Review

Community Paramedicine Supporting Social Needs: A Scoping Review

Tyne Lunn *, Jennifer Bolster , Alan Batt

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Review

Community Paramedicine Supporting Social Needs: A Scoping Review

Tyne M. Lunn [1,3,*], Jennifer Bolster [1,3,4] and Alan M. Batt [1,3,5]

[1] Department of Paramedicine, Monash University, Frankston, VIC, Australia
[2] Palliative Institute, Covenant Health, Alberta, Canada
[3] McNally Project for Paramedicine Research, Ontario, Canada
[4] British Columbia Emergency Health Services, Vancouver, British Columbia, Canada
[5] Faculty of Health Sciences, Queen's University, Ontario, Canada
* t.lunn@mcnallyproject.ca

Abstract: Introduction: Health and social needs exist along a dynamic continuum. Recognizing that health status is inextricably impacted by social determinants of health, there exists opportunities and a professional responsibility to better understand how community paramedicine can address social needs in effort to reduce healthcare inequities. **Aim:** The primary objective of this scoping review is to systematically investigate published peer reviewed and grey literature to explore how community paramedicine supports social needs along a health and social continuum. **Methods:** A scoping review of English language literature was conducted using the JBI Scoping Review methodology. We searched CINAHL, EMBASE, and MEDLINE and grey literature searches in Google Scholar and organisational websites. We used search terms related to community paramedicine and social needs. **Results:** A total of 30 peer-reviewed and 13 grey literature articles met inclusion criteria. The main findings of this scoping review describe the evolving ways community paramedicine models are addressing health and social needs. A key recommendation across the literature was the need to meaningfully engage communities early in program development to understand how best to implement and co-design an integrated service model that addresses the needs specific to each community, though there was a lack of evidence to guide this approach. There is a notable lack of evidence pertaining to how best to optimize technologies in program design and implementation. The results highlight opportunities to determine best practices for conducting holistic community needs assessments that include equitable stakeholder engagement and enhance education to prepare paramedics for expanded roles. **Conclusion:** Community paramedicine provides opportunities to better meet the needs of structurally marginalised communities. However, there is a social responsibility and opportunity to engage in community needs assessments to co-design service delivery, advance paramedic education, and enhance interprofessional collaboration to better support social needs and generate upstream solutions for individuals and communities.

Keywords: paramedic; community paramedicine; social needs; social isolation; equity

Introduction

Paramedic practice is continuously evolving, expanding in both acute and non-acute settings as paramedicine continues to establish its merits as an essential part of an integrated healthcare model.[1] There is ample opportunity to explore current paramedicine systems to guide future direction for progress and innovation. Prioritizing equity and accountability of the profession, Tavares et al identified paramedic roles at the individual practitioner-level.[3] and further outlined ten principles and their enabling factors to lead the progression of the paramedicine profession at the system-level.[2] While all concepts within this complementary body of work intersect, systems level principles of *health care along a health and social continuum* and *social responsiveness*, and the enactment by individual practitioners in their role as *health and social advocates* provides the foundational lens from which we

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approached this work.[3] One example of recent innovations in paramedicine includes paramedics in expanded roles, like extended care and community paramedics.[4] While the definition of community paramedicine varies around the world, for the purpose of this scoping review, we adopt the definition proposed by Wingrove et al.[5]

The concept of the health and social continuum illustrates that health and social factors are inextricably connected.[6,7] When paramedics respond to address an individual's health need, they also regularly encounter social aspects of care. The person receiving care is always immersed in a mix of health and social contexts. Moreover, everyone is born into and exists within a health and social continuum. This dynamic continuum also means that increases in health incidences may be related to unmet social needs; while those with social privileges and adequate support may experience less frequent or severe health incidences.[6,7,8]

Individual and population health is impacted by broad factors, with complex implications dependent on social and economic environments, physical environments, and individuals' behaviours and inherent characteristics throughout a lifetime.[6] Social determinants of health (SDoH) describe specific social and economic factors that determine health status.[6] These relate to an individual's position in society and expand beyond individual characteristics to include unearned advantages (i.e., privileges) and unearned disadvantages (i.e., discrimination, marginalization). This scoping review focused on social needs within the determinants of health, such as poverty, social isolation, culture, and access to health and social services. Experiences of discrimination, racism and trauma, both historical and contemporary, are important social determinants of health disproportionately impacting groups such as Indigenous Peoples, gender and/or sexually diverse individuals, and racialized populations.[6,8,9,10]

Community paramedics are uniquely positioned to encounter individuals needing care in their homes and communities and therefore have access to important information about a person's environmental, social, and cultural contexts that other health professionals are not directly privy to. The primary health concern may be why paramedics are called to deliver health care, but the health problem may, in fact, be an outcome of unmet social needs. Therefore, as community paramedicine evolves, so too has its definition expanded to encompass "*a program that uses paramedics to provide immediate or scheduled primary, urgent, and/or specialised healthcare to vulnerable populations by focusing on improving equity in healthcare access across the continuum of care*."[11]

Objective

The objective of this scoping review is to systematically scope the extent of published peer reviewed, and grey literature to identify how community paramedicine is supporting social needs along a health and social continuum, with a key focus on research implications and how this may inform future practice and health service development.[12,13]

We sought to answer the following research questions formulated using the population, concept, context (PCC) framework: [1] How does community paramedicine support social needs along a health and social continuum? [2] What does the literature highlight regarding innovation and opportunities to better meet social needs? and [3] What gaps exist in the literature that may inspire future research to address social needs? Acknowledging that relevant grey literature on the provision of community paramedicine exists, a scoping review was selected to achieve the study objectives.[13] We narrowed the research focus to community paramedicine due to the increasing ways these programs are expanding services within communities, including program development targeting specific marginalised populations and community needs.[11]

Language

We recognize the importance and evolution of language in accurately describing populations and their intersectional positions in society.[14,15] Therefore, we endeavour to use language within this manuscript that identifies the structural and systemic factors determining societal hierarchies and their inherent power imbalances. We will use language such as oppressed, marginalised, and under-resourced to reflect the ways dominant groups determine socioeconomic policies and constructs that

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oppress some, while privileging others. This acknowledges that populations are not inherently vulnerable, rather vulnerability is an outcome of systemic and structural discrimination, being under-resourced and therefore, marginalised.[15] All people, communities and population groups are equal in value and worth. We use this intentional language to point to the systems of oppression resulting in marginalised outcomes rather than misidentifying certain populations themselves as possessing a deficit.

Methods

We conducted the scoping review in accordance with JBI Scoping Review Guidance.[16] We registered the protocol with the Open Science Framework (https://osf.io/2d9j6/) in April 2023. We reported our process and findings according to the PRISMA Extension for Scoping Reviews.[17] This scoping review of literature did not involve any human participants or data not already made available on a public platform and therefore no ethics approval was required. We conducted a preliminary search of Google Scholar, MEDLINE, and JBI Evidence Synthesis to prevent duplication of effort and no current or in-progress systematic or scoping reviews on the topic were identified.

Identification of relevant studies

The search strategy aimed to locate both peer-reviewed and non-peer reviewed studies. Only articles published at the time this review was completed were included in this study. We conducted an initial limited search of Google Scholar and MEDLINE to inform our search strategy. The text words contained in the titles and abstracts of relevant articles (e.g., terms for community paramedicine, health and social continuum, and social needs), and the index terms used to describe the articles were used to further inform the search strategy. The search strategy, including all identified keywords and index terms, was further adapted for each database and/or information source (see Appendix 1).

We searched CINAHL, MEDLINE, and EMBASE in March and April 2023. We used the CADTH Grey Matters toolkit to guide grey literature searching in Google Scholar and Google.[18] Searching for grey literature was limited to national sources; provincial/state and local literature was included if documents were identified by searching national sites. Any reports identified through grey searches that were previously identified through database searches were excluded to avoid duplication. We conducted citation searching of final included studies identified from databases via 'citationchaser' software.[19]

Study selection

Peer-reviewed studies of any design (including editorials and commentaries) as well as grey literature were selected if the study objective or articles' body discussed how community paramedicine supports social needs along a health and social continuum. Articles were eligible for inclusion if they pertained specifically to community paramedicine addressing social needs and were published in English. Articles were excluded if their primary focus was outside the context of community paramedicine, did not address social needs, an economic or geospatial analysis, abstract only, or protocols for studies currently underway.

The review process consisted of two levels of screening: first, a title and abstract review and second, a full- text review. For the first level of screening, a title/abstract screening form was developed by the primary author (TL) informed by the JBI Scoping Review Guidance, using Covidence (Veritas Health, Melbourne, Australia) and reviewed by both co-authors (JB and AB)[16]. The screening criteria were tested on a sample of abstracts prior to beginning the abstract review to ensure that they were sensitive enough to capture any articles that may relate to the review question. Conflicts were resolved by AB and criteria were refined until agreement was reached. In the second step, two of the authors (TL and JB) independently assessed the full texts of screened articles in duplicate to determine if they met the inclusion/exclusion criteria. Conflicts were resolved by AB.

Data charting

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Data were extracted by one reviewer (TL), using a data extraction form created by the primary researcher (TL), informed by the JBI Scoping Review Guidance (see Appendix 2).[16] All extracted data were checked for accuracy by the most experienced reviewer (AB) who did not partake in the data extraction. Data extracted included article title, author name and year of publication, country of study, study design, study aim/objective, program setting and type, referral source, social needs assessment and education, key findings, discussion, conclusions about community paramedicine supporting social needs, and inductive categorisation. We exported the extracted data from Covidence into Excel 365 (Microsoft, Redmond, WA) for collation, analysis, and synthesis.

