

Exploring Paramedicine's Research Infrastructure in Ontario, Canada

Paramedicine

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Abstract

Objective: Paramedicine is expanding in scope and diversifying its contributions to healthcare systems and society. To achieve sustainable and meaningful development, paramedicine (like other health professions) must prioritize the generation and use of high-quality evidence to guide practice, policy, and innovation. However, paramedicine's progression has been criticized for lacking a sufficient evidence base, undermining its decision-making. We sought to examine the existing infrastructure within a paramedicine context that supports the community to engage in, produce, and/or use research.

Methods: This qualitative study employed semistructured interviews analyzed using reflexive thematic analysis. Purposive and snowball sampling was used to recruit and enroll those engaged in research capacity development and contributions in Ontario, Canada, representing diverse roles within the paramedicine community. The interview guide was informed by Cooke's six-principle research capacity framework: skills, collaboration, infrastructure, ownership, research-practice linkages, and culture. Data were transcribed, coded, and thematically analyzed using Braun and Clarke's six-phase method. Member checking was employed, offering participants the opportunity to review their transcripts for accuracy and to provide revision/elaborations. **Results:** Twenty-four individuals were interviewed. Two overarching themes emerged: (1) Structural and Cultural Foundations for Research, highlighting infrastructure challenges, fragmented pathways, cultural resistance, and a reliance on informal networks, and (2) Systemic Integration and Strategic Alignment underscoring calls for long-term growth, broader healthcare system integration, solving inequities in access to research infrastructure, better data access and governance, clear leadership on research, and demonstrations of value.

Conclusion: Ontario's paramedicine community faces significant challenges to research engagement, capacity building, and contributions, hindering the profession's ability to support the growth and use of a research and evidence ecosystem. Several implications and recommendations are outlined, including attending to internal (e.g., research infrastructure, professional integration) and external (e.g., strengthening collaboration and partnerships) factors and policy goals. International contexts are considered.

Keywords

health services research, research policy, paramedicine, research capacity, evidence-based policy

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Introduction

Paramedicine is expanding in scope and diversifying its contributions to healthcare systems and society. To achieve sustainable and meaningful development, paramedicine (like other health professions) must prioritize the generation and use of high-quality evidence to guide practice, policy, and innovation.¹⁻³

National studies have emphasized the need to establish a robust research community and value system within Canada's paramedicine sector. For instance, in 2013, the Canadian National EMS Research Agenda underscored the necessity of enhancing research education, fostering a research culture, building academic-practice partnerships, and increasing data availability.¹ The agenda called for improved mentorship, stronger leadership, and overcoming barriers such as inadequate funding, limited research roles, and weak collaboration between academic and practice settings. Recommendations included strengthening partnerships, establishing dedicated research funding, integrating research competencies into paramedic education, and creating a centralized body to coordinate research efforts. In 2021, a Canadian national study further articulated the importance of evidence-informed practices as a guiding principle for the future of paramedicine in Canada.⁴ This study highlighted the critical role of knowledge generation and the need for a dedicated infrastructure with sufficient resources to foster a thriving research community. It specifically emphasized the value of paramedic-led research initiatives to advance the profession.

While system advancement hinges on the profession's ability to generate, apply, and translate its own knowledge,⁵ paramedicine has at times been criticized for lacking a sufficient evidence base.^{6,7} For instance, evaluations of community paramedicine consistently highlight the inadequacy of the evidence supporting these innovations.⁸⁻¹⁰ When examining what the profession prioritizes, others have reported a narrow evidence base, failing to capture the broad range of issues or knowledge gaps in the profession.¹¹

This shortfall in evidence production and use can be attributed, at least in part, to limited research capacity and engagement. A recent review highlighted cultural and structural challenges to engaging in research and the need to integrate research into paramedicine better.¹² In Australia, and the Republic of Ireland, researchers highlighted system, process, and human-level barriers to research contributions.^{13,14} In the absence of a robust research ecosystem, the result is an increased risk of misguided decisions leading to the potential for ineffective or uncertain policies or practices, wasting of resources, potential failure to meet the needs of patients, and inequitable outcomes. Policies can become reactive and influenced by biases such as anecdotal experiences rather than empirical data.

Without addressing the systemic barriers and infrastructure gaps in paramedicine research, which we define as the structural, cultural, and systemic factors shaping research engagement, the profession risks stagnating and limiting its capacity to contribute to evidence-based or informed healthcare.¹⁵ To overcome such issues, researchers have described the features that must be present to support research capacity development. For instance, Cooke outlined a framework to guide policy, practice, interventions, and decisions related to research capacity development.^{16,17} It emphasizes the need to produce knowledge where it is to be used and the necessary features to produce skills in people. It also informs processes in organizations and wider research health systems that can support the planning, development, and execution of impactful research. Using Cooke's framework as a lens to examine Canadian research systems highlights several potential absences (e.g., formal education pathways, limited infrastructure, uncertain responsibility, and leadership) for individuals, organizations, and health and social care systems. Despite this, Canada is producing researchers and research, but it is unclear how and to what extent the system supports these efforts.

National policy indicates overwhelming support for building research capacity in healthcare systems.^{1,4} Failing to do so may mean misaligning funding and research activities or priorities, a fragmented and ad-hoc research environment, a lack of policy and institutional support, and underdeveloped human capital for research. In this study, our objective was to focus on the human capital and their ability to engage in research broadly as a means of attending to these issues. Specifically, we sought to examine the existing infrastructure within a paramedicine context that supports the community to engage in, produce, and/or use research.

