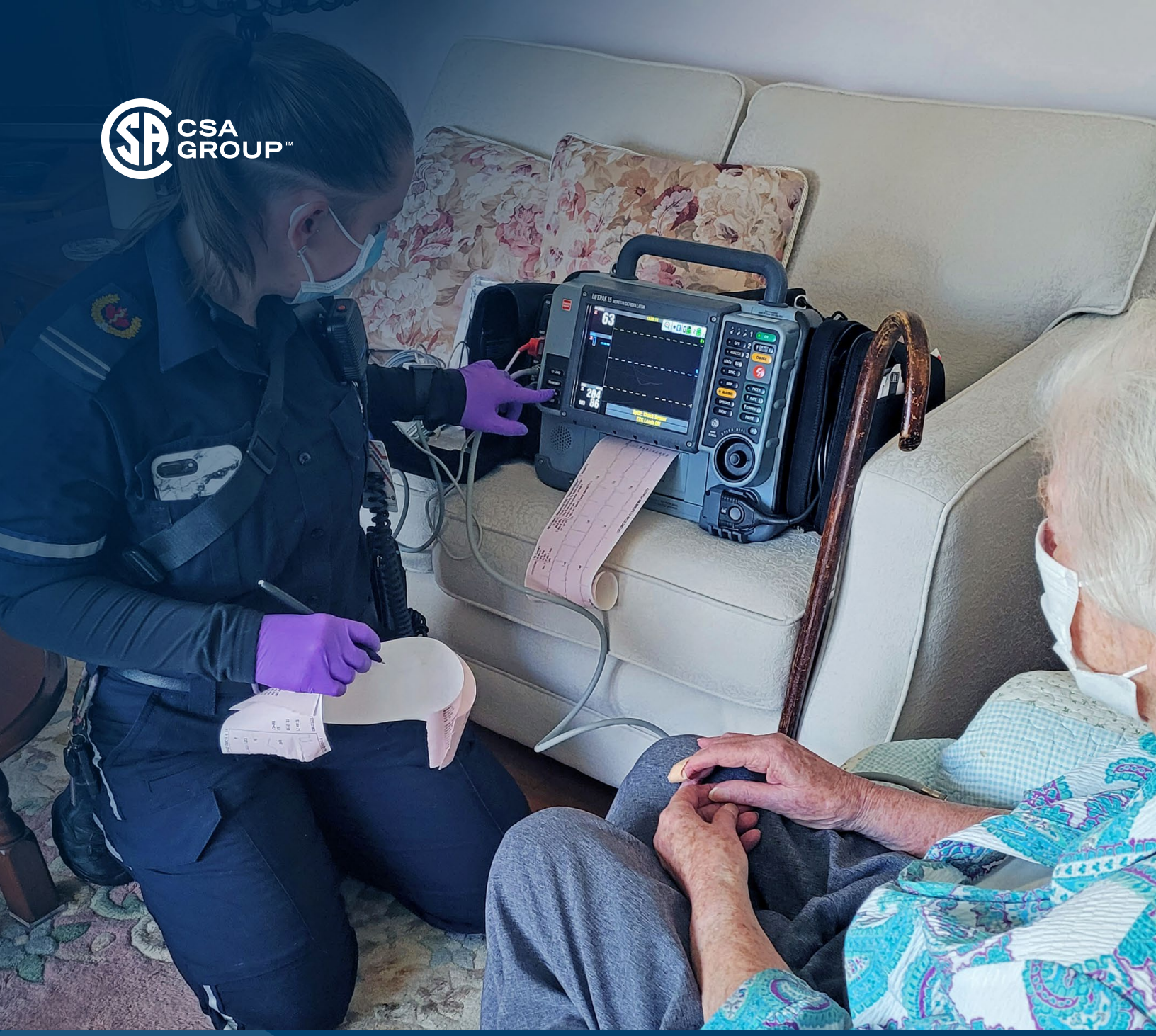

CSA GROUP™

STANDARDS RESEARCH

Advances in Community Paramedicine in Response to COVID-19

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Glossary

The following terms are used in the report but may require some explanation for the reader.

Collaborative care – an inter-professional process for communication and decision-making that enables the separate and shared knowledge skills of care providers to synergistically influence the client or patient care provided.

Note: Collaborative care implies a shared responsibility for patient care [1].

Community paramedicine program – a program that uses paramedics to provide immediate or scheduled primary, urgent, and/or specialized health care to vulnerable patient populations by focusing on improving equity in health care access across the continuum of care [1].

Community paramedic – a paramedic who has completed a formal and recognized educational program and has demonstrated competence in the provision of health education, clinical assessment and monitoring, point of care diagnostics, and treatment modalities within or beyond the role of traditional emergency care and transport [1].

Health disparities – differences in health status that occur among population groups defined by specific characteristics. They mostly result from inequalities in the distribution of underlying determinants of health across populations. Socio-economic status (SES), Aboriginal identity, gender, and geographic location are the important factors associated with health disparities in Canada [2].

Influenza-like illness (ILI) – an acute respiratory illness with a measured temperature of ≥ 38°C and cough, with onset within the past 10 days [3].

Social determinants of health – a group of social and economic factors that relate to an individual's place in society, such as income, education, or employment. Experiences of discrimination, racism and historical trauma are important social determinants of health for certain groups such as Indigenous Peoples, LGBTQ (Lesbian, Gay, Bisexual, Transgender and Queer and/or Questioning), and Black Canadians [2].

