



**Expanding paramedic scope of practice in the community**





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# Executive Summary

## Background

Paramedics are an important health human resource and are uniquely mobile in most communities across Canada. Recently, challenges in the delivery of healthcare have prompted governments from around the globe to consider expanding the role paramedics play in health systems. Utilizing paramedics for the management of urgent, low-acuity illnesses and injuries has been coined “community paramedicine” but the role, safety and effectiveness of this concept is poorly understood. We undertook a review of the international literature to describe existing scientific evidence related to community paramedic programs.

## Method

An international group of experts developed a search strategy and a health information specialist executed this search in 3 medical science indices for articles published in the last decade. We included all English research studies that reported a research methodology in our review. Two authors independently screened citations in a hierarchical manner. Differences were resolved by consensus. The data was abstracted and results were synthesized.

## Summary of Evidence

Over 2420 articles were screened and 9 met the inclusion criteria. The scope of the 9 studies was mixed, and 3 of the papers were derived from a single randomized controlled trial. This trial showed that community paramedicine may be beneficial to patients and health systems in terms of both clinical outcomes and cost effectiveness. Patient satisfaction was higher in the group treated by community paramedics. The other

studies drew conclusions favouring community paramedicine, however their methodologies were weak and their results must be interpreted cautiously.

## Evidence-Based Recommendations

Several recommendations can be made based on limited available evidence from a single randomized controlled trial of community paramedicine:

- A randomized controlled trial of community paramedicine in the Canadian health care system which addresses the shortcomings of the current literature is justified prior to widespread implementation.
- A needs assessment is required to understand the types of services that may constitute a community paramedic program as the intervention for the trial.
- Outcomes for community paramedicine studies should include clinical, operational, safety and patient satisfaction variables and may form the basis for developing quality and safety metrics post implementation.
- If community paramedicine is superior over the current standard of care, it may prompt curriculum change in college programs to ensure new graduates are well trained.

## Conclusion

Community paramedicine research to date is lacking, but one randomized controlled trial showed that paramedics may safely practice with an expanded scope, improving patient outcomes and satisfaction. Further research is required to fully understand how expanding paramedic roles affect health outcomes, the system of care and the cost of health care delivery.

# Expanding Paramedic Scope of Practice

## Background

Health care demand is increasing around the world as populations grow and age<sup>1-3</sup>. Emergency Medical Services (EMS) have been impacted by the increasing need for their services with requests for emergency ambulances rising by as much as 8% annually<sup>4-6</sup>. Many of the patients for whom EMS is summoned do not require emergent interventions by prehospital care providers<sup>6,7</sup> and may best be served by other health services through referral by prehospital care providers<sup>8</sup>.

Most EMS models only allow providers to treat and transport patients to an Emergency Department (ED) for further treatment although as many as 50% of patients transported to ED by EMS are discharged without significant treatment or referral<sup>9</sup>. It has been estimated that 31% of all ED visits are inappropriate<sup>10</sup> and that some patients transported to the ED by EMS leave without ever being seen by a hospital-based health care professional<sup>11</sup>. In rural settings, a lack of health infrastructure makes health care delivery difficult, and the presence of paramedics especially valuable<sup>3,12</sup>. In EMS systems with low call volumes, paramedics may be utilized more effectively to provide community based care as well as traditional emergency response. Further, this comprehensive community care may reduce the need for unnecessary transport of patients. This is important in a rural setting as transport time can be long and this takes a vehicle out of service for the next emergency call.

These observations have led to a paradigm shift to increased use of allied health professionals to carry out assessments and treatments traditionally delivered by physicians<sup>1,13-15</sup>.

While variable by region, paramedic scope of practice may include delegated medical acts such as; endotracheal intubation, needle thoracostomy, intravenous access, medication administration of antiarrhythmics, narcotics, dextrose and inotropes, and electrical therapies including defibrillation, cardioversion and transcutaneous pacing. In recent years, the scope of practice may have expanded to include fibrinolytics in ST-elevation myocardial infarction (STEMI)<sup>16</sup> and hospital bypass for STEMI<sup>17</sup> and suspected ischemic stroke<sup>18</sup>. Less critical conditions including hypoglycaemia<sup>19</sup>, epistaxis, and falls<sup>20</sup> may be managed exclusively by paramedics and often result in no transport to an ED. Some have suggested that, given the unique opportunities paramedics encounter in the field each day, health promotion and injury prevention should also be added to the scope<sup>21-23</sup>.

