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# The paramedic-general practitioner relationship: a scoping review

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# ABSTRACT

Background. Health services internationally are implementing programs that increase working ties between paramedics and general practitioners (GPs) to reduce unnecessary transport to emergency departments (EDs) and improve access to primary health care. As paramedic involvement in primary health care develops, there is increasing focus on the GP-paramedic collaborative relationship. Resulting issues regarding professional boundaries may occur, as paramedics practice in fields that were previously solely in the GP scope. An effective paramedic-GP working relationship will be an essential foundation to the success of future strategies. Methods. A search of three electronic databases was completed (Ovid MEDLINE, Embase Classic + Embase and CINAHL Plus). Eligibility for inclusion required analysis of the relationship between paramedics and GPs. All processes were completed by two independent reviewers. Results. After removal of duplicates, 4995 titles were screened by title and/or abstract. After full-text review, 15 studies were included. Five themes were identified that contribute significantly to the strengths and weaknesses of the relationship – the importance of communication, understanding scope of practice, leadership roles, responsibility for patient care and interdisciplinary training. Issues identified included significant variation in the structure of different emergency medical services and varying standards of education requirements for paramedics worldwide. Conclusions. There were no published Australian studies that had the primary aim of examining the paramedic–GP relationship. The depth of research on this topic is lacking, despite increased interest over the past decade. The relevance of the international literature to the Australian setting is questionable.

**Keywords:** ambulance, collaboration, community, connected care, general practitioner, paramedics, primary health care, relationship.

# Introduction

International demand for acute and non-acute health services continues to increase (Willson *et al.* 2022), with current models of health care provision considered unsustainable (Montgomery *et al.* 2017). Emergency departments (EDs) and jurisdictional ambulance services are frequently under-resourced and overstretched (He *et al.* 2011; Montgomery *et al.* 2017; Willson *et al.* 2022) – issues that are echoed in primary health care (PHC) (Mahtani *et al.* 2018; Eaton *et al.* 2020; Schofield *et al.* 2020). Up to 40% of lower-acuity ED presentations may be avoidable, providing the patient has suitable and timely access to PHC (Ismail *et al.* 2013; Willson *et al.* 2022). A high proportion of ambulance workload is made up of non-life-threatening concerns, potentially appropriate for management by PHC teams (Eastwood *et al.* 2016; 2020; Eaton *et al.* 2020).

The role of the Australian paramedic has evolved significantly over the past decade (Eastwood *et al.* 2016; Eaton *et al.* 2020). This expansion includes an increase in the scope of practice, introduction of professional registration and well-established tertiary education requirements (O'Meara *et al.* 2012; Eaton *et al.* 2020; Reaburn 2020). The paramedic caseload is increasingly comprised of low-acuity/PHC-suitable presentations, leading to changes in expectations of how paramedics assess and manage these patients (Eastwood *et al.* 2020; Eaton *et al.* 2020; Wagstaff and Mistry 2020). There is an

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increasing requirement for the paramedic role to encompass the confidence and competence to be selective with patient selection for transportation to EDs (Paulin *et al.* 2021), driven by EDs in Australia and abroad struggling with department congestion, long wait times and ambulance ramping (He *et al.* 2011; Finn *et al.* 2013; Willson *et al.* 2022). These challenges have driven a need for paramedics to, when appropriate, avoid patient transportation to EDs, utilising alternative patient care pathways, with the conveyance of all ambulance cases to an ED now considered an outdated and unsustainable practice (Blodgett *et al.* 2021; Paulin *et al.* 2021).

PHC services are also facing challenges in achieving adequate care for those in the community (O'Meara et al. 2012; Currie et al. 2020; Eaton et al. 2021a). There is a link between potentially avoidable hospitalisations and accessibility and effectiveness of PHC (Katteryl et al. 2012), and inappropriate patient transport to an ED may delay timely access to primary care (Eastwood et al. 2016). The combined pressures on both acute and non-acute health services have led to attempts to prevent unnecessary ambulance transport to EDs. Many organisations are trialling and implementing strategies, such as embedding paramedics within PHC teams or the implementation of paramedic referral pathways (Blodgett et al. 2017, 2020; Eaton et al. 2021a), the intent of which includes increasing patient satisfaction and reduction of burden on EDs. These novel approaches appear to increase collaboration between paramedics and those working in PHC, most frequently GPs (Bury et al. 2006). It is therefore valid to consider the importance of this professional relationship as an essential foundation to these strategies.

