

REVIEW ARTICLE

Interprofessional learning and rural paramedic care

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A B S T R A C T

Introduction: The traditional view of paramedic practice is one of provision of emergency care and transport within community or industrial settings. With greater integration of emergency services with the overall health system, this role is changing. Paramedics, especially in rural areas, are now working more closely with other professions in new and extended roles that incorporate non-emergency community-based care, preventative medicine and social care. Workforce shortages, health service budget cuts, population size and the changing demographic profile of many rural and remote communities highlight the need for effective interaction between the health professions to respond to the health needs of these communities. The rural environment therefore provides an opportune setting in which to explore the evolving role of paramedics and their interaction with other healthcare professionals in ways that can improve health outcomes for patients and the community. This article presents a critical review of the literature in this area and identifies gaps in which further research is required to further interprofessional learning (IPL) for paramedics.

Methods: Search databases included MEDLINE, SCOPUS, CINAHL and the University of Tasmania (UTAS) electronic library. Specific journal searches included the *Journal of Emergency Pre-Hospital Care* (JEPHC) and the *Journal of Interprofessional Care*. Search terms for this literature review consisted of a combination of prefixes 'inter' and 'multi' with adjectives 'professional', 'disciplinary' and 'shared' and the nouns 'education', 'learning' and 'training'. These search terms were then used in combination with each of the terms 'rural' and 'remote' then with 'paramedic/s' and 'pre-hospital' in order to source reports of interprofessional activities in these areas. Each of these was also combined with the search term 'collaboration'. On completion of the initial search process, the reference lists of relevant articles were examined for reports of professional interactions and rural paramedic care.

Results: Three major concepts emerged from 24 articles: interprofessional education (IPE), multidisciplinary teamwork, and interprofessional learning. Six articles focused on IPE; nine concerned multidisciplinary teamwork and nine IPL. Examination of the reference lists of these articles revealed a further eight articles with the theme of IPL incorporating paramedics. Predominantly, IPL was associated with new roles for rural paramedics where collaborative practice incorporated community-based care rather than being focused on emergency treatment and transport to hospital. Only two articles reported on a measurable patient care outcome



related to IPL. The majority of articles described programs or interventions without having directly examined the interactions and relationships between professions.

Conclusions: Rural paramedics are involved with other healthcare professionals, often in new or expanded roles. Published journal articles that report on this interaction are largely descriptive in nature and few describe the dynamics of this interaction or the conditions under which interprofessional activity could yield potential benefit to health service delivery or patient outcomes. As an overarching construct, IPL may be used to frame further investigation of this interaction and may help shape the emerging role of paramedics in rural settings where population size and other factors limit the availability of health professionals.

Key words: collaboration, interprofessional education, interprofessional learning, multidisciplinary, paramedic, rural health.

Introduction

Paramedics are considered experts in pre-hospital emergency care. Paramedic practice has traditionally been concerned with the provision of pre-hospital and out-of-hospital emergency medical services in a community or industrial setting, with the aim of stabilising the patient and transporting them to a hospital or health provider for further treatment¹. The paramedic profession, especially in rural areas, has witnessed an extension beyond this emergency care focus.

Paramedics are working more closely with other professions in an extension of care and expanded scope of practice that incorporates primary health care. This collaborative care in rural areas may range from paramedics working and being educated with other professions in the hospital environment, to involvement in healthcare planning in the pre-hospital environment². The resultant synergy of education and practice among various professions is synonymous with the basic premise of interprofessional learning (IPL) where processes are ultimately directed toward improved patient care outcomes.

Interprofessional learning could be considered an overarching concept incorporating both interprofessional education (IPE) and interprofessional practice (IPP). Interprofessional education occurs when two or more professions learn with, from and about each other, and IPP occurs when two or

more professions are committed to working and interacting together. This interaction is more comprehensive than different professions simply working side by side; it involves working together to achieve a common purpose of healthcare delivery, with mutual respect and improved health outcomes³⁻⁵. Stone⁴ offers a comprehensive definition of IPL:

It [IPL] is a philosophical stance, embracing lifelong learning, adult learning principles and an ongoing active learning process, between different cultures and health care disciplines. IPL philosophy supports health professionals working collaboratively in a health care setting, through a purposeful interaction with service users and carers, to produce quality patient centred care. It acknowledges both formal and informal methods of learning which progress to develop service delivery⁴.