Methods

Overview and philosophical underpinning

This study employed an interview-based qualitative design, using reflexive thematic analysis as the analytical framework.^{18,19} Our approach acknowledges the active role of the researcher in constructing knowledge, which is grounded in a constructionist epistemology and a relativist ontology. Relativism recognizes multiple realities shaped by individual experiences, perceptions, and social contexts, while constructionism posits that knowledge and meaning are coconstructed through interactions between researchers and participants rather than being objectively discovered. Reflexive thematic analysis acknowledges these positions and emphasizes the importance of researchers' reflexivity, recognizing how our perspectives, experiences, and active engagement shape the analytical process.

Ethical approval for this study was obtained from the Centennial College Research Ethics Board (#2020/21-22) and the University of Toronto Research Ethics Board (#47097). Participants provided informed consent prior to the interviews, and confidentiality was maintained throughout the research process and reporting.

Setting

This study was conducted in Ontario, Canada, where paramedic services are regulated by the Ministry of Health (MOH) and delivered by 52 service providers. Paramedics are employed by these providers and certified by the MOH and its affiliate Base Hospital structure. Education in paramedicine is offered through private institutions, community colleges, and universities, following standardized program requirements.²⁰ However, at the time of this study, Ontario lacked graduate programs specific to paramedicine, formal research centers dedicated to supporting paramedicine research, clear academic credentialing pathways, and sufficient paid research positions within paramedicine.

Despite these gaps, Ontario has a vibrant and productive paramedicine research community, supported by informal networks and collaborative opportunities that paramedics can access for research engagement. The province was selected for this study due to its significant concentration of paramedicine researchers, including members of a national research network and a community of PhD-qualified paramedics. Ontario offers a unique context for exploring paramedicine research capacity, with its combination of systemic challenges and active, grassroots research efforts, making it an ideal starting point for understanding national and broader profession-level research and evidence interests.

Sampling and participants

We employed purposive sampling to identify participants who could provide rich and diverse insights relevant to our research questions. This approach allowed us to explore the depth and complexity of participants' experiences. We initially targeted members of the paramedic community who had self-identified as being interested in or actively engaged in paramedicine research. Invitations were extended to individuals affiliated with the McNally Project for Paramedicine Research—a grassroots initiative aimed at building paramedic research capacity—and the Ontario Paramedic Association, which includes members expressing interest in paramedicine research.

Eligibility criteria included involvement in paramedicine and active engagement in research-related activities beyond participation as a research subject. Examples of qualifying activities included attending research meetings, enrolling in research courses, or conducting research as a collaborator or principal investigator. A formal research position was not a requirement for inclusion. Nonparamedics

were excluded from the study due to their distinctly different professional and academic contexts, which would not align with the focus of this research.

To further enhance the sample, snowball sampling was employed, leveraging participants' networks to identify additional individuals who could offer valuable perspectives. This approach facilitated access to a diverse cohort across various professional roles, geographic locations, and organizational affiliations, enriching the dataset with a broad range of experiences. Ensuring diversity in contexts was a priority to ensure the findings adequately represent the paramedic research community. A provisional target sample size of 20–30 participants was identified as likely sufficient to achieve data richness and complexity and generate meaningful, transferable insights. Sampling continued iteratively until these endpoints were reached.

Interview guide

Our interview guide was designed using Cooke's framework for evaluating research capacity building in health-care.^{5,16,17} This framework identifies six key principles: building skills and confidence, linking research with practice, providing supportive infrastructure, creating opportunities for collaboration, fostering institutional and individual ownership, and cultivating a research culture. Grounding the guide in this framework allowed for a comprehensive exploration of the factors that facilitate research capacity in paramedicine while remaining open to individual, organizational, and systemic influences.

The principal investigator developed the interview items, which were subsequently reviewed by a national community of paramedicine researchers for clarity and alignment. This advisory group included researchers outside of Ontario who hold PhDs and/or are actively engaged in paramedicine research. Drawing on their experiences of overcoming challenges to become successful paramedic researchers, they provided valuable insights to refine the guide.

In line with best practices for transparency in qualitative research and reporting standards, the full interview guide is included as a supplementary file (see Supplemental File 1). The guide was designed to elicit participants' experiences related to infrastructure and engagement in paramedicine research. While the guide provided structure, interviews remained flexible and responsive to participant input in accordance with the principles of our analytical strategy (described below).

Data collection and management

Data for this study were collected through semistructured interviews with participants. After extending invitations and obtaining consent, interviews were conducted by WT and AB via Zoom, using audio and video. The semistructured format used an interview guide but allowed for

flexibility, enabling the discussion to flow naturally and incorporate follow-up questions based on participant responses. All audio recordings were transcribed verbatim and anonymized to remove identifiers. During data collection, interviewers documented contextual observations and reflexive notes, which were treated as supplementary data but analyzed separately. These notes also informed iterative adjustments to the interview guide, ensuring clarity and alignment with emerging themes. Member checking was employed, offering participants the opportunity to review their transcripts for accuracy and to provide corrections, elaborations, or additions. No changes were requested; however, one participant expressed concerns about potential identification and requested their quotes not be included. Their concerns were respected.

All interview data were securely transferred to NVivo (Ver. 12) for analysis, ensuring a systematic approach to organizing and coding the dataset for further thematic exploration.