The cornerstone of safe and effective patient care relies on sound teamwork and communication (Manser 2009; Rosen *et al.* 2018); therefore, the relationship between paramedics and GPs can be considered critical to the safety and efficacy of these pathways. The paramedic-GP relationship is not novel – GPs have historically interacted with paramedics through paramedic attendance at PHC clinics for patients requiring emergency care and transport to an ED. Much of the relationship has therefore been under different circumstances to what is now occurring, with a shift towards joint patient care efforts for the non-acute patient. To overcome the challenges and optimise opportunities for best patient care, developing a robust understanding of the relationship is vital for future cooperation.

The aim of this scoping review was to describe and analyse literature that has examined the paramedic–GP relationship.

# **Methods**

#### Eligibility criteria/developing the search strategy

This literature review was conducted in accordance with the JBI methodology for scoping reviews (Peters *et al.* 2017). The search strategy used aimed to locate both published and

unpublished studies that analysed the relationship between and paramedics and GPs. An initial limited search of MEDLINE and Google Scholar was undertaken to identify articles on the topic. The text words contained in the titles and abstracts of potentially relevant studies, and the index terms used to describe the studies were used to develop a comprehensive search strategy. The paramedic-specific search filter created by Olaussen *et al.* that is optimised for sensitivity was utilised in the strategy (Olaussen *et al.* 2017).

The Population/Concept/Context search strategy framework was initially utilised to categorise terms (Peters *et al.* 2017). After some piloted searches, the decision was made to exclude the context category (out-of-hospital/prehospital) to prevent the inadvertent exclusion of potentially relevant literature.

The searches were not restricted by year or country of publishing. All historical evidence was included without reference to year of publishing exclusion criteria, as there was no discernible timeframe that the analysis of the relationship in question was either more or less relevant. As the findings of initial searches revealed limited Australian studies, international literature was included, so long as they were available in English, despite there being variance in the structure of health care settings, and training and scope of paramedics.

#### Information sources

In March 2022, systematic searches were completed using the following electronic bibliographic databases: Ovid MEDLINE, Embase Classic + Embase and CINAHL Plus (EBSCOhost). The final search strategy used for Ovid MEDLINE is shown in Appendix 1. The reference lists of all included sources of evidence were screened for any additional studies that met the inclusion criteria. References of papers that were excluded due to being literature reviews were scanned to capture any further relevant papers.

#### Data charting process

Following the completed searches, all identified citations were collated and uploaded into EndNote Version 8 (IBM). Citations were then imported into Covidence systematic review software (Veritas Health Innovation), and duplicates were removed automatically by the software or manually, as required. Titles and abstracts were screened by two independent reviewers (SP and RL) for assessment against the inclusion criteria. Potentially relevant sources were retrieved in full text and imported. Full-text screening was completed by the same two reviewers, with the final inclusion/exclusion criteria, shown in Table 1. Any conflicts that occurred throughout the review process were resolved through discussion between SP and RL with the assistance of the third author (LR), as required. The results of the search and study inclusion process are reported in a PRISMA-ScR flow diagram.

Table I. Inclusion/exclusion criteria for init	al screening.
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Inclusion	Exclusion
Paramedics and general practitioners Relating to working relationship Full text available in English	Does not examine the relationship between paramedics and general practitioners Editorial/opinion piece or study protocol Systematic or scoping review Conference or oral presentation Full text not available Full text not available in English Duplicate

#### Data items

Data were extracted from papers included in the review by two independent reviewers (SP and RL) using a data extraction template developed by the reviewing team. The data extraction included specific details: author, year/country of publishing, purpose/aim of study, participants, methodology and key findings relevant to the review question.