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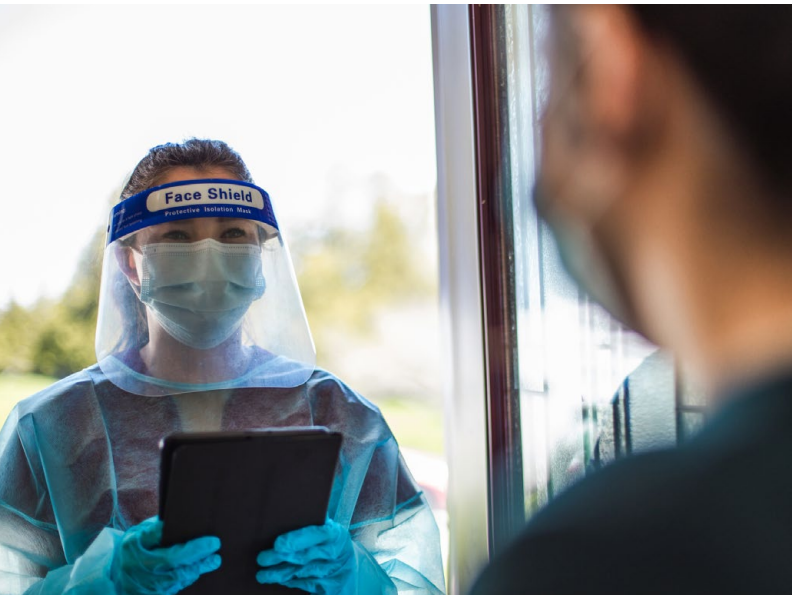
Executive Summary

Paramedics across Canada work collaboratively with other community partners to help ensure patients receive the services they require and the high quality in-home and in-community care they deserve. Community paramedicine programs aim to allow patients in all stages of life (e.g., older adults, persons with disabilities, persons living with chronic disease) to remain at home or in long-term care settings safely; decrease unnecessary 911 calls; decrease Emergency Department (ED) visits and length of hospital stay; educate and relieve stress for family and caregivers; and improve the quality of life of patients by keeping them actively engaged and informed. Community paramedic programs provide alternative models of care to improve support and access for vulnerable community members, including seniors and those living with chronic conditions.

The declaration of the COVID-19 pandemic in March 2020, and the subsequent public health measures across Canada demanded a change in service delivery models from many health care professions, including paramedics. This change particularly challenged community paramedicine programs in terms of meeting the needs of most vulnerable populations. Unfortunately, the pandemic highlighted the continued prevalence of social inequities in Canada, especially in already marginalized groups, and the importance of social connectedness and caregiver wellbeing solutions. In this research report, the results of a comprehensive literature review and a stakeholder engagement exercise across Canada were combined to provide insight into the innovations in service delivery, program focus, and the collaborative efforts of community paramedicine programs in response to COVID-19.

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.



"Community paramedicine programs informed by COVID-19 related best practices can help meet evolving out-of-hospital, primary care, and social needs."

1 Introduction

Already well situated in the community, paramedics work collaboratively with other community partners to help ensure patients receive the services that they require and the high quality in-home and in-community care they deserve. Community paramedicine programs aim to allow patients in all stages of life (e.g., older adults, persons with disabilities, persons living with chronic disease) to remain at home or in long-term care settings safely, decrease unnecessary 9-1-1 calls, decrease Emergency Department (ED) visits and length of stay in hospital, educate and relieve stress for family and caregivers, and improve the quality of life of patients by keeping them actively engaged and informed. During home and community visits, Community Paramedics can complete vital signs, wellness, and fall risk assessments; point-of-care-testing; medication management and administration; vaccinations; blood work; palliative care; provide social interaction; advise on system navigation; and more. These programs provide a flexible, innovative model of care that helps to improve access to additional support services for seniors and patients with chronic health and social issues [4].

For example, in Ontario, the County of Renfrew Paramedic Service's community paramedicine program reduced 9-1-1 activation by 24%, ED visits by 20%, and admissions to hospital after ED visits by 55% one year after implementation [5]. Nova Scotia's community paramedicine program, developed to address a shortage of available primary care services, reduced annual trips to EDs by 40% and decreased overall annual expenses for health care from $2,380 to $1,375 per person [5]. These and other examples demonstrate important contributions community paramedicine programs can make to improve health system capacity, reduce costs, and improve patient care [6].

The COVID-19 pandemic has further emphasized the health benefits of keeping people out of hospital if they can be cared for at home or in their community. Doing so can reduce the risk of spreading disease and help preserve health care resources. The ongoing pandemic has also highlighted the prevalence of social inequities in Canada, particularly in already marginalized groups, and the importance of social connectedness and caregiver wellbeing solutions. Community paramedicine programs informed by COVID-19 related best practices can help meet evolving out-of-hospital, primary care, and social needs. This report will identify and outline community paramedicine innovations across Canada in response to the COVID-19 pandemic and on-going needs; provide evidence-informed guidance; and suggest several areas for future consideration by paramedic services.

The following research questions guided this work:

- How have Canadian community paramedicine programs innovated in response to COVID-19?
- How can these innovations inform the future development of community paramedicine?

This study is informed by a conceptual framework based on the CAN/CSA-Z1630-17 *Community paramedicine: Framework for program development* [1] and innovations in the County of Renfrew Paramedic Service. The framework comprises four domains: leveraging technology, responding to COVID-19, addressing social needs, and caring for vulnerable populations. These domains are united in the idea of collaborating with other health care professionals and agencies, while facilitating care and case management coordination. Figure 1 provides an illustration of this conceptual framework, along with examples of innovations for each domain.