Data analysis

The data analysis followed Braun and Clarke's six-phase framework for reflexive thematic analysis, emphasizing the active role of the researcher in generating meaning.¹⁹ First, we immersed ourselves in the dataset by reading the transcripts thoroughly and documenting initial reflections and ideas. This process facilitated a deep understanding of participants' perspectives and laid the foundation for analysis. Next, we generated initial codes inductively, allowing patterns to emerge naturally from the data without predefined categories. These codes were treated as meaningful constructs that captured fragments of data relevant to the research questions. We then organized the codes into initial themes by grouping those with shared meanings and relationships. Similar codes were clustered, and overarching patterns were identified, forming interpretive stories that encapsulated key aspects of participants' experiences. Subsequently, we reviewed and refined the themes to ensure their coherence, consistency, and distinctiveness. This involved rereading the dataset to verify that the themes accurately reflected the data and were appropriately aligned with the research objectives. In the final phases, themes were defined and named to clarify their scope and significance. Each theme's "essence" was articulated, and a narrative was constructed to connect the findings to the research questions. Reflexivity was integral throughout this process as we revisited assumptions and critically evaluated our interpretations to ensure depth and rigor in the analysis. Reflexive insights were embedded to acknowledge our influence on the analytic process and the constructed themes.

We chose Braun and Clarke's approach for its flexibility and capacity to provide an in-depth understanding of subjective experiences. This method is particularly suited for

exploring complex and nuanced participant perspectives, emphasizing interpretive richness over objective consensus or reliability measures. By prioritizing interpretation, this approach captures the complexity and depth of lived experiences within the data.

Reflexivity

Our analytical approach recognizes the researcher as an active participant in shaping the data, acknowledging that positionality, perspectives, and decisions inevitably influence the outcomes. Both interviewers, WT and AB, are known to participants to varying degrees. As active researchers based in Ontario, we operate within the same research environment we are studying, mentor others navigating similar challenges, and have ourselves encountered these barriers. We both hold academic positions in Ontario and abroad, further informing our understanding of the paramedicine research landscape.

To remain grounded in participants' experiences rather than our own, we incorporated an external researcher (NC) who had no direct ties to the paramedicine community. Her involvement offered an additional lens, ensuring diverse perspectives were considered. While this collaboration strengthened the study's balance, we acknowledge our positionality and its potential influence on data interpretation. Reflexivity was maintained throughout the research process to identify and address these influences.

This study's methodological approach was explicitly designed to explore the infrastructure supporting research engagement. Guided by a constructionist epistemology, the research design emphasized participants' lived experiences and interpretations of research capacity. Cooke's framework provided a conceptual structure for the interview guide, while Braun and Clarke's reflexive thematic analysis enabled a nuanced interpretation of how these capacities are experienced and enacted. The themes identified in the analysis emerged through this interpretive process and directly address the research question by revealing the structural, cultural, and systemic factors shaping research engagement in the profession. This alignment ensured that both data collection and analysis remained grounded in the study's theoretical and methodological commitments.

Results

A total of 24 interviews were conducted, lasting an average of 42.2 min ($SD = 10.8$). Participants were predominantly male cohort ($n = 17$), with an average age of 42.5 years and 2–35 years of experience in paramedicine. Of the participants, 19 were actively certified paramedics and collectively representing diverse primary roles, including frontline paramedics, educators, research coordinators, base hospital staff, and researchers. They were affiliated

with ten distinct paramedic services, three base hospitals, four colleges offering paramedic programs, and affiliations with three universities. Only one held a formal primary position within a university, and three others held academic appointments with universities but had other primary employers. Educational qualifications spanned from diplomas to doctoral degrees, with some participants actively engaged in graduate training. Only three had no prior publications but expressed aspirations to publish, and nine had experience supervising student research. All participants expressed interest in continuing independent research in the future. Because our 24 participants were recruited from a small professional community, we have limited detailed demographic reporting to protect confidentiality. However, the collection of demographics is representative of the context and itself a meaningful finding.

We identified two overarching issues, each with its own structure. First was (1) *structural and cultural foundations for research*. This grouping includes themes related to the existing state of infrastructure, pathways, culture, and community support. Underlying themes focus on the internal foundation needed to build research capacity within the paramedicine profession. These include (a) infrastructure challenges, (b) advocacy and pathways, (c) cultural shifts and identity, and (d) grassroots and community efforts. The second is (2) *systemic integration and strategic alignment*. This grouping focuses on external interactions, policy alignment, and demonstrating value through data and economics. These themes emphasize embedding paramedic research within larger healthcare, policy, and funding ecosystems. These include (a) systemic integration with healthcare and public health, (b) equity in research infrastructure, (c) data access and governance challenges, (d) leadership and policy in research development, and (e) demonstrating research value through health economics. See Table 1 for a summary of themes, their definition and codes that were clustered within each.

Structural and cultural foundations for research

Infrastructure challenges. Participants consistently highlighted systemic barriers to engaging in research, including limited funding, a lack of protected research time, and inadequate institutional infrastructure. These constraints left paramedics relying heavily on personal initiatives and informal networks. As one participant noted, “*There is no standardized infrastructure to support paramedic-led research, leaving researchers isolated and forcing them to seek external support from academic institutions.*” (p-010) Others described more structural challenges necessary for research. For example, p-002 stated “*Navigating ethical approvals is challenging, especially in nonuniversity settings. These barriers make it difficult for paramedics to conduct research, even when the interest and capacity are present.*”

Advocacy and pathways. Efforts to formalize pathways for research engagement were identified as critical. Participants called for structured programs, such as undergraduate and graduate pathways, that integrate research into the professional trajectory of paramedics. In this context, profession-specific graduate training is lacking and despite the existence of alternative pathways outside of paramedicine, participants highlighted challenges in finding their way and advocated for more structured grassroots strategies, stating: “*Creating structured pathways, such as paramedic-specific undergraduate and graduate programs, is essential for building research capacity. These programs would help paramedics transition into research roles and contribute to the profession’s advancement.*” (p-001). While undergraduate strategies are underway, those seeking graduate education generally need to reach beyond professional boundaries. Without arguing for one pathway or another, it’s the pathway that participants seem to invite: “*Developing formalized pathways to PhD-level education would support paramedics in conducting independent research and becoming leaders in the field.*” (p-007)