Collating, summarising, and reporting results

We used the extracted data to report on the included articles' findings. Descriptive statistics were used to report the occurrence of concepts, characteristics, and populations. We conducted a descriptive qualitative content analysis of study characteristics to explore, summarize and report qualitative data.[20] We performed this via basic-level inductive coding, whereby papers were categorised based on their principal issue into five domains.[21] This was performed independently by two authors (TL and AB) in Covidence, and any discrepancies were resolved via discussion. Codes were combined into organizing categories as appropriate to facilitate summary and discussion. We report both measures and descriptions to quantify and explore the characteristics of the literature.

Trustworthiness and rigour

In addition to the steps outlined to ensure rigour in the scoping review screening and extraction process, we aimed to ensure trustworthiness in our analysis of the included studies.[22] Data were extracted directly from Covidence, reducing the chance of transcription errors. We aimed to ensure credibility and confirmability by performing multiple in-depth searches of the literature and using an inductive approach to our descriptive qualitative content analysis. This allowed the literature to guide the categories.[21] We aimed to ensure transferability by exploring literature on a global scale, with no time limitations, thereby accounting for a wide variety of contexts. Dependability was ensured through protocol publication, a clear audit trail, and multiple author review of data throughout the study. We did not evaluate included studies for quality as per the JBI Scoping Review methodology.[16]

Results

Identification of potential studies

Searches from databases and citation searching yielded a total of 1475 records (CINAHL: 135, Embase: 891, Medline: 370, citation searching: 79) which led to the removal of 380 duplicates. The remaining 1095 abstracts were screened (see Figure 1).

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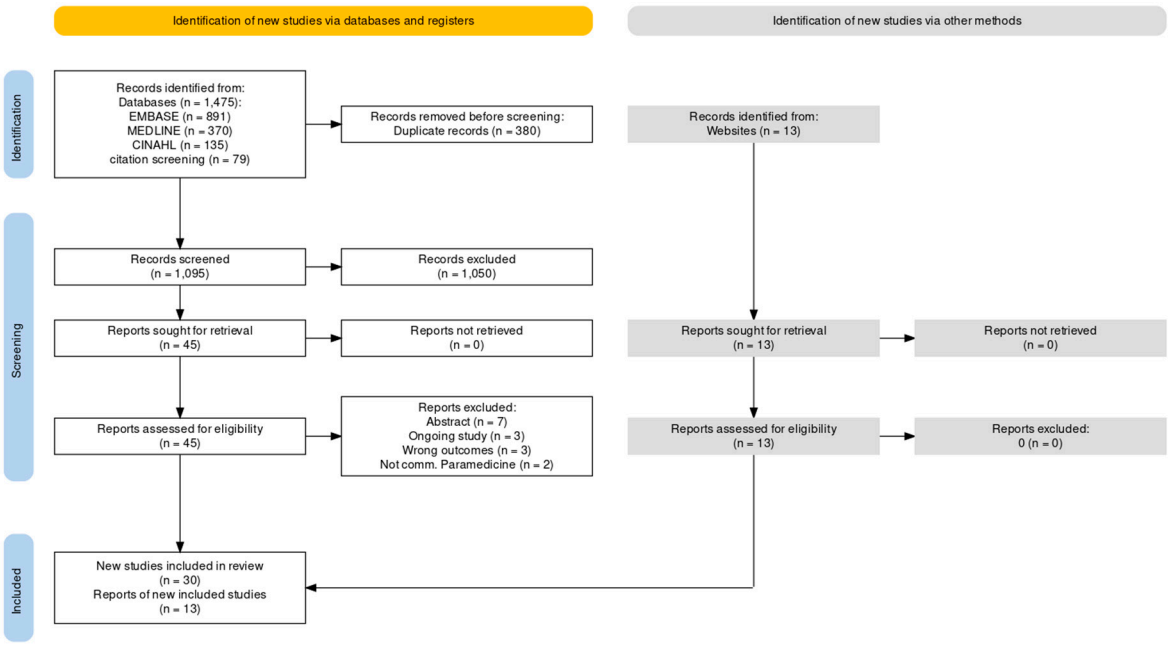

Figure 1. PRISMA diagram.

The full-text screening phase led to the inclusion of 30 peer-reviewed and 13 grey literature articles (n = 43). Most studies included in this review were from Canada (n = 19), followed by the USA (n = 17), Australia (n = 5) and Ireland (n = 2) (see Table 1).

The prevalent methodology utilised in the included peer-reviewed articles was editorials (n = 8), followed by qualitative analysis (n = 6), case reports (n = 5), systematic reviews (n = 3), cohort studies (n = 2), case control study (n = 1), comparative case study (n = 1), cross-sectional analysis (n = 1), diagnostic test accuracy study (n = 1), root cause analysis (n = 1), and quantitative analysis (n = 1). Full study characteristics can be found in Appendix 3.

The majority of included studies were published in the last decade. In 2022, most studies were conducted (n = 10), with an observed increase in studies produced since 2020 (see Figure 2 and Appendix 3). The program settings identified were predominantly urban (n = 18). When a program model was indicated, the literature mainly focused on home-visits (n = 22).

Table 1. Study locations.

Country	**Number of studies n (%)**
Canada	19 (44)
United States	17 (39)
Australia	5 (12)
Ireland	2 (5)
Total	43

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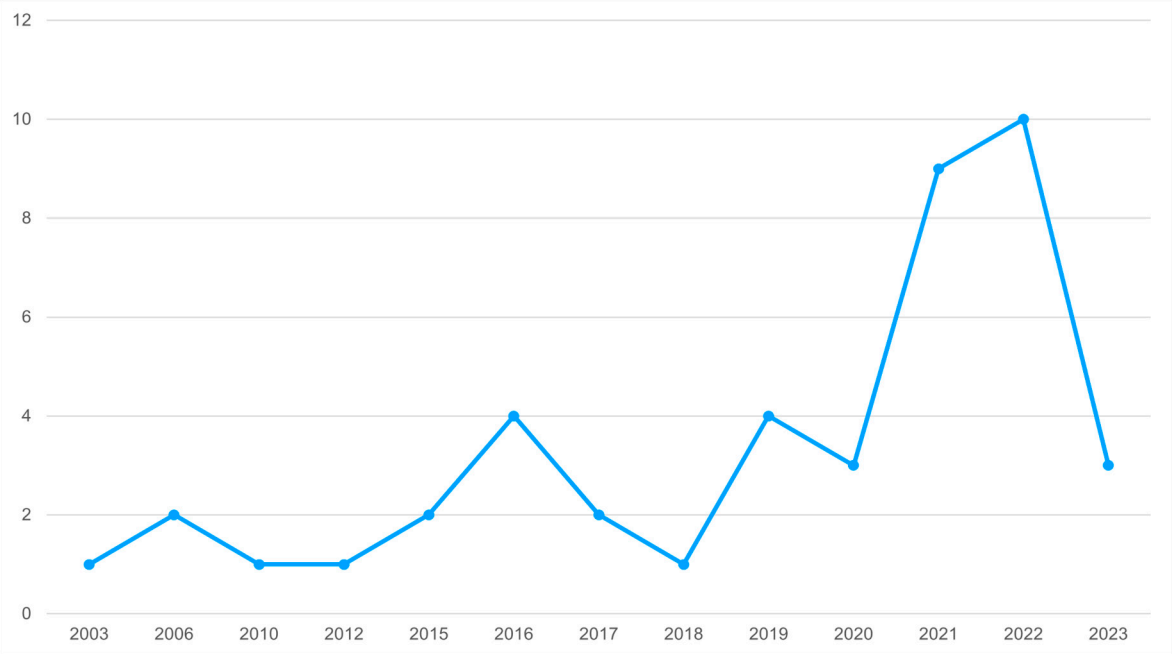

Figure 2. Publications per year.

Social needs domains

We identified five social needs domains supported by varied community paramedicine models across differing settings in this review: (1) access to health and social services; (2) daily living; (3) mental health and substance use; (4) technology; (5) social support, agency and belonging (see Table 2).

Table 2. Social needs domains. Note that many studies addressed more than one domain.

Domain	**Domain 1 - Access to Health & Social Services**	**Domain 2 - Daily Living**	**Domain 3 - Mental Health & Substance Use**	**Domain 4- Technology**	**Domain 5- Social Support, Agency & Belonging**
Count of studies n= 43	n= 42	n=30	n=28	n=3	n=33
Included codes	care coordination medications health literacy rural living palliative care hospice referrals in-home services caregiver	income education safe housing food security safe employment reliable transportation clean air clean water heating/cooling	mental health services drug cessation alcohol cessation tobacco cessation safe supply harm reduction	reliable internet cell phone tablet computer email access medical equipment mobility devices fall prevention	social isolation loneliness intimate partner violence physical safety cultural isolation race, ethnicity gender sexuality

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	support prevention/screening health promotion health insurance disability support safe childcare language barriers supportive living	electricity			identity documentation (ID) incarceration immigration status refugee status migrant worker veteran status older adults

Domain 1 - Access to health and social services

Access to health and social services was the predominant domain addressed in this review, with 42 of the 43 included studies addressing social needs within this domain. The disparity of workforce and subsequent services prevalent with rural living arose as a common challenge motivating both community-initiated and system-initiated community paramedicine development in remote and rural settings.[23-26] Risk of readmission post-discharge was found to increase when individuals met challenges managing existing chronic conditions due to lack of access to medications combined with low health literacy.[27,28] Amidst limitations from low health literacy and the complexities of system navigation, community paramedicines' role in care coordination arose as a key aspect of support provided by various program models.[28,-33] Capabilities for community paramedicine to address health needs was demonstrated in reports that paramedics are perceived as trusted health professionals engaged in health promotion and education during home-visits and outreach, and is evident in programs where EMS-based care coordination and system navigation is a program feature.[24,31,34-41] Programs proved adaptive when ad hoc response was required in instances of crisis, and included supporting persons impacted by flooding disasters and the COVID-19 pandemic.[24,42] Evaluation outcomes beyond health system utilisation were lacking in the literature. There was also a lack of evidence exploring community paramedicine's role in preventing and addressing climate change and its broad implications for health and healthcare.