# **Quality assessment**

The Quality Assessment with Diverse Studies appraisal tool was used to evaluate the methodological rigour of the included studies. This tool was chosen due to the heterogeneity of study types included in this review, and proven strong reliability and validity, especially when used for the appraisal of multior mixed-methods health services research (Harrison *et al.* 2021). Each of the 13 criteria were awarded a score between 0 and 3, which were then summed and converted to an overall percentage. The quality assessment was completed by two independent reviewers (SP and RL), and conflicts were resolved through discussion between the reviewers.

# Synthesis of results

Analysis of the studies was completed by two independent researchers (SP and RL). Following the extraction of the basic characteristics, a more detailed extraction of the relevant study findings was completed. The two researchers reviewed both individual data charts, and subsequently further discussed any differences in the synthesis of the evidence. A concept map was used to categorise and condense the results, and to organise the key themes found in the literature.

# **Ethics** approval

Due to the nature of this scoping review, it is exempt from human ethics approval.

# Results

# Selection of sources of evidence

An initial search of three databases resulted in 6746 studies. Following the removal of duplicates, 4995 studies remained. After title and abstract review, 93 studies remained, with 15 studies remaining after full-text review. No further studies were identified through both grey literature searching and backwards citation searching of included studies. A study selection overview is shown in Fig. 1.

# Characteristics of sources of evidence

A detailed breakdown of the characteristics of the included studies can be seen in Table 2, with a summary of the main results of the individual studies in Table 3. Six studies were from the UK, three from Norway, two each from Australia and Ireland, and one each from the USA and Denmark. Eight of the included studies used a qualitative methodology study design. The next most common methodology was quantitative, with four studies utilising a cross-sectional study in the form of a questionnaire. The included studies were published between the years of 2006–2021. A total of 13 of the 15 included studies were published within the past decade, with eight of these being published since 2018.

# **Quality assessment**

The mean Quality Assessment with Diverse Studies score was 79.0% (range 53.8–89.7%). Studies generally performed well on items relating to the theoretical or conceptual underpinning of the research, the description of the research setting and target population, and the appropriateness of the method of analysis to meet the research aim/s. Items relating to justification for the analytic method selection and consideration of research stakeholders in the study design were generally less well considered. The Quality Assessment with Diverse Studies scores are listed in Table 2.

# Results of individual sources of evidence

Key results are summarised within Table 3.

# Synthesis of results

The analysis of the studies identified that the perceived strengths and weaknesses of the relationship have five key themes: the importance of communication, concerns relating to scope of practice, leadership roles, responsibility for patient care, and the significance of interdisciplinary training and feedback.

#### Theme I: Importance of communication

The perceived standard of communication between the two working groups varied, with GPs more likely to report concerns around paramedic use of tone, whereas paramedics were more likely to report issues associated with a general lack of communication (Blodgett *et al.* 2017; Burns 2018). Three studies reported that both the paramedics and GPs thought that communication was rarely problematic, and allowed for cohesive multidisciplinary models of care (Villarreal *et al.* 2017; Mieritz *et al.* 2018; Myers *et al.* 2020). Two papers



Fig. I. PRISMA-ScR flow diagram.

found that poor communication could contribute significantly to issues and barriers within the working relationship (Blodgett, Robertson *et al.* 2017; Burns 2018). Experiences of suboptimal communication were reported by both paramedics and GPs.

#### Theme 2: Scope of practice

Understanding and agreement of scope of practice was found to be a contributing factor to issues within the relationship, primarily from a GP perspective, with concerns regarding paramedic scope of practice and knowledge. Two