1.1 Objectives

This research report aims to:

- Outline community paramedicine innovations across Canada in response to COVID-19.
- Summarize the peer-reviewed and grey literature on community paramedicine responses to COVID-19.
- Explore the potential role of community paramedicine services in addressing further health and social care needs.
- Inform the update of CAN/CSA-Z1630-17 *Community paramedicine: Framework for program development* and other standards as appropriate

2 Methods

To address the research questions, a scoping literature review was conducted of community paramedicine publications, with a focus on Canadian context, and a stakeholder consultation process was undertaken to capture innovations that may not be well represented in the literature.

2.1 Literature Review

A scoping review of the literature was conducted using the JBI Scoping Review methodology, informed by existing literature on the conduct and reporting of scoping reviews [7]–[9], focused on community paramedicine literature published from 2020 through to present. Additional searches were conducted from 2017 to capture innovations not directly related to COVID-19, but these were not the focus of the research project.

Figure 1: Conceptual framework guiding the study

Databases searched included CINAHL, MEDLINE, and EMBASE. The Canadian Agency for Drugs and Technologies in Health (CADTH) Grey Matters toolkit [10] guided grey literature searches on several organizational websites (including CSA Group, Public Health Agency of Canada, Health Canada, Canadian Institute for Health Information, and CADTH), Google Scholar, and Google web. The search terms included various combinations of keywords related to "community paramedicine," "COVID-19," "pandemic," "virtual triage," "palliative care," and other innovations informed by our conceptual framework (Figure 1).

Subject headings were used where appropriate, and keywords and subject headings were adapted as required for individual databases. Articles of all types that discussed innovations in community paramedicine and/or in primary care were included from the peer-reviewed literature. Grey literature searches excluded news reports but not official press releases. Studies in both English and French were included.

2.2 Stakeholder Engagement

The second part of the research project involved consulting and engaging with stakeholders representing intersections and relationships between community paramedicine, Indigenous community health, paramedic service organizations, and health and social care organizations across Canada. A culturally sensitive and safe approach was employed by incorporating the authors' previous experiences with vulnerable populations, community paramedicine service users, and Indigenous Peoples.

Stakeholder engagement was conducted virtually in order to ensure compliance with COVID-19 protocols, allow for a wide geographical participation across Canada, and reduce the risk to vulnerable population participants. Each participant provided their informed consent before the interview. Interviews were conducted only by the principal author, who is trained in conducting interviews and conducting research with vulnerable populations. Interviews were recorded and transcribed for analysis. Upon verification of transcript accuracy, the recording was destroyed. Only the principal author had access to the recordings.

Anonymized transcripts were thematically analyzed and coded following the conceptual framework. These findings were then integrated with the results of the scoping review, whereby data from the literature review and interviews were combined to answer the research question. Direct quotes from participants were used to support findings.

2.3 Ethics Approval

The scoping review was a review of published literature and did not require ethics approval. The stakeholder engagement exercise received ethics approval from the Research Ethics Board at Fanshawe College in Ontario (#21-06-01-1).

3 Results and Discussion

3.1 Scoping Review Results

The search strategy identified 2,156 studies through initial searches. After removing 266 duplicates, authors screened 1,890 studies and excluded 1,802. The remaining 88 underwent full-text review, during which a further 71 were rejected. An additional five documents were identified through backchaining. Three other documents were provided by interviewees. The final 22 studies informed this research report, combined with 26 grey literature sources, which included theses, reports, webinars, press releases, and blog posts.

The conceptual framework illustrated in Figure 1 was used to categorize the literature into common subjects, namely: leveraging technology, responding to COVID-19, addressing social needs, caring for vulnerable populations, collaborating with other health care professionals and agencies, and coordinating care and case management.

The literature review and the conceptual framework findings structured the focus of the stakeholder engagement exercise.

3.2 Interview Participant Characteristics

We interviewed a total of ten stakeholders from diverse community care and community paramedicine settings across Canada. We interviewed participants from

British Columbia, Alberta, Saskatchewan, and Ontario, as well as those representing organizations working at a federal and pan-Canadian level. Participants included frontline community paramedics, community health workers, community paramedicine program supervisors, federal and provincial government officials working with Indigenous communities, and non-profit sector workers.

3.3 Caring for Vulnerable Populations

The deep social inequities COVID-19 revealed have placed community paramedicine programs in a unique position to answer the needs of vulnerable populations [11], including older adults, Indigenous communities, palliative care patients, substance users, persons experiencing homelessness, and migrant workers.

> "We can't expect marginalized populations to change their approach to access the traditional health care system. They can't adapt, they're marginalized, they don't have the resources for that…we need to change our approach and to meet them where they're at."
>
> **—Participant, Community Paramedic**

It should be noted that the following populations are not representative of all marginalized and vulnerable communities in Canada – these are the findings that emerged from the literature and the stakeholder engagement exercise. The Ottawa Paramedic Service in Ontario responded to the needs of multiple vulnerable populations with their Special Population Response Team (SPRT – pronounced "spirit"). Examples of groups the SPRT served include long-term care and retirement residents, congregate care patients, the Inuit population through the Akusivik Inuit Family Health team, and the marginally housed or homeless—most frequently, families housed in hotels as overflow shelters. This also fails to capture the reality of intersectionality – that is, people who may be represented in one or more of these groups (e.g., homeless Indigenous persons, older immigrants). This concept of intersectionality illustrates that such individuals are at increased risk of marginalization due to the combined inequities they face. For example, paramedics in Winnipeg, Manitoba helped provide alternative isolation sites for homeless Indigenous persons who could not return to their communities when lockdowns occurred. These vulnerable populations are discussed in greater detail in the following sections.