Domain 2 - Daily living

In the domain of basic social needs required for daily living, people who are unhoused and/or experiencing poverty are identified as key populations facing structural barriers to health and wellness in 30 of the studies.[30,39,43-45] A total of 22 studies featured home-visit program models, while 11 studies described programs that adapted to create outreach services, specifically addressing the needs of people experiencing homelessness.[30,36,39,40,45] Other programs established clinics within shelters and paramedic specialist units tasked to inner-city areas with high rates of people who are unhoused.[30,44,45] One jurisdiction in the US leveraged technology by trialling GPS-based mobile health interventions to facilitate care coordination and health education for people experiencing homelessness.[39] For those housed, but facing challenges of low income, community paramedics acted as advocates, facilitating connections and referrals to community resources such as meals, employment and financial services.[24,29,41,46,47] For example, community paramedics identified that food insecurity was more prevalent for older adults living in community.[48]

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Domain 3 - Mental health and substance use

In 28 studies, the intersection of mental health and substance use were predominant factors in those receiving community paramedicine services. Community paramedics encounter a high proportion of individuals with complex health, including mental health needs, that could benefit from integrated care.[49,50] In recognizing high health system utilisation by people experiencing homelessness and building on proven effectiveness of mobile outreach, an innovative "City Centre Team" (CCT) was created in a major Canadian city to focus care needs on people who are unhoused with a high prevalence of substance use.[30,34,43] Evaluation of this resource demonstrated the capability of community paramedicine to address health and social needs of people experiencing homelessness by using interdisciplinary and interprofessional collaboration and communication across community, social, and health services. Similar mobile outreach models are proving beneficial in other major cities across Canada and the US, while other jurisdictions provide mental health care via community clinics.[29,44,45,51,52] Langabeer et al highlighted that individuals engaged in substance use often avoid seeking treatment, further reinforcing the benefits of outreach models in bringing care to people who use drugs in communities.[36]

Considering the high instance of substance use-related calls, community paramedicine's role in harm reduction strategies was not well explored in the included studies. In addition, while community paramedicine is rapidly expanding, initiatives to address mental health needs remain fragmented and there is a greater need for advocacy and attention to the social, economic and policy levels upstream of the point of individual crisis.[50]

Domain 4 - Technology

Contemporary healthcare services and record-keeping requires access to reliable internet, email, and mobile devices, yet only three studies explicitly explored this technology domain as an aspect of healthcare. Telemedicine and virtual care were described as features of community paramedicine models.[24,35] When testing a GPS-based mobile health intervention, in addition to providing reminders for medications and appointments, unhoused participants indicated regular access to a cell phone increased their ability to maintain personal safety and social connections.[39] Conversely, lacking access to internet services, digital devices, and durable medical equipment were identified as barriers to health.[53] The COVID-19 pandemic identified the capacity of community paramedicine to innovate programs by leveraging technology to facilitate patient monitoring and virtual visits.[24] Using technology to optimize collaboration between caregivers, interprofessional health providers and community services has given community paramedics a means to address inequities in accessing health care and social services.[24,39] This has been particularly beneficial in addressing gaps in social needs and service access for under-resourced populations who disproportionately faced inequities prior to the pandemic, such as unhoused and Indigenous Peoples in Canada.[24] However, included studies failed to describe strategies to optimize technologies and it remains unclear who is responsible for sourcing and maintaining devices used to facilitate care.

Domain 5 - Social support, agency and belonging

A total of 33 studies highlighted the negative impact of social isolation on health, particularly for older adults in both urban and rural settings.[24–26,32,33,38,46,48,51,52,54–56] Community paramedicines' ability to address social isolation was evident in programs that used combinations of home-visits and clinics. When these models were embedded in social housing and supportive living sites, they were also well-positioned to address poverty, food insecurity and isolation of older adults.[33,48,52] The proximity that community paramedics have to individuals' home and work life enables them to assess for harmful physical environments like elder abuse and intimate partner violence.[47] While individuals and communities are not inherently vulnerable, groups made vulnerable due to cultural isolation and systemic and structural inequities such as discrimination on the basis of age, gender, sexuality, race, culture, refugee or immigration status, and incarceration were identified as populations that community paramedics encounter.[1,23,24,47,53] There was no data indicating the ways

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in which community paramedics are trained to consider inequities due to structural and systemic discrimination in their approach.

Community needs assessment

A total of 36 studies reported on models of service delivery. In addition to outlining the service models, studies discussed the need for programs to be designed around community needs.[4,23,30,37,41] There was alignment across studies recommending engaging caregivers, broader stakeholders, and community members early when designing needs-based programming. Studies shared consensus on the priority todevelop community needs approaches that are person-centred, incorporate co-design, and consider the complex barriers to health and social care in structurally oppressed populations.[1,4,23,24,47,49,50,57]

Social needs education

Paramedics received additional education focused on SDoH in 24 of the included studies, while Logan identified the benefit of paramedics receiving cross-training as Community Health Workers (CHW).[37] In all included studies, community paramedics are described as collaborating with allied health professional, social and community groups, amplifying the necessity of integrated and collaborative approaches to bolster the supports required to address social needs in community care planning. Leyenaar identified that community paramedicine patients demonstrated higher proportions of complex care needs, including chronic disease and mental health needs, when compared to respective home care and community services support clients.[49] Education has been identified as a key enabler to advancing community paramedicine and meeting complex needs.[4,11,25,50] While community paramedicine training was found to be diverse in allowing learning to address patient needs along a health and social continuum, the optimal prerequisite education and experience requirements for roles practising in community paramedicine was unclear.[4,58]

Discussion

This scoping review aimed to explore how community paramedicine supports social needs along a health and social continuum and to identify gaps and opportunities for future research. We identified 43 articles from four countries between 2003 and 2023. Our findings demonstrate that paramedicine is supporting social needs through a variety of program models across various settings.

Community paramedicine is expanding in the United Kingdom, the Republic of Ireland, Finland, Australia, New Zealand, Canada and the USA.[4,11,52,54,56,59] This model of care is rapidly evolving in response to ageing populations and to address gaps in primary care.[4,55,56] Expansion of the paramedicine specialty has been largely motivated by health system utilisation measures, where emergency department avoidance and readmission is a key driver.[4,52,54,56] Recognizing the benefits to optimizing service utilisation, attention should be called to including additional indicators such as healthcare experiences, outcomes, and improved social support. Where paramedic practice has traditionally taken a reactive and pathogenic approach to healthcare delivery, Cockrell advances the benefit of applying a salutogenic approach where care focuses on supporting health and well-being rather than factors that cause disease (salutogenesis).[25] Programs are engaging with this concept increasingly proactive ways, such as recognizing and targeting social needs as key determinants of health.[1,53,60] Community paramedicine has potential to enable values-based care models by integrating services with primary health and social services to reduce barriers for structurally marginalised populations.[41,46,61,62]

Advances in technology enable innovations in healthcare to bridge access to service gaps, including telehealth, remote patient monitoring and virtual care, particularly in response to the COVID-19 pandemic.[24,33,52] Despite this, the evidence fails to provide guidance on optimal approaches to leveraging technologies in coordinating and supporting care. Recommendations exist to develop standards for virtual care, social media use, and enhancing cross-jurisdiction communications to rapidly coordinate during crisis response.[63,64] This will also require developing standards for data

stewardship in program evaluation, quality improvement and research.[65] There is a need to engage health systems planners to determine the most appropriate responsibility for sustainably sourcing, maintaining and the ongoing education necessary to optimize technology in care.

Benefit was seen when paramedics integrated the extension of person-centred palliative care services into the home, and therefore supporting optimization of quality of life along the trajectory of illness.[66] Within a designated Indigenous community in the remote north of Canada, the establishment of community paramedicine could address many health and social service gaps.[23,67] Authors cautioned a one-size-fits-all approach and highlighted the need for programs to better address the needs of communities by including relevant program indicators.[4,23,30,67] A key recommendation across the literature was the need to meaningfully engage broader partners and communities early in program planning to understand how best to co-design and implement an integrated service model that addresses the specific needs of each community.[4,23,25,30,37,50] Also taking into consideration that if priority focus is on increasing access to health and social services provided by the state-only, this risks embedding settler colonialism in health and social equity efforts.[68] This requires paramedicine leaders to critically examine whose voices and perspectives are included at decision-making tables and whose are not. This reinforces the necessity to further study and incorporate equitable practices for community and stakeholder engagement and apply learnings from non-health professions to conduct community needs assessments.[23,37,41] In efforts to address health equity through optimization of health system utilisation and prevent duplication of services, it remains unclear to what extent community paramedicine is recognized for its capabilities and considered in health system planning.