In light of this diverse scope of practice, many have suggested that paramedics may be well suited for treating patients with minor conditions in the field or referring them to non-ED health resources. This may potentially reduce EMS and ED workload, increase system capacity, improve patient satisfaction and improve clinical outcomes but must be done safely.

Many terms have been used to describe paramedics with an expanded scope of practice; emergency care practitioner<sup>24</sup>, extended skills paramedic<sup>25</sup>, community paramedic<sup>26</sup> and paramedic practitioner<sup>27</sup>. The International Roundtable for Community Paramedicine<sup>28</sup> (IRCP) is a network of EMS leaders pursuing the concept of expanding paramedic scope; given international participation in this organization, we have adopted the term “community paramedic” for the purposes of this report.

Our objective was to systematically review the international literature to identify scientific evidence related to community paramedics. This information is intended to inform

physicians, EMS operators, policy-makers and researchers who design, manage and measure EMS and healthcare systems.



## Methodology

### *Data Sources and Search Strategy*

We conducted a systematic review of the English literature to identify scientific evidence regarding community paramedicine. Our process followed the Cochrane methodology<sup>29</sup>. We searched Medline, Embase and CINAHL databases from January 1, 2000 to June 30, 2009 for all relevant articles. To find all relevant citations related to community paramedicine, we used a complex set of search strategies that combined medical subject headings and text words for terms related to emergency medical services, paramedics and community health. The search strategy was developed by the investigators in consultation with the Ontario Community Paramedicine Interest Group<sup>a</sup>, the International Roundtable on Community Paramedicine (IRCP)<sup>b</sup> and an information specialist. We identified additional articles by hand-searching bibliographies of all included articles and contacting experts in the field.

*a: The Ontario Community Paramedicine Interest Group is comprised of representatives from municipal EMS services in Ontario that are exploring community paramedicine models.*

*b: The International Roundtable on Community Paramedicine (IRCP) can be found at [www.irpc.info](http://www.irpc.info) and includes EMS researchers and administrators in its membership who share an interest in pursuing community paramedicine.*

### *Data Selection*

We included all research studies that measured an outcome (health, cost, safety, risk) related to paramedic provision of expanded scope of practice. We excluded opinion articles, commentaries, and letters to the editor; however, we hand reviewed bibliographies to ensure we had not missed eligible studies. Two authors reviewed all citations independently in a hierarchical manner; title, abstract, full article. Titles classified as “include” or “indeterminate” by at least one of the investigators were included in the next level of review. Disagreements at the full article level were resolved by consensus between the two authors.

### *Data Extraction*

Two authors (BB, SK) independently abstracted the variables of interest using a data abstraction tool: the study design, the population demographics, the control and intervention, outcome data, the type of EMS provider and the EMS setting. Any abstraction differences were resolved by consensus.

## Summary of Evidence

### *How many articles were found?*

There were 9 papers relating to 7 studies that met including criteria<sup>20, 25, 27, 30-35</sup>. Most studies were excluded because they were not related to community paramedicine or were narrative descriptions of community paramedicine programs without data.

### *Where did the studies originate?*

Studies originated from North America, the United Kingdom and Australia. The studies from the United Kingdom were set in urban and suburban centres<sup>20,25,27,30-33</sup>, while both the Canadian<sup>34</sup> and Australian<sup>35</sup> studies primarily focused on rural and remote areas where health services access is limited due to a lack of health human resources. In Canada, Australia and the United Kingdom, the impetus for expanding paramedic practice originated with government white papers exploring alternative models of health care delivery<sup>1, 3, 36</sup>.

### *What methods did the studies use?*

Only one study was a randomized controlled trial (RCT) which investigated the efficacy of community paramedicine in the UK, and the findings were supportive of community paramedicine<sup>27</sup>. The remaining body of evidence was limited to case-control, observational studies, economic and safety studies, and surveys<sup>20,25,30-35</sup>. To help advance research in this area the current evidence is summarized and we focus on the randomized controlled trial from the United Kingdom.