3.3.1 Older Adults

Older adults living with chronic conditions have long been the focus of community paramedicine programs, and this expanded in light of COVID-19 [12]. For example, older adults on low incomes face difficulties accessing services provided in response to COVID-19 due to poor health literacy and lack of internet [13] – community paramedics were well placed to address these issues in settings of social housing through innovations such as the *CP@Clinic* programs in Hamilton, Ontario [13].

The devastating impact of COVID-19 on the long-term care (LTC) sector has sparked renewed focus on the care of older adults in Canada, especially those in congregate living and care settings. Community paramedicine programs have provided clinical support to group homes, and retirement homes such as conducting non-emergency assessment, performing COVID test swabbing, and diagnostic point-of-care testing [14]. The Ottawa Paramedic Service partnered with the Ottawa Hospital and the Regional Paramedic Program of Eastern Ontario to provide emergency physician support to long-term care homes through community paramedics. They developed a dedicated consult line staffed by emergency physicians that community paramedics could access if they had patients requiring treatment or medications at home with no physician support. Multidisciplinary teams involving community paramedics performed mass triage and provided appropriate clinical care for patients in long-term care facilities experiencing large outbreaks in Ottawa, Ontario [15].

The emergence of long-term care at home is an area where community paramedicine programs are once again responding to community needs. Newly designed 'Community Paramedics Long Term Care' programs in Ontario incorporate many of the innovations outlined in this report, including 24-7

access to health services through in-person and virtual care by community paramedics; non-emergency home visits and testing; ongoing monitoring of chronic conditions to reduce emergencies; health promotion and education about managing chronic diseases; and connections to home care and community support services [16]. Many community paramedic LTC programs are designed to reduce ED visits and hospitalizations from LTC patients. A review by Ottawa Paramedic Service in Ontario illustrated that community paramedics could treat 11% of LTC patients on-site, avoiding an ED visit, within current directives. That number could increase substantially with the inclusion of additional diagnostic and management options such as point-of-care ultrasound [17], [18].

Overall, these programs support the needs and perspectives of older adults and their caregivers, who prioritized retaining autonomy, reducing social isolation, and the need for clear, collaborative care planning [19].

3.3.2 Indigenous Peoples

Indigenous communities in Canada have faced health inequity and inequalities for decades [2], [20]. Throughout the COVID-19 pandemic, these issues have been magnified and new issues have arisen. The second wave of COVID-19 in Canada demonstrated the vulnerability and susceptibility of Indigenous communities to outbreaks of COVID-19, as well as the numerous disparities faced by Indigenous Peoples in accessing appropriate health and social care supports. These issues are exacerbated by the comorbidity rates evident in Indigenous Peoples, and combined with issues of housing, food security, poverty, and intergenerational trauma (to name a few), which place Indigenous Peoples at an increased risk of COVID-19 [21]. Literature from the U.S. context illustrates that American Indian and Alaska Native Peoples are also vulnerable to COVID-19 due to social vulnerabilities similar to Indigenous Peoples in Canada [22].

There are underlying misconceptions around paramedic care in remote isolated Indigenous communities, largely due to the predominant operational model of fly-in response:

> "[Paramedics] come to the community, they take people away from the community, and then the people after they're taken away, die. And so, the young people, their idea of a paramedic was somebody who flies in on a plane, wearing a jumpsuit, takes my loved one away, and never comes back"
>
> **—Participant, Government Official**

As a result, community paramedics situated in these communities for the first time in response to COVID-19 had the opportunity to build trust and relationships with the community members, thereby addressing some of these misconceptions.

> "Paramedics, and this is across all the First Nations communities, not just the remote and isolated, [when embedded in the communities], brought a degree of trust and comfort to the community"
>
> **—Participant, Government Official**

Community paramedicine initiatives in Indigenous contexts are unfortunately not well documented in the peer-reviewed literature, but the grey literature and interview findings provided insights into new care solutions implemented in collaboration with First Nations, Inuit, Inuvialuit, and Métis communities. These solutions included community-led COVID-19 testing and contact tracing; distributing and administering vaccines; educating community members on testing procedures; bolstering of primary care resources within communities; and preparing for influenza season [23]. Focusing on supporting primary prevention and community preparedness is essential for increasing Indigenous communities' ability to respond to COVID-19 [21].

One such example is, in partnership with the Weeneebayko Area Health Authority Paramedic Services in Ontario, the *CP@Clinic* community paramedicine program is being adapted for implementation in Moosonee, Ontario. The program will be adapted to the community's unique setting, cultural practices, and resources. It is expected to reduce older adults' frailty, and improve their overall health and life quality long term [20].

A 2017 CSA Group report and 2019 follow-up case study in Tuktoyaktuk in the Northwest Territories outlined a number of key considerations for community paramedicine programs in Indigenous settings [2], [24]:

1. The expanding gap in health status among Indigenous Peoples is unacceptable – in particular the lack of focus on social determinants of health in Indigenous communities;
2. Western approaches to health are distinctly different from those of Indigenous Peoples – given the current focus on the implications of Canada's colonial past, acknowledging the need to adapt health care to be culturally safe is imperative;
3. Structural barriers to community engagement must be overcome to develop sustainable solutions – this includes funding and jurisdictional issues;
4. Essential services are absent in many isolated and/or remote communities – services need to be based on community need, and the lack of paramedicine services in many remote and isolated Indigenous communities results in an unsafe and unreliable system;
5. Community paramedicine appears to be a welcome model of care that is highly adaptable to ameliorating health status and health services in the North – this includes scheduled primary care delivery, and the ability to respond to the community's urgent and emergency needs.