The rural setting offers an ideal environment in which to explore IPL and the relationships between healthcare professionals in the delivery of care. Rural interprofessional teams include a diverse range of professionals such as doctors, nurses, counsellors, physical therapists, dental hygienists and community health workers⁶. The types of care offered by interprofessional teams in rural areas have ranged from primary health care preventative services such as general health assessments, childhood obesity programs, information on organ donation, pap smears, road safety campaigns and palliative care^{7,8}. In rural Australia, there have been positive reports of community interaction and primary health care



service provision using interprofessional teams that include paramedics^{2,9}.

The traditional approach to paramedic practice has centred on pre-hospital and out-of-hospital emergency medical services, generally practised in isolation to other health professionals. However, a number of proposals have been made to extend the role of paramedics to involve greater consultation with other healthcare providers in the ongoing care for patients in their own homes. As early as 2000, the United States National Highway Traffic Safety Administrator envisaged the future role of paramedics as one that would be more integrated with the overall health system by undertaking a community-based management role¹⁰. The potential for rural paramedics in this integrated role appeared in a 2004 agenda for the future of rural paramedics in the USA¹¹, and also a 2005 strategic directions article on the future of paramedic services in Canada¹². The focus has been on integration with the health system and provision of a mobile primary healthcare service offering activities such as self-care, injury prevention programs and social services¹². Most recently in Australia, a nationwide project has offered federal funding for the establishment of extended paramedic care models that will see paramedics working within primary health care and providing services complementary to those offered by general practitioners¹³. Some of this funding has been directed to rural areas where paramedics will be involved in patient care services such as ongoing wound care, initiation of antibiotic therapy, urinary catheterisation, and in areas such as pathology, chronic and palliative care. These proposals emphasise the critical importance of interprofessional activity.

Given the interprofessional nature of rural practice and proposals for expanded paramedic care, the rural environment offers an ideal opportunity by which to explore paramedic interaction with other professions. This article reviews literature that reports on rural paramedics' engagement with IPL and identifies gaps where future research is required.

Methods

A search was conducted across May 2013 of literature related to IPL in rural areas that incorporated paramedic care. This search used a technique based on research by Dimoliatis and Roff¹⁴, who identified search terms for the MEDLINE database most likely to retrieve articles relevant to inter/multi-professional education. In developing search algorithms, they argued searching the title/abstract as an effective approach in the search for interprofessional literature. Further to this, using a combination of prefixes 'inter' and 'multi' with adjectives 'professional', 'disciplinary' and 'shared' and the nouns 'education', 'learning' and 'training' retrieves almost all possibly relevant articles. This present study incorporated these search terms in combination with each of the terms 'rural' and 'remote' and also 'paramedic/s' and 'pre-hospital'. Each of these was also combined with the search term 'collaboration'.

The search extended beyond the MEDLINE database and incorporated the same search terms across SCOPUS, CINAHL and the University of Tasmania (UTAS) electronic library search. Specific journal searches conducted in the same manner include the *Journal of Emergency Pre-Hospital Care* (JEPHC) and the *Journal of Interprofessional Care*. The SCOPUS search only allowed examination of abstract rather than title and abstract. The UTAS search and CINAHL searches were conducted across all fields. On completion of the initial search process, relevant articles were examined for references also appropriate to IPL and rural paramedic care.

Journal articles, conference proceedings, reports and proceedings were all considered. All levels of evidence were also included. Journal articles were in English and no restrictions were placed on year of publication. To maintain relevance to interprofessional activity across paramedic care, certain literature was excluded. This included literature that was not healthcare related, did not refer to paramedic care, involved only a single profession, and did not have a clear statement of interprofessional intervention.



The content of each article was examined for relevance to definitions of IPE, IPP and IPL and grouped accordingly. Articles concerned with both IPE and IPP were considered to be examples of IPL. Articles that did not fit the concept 'interprofessional' were regarded as examples of multi-disciplinary teamwork – where health professionals work closely alongside each other but not necessarily in an interactive, collaborative or communicative way¹⁵.