#### Table 2. Characteristics of sources of evidence.

Author(s)	Year	Country	Purpose	Participants (n)	Study Design	QuADS score (%)
Blodgett et al.	2017	UK	Analysis of barriers and motivators of a prehospital GP referral system from the paramedic perspective	Paramedics $(n = 8)$	Mixed qualitative observational study using informal, semi-structured interviews via grounded theory	33 (85%)
Burns	2018	UK	Seek the GP perspective regarding paramedics providing referrals to urgent/primary care	GPs (n = 7)	Qualitative, semi-structured interviews using a phenomenological approach with purposive sampling.	21 (54%)
Bury et al.	2006	Ireland	Explore perceptions of GPs and EMTs of each other's roles in managing community emergencies	GPs (n = 369), EMTs (n = 226)	Quantitative, anonymous questionnaire of GPs and EMTs within regions, 4-point scale for agreement.	27 (69%)
Eaton et al.	2021	UK	Design and evaluate an education framework to support APPs transitioning into primary care	$\begin{array}{l} \text{APPs} (n=7) \\ \text{GPs} (n=4) \end{array}$	Qualitative, semi-structured focus groups using naturistic enquiry methodology in collective groups	29 (74%)
Forland et al.	2009	Norway	Analyse how ambulance workers perceive their competence in managing prehospital emergencies compared with other professions	Ambulance workers $(n = 156)$	Questionnaires with two groups of ambulance workers.	28 (72%)
Hjortdahl et al.	2014	Norway	Gain insight into EMTs' experience working alongside GPs in prehospital emergency care.	EMTs ( $n = 5-9 \times 4$ )	Focus group interviews	29 (74%)
Lazarsfeld- Jensen et al.	2014	Australia	Evaluation of interprofessional simulation-based education between GPs and paramedics	GPs $(n = 5)$ Paramedics/nurses/students (n = 11)	Multi-method qualitative review with observation of simulated scripted scenarios	32 (82%)
Mieritz et al.	2018	Denmark	Evaluate communication between GPs and emergency dispatch staff when organising emergency ambulance cases	Calls (n = 1334)	Retrospective analysis of calls where GPs requested an emergency ambulance	34 (87%)
Myers et al.	2020	USA	Analysis of a community paramedicine program to review overall GP satisfaction with the program	GPs (n = 18)	Online survey of GPs with direct involvement in referral to the program (one element of total study)	32 (82%)
Nystoyl et al.	2018	Norway	Examine collaboration between ambulance workers and GPs in clinical management of prehospital patients	Missions $(n = 172)$ Patients $(n = 180)$	Retrospective observational study	31 (80%)
O'Meara et al.	2016	Australia	Identification and analysis of how paramedics create and maintain professional boundaries while working in community paramedicine	$3 \times focus groups (10-20 participants each)$	Multi-method approach including observation of practice, informal discussion, interviews and focus groups	34 (87%)
Power et al.	2020	Ireland	Understand GP opinion on changes to clinical pathways enabling paramedics to treat and refer to GPs	GPs (n = 39)	Survey divided into four domains	35 (90%)
Proctor	2019	UK	Review student paramedics' views on incorporating placements in GP clinics on their paramedicine degree	Paramedic students $(n = 6)$	Pedagogic study including case study, semi-structured interviews and thematic analysis	32 (82%)
Schofield et al.	2020	UK	Explore how paramedics can be utilised to work in general practice	Paramedics $(n = 81)$ GPs $(n = 40)$	Mixed methods scoping study with literature review, mixed format national survey and interviews	35 (90%)
Villarreal et al.	2017	UK	Investigate whether co-responding GPs to emergency calls reduces transports to ED	Cases (n = 1903)	Prospective study of patients who are deemed to be suitable for GP assessment in the field	31 (80%)

UK, United Kingdom; USA, United States of America; EMT, emergency medical technician; GP, general practitioner; APP, advanced paramedic practitioner; QuaDS, Quality Assessment with Diverse Studies.