### *What was the scope of practice of the community paramedics in the United Kingdom RCT?*

The scope of community paramedicine in the UK RCT was tailored to the needs of the community and all participating paramedics received enhanced training in assessing and managing minor or low acuity patients beyond the capability of a standard paramedic. This included the assessment of minor, acute illnesses and ailments, providing alternate pathways for further assessment, treatment and follow-up, and providing on-scene education in injury prevention and chronic illness surveillance<sup>27</sup>.

Daytime care provided by community paramedics studied by Mason and others included alternate disposition pathways aside from the emergency department. These alternate pathways included protocol driven referrals to radiography clinics, general practitioners, district nurses, and social services.<sup>20, 27</sup> These community paramedics had enhanced skills (Figure 1) that allowed them to treat patients at home for minor illnesses or injuries (Figure 2) and then leave the patient at home without recommending transport to ED. The decisions were guided by protocols and skill development which enabled the provider to suggest self care, referral to an agency or transportation to an ED.<sup>20</sup>

**Figure 1**  
*Skill set of Community Paramedics  
 in the UK RCT*

- local anesthetic techniques
- suturing techniques
- wound care
- splinter removal
- principles of dressings and splinting
- joint examinations
- neurological, cardiovascular, respiratory system examination
- ear nose and throat examination
- protocol-led dispensing including
  - analgesia
  - antibiotics
  - tetanus toxoid
- mobility and social needs assessments
- requests for radiography
- referral processes including
  - emergency department
  - general practitioner
  - district nurse
  - community social services

**Figure 2**  
*Minor illnesses and ailments managed by  
 Community Paramedics in the UK RCT*

- minor allergic reaction, insect bite/sting
- boils and abscesses
- post-op wound/dressing problems
- minor wounds and lacerations
- minor soft tissue injuries and burns
- epistaxis
- foreign body (ear nose throat)
- sore throat, cold and flu
- toothache
- seizure in known epileptics
- resolved hypoglycemia in known IDDM
- back pain
- diarrhea, constipation
- blocked urinary catheter
- emotional or hysterical reaction
- alcohol intoxication
- social problems
- fainting
- falls

The role paramedics played varied across the other non randomized studies. In the UK, community paramedics also played a role in triaging calls to 999 (911) and were utilized in dispatch centres to enhance the capture rate of patients who would benefit from community paramedic care<sup>33</sup>.

Reeve observed that paramedics with additional training could help to fill the niche of service currently under resourced due to a lack of physicians in rural and remote areas of Queensland, Australia<sup>35</sup>. Martin-Misener described a similar extended practice for the paramedics of Long and Briar Islands in Nova Scotia, Canada<sup>34</sup>. Services of this model include expanded patient assessments, ordering screening tests for bone density and some cancers, chronic illness identification and surveillance, medication compliance monitoring, and health education.

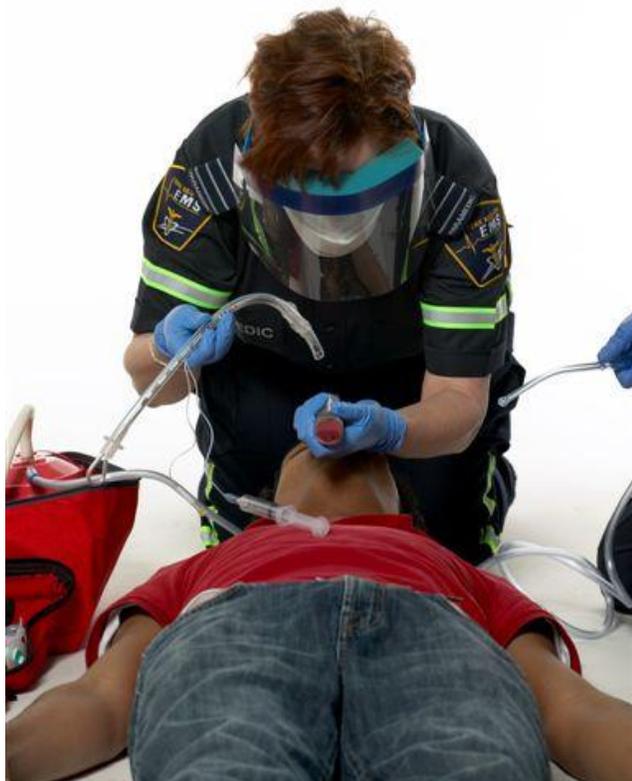
Paramedics also provided injury prevention initiatives including falls prevention, first aid and safety training and car seat clinics.<sup>34</sup>