3.3.3 Palliative Care

The literature demonstrates that when paramedics provide palliative and end-of-life care at home, it improves the comfort and quality of life for people living with life-limiting illnesses, as well as for their families and caregivers [25]–[27]. Paramedics can perform assessments, facilitate goals of care discussions, provide symptom management, and identify and place the appropriate care in place for in-home palliative care. As part of the *Paramedics Providing Palliative Care at Home Program* in Nova Scotia and Prince Edward Island, and Alberta Health Services' Provincial Emergency Medical Services *Palliative and End-of-Life Care Assess, Treat and Refer Program,* paramedics have provided palliative care at home since 2017 [26].

More recent paramedic-led palliative care initiatives in BC, Ontario, and elsewhere [15], [26], [28] have demonstrated the ability of paramedic services to quickly meet the increased palliative care demand during COVID-19, as well as respond to challenges with admissions to hospice, and visiting hospices and LTC facilities for family members.

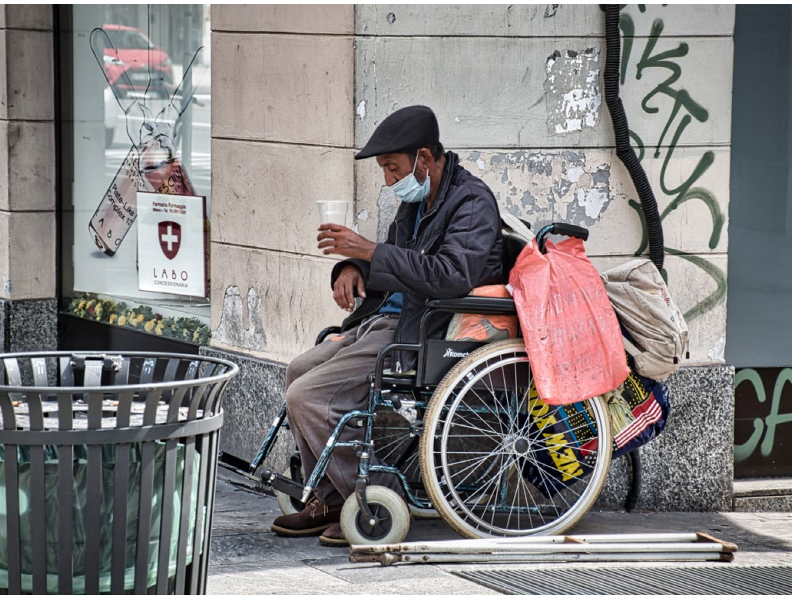
> "We did [COVID test] swabbing for palliative care patients because in order to get into hospice, they needed a negative swab to clear them. And there were patients whose wishes were to go to hospice who died in their homes waiting for their swab results until we stepped in."
>
> **—Participant, Community Paramedicine Supervisor**

> "We now have an expanded scope of practice to support the palliative care team."
>
> **—Participant, Community Paramedic**

Palliative care services in some settings faced shortages with PPE and medications, and issues with clinical caseloads, staffing, and bed availability [29]; notably, many of these were settings that did not engage community paramedicine programs as partners.

> "We weren't involved with the palliative care outreach team before COVID. So that's something that we've gone into that I don't think we will ever go back from and has been an amazing collaboration"
>
> **—Participant, Community Paramedicine Supervisor**

This increase in palliative care provision by community paramedics led to an identified need to provide paramedics with an improved ability to support grieving individuals and families. Quality palliative care helps people honour their culture, traditions, and spirituality. In response, the Canadian Virtual Hospice expanded the MyGriefToolbox, aimed specifically at paramedics who support end-of-life and palliative care at home, including the launch of a French version in 2021.



"People experiencing homelessness were unable to self-isolate in safe, appropriate, and comfortable environments, worsening the effects the COVID-19 pandemic placed on this vulnerable population."

> "People were lonelier in their deaths... It was hard, because these people weren't connected to their same social supports."
>
> **—Participant, non-profit worker**

3.3.4 Persons Experiencing Homelessness

People experiencing homelessness were unable to self-isolate in safe, appropriate, and comfortable environments, worsening the effects the COVID-19 pandemic placed on this vulnerable population. People experiencing homelessness may also find it difficult to acquire proper PPE to protect themselves against the virus. Community paramedics have collaborated with shelter staff in multiple jurisdictions to educate the homeless shelter populations, assess shelter users for ILI, and perform or refer individuals for COVID-19 testing as required. Community paramedics have also assisted shelter staff with logistical support to enable physical distancing, and in some cases, isolation from the general shelter population if suspected of having an ILI [14].

The Health Outreach Mobile Engagement (HOME) Program in London, Ontario, is a collaborative, multi-disciplinary, multi-sector mobile response to improve the health outcomes and health equity of highly marginalized individuals such as those experiencing homelessness, refugees, immigrants, and substance users. Community Paramedics from the Middlesex-London Paramedic Service (MLPS) work within this program, which is provided through a MLPS bus.

