics in the UK are actively doing so under the Making Every Contact Count model of health promotion.<sup>40</sup> The Australian Health Practitioner Regulation Agency highlights in the paramedicine professional capabilities that paramedics must advocate on behalf of the patient.<sup>41</sup> Following the recommendation of Shah et al. in their 2006 paper,<sup>35</sup> paramedic health promotion must extend beyond simply distributing education material, as this means of patient education was found to be ineffective due to chaotic nature of emergency out of hospital care.

The included studies of this review comment on the involvement of prehospital emergency services as part of an integrated health system.<sup>35,36</sup> Currently, rural fall prevention interventions are predominantly conducted by a combination of community health staff, pharmacists and general practitioners with a reliance on nurses to identify at-risk patients.<sup>5</sup> The most common interventions include medication checks by a general practitioner, assessment and referral by community health staff and pharmacist disposal of out-of-date medications.<sup>5</sup> Paramedic referrals for at-risk patients are standard practice within Australian, New Zealand and the UK ambulance services;<sup>9-16</sup> however, there is still a reliance on paper-based forms such as the New South Wales Ambulance Elderly at Risk form.<sup>9</sup> Given the low efficacy of paper-based forms on both patient recollection and primary care provider engagement,<sup>35,36</sup> a more modern electronic system is required to be universally utilised to better integrate paramedicine into the broader health system to facilitate efficient referrals and early activation of support networks.

The referral model promoted utilised within paramedicine is best designed for settings where there is timely access to other health services. The screening of patients to identify risk factors allows paramedics to be primely positioned to provide data regarding social and environmental risks to other health services. Paramedic-initiated fall referral programs have shown success in generally reducing the risk of future falls and unnecessary conveyance to hospital in a recent systematic review.<sup>42</sup> However, the high refusal rate amongst participants in Shah et al. 2010<sup>36</sup> for an in-home assessment suggests that some patients may not have further contact with the health system after nonconveyance to hospital following paramedic care.



Poor adherence to ongoing fall management programs is a consistent issue, with a 2017 Australian multidisciplinary paramedic-initiated fall referral program stating that only 46% of participants in the intervention group adhered to the entire program.<sup>43</sup> From these studies, adherence barriers stemmed from a lack of interest from patients, or the patients believing that either the program was unnecessary or that they were too frail to complete it.<sup>36,43</sup> Further research is required in this area to determine how to overcome these barriers to improve retention and uptake amongst eligible patients.

Current ambulance guidelines from Australia, New Zealand and the UK are still applicable to the rural and remote setting, as patients will ultimately still require treatment, transport, and referrals. However, the unique challenges of the rural and remote settings as outlined by the Australian Institute of Health and Welfare<sup>6</sup> will need to see paramedics to move into the primary care space to provide downstream preventative care to bridge the gap between patients and primary care networks. Successful models of community paramedic practice establish clear clinical boundaries, have access to physical infrastructure and clinical support and support service integration by allowing direct referrals to other health services.<sup>44</sup> The expansion of specialist paramedics and their scope of practice in rural and remote settings is dependent on the capacity of individual employers alongside community needs and preferences.<sup>44</sup> With rural Australians experiencing greater difficulties in accessing health and hospital services when compared to their major city counterparts, the landscape of paramedic practice is changing to utilise paramedics within the primary care space.<sup>20</sup>

A further consideration for the capability of paramedicine must consider the increased burdens on hospitals. Currently, none of the Australian ambulance services are meeting their targets to transfer patients from ambulance care to an emergency department within a timely manner.<sup>45</sup> Furthermore, all Australian ambulance services have had an increase in their transfer time, or off-stretcher period, from 2015–16 to 2020–21.<sup>45</sup> Ambulances remaining at hospital with extended off-stretcher time impairs response times, reduces available ambulances and puts communities at risk.<sup>45</sup> Specialist paramedics have already demonstrated a reduction in overall patient contact time due to high nonconveyance rates,<sup>22</sup> and as such there is significant potential to increase the scope of practice of standard care paramedics to offer greater levels of care. Nonconveyance has been found to also potentially be a positive experience for a patient through the restoration of self-efficacy following a loss of independence to manage their individual circumstances.<sup>46</sup> Empowering standard care paramedics to increase the nonconveyance rate will have benefits on addressing worsening hospital ramping

within Australia alongside increased response times for the communities that they serve.

The nature of prehospital care is chaotic, and restrictive on the application of nonurgent interventions.<sup>35,36</sup> However, it is well-established that not all patients who call an ambulance following a fall are transported.<sup>17</sup> Amongst this patient group who are not conveyed from their residence, there is significantly more time available to paramedics to conduct nonurgent interventions such as screening, and to complete assessments on the patient's living conditions.

Paramedic management of falls in the community should extend beyond the status quo of treat, transfer and refer.<sup>47</sup> Falls are a complex problem requiring a holistic approach to address a multitude of combined intrinsic, extrinsic and environmental factors.<sup>48</sup> Modifications to the physical environment can be simple once hazards have been identified, such as decluttering walking paths, and can be completed by older adults themselves.<sup>49</sup> It is important for paramedics to continue to act as navigators and advocates for their patients, and to make appropriate referrals to assist patients on their journey within the health system. However, further research is required in this area to determine what is feasible for paramedics to do in the home prior to departure in the event of a nonconveyance to address social and environmental risk factors. There is a cohort of patients who will have no further engagement with the health system following a nonconveyance by paramedics until there is another request for emergency services. The literature has highlighted these patients are at risk of future falls and consequentially injuries,<sup>18,19,43</sup> which presents as possibly unnecessary health expenditure and potentially preventable injury or death.

This scoping review has some limitations. From all searched available international literature, only two records were found to meet inclusion criteria. This echoes previous reports that there is limited literature on the relatively new health discipline of paramedicine<sup>26</sup> and rural and remote falls.<sup>5</sup> The results from the scoping review are up to date as of 25 September 2022.

## 6 | CONCLUSION

This scoping review has found that the current paramedicine scope of practice in managing falls amongst older adults in rural communities is identical to the current major city scope of utilising referral programs and screening at-risk patients.

The duty of care must be upheld through the promotion of major city–rural equity regarding resource allocation and responsivity. Referrals, especially paper-based forms, are insufficient in managing the needs of older adults in

a rural environment due to a lack of available health resources and high patient refusal of further management. Patient recollection of printed education material has been shown to be poor in the out-of-hospital emergency environment. Therefore, future research must address what capacity and value proposition paramedicine has at the point of care in relation to fall cases or risk there-of.

## AUTHOR CONTRIBUTIONS

**Aidan Peters:** Conceptualization; investigation; writing – original draft; methodology; writing – review and editing; resources. **David Lim:** Methodology; writing – review and editing; supervision. **Navindhra Naidoo:** Methodology; writing – review and editing; supervision.

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## CONFLICT OF INTEREST STATEMENT

The authors have no conflicts of interest to declare.

## ETHICS STATEMENT

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## SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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