### Table 3.Summary of main results.

Author(s)	Summary of main results
Blodgett et al. (2017), UK	<ul> <li>Four themes – barriers to GP referrals, approaching patients with referral schemes in mind, obstructions/barriers/frustration with GPs, awareness of scheme impact.</li> <li>Lack of trust from GPs in paramedics, GPs rejecting paramedic referrals without rationale, poor experience leads to lower likelihood of using it in the future.</li> </ul>
Burns (2018), UK	<ul> <li>Themes included inappropriate diagnostic certainty in paramedics, paramedics shifting patient care responsibility to the GP instead of engaging in shared care, strained communication in response to paramedics extending into GP scope of practice.</li> <li>Variability in perceived appropriateness of referrals.</li> </ul>
Bury et al. (2006), Ireland	<ul> <li>Agreement between paramedics and GPs that community interactions between the groups was mostly related to non-urgent cases.</li> <li>EMTs less confident that GPs had sufficient knowledge of training and skill set.</li> <li>Neither group believed that increased EMT involvement in primary care led to improved relationships.</li> <li>EMTs had less confidence in the interdisciplinary relationship.</li> <li>Both agreed that close links between ambulance services and GPs were required in the future.</li> </ul>
Eaton <i>et al.</i> (2021 <i>a</i> ), UK	<ul> <li>APPs felt a lack of supervision within the program and inconsistent feedback.</li> <li>GPs felt that providing supervision and feedback interfered with their own workload.</li> <li>GPs felt that APPs felt more comfortable with home visits and less so in the clinic.</li> <li>GPs noticed significant knowledge gaps in the APPs regarding primary care.</li> </ul>
Forland <i>et al.</i> (2009), Norway	<ul> <li>64% of respondents felt that they had good/ very good relations with out-of-hospital doctors.</li> <li>80% of ambulance workers felt that they are most competent to manage prehospital emergencies and that their skill set was underappreciated.</li> <li>A lack of clarity regarding leadership roles when working together in the prehospital environment was noted.</li> </ul>
Hjortdahl et al. (2014), Norway	<ul> <li>Most EMTs felt that GP assistance when managing critically ill patients was of value, more so in experienced EMTs.</li> <li>EMTs felt that GPs were particularly needed in complex patients.</li> <li>EMTs believed that GPs were occasionally a burden to emergency cases with poor communication skills.</li> </ul>

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Table 3.	(Continued).
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Author(s)	Summary of main results
	<ul> <li>Interdisciplinary feedback and debriefing were noted as important.</li> </ul>
Lazarsfeld-Jensen and Bridges (2014), Australia	• Simulation scenarios were thought to provide for a constructive breaching of professional boundaries, improved interdisciplinary collaboration, and increasing levels of respect and understanding of the challenges the other profession faces.
Mieritz et al. (2018), Denmark	<ul> <li>Communication between GPs and staff at the dispatch centre was mostly constructive and professional with problematic communication in 2% of cases.</li> <li>Most problematic communication was initiated by emergency dispatchers.</li> </ul>
Myers <i>et al.</i> (2020), USA	• At least two-thirds of the physicians surveyed in areas of overall comfort, patient benefit, community expectation, patient health, patient satisfaction, paramedic communication, paramedic responsiveness, quality care provision, benefit to other doctors and possible future expansion were comfortable with the program.
Nystøyl et al. (2018), Norway	<ul><li>Good collaboration was noted between the two professions.</li><li>Patient destination and outcome did not differ with GP involvement.</li></ul>
O'Meara <i>et al</i> . (2015), Australia	<ul> <li>Substantial challenges in paramedics expanding beyond their traditional scope of practice were noted due to professional boundaries.</li> <li>Health professionals are unclear about the role of community paramedics and what they can contribute to primary health care.</li> </ul>
Power and Bury (2020), Ireland	<ul> <li>51% of GPs agreed that GPs and paramedics have good pre-existing working relationships and 40% reported accepting informal referrals from paramedics.</li> <li>Most felt that patients could be safely referred by paramedics post hypoglycaemia or seizure episode.</li> <li>56% of GPs were confident that paramedics could safely choose patients for referral.</li> </ul>
Proctor (2019), UK	<ul> <li>Students agreed that there was increasing need to adapt paramedic skills and knowledge to meet demands of low-acuity patients.</li> <li>Placements increased confidence with patient assessment and increased their understanding of the GP role.</li> <li>Some participants noted concern, including that student paramedics would develop confusion over their scope of practice.</li> <li>Students felt strongly that placements strengthen professional relationships between paramedics and GPs.</li> </ul>

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#### Table 3. (Continued).