The program provides primary care, harm reduction, support with substance use, basic needs, and wrap-around care services to highly marginalized individuals who face barriers to accessing traditional models of care where they are at, including emergency shelters, encampments, housing, and other community settings. A July 2021 report outlines how the HOME program facilitated over 800 visits by 500 individuals from January to May 2021 [30]. These visits were for a variety of reasons, including medical care, harm reduction (e.g., equipment, education, and case management), basic needs (e.g., food and drink, personal items), infectious disease testing, and referrals to other community resources.

> "[The HOME team] go out into the community and find clients, and anybody that does need medical care, they'll bring back to the bus. The outreach workers help with housing supports, they can help with income taxes, basic needs, safe supplies and so on"
>
> **—Participant, Community Paramedic**

3.3.5 Substance Users

Harm reduction is crucial for relieving the opioid crisis, and the COVID-19 pandemic and the public health measures set in place increased the need for harm reduction strategies, but hampered their implementation. From 2019 to 2021, the Paramedic Association of Canada led the creation of a national standard for an innovative and holistic paramedic

response to Canada's opioid crisis across the prevention, harm reduction, and treatment continuum, in out-of-hospital emergency and community settings. This was published as CSA Z1650-21, *Paramedic response to the opioid crisis* [31].

The County of Renfrew Paramedic Service in Ontario, and the HOME Program in London, Ontario are examples in which at-risk community members receive naloxone kits and education, following CSA Z1650-21 recommendations. The HOME Program, which involves community paramedics, provides access to safe substance use education and equipment, with an overall non-punitive and harm reduction approach [30]. In addition to providing education and resources, paramedic response data has proved useful in providing near real-time epidemiological information (person, time, and place) on the opioid epidemic and in assessing trends and opportunities to develop alert triggers [32].

3.3.6 Immigrants and Migrant Workers

New immigrants and migrant workers coming to Canada during COVID-19 experience many additional challenges. Often, these difficulties include a language barrier, new culture, being away from their families, and equal access to health care. Community paramedicine programs have provided coordinated testing, assessment, and COVID-19 treatment in migrant workers, who have significant disparities in accessing health care compared to the general population. The HOME program in London, Ontario provides immigrants with resources to access the health and social care systems, such as assistance with navigation, applying for documentation, and referrals to community resources [30].

> "The amazing part about the employees that are out on the bus is that they will go to every length to find that patient what they need. And then with refugees, often that is translation, like taking the time to translate and understand and bring culture into care as well"
>
> **—Participant, Community Health Worker**

Community paramedics have also facilitated COVID-19 screening of migrant workers and individuals at border settings in collaboration with the RCMP and public health agencies, to identify those who need care, and reduce the risk to the existing population [14]. Immigrants who may live in multi-generational homes or congregate living settings where they were unable to isolate safely were also cared for by community paramedic programs. For example, in Saskatchewan, paramedics monitored and assessed members of vulnerable populations in designated "COVID hotels" where people could isolate safely if home isolation was unsafe or impossible.

3.3.7 Prisoners

Prisoners are at an increased risk of health issues compared to the general population due to several factors, most notably the similarities to congregate living arrangements. Community paramedics in Saskatchewan performed COVID swabbing in Correctional Service of Canada facilities, including Community-Based Residential Facilities, women offender institutions, and maximum-security facilities, including mass testing clinics and targeted swabbing in the event of increasing COVID cases in the local area.

3.4 Leveraging Technology

COVID-19 has caused an increased use of technology-assisted care delivery in both acute and primary care settings. Home visits were suspended in many areas [12], and services replaced with "virtual-care" options. This included care via telephone calls, and ultimately evolved to video-based consultation and provision of care in a number of jurisdictions [12], [33]. The demand for primary care visits among patients with higher health care needs did not reduce in light of the transition to increased virtual care [34], signaling the continued need to provide access to primary care in the presence of restrictions on physical visits.

> "The numbers of virtual health care visits actually increased, almost right away compared to the home visits, so the reach of that program all of a sudden expanded"
>
> **—Participant, Community Paramedic Supervisor**

Innovations in British Columbia and Ontario included the triaging of calls in the prehospital setting (thereby preventing unnecessary exposures and admissions), point-of-care testing (thereby preventing unnecessary transports to ED for diagnostic tests) and remote physiological monitoring of patients with COVID-19-like symptoms. Primary care literature suggests those with mild COVID-19 disease can be managed safely and effectively in the community, via a primary care virtual care model [35]. Monitoring patients with acute presentations (e.g., suspected ILI/COVID-19) and chronic diseases (e.g., heart failure) by community paramedicine programs reduces emergency calls, thereby benefitting the health system [36]. Remote patient monitoring was also used in remote Indigenous communities, wherein it had a "multiplier effect."

> "It increased the paramedics capacity to monitor and support a larger, larger cohort of patients – sometimes up to 40 at a time"
>
> **—Participant, Government Official**

However, the increased use of telehealth solutions also highlighted key social inequities in relation to access to technology, access to standard internet connections, and the challenges rural and remote populations face [12], [37]. Chronic conditions and patients' technological ability have also hampered some efforts to provide virtual care. Simple solutions implemented by some community paramedic programs, such as obtaining written consent for homebound vaccinations, and then providing this written consent to public health units, addressed this inequity, but this was not possible everywhere. Initiatives in other areas of health care such as the PHONE-CONNECT program in Toronto, Ontario and the SPARC-BC led program in British Columbia, which distributed phones to those in need, demonstrated the need to be connected to the internet to navigate, engage, and ultimately improve access to health and social care [38]. Community paramedicine programs must remain aware of the needs and limitations of their communities when implementing virtual community paramedicine solutions.