Results

The initial search methods used for this review yielded 24 articles with interprofessional themes that included paramedic care in rural and remote areas. Articles were published between 1997 and 2012. A review of all reference lists produced a further eight articles. None of the articles sourced represented level 1 (systematic review) or level 2 (randomised control trial) evidence¹⁶. The concepts of interest that emerged from a full content review of each of these articles were IPE, multidisciplinary teamwork and IPL.

Interprofessional education

Interprofessional education incorporating paramedics is one of the concepts highlighted in this literature search. The relevant articles are listed in Table 1. Early reports of IPE, involving paramedics in rural areas focused on the 'high end' disaster medicine aspect of pre-hospital care. Castle and Owen¹⁷ reported on paramedics undergoing trench rescue training in South Africa, and how hospital emergency staff gained patient care experience and awareness of 'in field' practice from participation in such training programs. Similar benefits have appeared in training among various pre-hospital and emergency department professionals in the USA, with courses designed around terrorism, hazardous materials, military and disaster response¹⁸.

More conventional paramedic response when incorporated with an IPE environment was focused on the traditional accident and emergency role of paramedics. Hays¹⁹ discussed the advantages of different educational activities that various

professions may be involved in, but incorporation of paramedics was limited to accident scene scenarios, or first aid knowledge, rather than participation in chronic disease cases or home-based assessments. Stafford et al²⁰ mentioned attendance of pre-hospital providers at an IPE initiative that incorporated development of rural trauma teams. Although the study was primarily concerned with attendance of surgeons, it was reported that pre-hospital (paramedic) provider attendance numbers at these courses was second only to nursing staff.

Paramedic participation in IPE has not been limited to emergency or first aid care. Bennett et al²¹, when reporting on the perceptions of university academic staff toward IPE initiatives, recognised the contribution of university paramedic schools and included informants from these schools to advise on faculty perceptions of IPE. Mearns et al²² noted the attendance of paramedics, nurses, doctors and other health professionals at three-day paediatric training courses in rural and urban Scotland. Although some of the course content included general first aid or paediatric life support, other content included communication, understanding the rights of paediatric patients and child protection issues.

Multidisciplinary teamwork

The concept of 'multidisciplinary' is considered to have a different meaning to 'interprofessional': health professionals may work alongside each other collaboratively, but not necessarily with a shared purpose that includes reciprocal learning.

Several articles described multidisciplinary teamwork (Table 2). In some cases, paramedics worked on ambulances alongside other professions such as nursing or medicine in the provision of pre-hospital care²³. Traditionally, however, paramedics responded to patients without initial assistance and incorporated other professions as care progressed. Importantly, this involved not only medical personnel but also professionals such as police and fire services²⁴. Pre-hospital care also included a multidisciplinary approach even when other disciplines were not present at an incident. Here, paramedics notified a trauma centre of patient condition and sought advice from other medical personnel at the trauma centre about care of a patient²⁵⁻²⁷.



Table 1: Interprofessional education

Authors	Country	Nature of article	Disciplines involved	Main findings and conclusions
Bennett et al. (2011) [ref. 21]	Australia	Presentation of perceptions of academic staff towards IPE from one Australian multi-campus health facility. Interviews with key informants and workshops with representation from various schools.	Medicine, nursing, dietetics, speech pathology, midwifery, medical education, disability studies, health management, paramedic, public health, psychology and psychiatry.	IPE approach supported unanimously. Some barriers to IPE include faculty barriers, industry challenges, future opportunities. Biggest barrier was need for overt leadership.
Castle and Owen (2003) [ref. 17]	South Africa	Report on pre-hospital rescue program.	Emergency nurses, paramedics.	Hospital emergency staff can learn from the experience of trench rescue.
Hays (2007) [ref. 19]	UK	Discussion article on community-based collaboration with health teams.	Medicine, nursing, dietetics, paramedic, pharmacy, speech and language therapy, physiotherapy, occupational therapy, psychology, social work, law.	IPE activities should be embedded into curriculum in each professional course. Students need to be exposed to good clinical practice.
Mearns et al. (2012) [ref. 22]	Scotland	Outlines a 3-day training program for those who work with acutely ill and injured children in Scotland.	Medicine, nursing, paramedic, allied health.	Benefits to holding courses in both rural and urban areas. Emphasis on clinical skills and scenarios.
Miller et al. (2006) [ref. 18]	USA	Assessment of an interdisciplinary curriculum for terrorism, hazardous materials, military and disaster response course by pre- and post-test self-reporting and examination.	Paramedic, emergency medical technician, nursing, medicine, first response, emergency dispatch, physician assistant, emergency room technician.	Project demonstrated successful training program with attention to personnel; time; facilities; political and financial support; and community, regional and state support.
Stafford et al. (2010) [ref. 20]	USA	Pre- and post-test self-assessments for continuous professional development course for trauma care providers.	Nursing, paramedic (emergency medical technician), medicine.	Interdisciplinary course appreciated by those who attended. With majority feeling they would change their practice as a result. Poor attendance by medical practitioners. Different strategies needed to attract a wider audience.