Author(s)	Summary of main results
Schofield <i>et al.</i> (2020), UK	<ul> <li>74% felt that paramedics working in general practice was positive.</li> <li>There was consensus that paramedics are recognised as clinicians that are well-placed to make a contribution to primary care without replacing GPs.</li> <li>GPs were concerned that not all paramedics would be able to perform this role.</li> <li>Paramedics were seen as a positive addition to the clinic that reduced demand on GPs.</li> <li>Paramedics tended to see simpler patients, leaving more complex work to GPs.</li> <li>Mentoring paramedics was time-consuming for GPs.</li> </ul>
Villarreal <i>et al.</i> (2017), UK	<ul> <li>Partnership between ambulance crews and GPs reduced the proportion of patients that require ED transport.</li> <li>21% of patients following GP involvement were transported compared with 61% without.</li> <li>The service was highly valued by both ambulance crews and GPs with excellent integration of the different skill sets.</li> </ul>

EMT, emergency medical technician; GP, general practitioner; APP, advanced paramedic practitioner.

studies from the GP perspective found that strain on the relationship occurred when doctors felt that paramedics were practicing outside their scope (Burns 2018; Eaton et al. 2021b). Both qualitative and cross-sectional studies identified GP concerns with perceived paramedic knowledge gaps and reported lack of confidence in paramedics safely practicing within a recently expanded scope of practice (Hjortdahl et al. 2014; Mieritz et al. 2018; Schofield et al. 2020). O'Meara et al. highlighted that having paramedics practicing outside the historically accepted scope of their practice and/or shifting into the expanded area of PHC crosses professional boundaries (O'Meara et al. 2015). Lazarsfield-Jenson et al. found that focusing on interdisciplinary simulation training increased the overall understanding of each other's scope of practice, aligning with overall improvements within the relationship (Lazarsfeld-Jensen and Bridges 2014).

#### **Theme 3: Leadership roles**

It was found that lack of clarity around professional roles, and ambiguity around leadership, contributed negatively to the paramedic relationship, with the importance of clinical leadership within the relationship being a reccurring theme. Where Scandinavian GPs were required to respond to emergency incidents in the community, paramedics/emergency medical technicians expressed their belief that the GPs should act as scene leaders, while also identifying a potential correlation of perceived substandard GP leadership, leading to poor cooperation in this context (Forland *et al.* 2009; Hjortdahl *et al.* 2014).

#### Theme 4: Responsibility for patient care

Multiple qualitative studies identified responsibility for patient care as an issue on both sides of the relationship (Blodgett *et al.* 2017; Burns 2018). Paramedics reported frustration that GPs were sometimes unwilling to take on referrals of some patients, perceiving that the doctors were afraid to take on a reasonable level of responsibility for patient care (Blodgett *et al.* 2017). GPs reported a sense that paramedics occasionally used professional collaboration to shift the burden of responsibility for patient care to GPs and were not focused on an appropriate team based model of care (Burns 2018).

# Theme 5: Significance of interdisciplinary training and feedback

The importance of interdisciplinary training and feedback through shared learning as a means of strengthening the relationship between paramedics and GPs was identified, with consistent reference only to the value of feedback from GP to paramedic, with no mention of the converse. Shared learning was addressed in six studies, often with focus on professional feedback. Studies from the paramedic perspective highlighted the importance of receiving feedback from GPs, especially for paramedics transitioning to work within PHC teams (Hjortdahl et al. 2014; Blodgett et al. 2017; Eaton et al. 2021b). Variations in paramedic and GP perception of the adequacy of feedback and mentorship were identified. GPs tended to believe that feedback and supervision was sufficient, but paramedics believed that current practices did not optimise their individual practice nor their ability to collaborate successfully (Blodgett et al. 2017; Burns 2018; Eaton et al. 2021b). There was agreement that professional respect is enhanced through interdisciplinary training, while also finding that empathy for the professional challenges of each discipline is improved with increased awareness of professional skill sets (Bury et al. 2006; Hjortdahl et al. 2014; Lazarsfeld-Jensen and Bridges 2014; Proctor 2019).