Cultural shifts and identity. Participants identified a pervasive cultural resistance to research within paramedicine, which they attributed to the profession’s historical emphasis on operational efficiency and clinical roles rather than evidence generation. This resistance reflects longstanding perceptions that prioritize immediate, hands-on care over academic or research-focused activities. Many paramedics see themselves primarily as frontline responders, and research is often perceived as disconnected from their practical, day-to-day realities: “*Many paramedics do not perceive research as a core component of professional practice. Shifting this perception requires integrating research into everyday clinical work and education.*” (p-001) This cultural norm presented challenges when seeking support: “*Resistance to non-clinical roles and research-focused activities creates a fractured landscape where paramedic researchers struggle to find acceptance within their own profession.*” (p-007) Participants reported difficulty reconciling dual identities and, as a result, “*often feel unsupported...leading to a sense of isolation within their organizations.*” (p-005)

Grassroots and community efforts. Grassroots initiatives, such as the McNally Project for Paramedicine Research, were viewed as essential for fostering research capacity. However, these efforts were often limited in scope and sustainability due to reliance on informal networks: “*Grassroots efforts like McNally are central to paramedic research, connecting early-career researchers and fostering collaboration. However, these initiatives face scalability challenges and depend heavily on external partnerships for resources.*” (p-005) The McNally Project, in particular, offers no formal structure and exists (at the time of writing)

Table 1. Summary of themes, their definition, and codes that were clustered within each.

Themes		Description	Clustered codes
Structural and Cultural Foundations for Research	Infrastructure Challenges	Systemic barriers to research, such as funding shortages, lack of protected time, and inadequate infrastructure.	Reliance on Informal Systems; Funding and Infrastructure Challenges; Barriers to Access; Fragmented Pathways; Limited Organizational Support; Ethical Approval Barriers.
	Advocacy and Pathways	Efforts to formalize research pathways, including education, governance, and career progression.	Advocacy for Structured Pathways; Unified Governance Proposals; Formalizing Research Pathways; Integration of Research in Education; Cross-Disciplinary Collaboration.
	Cultural Shifts and Identity	Resistance within paramedicine to embracing research as part of professional identity.	Cultural Resistance to Research; Dual Identity Challenges; Mentorship and Visibility.
	Grassroots and Community Efforts	The reliance on informal networks and grassroots initiatives to drive research efforts in the absence of formal infrastructure.	Grassroots Initiatives; Informal Networks as Drivers; McNally and Credential Barriers.
Systemic Integration and Strategic Alignment	Future Directions and Models	Proposals for long-term research growth, informed by international and domestic examples.	Future Research Directions; Lessons from International Models; Unified Systems as Models; Successful Integration Examples; International Examples.
	Systemic Integration with Healthcare and Public Health	Collaborating with public health and healthcare systems to align paramedic research with broader healthcare priorities.	Public Health Opportunities; Collaborations with Health Canada and CIHI; Integration of Research in Broader Healthcare.
	Equity in Research Infrastructure	Addressing disparities in access to research resources and opportunities, especially for smaller or rural services.	Equity in Research Access; Barriers for Rural Services; Mentorship Gaps for Underserved Areas.
	Data Access and Governance Challenges	Issues around data ownership, accessibility, and governance that limit collaborative and large-scale research.	Data Ownership as Power; Barriers to Data Sharing; Siloed Data Issues.
	Leadership and Policy in Research Development	The role of leadership and policy in fostering a culture of research and prioritizing research initiatives.	Leadership Gaps in Research; Policy Misalignment with Research Goals; Union and Leadership Resistance.
	Demonstrating Research Value through Health Economics	Using economic evaluations to showcase the value of paramedic research and influence policy.	Cost-Effectiveness of Community Paramedicine; Economic Benefits of Research; Health Economics as Advocacy.

as a volunteer organization. It appears to fill a community-perceived void but is limited in its tangible contributions to the system: *“Informal networks often facilitate partnerships and collaborations, but the lack of structured mentorship programs limits the ability of these networks to achieve sustainable growth.”* (p-002)

Systemic integration and strategic alignment

Future directions and models. Participants emphasized the need for a long-term vision, incorporating lessons from international models such as those in Australia, the United Kingdom (UK), and perceptions of other parts of

Canada. Participants called for a cohesive, long-term vision for paramedic research, informed by successful international and domestic models. Participants emphasized the importance of learning from jurisdictions that have made significant progress in embedding research into paramedicine, both through dedicated infrastructure and cultural change. Countries such as Australia and the UK, as well as examples from provinces such as Alberta and Nova Scotia, were highlighted as potential templates for advancing paramedic research in Ontario: *“Examples from Alberta and Nova Scotia show how unified systems can advance research by aligning priorities, standardizing data collection, and providing centralized support for*

researchers.” (p-006) Whether accurate or not, the emphasis was on funding, and integration of research: *“International models, such as Australia’s dedicated funding mechanisms and the UK’s integration of research into paramedic education, provide a roadmap for advancing paramedic research.”* (p-002)