IPE, interprofessional education

Several authors acknowledged the importance of the paramedic on the multidisciplinary team. Harris et al²⁸ reported on midwives and obstetric care in rural Scotland. They recognised the expertise of paramedics in pre-hospital care when associated with the management of obstetric emergencies by midwives in rural areas. Danne²⁹ suggested multidisciplinary trauma courses and the need for more widespread upgrading of paramedic skills in rural areas to deal effectively with trauma patients. Two articles illustrated

multidisciplinary teamwork that did not involve direct patient care. Gaffney and Johnson³⁰ and Sanddal et al³¹ recognised the expertise of pre-hospital providers in trauma care, with their inclusion of paramedics on multidisciplinary panels of review to determine appropriate trauma management.

One article, in adopting a theoretical perspective of paramedic work, offered a link from multidisciplinary teamwork to IPE. Campeau³², in adopting a grounded theory



approach to examine paramedic scene management, suggested that in addition to more technical or procedural medical components, paramedic curriculum should involve training in how to negotiate working with allied and non-allied personnel at the scene of patient care. The article by Campeau³² offers insight into the synergy that can exist between multidisciplinary teamwork and interprofessional education. Although the study was around scene management that incorporated varied personnel in practice, the author suggested such training would also benefit other healthcare personnel in their understanding of the patient/paramedic environment.

Interprofessional learning

Some of the literature described the concepts of IPE or of multidisciplinary teamwork and also addressed the processes involved with professional interaction, a key component of IPL (Table 3).

Some articles contained cursory acknowledgement of the role of paramedics, and others offered more comprehensive descriptions of interprofessional activities. Humphreys and Gregory³³, in their review of major health policy in Australia, referred to the possibility of an expanded scope of practice for paramedics to work more closely with other health professionals in rural areas. More specific to IPL, in Australia paramedics have been able to undertake a Graduate Certificate in Remote Paramedic Practice through the Mount Isa Centre for Rural and Remote Health of James Cook University in Queensland. This course involved paramedics learning from medical practitioners and other health professionals to become part of a rural primary healthcare team. Following a review of the program, Reeve et al³⁴ reported increased participation in patient education and health promotion, increased partnership with other community healthcare providers, engagement in service provision and changes to patient care such as greater interaction, with more time spent in the patient's home environment.

Paramedic work has been shown to involve more than traditional emergency care, and has included a move into primary health care with community involvement, organisational support, professional support, and education and training. Paramedics in rural areas have participated in education sessions with other health professionals, worked informally in assistance roles in emergency departments, and have consulted with other health practitioners in patient care planning^{2,9,35,36}. These enhanced roles for paramedics have been further described by Ruston and Tavabie³⁷, who reported on a program in the UK where paramedics were specifically trained to work in community-based health care. These paramedic 'practitioners' undertook placements in general medical practices, both learning from and working with GPs and other health professionals. In an earlier review of these new roles for paramedics in the UK, Cooper and Grant³⁸ found a 25% reduction in conveyance to hospital, in addition to interprofessional working, the ability for immediate treatment and referral, and high degrees of patient satisfaction.