# Discussion

In some cases, the value of the study to the Australian context was questionable. Scandinavian studies involved an Emergency Medical Services (EMS) configuration where paramedics and GPs work alongside each other in the community emergency response setting – an uncommon scenario within Australia. These studies found that staff reflected more positively on the relationship when compared with studies that investigated the relationship where paramedics and GPs did not work together in a single service (Forland *et al.* 2009; Hjortdahl *et al.* 2014;

Mieritz *et al.* 2018; Nystøyl *et al.* 2018). Examining the experience of the relationship in a variety of settings is essential to best inform future collaborative efforts. The question of whether the two professions should be participating together in a single episode of patient care, and in what capacity, is unresolved and key to directing the future of the relationship.

An identified theme relating to transfer of patient care responsibility was complex to analyse. Multiple contributing factors included poor communication, and a lack of trust and understanding of each other's scope of practice, collectively contributing to issues surrounding responsibility for patient care. It is reasonable to infer that if a GP perceives a paramedic to lack the necessary skills in patient assessment, they may feel uncomfortable receiving a paramedic patient referral and the transfer of the associated responsibility. Although there was a perception in the literature that understanding of scope of practice underpins interdisciplinary trust, there was no examination of the exact nature of the scope of practice knowledge issue with sufficient detail.

The importance of interdisciplinary training to improve interprofessional understanding and empathy was highlighted throughout the literature (Hjortdahl et al. 2014; Lazarsfeld-Jensen and Bridges 2014; Proctor 2019; Eaton et al. 2021b). Multiple studies specifically detailed the desire of paramedics to receive more feedback from GPs (Blodgett et al. 2017; Eaton et al. 2021b). The concept of paramedics providing feedback to GPs was not discussed in any examined literature. This may be indirectly attributable to entrenched medical hierarchy, based on the belief that the more extensive training of the GP makes it inappropriate for paramedics to give feedback. Effective feedback has been found to be one of the most important factors for improving multidisciplinary teamwork (Salas et al. 2018). Therefore, in any model of care that relies on the collaboration of two different professions, opportunities for two-way feedback are vital.

The importance and value of the paramedic–GP relationship is expressed through the notion that a singular negative encounter or interaction between disciplines can have lasting impact on future effective cooperation (Blodgett *et al.* 2017). Successfully establishing health care services that rely on collaboration between the two professions will be enhanced by addressing any existing challenges and barriers to a closer working relationship (O'Meara *et al.* 2015).

Ten of the studies were published in the UK and Scandinavia, which suggests that other countries have been more innovative in health service provision and expanded paramedic involvement. In the UK, one of the driving factors for paramedics working within PHC teams is workforce shortages within traditional PHC professions, including GPs (Montgomery *et al.* 2017; Eaton *et al.* 2021*a*). Australian demand for both acute and nonacute health care is also increasing at a concerning rate (FitzGerald *et al.* 2012; Currie *et al.* 2020). There are ongoing challenges associated with the unequal distribution of health professionals, including GPs, needed to meet rural/remote Australia PHC demands (O'Meara *et al.* 2012; Currie *et al.* 2020). As overall demand for PHC services increases in Australia, there will be the subsequent need for reform of models of care that may require further collaboration between paramedics and GPs. Key potential challenges for future paramedic involvement in Australian primary care will include ensuring that patient care does not become fragmented, that the quality and safety of PHC is not diluted, and understanding if and how GPs will be provided with time, funding, and appropriate methodology to mentor/supervise/educate paramedics.

Summarising the overall state of the relationship was limited by inconsistences in the literature and the absence of collaborative studies comparing acute and nonacute settings. The majority of studies evaluated individual experiences of the relationship in one setting; for example, both paramedics' and GPs' involvement in a referral scheme or paramedics embedded in a GP clinic. As such, the included studies lack the depth required to deeply understand the relationship, as it exists across multifaceted environments of clinical practice, whereby the groups may interact in the community, hospitals or a PHC – any of which might involve the care of acute or non-acute patients.