Systemic integration with healthcare and public health. This theme emphasizes the importance of embedding paramedic research within broader healthcare and public health systems. Participants consistently highlighted the potential for collaboration with public health agencies, hospitals, and other healthcare organizations as an underutilized opportunity to advance research capacity: *“Collaborations with agencies such as Health Canada and CIHI demonstrate the potential for structured support and alignment with broader healthcare priorities.”* (p-003) Aligning paramedic research with broader healthcare priorities was seen as essential for enhancing the profession’s impact and securing long-term sustainability for research initiatives: *“Integration with public health systems allows for a more holistic approach to paramedic research, ensuring that the data generated contributes to broader health system goals.”* (p-008)

Equity in research infrastructure. This theme focuses on the significant disparities in access to research resources and opportunities across paramedic services in Ontario. Participants frequently highlighted inequities faced by smaller or rural paramedic services, which lack the funding, mentorship, and infrastructure available to larger, urban services. These disparities hinder the ability of paramedics in these underresourced settings to participate in or lead research, perpetuating systemic inequities in professional development and contributions to the field. For instance, one participant stated: *“Without systemic support like funding for graduate education, protected research time, and access to institutional resources, research opportunities remain inequitable and inaccessible to many paramedics.”* (p-012) Another stated, *“Creating a unified system for funding and access to resources would level the playing field and ensure that all paramedics, regardless of their location or service, can engage in meaningful research.”* (p-010)

Data access and governance challenges. Issues surrounding data ownership and governance emerged as a significant barrier. Participants described data as being “siloeed” and tightly controlled by individual services, limiting the potential for collaborative research: *“Data ownership by services is seen as power, creating barriers to collaboration and research access. Many services are hesitant to share data with external researchers, citing trust issues and control concerns.”* (p-016) Others suggested the need to organize data centrally to ensure researchers had access similar to other systems: *“Without a centralized*

governance model, data remains siloeed, limiting the potential for large-scale, evidence-based research that could transform the profession.” (p-010)

Leadership and policy in research development. Leadership and policy emerged as critical drivers for advancing paramedic research initiatives. Participants repeatedly emphasized the need for strong, visionary leadership, and supportive policies to create an environment where research is prioritized and valued within paramedic services. A lack of leadership commitment and policy frameworks has resulted in a fragmented and underdeveloped research culture, where operational priorities overshadow research and evidence generation. One participant noted: *“Service leadership often lacks understanding or prioritization of research; ministry agreements do not incentivize it. Operational metrics dominate, leaving little room for research initiatives.”* (p-022) Leadership and policy were seen as pivotal for driving research initiatives. Participants highlighted a lack of vision and prioritization of research within paramedic services that, if resolved with policy, might provide meaningful progress: *“Policies at the provincial level could formalize research roles within paramedic services, creating dedicated positions that align with broader healthcare goals.”* (p-003) Leadership and policy form the backbone of a strong paramedic research infrastructure. Without visionary governance and supportive policies, research initiatives will continue to struggle for relevance and resources.

Demonstrating research value through health economics. Participants acknowledged the critical role of health economics in showcasing the tangible benefits of paramedic research. Participants identified economic evaluations as a powerful tool to demonstrate the cost-effectiveness and broader value of paramedic-led initiatives to healthcare systems and policymakers. By framing research outcomes in terms of financial impact and healthcare efficiencies (in addition to/complementing patient-centered and professional outcomes), paramedic services are more likely to secure funding, justify the integration of research into practice, and influence policy development: *Showing the return on investment for research initiatives will be key to convincing leadership and policymakers to prioritize funding for paramedic research.”* (p-002) Health or service economics achieved through research was viewed as a vital tool and requirement for demonstrating the value of paramedic research: *“Future research goals include emphasizing health economics as part of paramedic research agendas to influence policy and improve service delivery.”* (p-010)

Discussion

This study sought to explore the existing infrastructure in a paramedicine context that facilitates the paramedicine

community to engage in, produce, and/or use its own research. Our results highlight two broad imperatives of attending to (1) *structural and cultural foundations for research* and (2) *systemic integration and strategic alignment*, representing internal and external considerations, respectively. Internally, participants discussed the need to address barriers such as infrastructure challenges, fragmented pathways, cultural resistance, and reliance on informal networks. Externally, participants emphasized the need to leverage existing models, target a research ecosystem that aligns with healthcare system priorities, address equity to research, create data access and governance, drive leadership and policy for research, and aim to demonstrate the value of research. Together, these findings echo suggestions made more than 10 prior,¹ highlighting limited progress and the ongoing multifaceted barriers and opportunities that shape paramedicine's research landscape.

The capacity of individuals, groups, or systems to conduct research or to empower and enable research activities is central to a robust research community. Research capacity building is a complex process, often characterized as a “set of purposefully coordinated components that target multiple levels and sectors of a system, operate both independently and interdependently, and interact within their implementation contexts.”²¹ While we can identify individual elements that support research within the system, they often lack coherent coordination. This can be improved by leveraging what others have identified as effective strategies across diverse health sectors and international paramedicine contexts.^{22–25} This includes, for example, fostering academic-practice partnerships. While infrequent in Ontario, examples from the United Kingdom highlight the potential of these “research-paramedic” roles.²⁵ In addition, promoting collaborative and experiential learning across different system levels—from individuals to entire organizations—embedding research as an inherent activity and ensuring structured support, mentorship, and protected research time were identified as institutional priorities in recent public health, health system, and paramedicine studies in England, Scotland, the Republic of Ireland, and others.²⁶

In Ontario's paramedicine sector—and potentially at a national level—fundamental elements supporting research are advancing, though they remain challenging to locate. Participants reported challenging experiences, suggesting that increased cross-sector collaboration could provide meaningful mitigation. There is a clear need to bridge the divide between academic and practice environments. Calls for stronger leadership, sustainable infrastructure, and the integration of research as a core organizational function align with Cooke's vision of embedding capacity development into systems and fostering sustained partnerships.^{5,16,17} Structural and systemic challenges seem to intersect to create a reinforcing cycle that hinders progress

for a paramedicine research ecosystem. Cultural resistance to research within the profession is compounded by the lack of visible leadership on this issue, clear career pathways, and other organizational supports needed to normalize and foster research. Concurrently, systemic inequities in academic access, funding, and data availability hinder even motivated researchers from overcoming these cultural obstacles.