Two articles are particularly useful in describing the potential of IPL for rural paramedics. A comprehensive three-year evaluation of a primary healthcare project on Long and Brier Islands in Nova Scotia involved paramedics, nurses and physicians³⁹. The study reported not only positive collaboration between health team members, but also increased access to healthcare services and the cost-effectiveness of this model of patient care in rural communities with low emergency call volumes. Shah et al⁴⁰ reported similar success with a program in rural New York state. Here, paramedics were trained in geriatric care in order to provide collaborative home-based assessment and care for elderly adults who accessed emergency medical services. Health screening by paramedics resulted in home visits from a nurse or social worker with further evaluation in the fields of vaccinations, advanced directives, formal and informal support services, nutrition, activities of daily living, depression, alcohol and drug abuse, falls, cognition, medication and home safety. This interprofessional activity also identified an otherwise unknown number of individuals with unmet needs.



Table 2: Multidisciplinary teamwork

Authors	Country	Nature of article	Disciplines involved	Main findings and conclusions
Danne (2003) [ref. 29]	Australia	Discussion article on issues of trauma care in rural Australia.	Medicine, nursing, paramedics.	Multidisciplinary trauma courses will have benefits for trauma teams. Widespread upgrading of rural paramedic skills needed.
Campeau (2009) [ref. 32]	USA	Qualitative inquiry into paramedics' scene management.	Paramedics, physicians, any others at pre-hospital scene (not specified).	In addition to medical training paramedic curriculum should involve training to negotiate tasks amongst allied and non-allied health personnel.
Gaffney and Johnson (1999) [ref. 30]	UK	Discussion article on paediatric trauma care in the UK.	Medicine, nursing, paramedics.	Paediatric pre-hospital care needs to be integrated with existing services of other groups. Multidisciplinary panel required in the early stages.
Garrett (2005) [ref. 24]	USA	Description of rural ambulance system.	Paramedic, police, fire.	Various pre-hospital personnel work with paramedics in delivery of patient care.
Gunnarson et al. (2012) [ref. 23]	Iceland, Scotland, Sweden	Discussion on ambulance services in rural Iceland, Sweden and Scotland.	Paramedic, nursing, medicine.	Recruitment of qualified ambulance personnel in Sweden is often difficult in rural areas and ambulances may be staffed with highly trained nurses or doctors. The more time it takes to transport patients, the more crucial the skill level of the ambulance crew.
Gunnels et al. (1997) [ref. 25]	USA	Case study description of rural trauma centre.	Paramedic, nursing, medicine.	Pre-hospital providers can provide crucial information for the critical care of trauma centre patients.
Harris et al. (2011) [ref. 28]	Scotland	Qualitative interviews to explore and understand what it means to provide midwifery care in rural and remote areas.	Midwifery, paramedic, medicine.	Multiprofessional continuing professional development courses have been effective in bringing together teams around obstetric emergencies.
Samddal et al. (2011) [ref. 31]	USA	Retrospective case study to determine the rate of preventable mortality and opportunities for improvement in management of traumatic death in Utah. Conducted by retrospective case reviews.	Multidisciplinary panel: trauma surgeons, emergency physician, nursing, department managers, trauma coordinators, flight nurse, pre-hospital providers.	Resource organisation and education of emergency department primary care providers in basic principles of stabilisation and initial treatment may be most cost-effective method of reducing preventable deaths.
Söderholm et al. (2008) and Sonnenwald et al. (2008) [refs 26, 27]	USA	Post-test study to determine paramedic skills in response to 3D telepresence technology.	Paramedic, medicine.	Paramedic response to 3D instruction by physician is more effective than 2D instruction, or no instruction. Use of 3D technology could lead to more effective physician, paramedic collaboration.