The implementation of point-of-care testing by community paramedics allows for improved patient experience, faster access to results, and a reduction in unnecessary hospital admissions. It is often the only viable option available to remote and rural communities [39].

3.5 Responding to COVID

Many community paramedicine programs responded by providing community testing, patient assessment and treatment, and pandemic planning to support operational needs of local health care facilities [14]. Coordinating with other health care stakeholders allowed community paramedicine programs to determine triage needs in the event of demand surge on the system, ensuring that vulnerable populations were not overlooked. For example, a targeted patient assessment team to COVID-19 calls in Winnipeg, Manitoba resulted in approximately 54% reduction in ED transports [14]. The Renfrew County Virtual Triage and Assessment Centre (RC-VTAC) in Ontario provides access to doctors and nurse practitioners via phone and video call, with subsequent in-home visits conducted by community paramedics. RC-VTAC community paramedics conducting 4,700 home visits in the first year of operation [40]. Both initiatives demonstrated reduced demand on hospital and emergency 9-1-1 services.

Community paramedicine programs have been involved in the planning, logistical management, and implementation of novel drive-through, pop-up, clinic, and in-home COVID-19 swabbing programs [41]. Community paramedicine programs also provided guidance, coaching, and support to LTC staff related to PPE and infection prevention and control measures. In several jurisdictions, community paramedicine programs initiated and managed the patient 'cohorting' in LTC settings. Mobile vaccination efforts have been established in several jurisdictions across Canada, whereby paramedic services collaborated with public health units to provide vaccinations to communities, including homebound individuals, marginalized communities, and vulnerable populations. This came about in some areas due to the position of community paramedic programs – they already had personnel

trained in swabbing, were mobile, and could access populations otherwise difficult to reach, and had sufficient supplies of PPE and testing equipment [14].

> "We were the first reached for to go do home swabs – before public health was doing them – because they were like, we don't know how to do this "mobile", who could do that? And then they were like, oh, community paramedics."
>
> **—Participant, Community Paramedic**

3.6 Addressing Social Needs

COVID-19 unmasked significant social inequities across Canada in social determinants of health, such as housing stability, access to health care, food insecurity, access to technology, and social isolation among older and rural populations. Community paramedicine programs are capable of addressing social factors when appropriately educated and supported [42], and ensure equitable access to health care where they exist [11].

Many programs are working to address these social needs by focusing on interventions designed to target specific social determinants of health. For example, conducting regular virtual and in-home visits with vulnerable older adults (e.g., seniors check-in) to address social isolation [14].

Community paramedics who engaged with this study as stakeholders shared situations where they helped people purchase groceries, communicated and liaised with neighbours to check on vulnerable adults, or helped patients with technology issues to book vaccinations. These insights, combined with the initiatives described above targeted at vulnerable population groups are largely focused on addressing social determinants of health such as isolation, barriers to access, and socioeconomic disadvantage.

3.7 Collaborating and Coordinating Care

A common theme across the COVID-19 literature in relation to community paramedicine (and the broader health care system) and the responses from interview participants is the need for collaborative approaches to care provision, the need for case management between acute and community care services, and the ability of community paramedicine programs to extend care into patients' homes and communities. The move to virtual care delivery in responses to COVID-19 has led to an increase in collaboration between paramedics, patients, and their primary care physician and allied health team members [12].

> "COVID-19 progressed the shift away from being fearful of leaving people at home"
>
> **—Participant, Community Paramedic**

Performing urgent community assessments on behalf of, and in collaboration with family physicians in primary care demonstrated the increasing role community paramedics can play within the primary care setting [14]. This primary care extender role could provide solutions for remote and isolated communities to access culturally safe primary care and would help to address some of the issues faced by these communities in recruiting and retaining health care professionals. Community paramedicine programs have increasingly collaborated with colleagues in public health units, in the provision of swabbing, vaccination, contact tracing, and outreach education. This intersection between paramedicine and public health has been discussed on an academic level, and COVID-19 has demonstrated the real-life applications of such collaboration.

In the Ottawa Paramedic Service in Ontario, community paramedics joined the High Intensity Supports at Home Program (directed by Home and Community Care) to work as part of integrated teams to care for hubs of patients in crisis. In addition to community paramedics, each team comprises nurses, nurse practitioners, physiotherapists, care coordinators, personal support workers and other health care providers, and is assigned a 'hub' of ten patients they care for. In addition, community paramedics joined clinical care teams, and would frequently go into homes with an interdisciplinary team that included palliative care specialists (the regional palliative care program and physicians specialised in palliative care), hospital physicians (including intensive care, emergency, and palliative care physicians), and nurse practitioners to provide care in-situ.

3.8 Future Directions and Considerations

Future directions and considerations informed by the innovations outlined in this report, as well as reported by stakeholders who were engaged in the process are outlined below.

- Community paramedic programs can improve the coordination and management of cases in the community. They are ideally situated at the intersections of primary care, community care, public health, and out-of-hospital care so as to coordinate and manage cases within the community, not just in rural and remote communities, but also in urban ones.
  - This may include bridging and coordinating care from hospital – "hospital-to-home" (e.g., post-discharge IV medications and assessments to facilitate early discharge), conducting in-home wellness and safety assessments, remote patient monitoring, acting as primary care extenders in remote and isolated communities, and supporting patients in accessing care (in-person and/or virtual) from other specialties (e.g., dialysis, chemotherapy, mental health, rehabilitation) [14], [43];

> "Our model really has been around rural and remote community paramedics and supporting those communities. But where we see the highest volumes of patients, especially complex ill patients who could possibly be discharged home early if they had appropriate care– we're seeing that more in urban environments"
>
> **—Participant, Community Paramedic Supervisor**

> "We are the in-community extension of the care they would receive in hospital if you will."
>
> **—Participant, Community Paramedic**

- Further efforts to educate the health care system and integrate the expertise and knowledge of community paramedics into public health and primary care settings (i.e., paramedics practicing outside of paramedic service settings) should be pursued, (e.g., CP@Clinic model, integration with Family Health Teams, and providing services in emergency departments that are over capacity). There is also evidence from other jurisdictions that demonstrates paramedics can undertake significant roles in primary care [44]–[46].