*What impact did community paramedics have on clinical and health care system outcomes in the United Kingdom RCT?*

Community paramedics may have a positive effect on patients and the health care system, including a reduction in ED attendances and inpatient length of stay. The UK RCT by Mason (2007) found several potential benefits after conducting the randomized controlled trial of community paramedic care versus standard paramedic care: patients were less likely to attend the emergency department either at the initial episode or within the next 28 days (62% vs 88%,  $p < 0.001$ ); were less likely to require hospital admission for 28 days after the initial

episode (40% vs 47%,  $P < 0.001$ ); and were more likely to receive some form of on-scene treatment including advice (81% vs 73%,  $p < 0.001$ ). Clinical outcome data showed no statistically significant difference in outcome: within 28 days of the index episode, there was no difference in self-reported deterioration or patient mortality between the two cohorts (21.7% vs 25.6%,  $p = 0.13$ , 4.4% vs 5.0%,  $p = 0.41$ )<sup>27</sup>. Mason states that community paramedics “conveyed considerable benefit for patients and the National Health System in terms of reduced overall attendances at an emergency department or hospital, shorter episode times and higher levels of satisfaction among patients.”<sup>27</sup>

Patient satisfaction improved in each community paramedic model primarily as it gave the patient choice and access to services other than attending the ED. Mason’s RCT identified that patients reported being “very satisfied” more often when treated by community paramedics compared to standard paramedics (85.5% vs 73.8%,  $p < 0.001$ )<sup>27</sup>.



Other non randomized studies suggested similar success; Cooper suggested that when a community paramedic was dispatched to minor calls, they were able to successfully provide referrals to alternate care including general practitioners, minor injury units, district nurses, or a falls prevention group, transporting 38% of patients to the ED compared to a 68% transport rate by standard paramedics during the same time (comparison only, no  $p$  value)<sup>31</sup>. Martin-Misener attributed positive effects of the Nova Scotia community paramedic-nurse practitioner model to surveillance and self-reporting assessments. Martin-Misener concluded that more patients with chronic illness were identified and better managed as evidenced by fewer off-island travel expenses to medical assessment and care over time after implementation of the community paramedic model. The model improved patient access to health care and reduced costly visits to a general practitioner by 28% and to the emergency department by 40% (no  $p$  value reported)<sup>34</sup>.

### *Can community paramedics practice safely?*

A post hoc substudy of Mason’s RCT specifically assessed the safety of not transporting patients by comparing the rate of unexpected ED visits 7 days after contact with the community paramedic and found no statistically significant difference in the rate that nontransported patients attended an emergency department for reasons related to their index case within 7 days of the index episode (8.9% vs 6.8%,  $p = 0.052$ ) but did find a difference in the rate of ED attendance within 7 days for any reason (11.9% vs 9.5%,  $p = 0.049$ ). There was no difference in the rate of suboptimal care as judged by a physician review panel (26.5% vs 27.1%,  $p = 0.94$ )<sup>25</sup>. In the original RCT, retrospective chart review found no statistically significant difference in mortality (OR 0.87, CI 0.63 to 1.21).

The authors concluded that community paramedics with extended skills practice as safely as standard practice paramedics and that “their decisions to treat patients and leave them at home or transfer them to the ED appear to be...safe and did not lead to a significant increase in reattendance or death<sup>27</sup>.” Further research is required to understand which interventions can safely be performed, and which alternate care pathways can safely be recommended, by community paramedics.

In a prospective cohort study of 797 patients receiving community paramedic care compared to standard paramedic care, Snooks identified that three patients in each cohort were left at scene inappropriately as deemed by a chart review conducted by physicians, although none sought medical care following the index episode. Snooks also identified that the community paramedics were more thorough documenting their cases, which allowed for more useful evaluation of care processes<sup>20</sup>.

These studies are specific to UK paramedics; the safety of expanding paramedic scope in Canada is not well understood, and training and education differ substantially between the two jurisdictions. In Canada, paramedics may attend a paramedic education program as short as six months or as long as four years. In the UK, a baccalaureate degree must be held to be considered for expanded practice.