Addressing this cycle requires a coordinated, multifaceted strategy that targets both individual and organizational levels of research capacity. Although some research organizations aim to support paramedicine researchers, they remain uncommon and largely disconnected from key data systems, practice settings, academic centers, and governmental frameworks. Currently, education and organizational support for paramedics to engage in research is insufficient, with limited allocation of time, training, and remuneration.¹² Many of these issues have been previously raised in Canada,¹ with little progress, at least in this context. Consequently, a gap persists between research capacity, knowledge production, and policy, hindering the translation of research into practice. Our participants seemed to experience or recognize that to bridge this gap, they (or the system) needed to foster more interdisciplinary collaborations, do more to demonstrate the value of paramedic research, and to align research priorities with provincial healthcare policy and objectives better.

Challenges related to research capacity in paramedicine are not limited to Ontario or Canada; they are mirrored in international contexts such as Australia, the Republic of Ireland, and the United Kingdom (UK). Each of these regions has faced obstacles related to resource availability—such as funding, training, and leadership—necessary for developing a sustainable research culture. While collaborative academic-practice partnerships are infrequent in Ontario, examples from the UK highlight their potential impact.^{27,28} Furthermore, paramedicine in Canada shares Australia's struggle to build a senior academic workforce,²⁹ underscoring the importance of initiatives like the Career Framework for Paramedics, which emphasize coordinated, systematic approaches to research capacity building.³⁰ As a profession, we lack meaningful structured research collaboration and coordination across borders—we appear to rely on single-center research, contextually bound questions, and small teams.³¹ This, in turn, means we are restricted to resources in local environments. Improving collaborations may help mitigate some locally imposed barriers. Policy support in countries such as England, Wales, Scotland, and Australia—where dedicated leadership roles and funding mechanisms for paramedic research exist—contrasts with Canada's limited formal recognition of paramedics as research professionals. Such differences reinforce the need for integrated policy development, funding opportunities, and

Table 2. Recommendations to support growth in research capacity and contributions (specific to this context).

Recommendation	Description	Action points
Develop a Centralized Research Framework	A provincial unified governance structure is needed to support paramedic research. This body could provide strategic direction, support academic partnerships, coordinate research structures across services, and ensure equitable access to resources.	• Establish a provincial paramedic research institute and/or academic partnerships to standardize research processes and priorities. • Develop a shared data governance policy to streamline access and ethical approvals across jurisdictions. • Partner with federal and provincial health organizations (e.g., CIHI, Health Canada) to align paramedic research with broader healthcare priorities.
Foster Academic-Professional Partnerships	Establishing robust academic-professional partnerships is vital to integrating research into paramedic practice, enhancing evidence-based care, and ensuring alignment with broader healthcare policies. These partnerships should be structurally supported through dedicated policy initiatives, funding, and legislative advocacy.	• Advocate for provincial and federal policy frameworks that support formal partnerships between paramedic services and academic institutions. • Establish joint academic-professional initiatives that include shared roles, research programs, and infrastructure support. • Engage with policymakers to develop incentives for academic institutions and paramedic services to collaborate on research. • Work towards including academic-partnership requirements in accreditation standards for paramedic services, ensuring that collaboration becomes a core criterion for service quality and funding eligibility.
Create Targeted Funding Mechanisms	Dedicated funding streams are critical to enabling paramedic research and fostering long-term capacity.	• Introduce funding grants specifically for paramedic-led research projects, targeting diverse services, including smaller and rural areas. • Incentivize research activities through subsidies for graduate programs or research-focused roles within paramedic services. • Encourage partnerships with philanthropic organizations or private stakeholders to supplement public funding.
Build Data Sharing and Analytics Capacity	Data is a cornerstone for paramedic research, but ownership and access issues hinder progress.	• Create a provincial paramedic research database with standardized taxonomies and shared data governance protocols. • Train paramedics in data analytics and management to build in-house capacity for using research to inform service delivery. • Foster collaborative research agreements that address trust issues between paramedic services and external institutions.
Strengthen Research Integration in Education	Embedding research training within paramedic education ensures it becomes part of the profession's identity.	• Mandate research literacy and evidence-based practice modules in paramedic entry-to-practice and continuing education programs. • Establish undergraduate and graduate pathways for paramedics, including research-specific streams, to nurture future scholars.

(continued)

Table 2. Continued.