Significant variation in the training level and scope of practice of the paramedic is observed in the included studies. The search criteria included all potential terms pertaining to paramedic, including emergency medical technician/ambulance officer and so on, accepting that there are vast differences in the education standards for these roles. As Australia predominantly has a tertiary education entry requirement for state-based ambulance services (Reaburn 2020), it could be argued that some of the literature is not representative of the Australian paramedic–GP relationship. Another limitation of this review was access to full-text articles. There was a total of 16 articles that were not accessible in full-text version, and it is therefore possible that some relevant literature has been omitted from this review.

There is a need for an Australian-based study that examines the relationship between paramedics and GPs that would ideally investigate both perspectives. To achieve holistic understanding, there needs to be an investigation of how these two professional groups interact within and outside of PHCs. The findings of this research could inform the development of collaborative models of care that optimise relevant skill sets. Reform in this area could potentially improve outcomes for patients and health care services.

As models of care evolve, interest in the GP–paramedic relationship is increasing. This review found five main themes contributing to the relationship – the importance of communication, understanding each other's scope of practice, leadership roles, responsibility for patient care and the significance of interdisciplinary training. Internationally, paramedic involvement in PHC is increasing, with an aim to avoid unnecessary ED transport and improve access to PHC for patients. Further investigation of the Australian context is required to optimise both current and future interdisciplinary collaborations and relationships.

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Data availability. The data that support this study will be shared upon reasonable request to the corresponding author.

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# Appendix I. Search strategy completed in Ovid Medline

Search Line	Search	Results
I	(Ambulances or Emergency Medical Technicians or Air Ambulances or emergency medical services).sh. or paramedic*.tw. or ems.tw. or emt.tw. or prehospital.tw. or pre-hospital.tw. or first responder*.tw. or emergency medical technicians.tw. or emergency services.tw. or Ambulance*.tw. or HEMS.tw. or field triage.tw. or out-of-hospital.tw.	106 595
2	Allied health personnel/or emergency medical technicians/	17 663
3	General practitioners/or physicians, family/or physicians, primary care/	30 298
4	General Practice/or Family Practice/	77 248
5	Primary Health Care/	87 165
6	(primary care or primary health care).tw.	129764
7	(GP* or General practitioner*).tw.	205 874
8	LOCUM*.tw.	477
9	Primary health care provider.tw.	140
10	l or 2	116129
11	3 or 4 or 5 or 6 or 7 or 8 or 9	400 637
12	10 and 11	4133
13	Cooperative behaviour/or Interpersonal Relations/	119449
14	Cooperat*.tw.	129 698
15	Relationship*.tw.	I 268 945
16	Attitude/or 'attitude of health personnel'/or attitude*.tw.	277   37
17	Teamwork*.tw.	9942
18	Communication/	93 390
19	Communicat*.tw.	278 984
20	Interprofessional relations/or interdisciplinary communication/	69 827
21	Communication barriers/	7067
22	Aware*.tw.	219124
23	Rapport*.tw.	5256
24	Agree*.tw.	325 908
25	Integrat*.tw.	488 749

(Continued on next page)

Search Line	Search	Results
26	Collabor*.tw.	146 021
27	Inter-professional.tw.	1342
28	Perception/	40 977
29	Trust/	11 589
30	Network*.tw.	447 781
31	Compatib*.tw.	104 932
32	Understand*.tw.	26 63
33	Insight*.tw.	436 339
34	Judge*.tw.	84 503
35	Extended role*.tw.	389
36	Referral and consultations/or referral*.tw.	159 529
37	Scope.tw. or 'Scope of practice'	64 825
38	Link*.tw.	948 627
39	Interrelate*.tw.	42 046
40	Associat*.tw.	4 42   97
41	Correspond*.tw.	599 852
42	Connect*.tw.	372 365
43	Liais*.tw.	8180
44	13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43	9010404
45	12 and 44	2346

\*, truncation symbol when used in OVID MEDLINE.