The move towards tertiary education for community paramedicine specialisation in some jurisdictions provides greater opportunities for interprofessional learning to prepare paramedics as integrated members of the primary and greater healthcare team.[4,11,25,59,69] While studies mentioned additional paramedic training on SDoH, what this training entailed was unclear or implicit, and inconsistencies in this requirement across studies indicate opportunity to enhance this education to better prepare paramedics to respond to the complexities of care within the health and social continuum.[4,69]

Educators and program developers should expand beyond paramedicine to examine what can be learned from broader health and non-health professions in addressing equity along a health and social continuum. Paramedicine will reciprocally benefit from partnering, mentorship and collaboration with broad health and social professionals[62] While some studies in this review targeted social needs, few programs appeared to examine the implications of intersectionality and structural competency on health and social inequities.[1,50,57] This intentionality was applied in a study that examined women's experiences participating in a community paramedic program, where participants reported an overall reduction in barriers to care that specifically prioritized women's health needs.[31] Evidence shows workforce diversity gaps have a direct effect on care and outcomes, revealing that practitioners employed in more homogeneous environments possess greater risk of providing inequitable care.[70–74] Community paramedicine should lead responsibly by applying knowledge in the provision of intersectionality and structural competency to workforce recruitment strategies, practitioner education and systems-level planning.[10,14,15,75,76] A core tenet of community paramedicine is cultivating trusting relationships, and while paramedics are generally perceived as trusted health professionals, there is an opportunity to examine how program planning and implementation can be optimized by recruiting practitioners who represent and reflect the cultures of the communities served.[37,70,77]

As evidenced by this review, community paramedicine is rapidly evolving to provide responsive and integrated healthcare to communities. However, as Ford-Jones cautions - paramedics face tensions between implementing beneficial practice in response to unmet social needs, and the need to influence policymakers within health and non-health professions. Paramedics must take appropriate action at the public policy level to develop evidence-informed, upstream solutions to address broader determinants of health in sustainable ways.[50,78] Training paramedics to address increasing mental health needs is not a viable option to address the intersectional and structural

barriers that must be addressed via broader policy.[25,36,37,50] Acknowledging that political and socioeconomic factors are key determinants of health, there is a need for paramedicine broadly to determine roles in health and social advocacy to influence policy that commits to equity, for all.

Limitations

Despite efforts to be comprehensive, there may be relevant studies missed in this review. Areas where communities are leading development of community-led paramedicine programs to address local needs may not have published or reported work for inclusion. The inclusion of English-only papers risks overlooking potential studies of expanded paramedic roles or community paramedicine programs in countries where English is not the primary language.

Conclusion

Health system utilisation remains a predominant motivator behind community paramedicine service development. Community paramedicine programs are supporting social needs through a variety of service models. As program models evolve to address social needs of under-resourced and marginalised populations, we need to engage in community needs assessments to co-design service delivery. Better understanding of community needs will help to enhance paramedic education and engage interprofessional collaboration to best support social needs of individuals and communities. Paramedicine leaders, including paramedics themselves, have a social responsibility to advocate for and implement approaches to service delivery and care that addresses the needs of the person receiving care and their communities in ways that consider the complex intersections of health and social conditions to optimize health equity.[1–3,57,70]

Author contributions: TL and AB conceptualised the study. TL and AB conducted the initial and subsequent searches. TL and JB screened abstract and full texts for inclusion. TL extracted data from the included full texts. AB resolved conflicts in the screening phases and reviewed the extracted data. TL performed analysis, synthesised the results and authored the first draft. All authors edited the manuscript for intellectual content. All authors have approved the final version for publication and accept responsibility for its content.

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ORCID iD

Tyne M. Lunn https://orcid.org/0000-0002-4257-9968

Jennifer Bolster https://orcid.org/0000-0001-7239-5839

Alan M. Batt https://orcid.org/0000-0001-6473-5397

Appendix 1 - Search Strategy

Database: Ovid MEDLINE(R) <1946 to March 31, 2023>
Search Strategy:

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1 "social determinants of health".mp. (11939)

2 SDoH.mp. (664)

3 social needs.mp. (2234)

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4 poverty.mp. (65784)
5 homeless*.mp. (12711)
6 houseless*.mp. (18)
7 "food insecurity".mp. (5926)
8 "social isolation".mp. (21797)
9 "community paramedicine progra*".mp. (39)
10 "mobile integrated healthcare".mp.] (22)
11 "mobile integrated health care".mp. (8)
12 "community paramed*".mp. (153)
13 "paramed*".mp. (12112)
14 "community care paramedic".mp. (0)
15 isolat*.mp. (2050741)
16 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 15 (2141019)
17 9 or 10 or 11 or 12 or 13 or 14 (12125)
18 16 and 17 (370)
****

Appendix 2 - Data Extraction Form (within Covidence)

Study ID
Title
Title of paper / abstract / report that data are extracted from
Lead author contact details
Country in which the study was conducted

- United States
- UK
- Canada
- Australia
- Other

Characteristics of included studies
Aim/objective of study
Study design

- Randomised controlled trial
- Non-randomised experimental study
- Cohort study
- Cross sectional study
- Case control study
- Systematic review
- Qualitative research
- Prevalence study
- Case series
- Case report
- Diagnostic test accuracy study
- Clinical prediction rule

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- Economic evaluation
- Text and opinion
- Other

Start date

End date

Study funding sources

Possible conflicts of interest for study authors

Participants

Population description

Program setting

- Rural
- Urban
- Mixed
- Other

Type of program

- Home visit
- Clinic
- Mobile/outreach
- Other

Referral source

- 911 crew
- Secondary triage
- Community referral
- MRP referral
- Discharge referral
- Other

Inclusion criteria

Exclusion criteria

Total number of participants

Primary outcome

Social needs assessment conducted?

- Yes
- No
- Unclear

Social needs addressed

- Poverty/SES
- Housing
- Food insecurity
- Social support & isolation
- Mental health/substance use
- Access to services
- Employment
- Environmental

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- Health literacy
- Other

Paramedic education includes/targets SDoH

- Yes
- Unclear
- Other

Notes

Appendix 3 – Study Characteristics

Author(s) and Country of Origin	Year	Methodology	Key Findings	Categories
Allana et al, Canada	2021	Text and opinion	Better integration with the health system or new payment models for paramedic services may help realign the incentive to address social determinants, particularly where there are cost savings that occur in other parts of the health system as a result of paramedic care.	Poverty/SES; Housing; Food insecurity; Social support & isolation; Mental health/substance use; Access to services; Employment; Environmental; Health literacy
Boland et al, United States	2022	Cohort study	Statistically significant reductions in the mean incidence of ED utilization were observed across all sex and age groups, and reductions were observed irrespective of home visit frequency and quartile of baseline IR of 9-1-1 calls.	Social support & isolation; Mental health/substance use; Access to services
Buitrago et al, United States	2022	Other: Root Cause Analysis (RCA)	The top 5 root causes for readmission across the 79 readmitted patients (and therefore included in the CCA) were worsening of existing disease state, poor health literacy, new disease state, poor functional status, and behavioural health issues. The most common contributing factor for readmission for those with respiratory diseases was inadequate management of an existing disease state (n 5 16, 23.5%) followed by medication management (n 5 14, 20.6%). Functional status, behavioural health issues, and income limitations each represented 7.4% (n 5 5) of the total contributing factors. Poor health literacy and functional status.	Poverty/SES; Housing; Social support & isolation; Mental health/substance use; Access to services; Health literacy

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Chan et al, Canada	2019	Systematic review	Community paramedicine programs and training were diverse and allowed community paramedics to address a spectrum of population health and social needs. The types of services provided included assessment and screening, acute care and treatment, transport and referral, education and patient support, communication, and other (Table 3). Most common were physical assessment (n = 27; 46.6%), medication management (n = 23;39.7%), and assessment, referral, and/or transport to community services (n = 22; 37.9%). The training for these programs usually covered how to care for seniors; assessing the environment (e.g., home), health risks, and overall health; health promotion; and intervention-specific materials (n = 1 each; 25.0%)	Social support & isolation; Access to services; Health literacy
Cockrell et al, Australia	2019	Systematic review	These results fall into a number of broad categories. First, the impact rurality has on health and wellbeing, and then the way paramedics respond to those challenges. Next, the way social determinants of health impact capability and resilience and potential ways paramedics can impact health resilience in their practice. Finally, an exploration of the developing practice of paramedicine and the capacity of paramedics to engage in new roles and activities as they develop, especially in reference to using a salutogenic model in practice. However, rurality alone does not equate to higher morbidity and mortality rates, but rather exacerbates socioeconomic disadvantage, decreased access to healthcare, occupational risk and environmental hazards. There is the potential for disparities in rural communities to be further addressed using a salutogenic approach by paramedics. Successful community paramedicine (CP) programs are integrated within local healthcare systems and offer reasonable options for treatment or referrals in appropriate situations while being as unique as the communities in which they serve. The recent move toward tertiary education in paramedicine has provided programs with greater opportunities for	Poverty/SES; Social support & isolation; Access to services; Environmental; Health literacy

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			interprofessional learning (57). Interprofessional learning programs which educate paramedics to become members of the primary health team has shown to increase participation in patient education and health promotion. Most health professionals seem motivated and interested in participating in interprofessional practice, however, success is often hindered by embedded cultural behaviours and rigid professional boundaries (58)	
Ford-Jones and Daly, Canada	2022	Qualitative research	The study findings outline three promising practices: diversion programmes that transfer patients to a destination other than the ED; crisis response teams that attend calls identified as involving mental health and community paramedicine programmes including referral programmes. Community Paramedicine: The most consistently mentioned programme to address psychosocial concerns is the community referral programme, often called Community Referral by Emergency Medical Services (CREMS). Community paramedicine is a rapidly expanding domain of paramedicine, with many initiatives involving a more psychosocially focused follow-up for users of paramedic services. Other mental health-related initiatives in community paramedicine included follow-up by paramedic services and other mental health workers following substance use–related calls, as well as referral programmes for those with repeat police and ambulance interactions for mental health, substance use issues or psychosocial needs. While many of these programmes relate more specifically to chronic disease or home care, mental health and substance use–related needs have come to the forefront, even during the time of the field work, particularly in relation to the opioid crisis.	Mental health/substance use; Access to services