Table 3: Interprofessional learning

Authors	Country	Nature of article	Disciplines involved	Main findings and conclusions
Barishansky (2007) [ref. 36]	Canada, USA	Discussion on rural emergency medical service in Canada, USA.	Paramedic, other healthcare workers (not specified).	Expanded role initiatives combined emergency response with public health care.
Cooper, Grant (2009) [ref. 38]	UK	Literature review of new and emerging roles for out of hospital emergency care.	Paramedic, nursing, medicine, other health care.	New paramedic roles are having an impact on patient care. Includes 25% reduction in conveyance to hospital, interprofessional working, immediate treatment and referral, high level of patient satisfaction.
Humphreys and Gregory (2012) [ref. 33]	Australia	Review of major health policy in Australia 2002–2012.	All health disciplines.	Despite some initiatives to support nurses and allied health there is still some way to go to achieve equivalence with medicine and others in rural areas. Medical dominance, interprofessional rivalry, specialty dominance are still barriers to interprofessionality.
Martin-Misener et al. (2009) [ref. 39]	Canada	Evaluates a primary health care initiative in Nova Scotia using structured questionnaires and group interviews with patients and health providers.	Paramedic, nursing, medicine.	Model of care incorporating healthcare collaboration resulted in decreased cost, increased access, high levels of acceptance and satisfaction.
Mulholland et al. (2009) [ref. 2]	Australia	Describes the expanded roles for rural paramedics on the east coast of Tasmania, and what factors facilitate these roles. Used semi-structured interviews, observation, document review.	Paramedic, medicine, nursing.	Emergency response is only part of paramedic practice. Other elements include community involvement, organisational support, professional support, education and training.
Reeve et al. (2008) [ref. 34]	Australia	Participant evaluation of the population health component of the Graduate Certificate in Remote Paramedic Practice. Pre- and post-course surveys.	Paramedic, medicine, community health.	Positive evaluation of a course that enabled participants to use a common framework to enhance primary health care.
Ruston and Tavabie (2011) [ref. 37]	UK	Reports on the placement of paramedic practitioner students in GP training practices. Uses case study method with semi-structured interviews and surveys.	Paramedic, medicine.	Placement provides a sound model for expanding the skills of paramedic practitioners to meet demands of community-based health care.
Shah et al. (2010) [ref. 40]	USA	Describes program in rural New York using paramedics in community based elderly person assistance program.	Paramedic, nursing, social work.	Program provided a new service. Identified a significant number of individuals with unmet needs.
Stirling et al. (2007) [ref. 9]	Australia	Thematic analysis of paramedic care across four rural case sites in Australia.	Paramedic, nursing, medicine, other health care.	Paramedics in rural areas can offer improved health care by active community and health service engagement.

Hauswald et al⁴¹ described an ‘advanced care’ project with paramedics working cooperatively with nursing and medical staff to provide primary healthcare services in rural USA. In a

continuation of the paramedic practitioners initiative reported by Ruston and Tavabie³⁷ similar schemes have been in operation in the UK since the early 2000s. Emergency care



practitioners (ECPs) are described as paramedics trained to work from general practitioner surgeries, support primary healthcare teams, attend unscheduled home visits and arrange hospital admissions, with time divided between local minor injury units and ambulance stations. Other paramedic practitioners have undertaken training in wound care and suturing, joint examination, social needs assessment, antibiotic administration and radiological referral to provide care in referral with other health professionals^{38,42-46}. Emergency care practitioners and paramedic practitioners have appeared in both rural and urban areas of the UK. Evidence from Australia has shown that rural paramedics in particular have been involved in IPE and practice that has evolved through informal networks. In a major study of case sites across four Australian states, O'Meara et al⁴⁷ highlighted the involvement of rural paramedics with other health professionals in the treatment of minor injuries and the provision of primary health care.

Discussion

This literature review is an investigation of IPL specifically incorporating paramedic practice and care in rural communities. The choice of a rural setting was made because of the unique perspective the rural environment has on IPL, with teams of various health professionals collaborating to improve patient care outcomes. The literature was grouped into three categories: IPE, multidisciplinary teamwork and IPL. Each incorporated professional interaction but in different ways. Interprofessional education involved professions learning with, from and about each other. Multiprofessional teamwork represented collaboration between health professionals in practice. Interprofessional learning included the interactive processes that occurred as well as education and collaborative practice components. Arguably, all were orientated to the end goal of providing quality, patient-centred care.

Paramedics have been involved in education programs with other healthcare professions. In some instances, this education process has been about specific aspects of pre-

hospital intervention, such as the disaster response program¹⁸ trauma team development²⁰ or paediatric care²². The aim of such education has been to inform practice with, for example, more efficient trauma teams, or a greater understanding of paediatric care.