Recommendation	Description	Action points
Address Equity in Research Access	Efforts to build research capacity must prioritize equitable access to resources, mentorship, and funding across all paramedic services.	• Encourage experiential learning through partnerships with universities, allowing paramedics to engage in real-world research projects during training. • Offer mentorship and grant-writing workshops targeting paramedics from smaller or underserved services. • Implement policies to ensure services in rural or resource-constrained areas receive proportional research funding and opportunities. • Provide travel grants or secondment programs to enable paramedics from smaller services to participate in conferences or cross-jurisdictional projects.
Foster Leadership and Advocacy	Leadership at all levels and of paramedic services/systems including government and academic institutions must champion research as a priority, recognizing its value for patient care and system efficiency.	• Establish research-focused leadership roles, such as research directors or coordinators, within paramedic organizations, systems, and academic institutions aligned with the United Kingdom and Canadian Career Frameworks for Paramedics.^{30,32} • Train senior leaders on the value of research and provide incentives for embedding research into operational priorities. • Work with unions to negotiate collective agreements that include provisions for protected research time and roles.
Leverage Interdisciplinary, National, and International Collaborations	Collaboration across disciplines and borders can bring new perspectives and resources to paramedic research.	• Partner with other health professions and sector (e.g., public health) researchers to conduct interdisciplinary studies that address complex healthcare challenges. • Learn from existing models, to establish dedicated funding mechanisms or the integration of research into practice, and adapt these strategies to provincial contexts. • Encourage cross-border partnerships to pool expertise and data, expanding the scope and impact of paramedic research.
Elevate the Visibility and Value of Research	Building a culture that values research requires actively demonstrating its impact.	• Use health economics to quantify the cost-effectiveness of research-based interventions. • Disseminate success stories and case studies through paramedic-specific journals, professional conferences, and public platforms. • Recognize and reward research contributions within paramedic services through awards, promotions, or funding for further projects.
Establish Hybrid Clinical-Research Roles	Balancing clinical duties with research responsibilities is a challenge for many paramedics. Hybrid roles could help paramedics contribute to both domains effectively.	• Create part-time and conjoint research appointments within paramedic services, allowing paramedics to split their time between clinical practice and research, as outlined in the Canadian Career Framework for Paramedics.³⁰ • Provide administrative support for hybrid

(continued)

Table 2. Continued.

Recommendation	Description	Action points
Advocate for Research as a Core Professional Competency	Paramedic research must be framed as a core component of professional identity, not a peripheral activity.	roles, such as assistance with grant applications, ethics approvals, and publication submissions. • Pilot these roles in large, resource-rich services and scale them to smaller services once proven successful. • Develop professional standards that require paramedic services to contribute to or support research as part of their mandate. • Integrate research goals into provincial or municipal performance agreements for paramedic services. • Encourage professional organizations to include research contributions as criteria for certifications or awards.

institutional support to foster a robust research environment within paramedicine globally.

Using the data from this study we outline ten recommendations for the paramedicine community to consider toward establishing an environment that would build and develop paramedicine research capacity and contributions. These recommendations were derived inductively and grounded in a close interpretation of the data, ensuring alignment with participants' perspectives and maintaining practical relevance. The process was iterative, moving between data and emerging recommendations, and was further informed by relevant literature,^{1,4,5,16,17} which helped situate our findings within broader scholarly and professional contexts. This approach ensured that the recommendations reflect both the empirical insights of the study and their implications for policy, practice, and future research (see Table 2).

Limitations

This study must be considered in the context of its limitations. First, our participants represent individuals who are trying to navigate the system rather than be in a position (at least at this point) to change it directly. For example, none were in leadership positions at the regulator level or large funding agencies. Further, while our intention was to include diverse representation, some groups may have been underrepresented. This leads to a perspective that is inherently bounded but still meaningful. Further examination of systemic barriers and enablers may need to be explored at the policymaker or healthcare/educational administrator level. Second, we focused on a particular context. This may limit generalizability to other provinces, healthcare systems, regulatory environments, or professional structures. We aimed to provide sufficient context to allow readers to judge the degree of transferability of

our findings. Rather than claim that our findings are consistent elsewhere, we invite others to examine whether the summary of themes and subsequent recommendations are relevant in the same way that we used Cooke's earlier contributions. Third, while we considered progress from earlier calls to support research capacity building and infrastructure, this data represents a "snap-shot" and does not capture changes or trends over time. Longitudinal studies would be necessary to track progress.

Conclusions

Research capacity development, production, and utilization will continue to face significant obstacles in paramedicine until structural and cultural foundations are solidified and systemic integration and strategic alignment are realized. These barriers form a cycle that perpetuates underdevelopment in paramedic research capacity, limiting the profession's ability to effectively generate, translate, and apply knowledge. Overcoming these challenges requires a transformative strategy that shifts priorities, empowers paramedics as leaders in knowledge production, and establishes a cohesive infrastructure that fosters meaningful contributions to healthcare. A multifaceted approach is essential to drive paramedic research forward in Ontario, addressing both internal and external challenges. Building robust infrastructure, ensuring equitable access, fostering interdisciplinary collaboration, and embedding research as a core element of professional practice, among others, will be crucial. Such an approach can unlock the full potential of paramedic research, enabling significant contributions to evidence-based healthcare, professional practice, professionalization, and autonomy. Proposed strategies not only reflect the themes identified in this study but also chart a clear, strategic path for the sustainable development of research capacity within paramedicine.

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Author contribution(s)

W Tavares: Conceptualization; Data curation; Formal analysis; Formal analysis; Investigation; Methodology; Project administration; Supervision; Writing – original draft; Writing – review & editing.

N Chawanda: Data curation; Formal analysis; Writing – review & editing.

A Batt: Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Writing – original draft; Writing – review & editing.

Data availability statement

The data that supports the findings of this study are not publicly available due to privacy or ethical restrictions.

Declaration of Conflicting interests

The author(s) declared the following potential conflicts of interest with respect to the research, authorship, and/or publication of this article: Walter Tavares and Allan Batt are editors at Paramedicine. Neither played any role in the editorial process, which was conducted in adherence to the journal's peer review policy.