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Gainey et al, United States	2018	Case report	MIH providers were recruited early in the flood response to target vulnerable community members in need of the most assistance. The MIH team is a community-based model of care using paramedics to reach patients in their communities and homes. In addition to the novel utilization of MIH providers to assist disaster victims, the agency's three medical control physicians, all board-certified in emergency medicine and EMS, were also utilized in novel ways. In the early hours of the disaster, many calls for assistance came from citizens whose homes could not be accessed by traditional EMS ambulances given the extensive flooding. Some calls were forwarded to the physicians for telephone triage and assessment with some patients given self-care instructions via telephone. Additionally, during the operations phase of disaster response, the medical control physicians responded to in-field calls, providing medical care and appropriately triaging patients for transport versus non-transport to local hospitals. This became important for the appropriate utilization of EMS transport units and to maintain control of patient volumes transported to local hospital emergency departments. This utilization of EMS physicians augmented the work being performed by the MIH providers.	Housing; Access to services; Environmental
Georgiev et al, United States	2019	Case report	Community Paramedicine: Patients in this CP program experience complex health conditions and have limited access to resources, which negatively affect their SDoH. Individuals with low incomes are more likely to lack health insurance and have unmet medical needs, including care coordination and access to primary care. The NPs in this CP program identify the needs of a vulnerable population, provide individualized service based on SDoH, and coordinate care with team members. They also work closely with health economists and researchers to understand federal and state regulations that may impede or improve access to care for vulnerable populations. The recommendation for CP programs is to use a multidisciplinary approach.	Poverty/SES; Housing; Food insecurity; Social support & isolation; Mental health/substance use; Access to services; Environmental; Health literacy

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			Telemedicine: Telemedicine provides the capability for patients in homes to remotely connect to caregivers. One in four CP programs use telemedicine,16 and the use of telemedicine in CP has been proven to decrease hospital transports. Specially trained paramedics used physician-guided telemedicine to treat acutely ill patients with HF, dementia, diabetes, COPD, and decubitus ulcers in their homes.	
Hirello and Cameron, Canada	2021	Text and opinion	Paramedics play an important role in the Canadian healthcare system. They deliver high quality care on demand, in any region, to whomever needs it. However, for paramedics to fulfil their potential in modern healthcare, the profession must ensure its values are aligned with all other healthcare providers. This requires enactment of socially accountable practice at all levels of the paramedic profession, including educators, employers, policy makers, other healthcare providers and most importantly, practicing paramedics.	
Langabeer et al, Unites States	2020	Case report	Of the individuals who had an in-home conversation with the outreach team, 70 patients (33% success rate) engaged in same day treatment. Nearly 70% of the people we outreach to are socio-economically vulnerable, based on their lack of current employment, health insurance, or stable housing.	Poverty/SES; Housing; Social support & isolation; Mental health/substance use; Access to services; Employment; Health literacy
Leyenaar et al, Canada	2021	Other: Quantitative	Opportunity exists for further collaboration between community-based support services agencies and home care providers, community paramedicine home visit programs, and other parts of the healthcare continuum—particularly primary care providers—to improve coordination of care to medically complex community-dwelling older adults. High proportions of mental health-related conditions were identified in community paramedicine patients. Other research has demonstrated that mental health and social isolation can contribute to repeated 9-1-1 use. While we provided a comparison to other cohorts of community-dwelling older adults, further	Social support & isolation; Mental health/substance use; Access to services

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			comparisons are needed with additional community and geriatric mental health populations. When using existing community care populations as a reference group, it appears that patients seen in community paramedicine home visit programs are a distinct sub-group of the community-dwelling older adult population with more complex comorbidities, possibly exacerbated by mental illness and social isolation from living alone. Community paramedicine programs may serve as a sentinel support opportunity for patients whose health conditions are not being addressed through timely access to other existing care providers.	
Logan, United States	2022	Case report	explores how a group of paramedics were cross trained as community health workers (CHWs) in Indiana.	Poverty/SES; Housing; Food insecurity; Social support & isolation; Mental health/substance use; Access to services; Employment; Environmental; Health literacy
McManamny et al, Australia	2022	Qualitative research	Key Themes: Role - trusted; visible within the community; skilled; importance of networking; widespread coverage; varied Other Service - importance of "territory"; filling a gap or void; the rural GP Barriers - other services; funding; time Activities - opportunities; individual community needs; hospital avoidance The results of this study suggest that paramedic health education for rural-dwelling older people is both feasible and acceptable to older people and to the community; however, a range of barriers challenge the concept of paramedics working within this expanded scope.	Social support & isolation; Access to services; Health literacy

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Moczygemba et al, Unites States	2021	Qualitative research	Qualitative data indicated that unlimited smartphone access allowed participants to meet social needs and maintain contact with case managers, health care providers, family, and friends. mHealth interventions are acceptable to people experiencing homelessness. HIE data provided more accurate ED and hospital visit information; however, unlimited access to reliable communication provided benefits to participants beyond the study purpose of improving care coordination.	Poverty/SES; Housing; Food insecurity; Social support & isolation; Mental health/substance use; Access to services; Employment; Health literacy
Mund et al, United States	2016	Text and opinion	mobile integrated health units address gaps and barriers experienced by geographically, socially, economically and/or culturally isolated to accessing health and social services	Poverty/SES; Housing; Food insecurity; Social support & isolation; Mental health/substance use; Access to services; Employment; Environmental; Health literacy; Other: refugee, immigration status
Naimi et al, United States	2023	Diagnostic test accuracy study	It was common for patients to have more than seven individual SDoH needs. The most frequently identified individual SDoH needs were categorized in the Coordination of Healthcare (37.7% of all needs), Durable Medical Equipment (18.8%), and Medication (16.3%) domains. The four needs correlated with the largest statistically significant increases in 30-day hospital utilization—portable oxygen, social security card, home health, and physical therapy—are also correlated with statistically significant increases in HOSPITAL score, making them good targets for focused interventions.	Poverty/SES; Housing; Food insecurity; Social support & isolation; Mental health/substance use; Access to services; Employment; Environmental; Health literacy; Other: durable medical equipment - transportation - utilities - access to ID documents - coordination of health care needs - medication

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Pennel et al, United States	2016	Other: comparative case study	Across the three paramedic care coordination sites, four major themes emerged. These were: (1) a shift in the paramedic and patient interactions from episodic, crisis- based to longer- term, ongoing; (2) aspects of the rural environmental and social context that enabled and constrained paramedic care coordination programs; (3) impacts of care coordination including patient peace of mind as well as improved use of preventive health care and disease self- management; and (4) major concerns voiced about programs' sustainability.	Poverty/SES; Food insecurity; Social support & isolation; Mental health/substance use; Access to services; Environmental; Health literacy; Other: education - language barriers - uninsured - disability - immigration status - transportation - healthcare coordination
Pirrie et al, Canada	2020	Cross sectional study	Measurements: poverty, food insecurity and risk factors. The poverty rate was lower than expected which could be related to the surrounding environment and perceptions around wealth. Food insecurity was approximately twice that of the general population of older adults in Canada, which could be related to inaccessibility and increased barriers to healthy foods. For those who reported being food secure, dietary habits were considered poor. While social housing may function as a financial benefit and reduce perceived poverty, future interventions are needed to improve the quality of diet consumed by this vulnerable population.	Poverty/SES; Housing; Food insecurity; Social support & isolation; Mental health/substance use; Access to services
Rahim et al, United States	2022	Text and opinion	Community Paramedicine has potential to enable value-based care models, increase access to primary care, reduce burden on EMS and EDs - specifically filling gaps for marginalized populations accessing primary care.	Poverty/SES; Housing; Food insecurity; Social support & isolation; Mental health/substance use; Access to services; Employment; Environmental; Health literacy
Ridgeway et al, United States	2023	Qualitative research	The clinic received favourable survey ratings on acceptability, appropriateness, feasibility, program favourability (mean [SD], 4.5 [0.9]), likelihood to recommend (mean [SD], 4.6 [0.9]), and accessibility (mean [SD], 4.2 [0.8]), all on 1–5 scales, with slight variations across groups (Appendix, Exhibit 1).	Poverty/SES; Housing; Food insecurity; Social support & isolation; Mental health/substance use; Access to services

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			Interviews deepened understanding of implementation (Table 4).	
Rosa et al, Canada	2021	Text and opinion	The literature has identified discrepancies with the delivery of timely and accessible in-home palliative care.13 Community paramedicine has been suggested as a viable option to bridge this gap.	Social support & isolation; Access to services
Ruest et al, Canada	2016	Text and opinion	Community Paramedics are in an excellent position to see the importance of health promotion and injury prevention and can use their position in the community to advocate on the part of the client and community, thereby drawing attention from the traditional illness care to a broader aspect of treatment, promotion and prevention. Community Paramedics can easily expand their role to become Health Promotion experts and advocates of the rural older adult population, ensuring that each person has equitable access to all resources required to advert social isolation. "We hope that, regardless of where they live, older people enjoy equal opportunity of access to services for equal needs".	Poverty/SES; Housing; Food insecurity; Social support & isolation; Access to services; Employment; Environmental; Health literacy
Schwab-Reese et al, United States	2021	Qualitative research	Participants viewed the community paramedic as a trusted provider who supplied necessary health information and support and served as their advocate. In their role as physician extenders, the community paramedics enhanced patient care through monitoring critical situations, facilitating communication with other providers, and supporting routine healthcare. Women noted how community paramedics connected them to outside resources (i.e., other experts, tangible goods), which aimed to support their holistic health and wellbeing.	Poverty/SES; Housing; Food insecurity; Social support & isolation; Mental health/substance use; Access to services; Employment; Environmental; Health literacy; Other: Education
Shannon et al, Australia	2022	Systematic review (rapid)	The outcome measures reported show that there is evidence to support the implementation of community paramedicine into healthcare system design. Community paramedicine programmes result in a net reduction in acute healthcare utilisation, appear to be economically viable and result in positive patient outcomes with high patient satisfaction with care; This review identified and	Access to services