Traditional paramedic practice has not necessarily been interprofessional in nature. It has generally been more multidisciplinary, where professionals collaborate to achieve patient care whilst protective of their own professional identity and activity spaces. Non-medical personnel such as police and fire crews have assisted at accident scenes²⁴, paramedics have been part of obstetric emergency teams²⁸, trauma teams²⁹ or even clinical review panels³⁰, but their membership has often been determined by their specific disciplinary expertise. Campeau's³² work on the theory of paramedic scene management acknowledged the collaboration of allied and non-allied personnel in provision of paramedic care; however, rather than multidisciplinary working, the paramedic scene of care had become one in which individual professions were involved in complex collaborative processes.

It is this awareness of the processes of collaborative practice, and the interprofessional nature of education, that suggests that paramedics in rural areas may be involved in a process of interactive, IPL. Frequently, the literature indicated a move in rural paramedic practice toward roles incorporating interprofessional interaction not previously seen with traditional emergency care. Reeve et al³⁴, and Ruston and Tavabie³⁷ both mentioned paramedics training and working with medical and other healthcare practitioners in pursuit of a primary healthcare model of practice. Mulholland et al² suggested that informal primary healthcare practices existed alongside an emergency care model in rural areas. This extended scope of practice for paramedics continued as a prominent theme in the literature around IPL incorporating paramedic care. Articles referred to processes where training and practice are undertaken with other health professionals to provide clinical care beyond that of emergency care, incorporating interventions such as wound care, antibiotic administration, radiological referral, and even social needs



assessment^{38,42-46}. The Long and Brier Islands project³⁹ and the New York initiative⁴⁰ saw paramedics and other health professionals learning about, from and with each other, with commitment to working together and achieving common healthcare delivery. These are all principles of interprofessional education, practice and learning^{4,48}.

Despite some evidence of IPL incorporating paramedic care, the ways in which different rural groups involved in paramedic care interact and construct meaning about an interprofessional approach to patient care are largely underexplored. The sourced literature to date is largely descriptive of certain procedures and programs; there is sparse knowledge around interactions of various professions involved; little is known of the influence of this activity on aspects such as professional identity or culture. Leadership is an area recognised as important in new paramedic interventions^{41,44,45}; however, the effect(s) of group interaction and implications for leadership within paramedic care and IPL is underexplored. Importantly, the aim of IPL is for quality patient-centred care, yet few articles reported on the impact of IPL on patient outcomes.

Interprofessional learning involves complex processes between people from different disciplines. Further investigation of paramedics' involvement with other professionals may add to the understanding of IPL. Rural and remote areas, where there are often strong imperatives for healthcare providers to work together to achieve the best possible patient outcomes, can be an ideal setting for such investigations.

Limitations

The scope of this review was limited to discussion on IPL and rural paramedic care, and the terms used, specific search engines and journals limited the literature selected. Although journal articles, conference proceedings, reports and proceedings that were able to be located were all considered, other relevant literature may exist among 'grey literature'. A search of all fields rather than title/abstract alone may capture greater data. For paramedic literature, a search on

'expanded scope' or 'extended care/practice' may reveal further articles where interprofessional learning or activity is taking place but not referred to as such.

Conclusions

Rural paramedics are involved with other healthcare professionals, often in new or expanded roles. Within these roles, paramedics collaborate in IPE, learning with, from and about other healthcare professionals, and are involved in multidisciplinary practice. Published journal articles that report on this interaction are largely descriptive in nature and few describe the dynamics of this interaction or the conditions under which interprofessional activity could yield potential benefit to health service delivery or patient outcomes. Interprofessional learning brings together education and practice in a process whereby individual professions interact together with a common aim of enhanced patient care. Interprofessional learning embraces adult learning principles and ongoing active learning processes in a philosophical stance supporting collaborative, purposeful, informal and formal interaction in the healthcare setting. As an overarching construct, IPL may be used to frame further investigation of this interaction and may help shape the emerging role of paramedics in rural settings where population size and other factors limit the availability of health professionals.

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