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Supplemental material

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References

- Jensen JL, Bigham BL, Blanchard IE, et al. The Canadian national EMS research agenda: a mixed methods consensus study. *CJEM* 2013; 15: 73–82.
- Pickstone C, Nancarrow S, Cooke J, et al. Building research capacity in the allied health professions. *Evid Policy* 2008; 4: 53–68.
- Leggio WJ and Cummins NM. The importance of research for paramedicine as a profession. In: *Introducing, designing and conducting research for paramedics*. Bridgwater, Somerset, United Kingdom: Class Professional Publishing, 2022 September 15, pp.5.
- Tavares W, Allana A, Beaune L, et al. Principles to guide the future of paramedicine in Canada. *Prehosp Emerg Care* 2021; 17: 361–372.
- Cooke J, Gardois P and Booth A. Uncovering the mechanisms of research capacity development in health and social care: a realist synthesis. *Health Res Policy Syst* 2018; 16: 1–22.
- Bigham BL, Buick JE, Brooks SC, et al. Patient safety in emergency medical services: a systematic review of the literature. *Prehosp Emerg Care* 2011; 16: 20–35.
- Bowles KA, Cummins NM, O'Toole M, et al. A scoping review of out-of-hospital research in Ireland from 2000 to 2022. *Paramedicine* 2024; 1–20. <https://doi.org/10.1177/27536386241263359>
- Bigham BL, Kennedy SM, Drennan I, et al. Expanding paramedic scope of practice in the community: a systematic review of the literature. *Prehosp Emerg Care* 2013; 17: 361–372.
- Shannon B, Eaton G, Lanos C, et al. The development of community paramedicine: a restricted review. *Health Soc Care Community* 2022; 30: e3547–e3561.
- Leduc S, Wells G, Thiruganasambandamoorthy V, et al. Alternative care models for paramedic patients from long-term care centers: a national survey of Canadian paramedic services. *CJEM* 2023; 25: 344–352.
- Cavanagh N, Blanchard I, Weiss D, et al. Looking back to inform the future: a review of published paramedicine research. *BMC Health Serv Res* 2023; 23: 1–21.
- Runacres J, Harvey H, O'Brien S, et al. Paramedics as researchers: a systematic review of paramedic perspectives of engaging in research activity from training to practice. *J Emerg Med* 2024; 67: 523–530.
- Ross L, Reynolds L, Reeves H, et al. Barriers and enablers to paramedicine research in Australasia: a cross-sectional survey. *Paramedicine* 2023; 20: 107–116.
- Cummins NM, Fitzgerald C, Cronin UM, et al. Barriers and facilitators to the implementation of a national research strategy for paramedicine in Ireland: findings from a focus group study [version 1; peer review: 3 approved with reservations]. *HRB Open Res* 2024; 7: 49.
- Bigham BL, Jensen JL and Blanchard IE. Paramedic-driven research. *CMAJ* 2010; 182: 1080.
- Cooke J. A framework to evaluate research capacity building in health care. *Br J Fam Plann* 2005; 6: 44–52.
- Cooke J. Building research capacity for impact in applied health services research partnerships. *Int J Health Policy Manag* 2020; 10: 93–100.
- Braun V and Clarke V. Reflecting on reflexive thematic analysis. *Qual Res Sport Exerc Health* 2019; 11: 589–597.
- Braun V and Clarke V. *Thematic analysis: a practical guide*. London (UK): Sage, 2022.
- Ministry of Training, Colleges and Universities. *Paramedic program standards*. Toronto (ON): Queen's Printer for Ontario, 2008.

21. Willis C, Riley B, Lewis M, et al. Guidance for organisational strategy on knowledge to action from conceptual frameworks and practice. *Evid Policy* 2017; 13: 317–341.
22. McAteer J, Di Ruggiero E, Fraser A, et al. Bridging the academic and practice/policy gap in public health: perspectives from Scotland and Canada. *J Public Health (Oxf)* 2019; 41: 632–637.
23. Khan K, Porroche-Escudero A, Georgiou G, et al. Building health research capacity: the impact of a United Kingdom collaborative programme. *Internet J Allied Health Sci Pract* 2021; 19: 7.
24. Haynes A, Rowbotham SJ, Redman S, et al. What can we learn from interventions that aim to increase policy-makers' capacity to use research? A realist scoping review. *Health Res Policy Syst* 2018; 16: 1–27.
25. Cordrey T, King E, Pilkington E, et al. Exploring research capacity and culture of allied health professionals: a mixed methods evaluation. *BMC Health Serv Res* 2022; 22: 85.
26. Bowles KA, Batt AM, O'Toole M, et al. Identifying the essential elements to inform the development of a research agenda for paramedicine in Ireland: a Delphi study. *Health Res Policy Syst* 2024; 22: 00.
27. Welsh Ambulance Services NHS Trust. Research and development 2024 [Internet]. [cited 2024 Dec 5], <https://ambulance.nhs.wales/about-us/research-and-development/>
28. McClelland G, Limmer M and Charlton K. The REsearch PARamedic experience (RESPARE) study: a qualitative study exploring the experiences of research paramedics working in the United Kingdom. *Br Paramed J* 2023; 7: 14–22.
29. Simpson P, Barr N, Reid D, et al. Profiling the Australasian paramedicine tertiary academic sector and workforce: a cross-sectional study. *Paramedicine* 2023; 20: 206–213.
30. Cameron C and Batt AM. *Career framework for paramedics*. 1st ed. Ottawa (ON): Paramedic Association of Canada, 2024.
31. Simpson P. Leveraging collaboration to enhance quality in paramedicine research. *Paramedicine* 2024; 21: 144–146.
32. College of Paramedics UK. *Post graduate career framework*. London: College of Paramedics, 2023. <https://tinyurl.com/3sydp8cw>