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			explored community paramedicine literature focused on five key areas: education, models of delivery, governance and clinical support, the scope of the role and outcomes associated with community paramedic models. Models of care delivery: community assessment/referral; community paramedic-led clinics; home visit programs; remote patient monitoring; community paramedicine specialist response; hospital discharge/transitional care support; palliative care; influenza surge programs; COVID response programs. A key recommendation and lesson reported in the literature across multiple studies was the essential role of understanding the community needs and factors that enabled a sustainable community paramedicine programme (Leyenaar, McLeod, et al., 2019; Pearson & Shaler, 2017; Seidl et al., 2021). O'Meara et al. (2015) advised that engaging appropriately with the community can result in more integrated paramedic services, working as part of a less-fragmented system across the health, aged care and social service sectors. This was found to also be important to prevent duplication and overlap of existing service delivery (Feldman et al., 2021). The findings of this review demonstrate a lack of research and understanding of the education and scope of the role of community paramedics, and also highlighted a need to develop common approaches to education and scope while maintaining flexibility in addressing community needs. There was a lack of standardisation in the implementation of governance and supervision models which may prevent community paramedicine from realising its full potential. Finally, although there has been an increased focus on outcomes in the literature, such reporting is inconsistent. This inconsistency, and the gaps evident across the other areas of focus, makes it difficult to articulate what community paramedicine programmes can achieve and their impacts on the healthcare system.	

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Sokan et al, United States	2022	Case control study	This pilot study demonstrated a trend toward improved medication adherence among patients enrolled in the MIH-CP program.	Social support & isolation; Mental health/substance use; Access to services; Environmental; Health literacy
Stickler et al, United States	2021	Case report	The Mobile COVID-19 Unit was rapidly developed and deployed. It was successful in educating patients on self-management, provision of timely medical care for COVID-19 and other acute and chronic health conditions and building trust with this underserved community. The Unit also supported COVID-19 vaccination of unsheltered adults in conjunction with OCPH. Success of this program was predicated on close communication between the CP team, Olmsted County Housing Stability Team, and shelter staff; versatility of CP skills spanning education, social support, and medical evaluation/management; and endorsement by community partners respected by the homeless community.	Poverty/SES; Housing; Food insecurity; Social support & isolation; Mental health/substance use; Access to services; Employment; Environmental; Health literacy
Strum et al, Canada	2015	Text and opinion	Paramedics are well positioned to serve as health advocates to respond to individual patient health needs, respond to health needs of the communities, identify determinants of health of populations they serve, and promote the health of individual communities and populations. Community Paramedicine is an evolving service model that enabled paramedics as health advocates.	Poverty/SES; Housing; Food insecurity; Social support & isolation; Access to services; Employment; Health literacy; Other: Education - Early Childhood Development - Working Conditions
Swayze et al, United States	2016	Text and opinion	Mobile Integrated Healthcare-Community Paramedicine (MIH-CP) supports chronic disease by addressing individuals' determinants of health through 1. patient education 2. medication inventory/reconciliation and connecting individuals to 3. social support interventions 4. environmental interventions 5. economic support interventions	Poverty/SES; Housing; Food insecurity; Social support & isolation; Mental health/substance use; Access to services; Employment; Environmental; Health literacy

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Taplin et al, Canada	2022	Cohort study	Emergency department visits were unchanged following the initial visit, while there were significant increases in community-based care. In the year following the initial community paramedic visit there were small but significant increases in community-based care utilization of people experiencing homelessness. These data suggest that the continued development and implementation of paramedics as part of an interdisciplinary care team can increase access to care for a traditionally underserved population with complex health needs. Patients would likely benefit from the integration of community paramedics in community-based management that aim to improve access to care following ED visits.	Poverty/SES; Housing; Food insecurity; Social support & isolation; Mental health/substance use; Access to services; Employment; Environmental; Health literacy
Taplin et al, Canada	2023	Qualitative research	The community paramedics address the health and social needs of individuals experiencing homelessness (IEH) while working in a multidisciplinary setting. The CCT is an innovative program that can inform future health service design in similar settings.	Poverty/SES; Housing; Food insecurity; Social support & isolation; Mental health/substance use; Access to services; Employment; Environmental; Health literacy
Newall, Canada	2015	Grey Lit	Paramedics with Winnipeg Fire Paramedic Services beginning to do more preventative community work – calling this community paramedicine. Community Paramedic initiative Emergency Paramedics in the Community (EPIC) project – focuses on common 911 callers; perform in-community medical assessments; refer to community resources. Main purpose is to provide preventative medical care and prevent unnecessary 911 calls proactively. EPIC targets frequent 911 callers and at-risk individuals, including those isolated, substance misuse, mental illness, chronic disease	social isolation; loneliness, food security, elder abuse, mental health, substance use; access to services
Raven et al, Australia	2006	Grey Lit	Review summary of expanded paramedic roles supporting social needs; Nova Scotia, Canada community-initiated community paramedicine program to address healthcare needs of citizens geographically isolated on an island; East Anglian Ambulance Service, UK operationalized community	remote/rural, social isolation, access to health services, mental health

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			paramedics in urban areas to address gaps in accessing health services, linking nursing-social-mental health teams to persons receiving care	
Thomas-Henkel and Schulman, United States	2017	Grey Lit	Community paramedics use an electronic record tool to screen for SDoH during home visits; electronic record is integrated with EPIC EMR allowing for interprofessional reporting and referrals; community paramedics are well positioned for screening and assessments based on their unique understanding of communities	substance use; race; ethnicity; income/SES; education; intimate partner violence (IPV)/; interpersonal safety/violence; physical activity; social isolation; insurance status; incarceration; mental health; food security; housing; legal barriers; childcare; working conditions; access to health services; medications; transportation; language barriers; refugee status; temporary foreign worker; veteran status
Olynyk, Canada	2010	Grey Lit	Utilizes CPs to connect individuals to core services: nursing, personal support, PT/OT, Speech-Language Therapy, extreme cleaning and secondary services: social work, nutritional counselling, medical equipment/supplies, health care referrals, public health, health education, long term care placement	care coordination; disability; mental health (including hoarding); people who use drugs or alcohol; cognitive pathology (dementia); need for Supportive Living placement; homelessness; social isolation
Nolan et al, Canada	2012	Grey Lit	overview of Community Paramedicine programs across Canada; some service delivery involves the provision of connecting health and social services, filling healthcare gaps, access to health services, remote/rural healthcare service; service to marginalized populations	access to health services; remote/rural living; social isolation; living environment; age; gender; income/SES; poverty; cultural isolation/social integration

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Misner, Canada	2003	Grey Lit	Community paramedicine, while not a new idea, has never before been used in collaboration with a nurse practitioner and an off-site physician. Expanded paramedic role to address geographically isolated citizens; community-initiated/community-led; community needs-assessment via town-hall engagement followed by survey; off-site physician oversight; supported with additional paramedic education sessions to prepare for expanded community work; increased paramedic coverage, paramedic-staffed clinics for screening, prevention, health promotion; incorporated NP collaborative practice – enabled expansion to more complex care services; lab diagnostics; relationship building with Islanders; building collaborative relationships with community services and health professionals such as Home Care	Remote/rural living; access to health services
Hay, Canada	2006	Grey Lit	Community Paramedicine as an innovative model addressing gaps in healthcare service delivery to vulnerable populations	rural living; homelessness
Ashton and Leyenaar, Canada	2019	Grey Lit	This case study demonstrates that CSA Z1630 does provide useful guidance for the implementation of community paramedicine in a remote Indigenous community in the North. In the absence of an existing paramedic service, the findings of the study show that while specific aspects of the Standard are applicable, other elements would only be applicable once a paramedic service was established. The report identifies a number of areas where revisions to the Standard would make it more applicable to address the needs of remote Indigenous communities, such as relevant program indicators and broader stakeholder and partner participation in community paramedicine planning, and program and service delivery.; community-needs assessment, consultation; community member, services and interprofessional collaboration	remote/rural living; social isolation; access to health services; income/SES; employment/working conditions; education/literacy; childhood experiences; physical environment; social supports/coping skills; culture

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CSA, Canada	2017	Grey Lit	National Standard to provide guidance to fully understand context, key considerations, and essential elements for community paramedicine program development; Section 5.3 Specialized Capabilities, g) understanding the social determinants of health	access to health services; remote/rural living; social isolation; living environment; age; gender; income/SES; poverty; cultural isolation/social integration
Batt et al, Canada	2021	Grey lit	Community paramedicine programs have evolved to meet the needs of their communities. They have achieved this by responding to COVID-19 in collaboration with public health agencies; leveraging technology to facilitate remote monitoring and virtual visits; addressing social inequities in their communities, such as access to health care and social services; and by meeting the needs of vulnerable populations, who already faced issues in equity of access to services prior to the pandemic. The COVID-19 pandemic has highlighted the essential collaborative care role community paramedicine programs can provide to patients in their homes or communities. These programs have demonstrated their ability to support public health measures, provide home and community-based care, and most importantly, collaborate with other health care professionals in coordinating and providing care to Canadians regardless of social circumstances.	older adults; race/ethnicity (Indigenous Peoples); homelessness; palliative care; people who use drugs; immigrants and migrant workers; incarcerated; food security; poverty; health literacy; internet access; caregiver support; care coordination
PHECC, Ireland	2020	Grey Lit	Community Paramedicine is an opportunity to combine emergency care with primary care to support health equity in rural regions; Report Recommendations: 1. focus on shifting care from acute hospital to community 2. include the word "paramedic' in the title determined for Community Paramedic practitioner 3. mainstreaming of community paramedicine to Ireland and engage with wider stakeholders 4. set standards and educational outcomes 5. integrate community paramedicine into primary and acute care 6. take cognisance of the evaluation of pilot projects 7. engage a sub-group to set clinical standards 8. robust	access to health services; rural living