### *Are community paramedics cost effective?*

The cost effectiveness of community paramedic programs was quantitatively assessed in two articles<sup>32, 34</sup>. The clustered randomized control trial conducted by Mason (2007) was assessed for cost-effectiveness by Dixon. Community paramedicine failed to show superiority for the EMS-phase of care. There was no significant difference in cost in a study that had the power to find a difference of at least 5% (beta 80%). However, when the QALY (quality of adjusted

life) indicators were included in the model, the cost to treat a patient in the paramedic practitioner cohort was £680 (\$1050 CAD) less (all figures from 2008).<sup>32</sup> Training costs were included in the model, and may skew data against the community paramedic model. Also, missing data rates were high for these analyses and the actual cost savings realized by the intervention is unclear.

Mason identified a lower total episode time in the community paramedic cohort compared to the standard paramedic cohort (235 vs 278 minutes ( $p < 0.001$ ), though this time was not specific to the EMS period<sup>27</sup>. Neither study considered the many indirect costs that could be impacted by community paramedicine programs. These data are insufficient to allow understanding of how community paramedics affect EMS resource utilization and health system costs; rigorous cost analyses are lacking.

Martin-Misener’s nurse practitioner-community paramedic model in Nova Scotia produced several statistically significant cost savings for both the patient and the health care system, mostly due to decreased travel off of the small islands to the mainland hospital. Direct annual health care cost diminished from \$2380 to \$1375 per person over the three years of the study. Total visits to a general practitioner (who are not on the Islands) decreased from 5214 to 3759 during the study period, a 28% decrease. This was associated with significant travel expense savings ( $p = 0.02$ ) and reductions in prescription medication costs ( $p = 0.02$ ). A 40% reduction in emergency department visits was also realized between the first and final year of the study (no  $p$  value reported)<sup>34</sup>. The methods of the study do not assess to what degree the community paramedic presence contributed to these cost savings.

Rigorous research is required to understand if community paramedicine programs can contribute to health system cost savings.

## Evidence-Based Recommendations

There is a paucity of evidence supporting or refuting the concept of community paramedicine and broad implementation of such programs is not justified by current scientific evidence. Only one European randomized controlled trial exists and its results favour community paramedicine but these successes have not been repeated elsewhere. Of the data available, it is reasonable to recommend that a randomized controlled trial of community paramedicine be undertaken in the Canadian health care system. The following recommendations are based on the single randomized controlled trial conducted in Britain and unique to the National Health System in the UK demonstrating decreased time on scene, patients being more likely to receive treatment in the field, and better patient satisfaction without demonstrating any significant impact on health outcomes.

- Lacking evidence in support of community medicine suggests that an RCT is required to further science in this area and ensure precious health care resources are targeted appropriately to improve health outcomes.
- Community paramedic programs described in the literature are for the most part (>80%) describing international experiences in the UK (4), Australia (1) and Canada (1). This body of work

suggests that any community program should be tailored to local needs, and many allied health professionals are reported to be crucial to the design and operations of such programs. Interprofessional collaboration and an assessment of community needs are required to understand the types of services a community paramedic program should optimally provide.

- A needs assessment would allow the target community to define the scope of practice in advance of any interventional trial.
- Outcomes for community paramedicine research should include health outcomes, direct and indirect costs, clinical and operational outcomes, patient safety outcomes and patient satisfaction measurement. These metrics should continue to be measured if the program is implemented as a standard of care.
- If community paramedicine is superior over the current standard of care in the target region, it may prompt curriculum change in college programs to ensure new graduates are well trained.



## Conclusion

There is a paucity of literature investigating the effectiveness of expanding the scope of paramedic practice and most of the current literature lacks strong methods to support community paramedicine; however, the evidence to date suggests that paramedics may be capable of learning and applying additional medical competencies. Current literature is mostly international and focuses on community paramedic roles either to supplement care in rural areas, or more appropriately treat and refer

patients in high-density areas to lessen emergency department utilization. The model of expanded paramedic scope of practice in the United Kingdom is the only example in the world that has been well-studied, and its results are promising and may be applicable to the Canadian health care system. Further pragmatic research of community paramedicine is required to fully understand the potential benefits and risks for health systems and patients alike.





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