> "With a large population and a small health unit, they didn't have the capacity, and they were more than happy to have our staff on board with them."
>
> **—Participant, Community Paramedic Supervisor**

> "Parts of the health system…they didn't even know what a community paramedic was, or that it existed, or what our scope was"
>
> **—Participant, Community Paramedic**

- There should be a continued merging of community paramedicine approaches with traditional paramedic response models. There are opportunities within jurisdictions to facilitate low-acuity responses, treat-and-refer, treat-and-release, and targeted follow-ups, thereby increasing the potential for paramedicine as a discipline to impact overall health service delivery.

> "If we ever want to make any meaningful change, we have to become proactive. We need to move toward our frontline paramedics being able to activate us to come [to a 9-1-1 call] to transfer care to us. And then the community paramedics can help get that person the appropriate supports"
>
> **—Participant, Community Paramedic Supervisor**

> "The community paramedic program is the only component of our organization that has capacity… I think as we try to meet our increased patient demand, it's likely that the focus will shift on to the CPs in some way"
>
> **—Participant, Community Paramedic**

> "All patients that are left at home under a treat-and-refer pathway, they get a phone call 24 to 48 hours connecting with them to make sure that they're still okay. And that used to be a community paramedicine function, and we've shifted it out of the community paramedicine program, and into the regular stream. Because as we build this out, we're realizing that that connection piece is so key to all patients"
>
> **—Participant, Community Paramedic Supervisor**

"There is a need to define and measure a set of universal or common key performance indicators and evaluation items for evaluating the impact of community paramedicine programs."

> "I would say that what we're building is an alternative model of care for all paramedics but building it off the community paramedicine program."
>
> **—Participant, Community Paramedic Supervisor**

- Efforts should be continued to improve information sharing between paramedic services, community paramedicine programs, primary care services, and allied health and social care agencies (e.g., child care agencies, food banks, shelters) to ensure those with health and/or social needs receive the care and attention they require before their situation escalates in urgency.

> "A really common social support piece that was always present [pre-COVID] is food insecurity, particularly in our elderly population. And then when the pandemic happened, even just the regular ways of getting groceries and getting food changed, there was an immediate increase in where I saw it"
>
> **—Participant, Community Paramedic**

- Community paramedic programs should consider (where services and coverage allow) the provision of technology (e.g., phones, tablets, computers), technological support, and internet connectivity as social interventions to reduce the barriers rural, vulnerable, and marginalized communities face in accessing health care and social care information [38].

> "When it comes to vaccinations, that's a whole other inequity piece. Obviously, the online format of having to sign up for it assumes that you have access to the internet, to a device that has the internet, and the health and computer literacy to do it."
>
> **—Participant, Community Health Worker**

- There is a need to define and measure a set of universal or common key performance indicators and evaluation items for evaluating the impact of community paramedicine programs. Program evaluation and measurement should be aligned with community needs and program objectives, while retaining a patient-centred focus [24].
- Community paramedic programs have demonstrated they are well-positioned to provide in-home influenza, pneumonia, shingles, and COVID-19 booster vaccinations to vulnerable communities [13], and further alignment with public health in these and other areas of operations should be pursued.

> "Our community paramedics were the first to start going to homebound patients... we do pop up clinics for the flu vaccine every year in low income housing, and then we do mobile visits for those who are homebound. So it was a really easy transition for us to COVID vaccination."
>
> **—Participant, Community Paramedic Supervisor**

- Opportunities remain for community paramedicine programs to provide outreach education and support to communities on public health, health care, and social care issues. These may include issues such as recognizing and managing opioid overdoses, providing first aid supplies to individuals experiencing homelessness, linking families with food banks, and public education regarding health care.

> "When I was showing up there for some type of actual health procedure. I was also spending time with public education pieces, because that's what was there…a vacuum of information…a need."
>
> **—Participant, Community Paramedic**

Continued research is needed to determine the most appropriate models of community paramedicine care, while maintaining awareness of the need for programs to respond to local community needs. Some of the future directions and considerations will require changes in policy, legislation, and funding models to support their development. These future directions may improve quality of life [47], [48], reduce health care costs [47], improve equity, and increase access to health care [49] for all who live in Canada.

4 Conclusions

The COVID-19 pandemic has highlighted the essential collaborative care role community paramedicine programs can provide to patients in their home or community. Unfortunately, the pandemic has also highlighted the continued prevalence of social inequities in Canada, particularly in already marginalized groups, and the importance of social connectedness and caregiver wellbeing solutions. Community paramedicine programs have evolved to meet the needs of their communities. Such programs helped caregivers respond to COVID-19 in collaboration with public health agencies; leverage technology to facilitate remote monitoring and virtual visits; address social inequities in their communities such as access to health care and social services; and meet the needs of vulnerable populations, who already faced issues in equity of access to services prior to the pandemic. Community paramedic programs have successfully helped caregivers 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.

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