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			clinical governance structures, licensed providers 9. enabling legislation changes	
Shannon et al, Australia	2021	Grey lit	scoping review spanned 7 countries; varied program models and education requirements; over-arching themes relevant to supporting social needs 1. community-needs 2. collaboration, interprofessional, community, stakeholders 3. communication for role clarity, misconceptions 4. support of CP, experienced paramedic recruitment, workforce support 5. research, evaluation, data-sharing. Core: community-centred approaches, interprofessional practice, and program evaluation as enabling factors of community paramedicine program development and implementation	access to health services;
PHECC, Ireland	2022	Grey Lit	framework founded on community paramedicine model: 1. healthcare service 2. specialist paramedic - community care 3. community need; potential settings of care include integrated health-social service; scope of practice addresses SDoH, social needs; educational domains to support social needs - integration into primary care, communications, teamwork	health promotion; health literacy; substance use; mental health; homelessness; palliative care; care coordination; health and social services referrals; advocacy

References

1. Allana A, Pinto AD. Paramedics Have Untapped Potential to Address Social Determinants of Health in Canada (2021, accessed 26 April 2023).
2. Tavares W, Allana A, Beaune L, et al. Principles to Guide the Future of Paramedicine in Canada. *Prehospital Emergency Care* 2021; 1–11.
3. Tavares W, Bowles R, Donelon B. Informing a Canadian paramedic profile: framing concepts, roles and crosscutting themes. *BMC Health Serv Res* 2016; 16: 477.
4. Shannon B, Eaton G, Lanos C, et al. The development of community paramedicine; a restricted review. *Health & Social Care in the Community* 2022; 30: e3547–e3561.
5. Wingrove G. International Roundtable on Community Paramedicine. *Australasian Journal of Paramedicine*; 9. Epub ahead of print 7 February 2011. DOI: 10.33151/ajp.9.1.33.
6. Commission on Social Determinants of Health. Closing the gap in a generation: health equity through action on the social determinants of health : final report of the commission on social determinants of health. *Combler le fossé en une génération : instaurer l'équité en santé en agissant sur les déterminants sociaux de la santé : rapport final de la Commission des Déterminants sociaux de la Santé* 2008; 247.
7. Essington T, Bowles R, Donelon B. The Canadian Paramedicine Education Guidance Document.
8. Porroche-Escudero A. Health systems and quality of healthcare: bringing back missing discussions about gender and sexuality. *Health Systems* 2022; 1–7.
9. IISD. Who Is Being Left Behind in Canada? *International Institute for Sustainable Development*, https://www.iisd.org/articles/insight/who-being-left-behind-canada (2023, accessed 31 March 2023).

10. Truth and Reconciliation Commission of Canada. *Honouring the truth, reconciling for the future: summary of the final report of the Truth and Reconciliation Commission of Canada.*, http://epe.lac-bac.gc.ca/100/201/301/weekly_acquisition_lists/2015/w15-24-F-E.html/collections/collection_2015/trc/IR4-7-2015-eng.pdf (2015, accessed 30 March 2021).
11. Shannon B, Batt AM, Eaton G, et al. *Community Paramedicine Practice Framework Scoping Exercise*, https://www.phecit.ie/Custom/BSIDocumentSelector/Pages/DocumentViewer.aspx?id=oGsVrspmiT0dOhDFFXZvIz0q5GYO7igwzB6buxHEgeAwoe6hhx3Qzd%252fCRqybt66szE0PsYSC8wDndnJ4ZZBtixIuvZKX1%252f4wN58oIZl8uwPebsYwRo0IvX6hVCWn5T8FxWsBQJfWSaVSf%252bRJ%252b80BMTb0c8d%252b63Hj (2021, accessed 18 May 2023).
12. Arksey H, O'Malley L. Scoping studies: towards a methodological framework. *International Journal of Social Research Methodology* 2005; 8: 19–32.
13. Munn Z, Peters MDJ, Stern C, et al. Systematic review or scoping review? Guidance for authors when choosing between a systematic or scoping review approach. *BMC Medical Research Methodology* 2018; 18: 143.
14. Cho S, Crenshaw KW, McCall L. Toward a Field of Intersectionality Studies: Theory, Applications, and Praxis. *Signs: Journal of Women in Culture and Society* 2013; 38: 785–810.
15. Nixon SA. The coin model of privilege and critical allyship: implications for health. *BMC Public Health* 2019; 19: 1637.
16. Peters MDJ, Marnie C, Tricco AC, et al. Updated methodological guidance for the conduct of scoping reviews. *JBI Evidence Synthesis* 2020; 18: 2119–2126.
17. Tricco AC, Lillie E, Zarin W, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. *Ann Intern Med* 2018; 169: 467–473.
18. Grey Matters: a practical tool for searching health-related grey literature | CADTH, https://www.cadth.ca/grey-matters-practical-tool-searching-health-related-grey-literature (accessed 11 June 2023).
19. Haddaway NR, Grainger MJ, Gray CT. citationchaser: An R package and Shiny app for forward and backward citations chasing in academic searching. Epub ahead of print 16 February 2021. DOI: 10.5281/zenodo.4543513.
20. Francis E. 11.2.8 Analysis of the evidence - JBI Manual for Evidence Synthesis - JBI Global Wiki, https://jbi-global-wiki.refined.site/space/MANUAL/4687681 (accessed 11 June 2023).
21. Hsieh H-F, Shannon SE. Three Approaches to Qualitative Content Analysis. *Qual Health Res* 2005; 15: 1277–1288.
22. Thomas E, Magilvy JK. Qualitative Rigor or Research Validity in Qualitative Research. *Journal for Specialists in Pediatric Nursing* 2011; 16: 151–155.
23. Ashton C, Leyenaar MS. *Health Service Needs in the North: A Case Study on CSA Standard for Community Paramedicine*. Canada: Canadian Standards Association.
24. Batt AM, Hultink A, Lanos C, et al. Advances in Community Paramedicine in Response to COVID-19.
25. Cockrell KR, Reed B, Wilson L. Rural paramedics' capacity for utilising a salutogenic approach to healthcare delivery: a literature review. *Australasian Journal of Paramedicine*; 16. Epub ahead of print 23 April 2019. DOI: 10.33151/ajp.16.635.
26. Misner D. Community Paramedicine: A Part of an Integrated Health Care System, https://ircp.info/Portals/11/Downloads/Expanded%20Role/Community%20Paramedicine.pdf?ver=TfO8p2_1qDzq4LlLyNLlqA%3d%3d (2003, accessed 18 May 2023).
27. Buitrago I, Seidl KL, Gingold DB, et al. Analysis of Readmissions in a Mobile Integrated Health Transitional Care Program Using Root Cause Analysis and Common Cause Analysis. *J Healthc Qual* 2022; 44: 169–177.
28. Sokan O, Stryckman B, Liang Y, et al. Impact of a mobile integrated healthcare and community paramedicine program on improving medication adherence in patients with heart failure and chronic obstructive pulmonary disease after hospital discharge: A pilot study. *Exploratory Research in Clinical and Social Pharmacy* 2022; 8: 100201.
29. Olynyk C. Toronto EMS Community Paramedicine Program Overview 2010, https://ircp.info/Portals/11/Downloads/Expanded%20Role/Toronto%20CREMS/Toronto%20EMS%20Community%20Paramedicine%20Program%20Overview%202010.pdf?ver=Vn9xFmVDYfFxk0pJG0QiFw%3d%3d (2010, accessed 3 June 2023).
30. Taplin J, Dalgarno D, Smith M, et al. Community paramedic outreach support for people experiencing homelessness. *Journal of Paramedic Practice*; 15.
31. Schwab-Reese LM, Renner LM, King H, et al. "They're very passionate about making sure that women stay healthy": a qualitative examination of women's experiences participating in a community paramedicine program. *BMC Health Serv Res* 2021; 21: 1167.
32. Pennel CL, Tamayo L, Wells R, et al. Emergency Medical Service-based Care Coordination for Three Rural Communities. *Journal of Health Care for the Poor and Underserved* 2016; 27: 159–180.

33. Ruest M. County of Renfrew Paramedic Service Resilience Program Contribution to the Health Promotion Strategies that Address the Inequities Associated with Social Isolation of Seniors in the County of Renfrew. *Canadian Paramedicine*, 2016.
34. Boland LL, Jin D, Hedger KP, et al. Evaluation of an EMS-Based Community Paramedic Pilot Program to Reduce Frequency of 9-1-1 Calls among High Utilizers. *Prehospital Emergency Care* 2022; 1–8.
35. Georgiev R, Stryckman B, Velez R. The Integral Role of Nurse Practitioners in Community Paramedicine. *The Journal for Nurse Practitioners* 2019; 15: 725–731.
36. Langabeer JR, Persse D, Yatsco A, et al. A Framework for EMS Outreach for Drug Overdose Survivors: A Case Report of the Houston Emergency Opioid Engagement System. *Prehospital Emergency Care* 2021; 25: 441–448.
37. Logan RI. 'I Certainly Wasn't as Patient-Centred': Impacts and Potentials of Cross-Training Paramedics as Community Health Workers. *Anthropology in Action* 2022; 29: 14–22.
38. McManamny TE, Boyd L, Sheen J, et al. Feasibility and acceptability of paramedic-initiated health education for rural-dwelling older people. *Health Education Journal* 2022; 81: 848–861.
39. Moczygemba LR, Thurman W, Tormey K, et al. GPS Mobile Health Intervention Among People Experiencing Homelessness: Pre-Post Study. *JMIR Mhealth Uhealth* 2021; 9: e25553.
40. Mund E. Taking Care to the Streets. *EMSWorld*, https://lw.hmpgloballearningnetwork.com/site/emsworld/article/12179630/taking-mih-cp-care-to-the-streets (2016, accessed 11 June 2023).
41. Rahim F, Jain B, Patel T, et al. Community Paramedicine: An Innovative Model for Value-Based Care Delivery. *Journal of Public Health Management and Practice*; Publish Ahead of Print. Epub ahead of print 2 December 2022. DOI: 10.1097/PHH.0000000000001683.
42. Gainey CE, Brown HA, Gerard WC. Utilization of Mobile Integrated Health Providers During a Flood Disaster in South Carolina (USA). *Prehosp Disaster med* 2018; 33: 432–435.
43. Taplin JG, Barnabe CM, Blanchard IE, et al. Health service utilization by people experiencing homelessness and engaging with community paramedics: a pre–post study. *Can J Emerg Med* 2022; 24: 885–889.
44. Ridgeway JL, Wissler Gerdes EO, Zhu X, et al. A Community Paramedic Clinic at a Day Center for Adults Experiencing Homelessness. *NEJM Catalyst*; 4. Epub ahead of print 15 March 2023. DOI: 10.1056/CAT.22.0300.
45. Stickler ZR, Carlson PN, Myers L, et al. Community Paramedic Mobile COVID-19 Unit Serving People Experiencing Homelessness. *Ann Fam Med* 2021; 19: 562–562.
46. Strum R. Paramedics as Health Advocates. *Canadian Paramedicine*, 2015.
47. Thomas-Henkel C, Schulman M. Screening for Social Determinants of Health in Populations with Complex Needs: Implementation Considerations.
48. Pirrie M, Harrison L, Angeles R, et al. Poverty and food insecurity of older adults living in social housing in Ontario: a cross-sectional study. *BMC Public Health* 2020; 20: 1320.
49. Leyenaar MS, McLeod B, Jones A, et al. Paramedics assessing patients with complex comorbidities in community settings: results from the CARPE study. *Can J Emerg Med* 2021; 23: 828–836.
50. Ford-Jones PC, Daly T. Filling the gap: Mental health and psychosocial paramedicine programming in Ontario, Canada. *Health Social Care Comm* 2022; 30: 744–752.
51. Newall N. *Who's At My Door Project: How organizations find and assist socially isolated older adults*. Winnipeg, Manitoba: Centre on Aging.
52. Nolan M, Hillier T, D'Angelo C. *Community Paramedicine in Canada*, https://ircp.info/Portals/11/Downloads/Policy/Comm%20Paramedicine%20in%20Canada.pdf?ver=XJMZv0HNBUMEpxqc9etOFg%3d%3d (2012, accessed 3 June 2023).
53. Naimi S, Stryckman B, Liang Y, et al. Evaluating Social Determinants of Health in a Mobile Integrated Healthcare-Community Paramedicine Program. *J Community Health* 2023; 48: 79–88.
54. Raven S, Tippett V, Ferguson J-G, et al. *An exploration of expanded paramedic healthcare roles for Queensland*. Queensland, Australia: Australian Centre for Prehospital Research.
55. Hay D, Varga-Toth J, Hines E. *Frontline Health Care in Canada: Innovations in Delivering Services to Vulnerable Populations*. Research Report F, 63, September 2006.
56. PHECC. *The introduction of Community Paramedicine into Ireland*, https://www.phecit.ie/Custom/BSIDocumentSelector/Pages/DocumentViewer.aspx?id=oGsVrspmiT0dOhDFFXZvIz0q5GYO7igwzB6buxHEgeDKMmmW%252fnE3lbsxRkYxd6aQYk7snfcymr0EG16DvMZvqmNsz5SqfTY2bCjDsrkmvfchr0f6fWdxsRfEpP0eHF2WFYnnA1HA6sq8buhbiuE7hUxFSMEFO%252btRyWB31RTiP1quSbFCsa%252bZGt6Ri4g1h1nnWZcXksZCSqw%253d (2020, accessed 18 May 2023).
57. Hirello L, Cameron C. Improving Paramedicine through Social Accountability. *Canadian Paramedicine*, 2021, https://canadianparamedicine.ca/special-editions/ (2021).
58. Chan J, Griffith LE, Costa AP, et al. Community paramedicine: A systematic review of program descriptions and training. *CJEM* 2019; 21: 749–761.

59. PHECC. *Community Paramedicine in Ireland: a framework for the specialist paramedic*, https://www.phecit.ie/Custom/BSIDocumentSelector/Pages/DocumentViewer.aspx?id=oGsVrspmiT0dOhDFFXZvIz0q5GYO7igwzB6buxHEgeDq00klOJxrAiwRg8WilA7iQpuh0JuuyxLZ%252fgoqHj9YAdVJBi%252feIjLQQQejAdgErxHc1gOlnYuCfGcZtM%252fFZTDuGELCeo4hOpwR2WpMNptaZMMl%252biPM01lTiSTAjYn0UiWidbzfXGJzNluN5VUHbqIsRWHtJZQ5aTg%253d (2022, accessed 18 May 2023).
60. Agarwal G, Lee J, McLeod B, et al. Social factors in frequent callers: a description of isolation, poverty and quality of life in those calling emergency medical services frequently. *BMC Public Health* 2019; 19: 684.
61. Agarwal G, Brydges M. Effects of a community health promotion program on social factors in a vulnerable older adult population residing in social housing. *BMC Geriatr* 2018; 18: 95.
62. Agarwal G, Keenan A, Pirrie M, et al. Integrating community paramedicine with primary health care: a qualitative study of community paramedic views. *CMAJ Open*; 10. Epub ahead of print 2022. DOI: 10.9778/cmajo.20210179.
63. Batt AM, Bank J, Bolster J. Canadian Paramedic Landscape Review and Standards Roadmap.
64. Bolster J, Batt AM, Pithia P. Emerging Concepts in the Paramedicine Literature to Inform the Revision of a Pan-Canadian Competency Framework for Paramedics: A Restricted Review. Epub ahead of print 2022. DOI: 10.7759/cureus.32864.
65. First Nation Information Governance Centre - OCAP Principles. *The First Nations Information Governance Centre*, https://fnigc.ca/ (accessed 11 June 2023).
66. Rosa A, Dissanayake M, Carter D, et al. Community paramedicine to support palliative care. *Progress in Palliative Care* 2021; 0: 1–5.
67. CSA. Community paramedicine: Framework for program development, https://www.csagroup.org/store-resources/documents/codes-and-standards/2425275.pdf (2017, accessed 18 May 2023).
68. Gebhard A, McLean S, St Denis V. *White benevolence: racism and colonial violence in the helping professions*. Canada: Fernwood Publishing Company, 2022.
69. O'Meara P, Ruest M, Stirling C. Community Paramedicine: Higher Education as An Enabling Factor. *Australasian Journal of Paramedicine* 2014; 11: 1–9.
70. NAEMSE. NAEMSE Consensus Statement on Diversity, Equity, Inclusion, and Belonging. *Prehospital Emergency Care*, https://www.tandfonline.com/doi/pdf/10.1080/10903127.2023.2212753?download=true (2023, accessed 11 June 2023).
71. Alsan M, Garrick O, Graziani G. Does Diversity Matter for Health? Experimental Evidence from Oakland. *American Economic Review* 2019; 109: 4071–4111.
72. Crowe RP, Krebs W, Cash RE, et al. Females and Minority Racial/Ethnic Groups Remain Underrepresented in Emergency Medical Services: A Ten-Year Assessment, 2008–2017. *Prehospital Emergency Care* 2020; 24: 180–187.
73. Rosenkranz KM, Arora TK, Termuhlen PM, et al. Diversity, Equity and Inclusion in Medicine: Why It Matters and How do We Achieve It? *Journal of Surgical Education* 2021; 78: 1058–1065.
74. Rudman JS, Farcas A, Salazar GA, et al. Diversity, Equity, and Inclusion in the United States Emergency Medical Services Workforce: A Scoping Review. *Prehospital Emergency Care* 2023; 27: 385–397.
75. Metzl JM, Hansen H. Structural competency: Theorizing a new medical engagement with stigma and inequality. *Social Science & Medicine* 2014; 103: 126–133.
76. Castillo EG, Isom J, DeBonis KL, et al. Reconsidering Systems-Based Practice: Advancing Structural Competency, Health Equity, and Social Responsibility in Graduate Medical Education. *Academic Medicine* 2020; 95: 1817–1822.
77. Coletto D. Canadians Are Ready for Paramedics to Do More in Healthcare: Abacus Data Poll, https://abacusdata.ca/pac-2023/ (2023, accessed 9 June 2023).
78. Allana A, Tavares W, Pinto AD, et al. Designing and Governing Responsive Local Care Systems – Insights from a Scoping Review of Paramedics in Integrated Models of Care. *IJIC* 2022; 22: 5, 1–19.
79. Allan B. *First Peoples, Second Class Treatment*. Toronto: Li Ka Shing Knowledge Institute, https://www.wellesleyinstitute.com/wp-content/uploads/2015/02/Summary-First-Peoples-Second-Class-Treatment-Final.pdf (2015, accessed 1 October 2021).