

RESEARCH ARTICLE

A SCOPING STUDY AND QUALITATIVE ASSESSMENT OF CARE PLANNING AND CASE MANAGEMENT IN COMMUNITY PARAMEDICINE

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Abstract
Introduction

Community paramedicine (CP) establishes an ongoing patient relationship beyond short emergency care episodes. How care planning and case management have been adapted from the isolated incidents of traditional practice is unclear. The objective of this study is to contribute to paramedic practice by examining broad areas of care planning in CP, identifying gaps in the evidence, clarifying key concepts, and reporting on the types of evidence that address and inform practice. A qualitative analysis of included literature outlines program capacities and identifies comprehensive models of care that can inform clinical practice in CP.

Methods

A scoping study was completed that included conducting a systematic search of the literature (in MEDLINE and CINAHL) and selecting relevant studies, followed by data extraction, summarizing, and reporting. The authors of included studies were contacted to confirm the aspects of care planning that were extracted from their respective studies. Aspects of care planning were compared between studies and used to generate a comprehensive list of existing practices.

Results

Ten of 1648 studies met inclusion criteria. Qualitative analysis identified 22 aspects of care planning along four themes; enrollment (n=3), assessment and management (n=6), intervention and care (n=5), and collaboration (n=8). No study included all 22 aspects of care planning. One aspect of care planning was present in all 10 studies; collaboration with primary care providers.

Conclusions

The aspects of care planning identified through this study provide a framework that can guide service providers in the delivery of care and researchers in defined outcome measures to be assessed. Future program development should be guided by the finding that all articles included in this study included collaboration with primary care providers. By summarizing care planning within CP programs, ongoing program development can embrace collaboration with other care providers to help insure that patients receive the appropriate care.

Keywords: Emergency Medical Services, Extended Care Paramedic, Community Paramedic, Care planning, scoping study

Introduction

Paramedic services deliver care within an operational context that often considers the use of emergency services to be based on singular incidents (1,2). Singular short interactions involving transition to care in emergency departments (EDs) (3,4) have limited the basis for care planning and case management by paramedics. Studies on patient outcomes following ED visits indicate that many patients are discharged without subsequent referral (5,6) or after receiving only minor treatment or care (7,8). This can also mean that patients are repeatedly seen by paramedics (9,10). Such patients may represent individuals who would benefit from treatment and care offered through alternative models that have been developed in response to new patterns of use. Two examples of paramedics acting in new roles have been called community paramedics (11) and paramedic practitioners (12). How care planning and case management have been adapted by paramedics acting in these roles from the traditional practices in isolated incidents is unclear.

Community paramedics have been used to address preventable 9-1-1 emergency calls through improved collaboration with local community health care partners (13). Municipal or regional administration of services in many jurisdictions means that delivery of care by community paramedics is often initiated in direct response to a perceived community level need (14,15). The regional heterogeneity of program development has led to vastly different practices between different jurisdictions and, in turn, difficulty in assessing the clinical benefits of these initiatives (14–16). Despite these limitations, programs using community paramedics have demonstrated the potential to reduce emergency departments (ED) visits (17–19), improve patient satisfaction (17,20,21), and improve system performance (16,22).

Paramedic practitioners share some similarities with community paramedics. The rationale for the paramedic practitioner model (also called an extended care paramedic model) (12,23,24), included a hypothesis that not all patients seen by paramedics required transport to an ED. The practitioner model required a significant adjustment in service delivery, up to and including redefining what constitutes emergency care for service providers and what alternatives to an emergency department may be feasible (12,23,25,26). Extended care paramedics (ECPs) may be assigned to calls through new approaches to dispatching and use an extended scope of practice when treating patients (12,26). Legislation and policies governing service provision often mean that ECP programs function separately from traditional emergency response (9,15,16,19,27,28), thus reinforcing heterogeneity in service delivery between different jurisdictions.

Objectives

Herein, models of care that utilize either community paramedics or paramedic practitioners in non-emergency situations are referred to using the term community paramedicine. Despite heterogeneity in program structure, it is expected that common roles and approaches are occurring with respect to the clinical management of cases through community paramedicine. Previous reviews (13–16,22,29) evaluating community paramedicine have presented some information about how paramedic services adapt their service delivery model overall, but concepts of care planning and case management involving community paramedics or paramedic practitioners beyond singular encounters have not been summarized. This study addresses this void by examining broad areas of care planning in community paramedicine, identifying gaps in the evidence, clarifying key concepts, and reporting on the types of evidence that address and inform practice in paramedicine. We include a qualitative assessment of care planning and case management in community paramedicine programs to analyze the core operational components and outcome measures of the described clinical interventions within each of the studies. We define program capacities and identify comprehensive models of care that can inform evidence-based practice within paramedicine.

Methods

A scoping study was conducted using the standard framework developed by Arksey and O'Malley (30). The study process included conducting a systematic search of the literature and selecting relevant studies, followed by data extraction, summarizing, and reporting. Arksey and O'Malley suggest that a consultation exercise may enhance the

review process (30). In this study, the authors of included studies were contacted to confirm the components of care planning that were extracted from their respective studies.

Systematic search

A systematic search of the literature was conducted between September 12, 2016 and October 15, 2016. Determining the appropriate search strategy for identifying articles about a sub-specialty of paramedic work required several iterations and adjustments. Search terms were selected to describe the care provider as opposed to the program delivering care because various terms may be used to describe community paramedicine programs. The term “community paramedic” can be interchanged with other terms such as “extended care paramedic,” “paramedic consultant,” or “paramedic practitioner.” These terms have been adopted to varying degrees and have different meanings in different jurisdictions. Combinations of keywords (with wildcard enabled suffixes) and main subject headings were used to reflect these terms. Searches were replicated for MEDLINE and CINAHL. The search was restricted to literature published in the past 15 years (dating to 2001) in order to capture the emergence of community paramedicine service delivery models (11,12). Systematic search details are provided in the supplemental file associated with this article.

Study selection

Citations were screened—first by title, then by abstract, and finally by full-text—to confirm that they met inclusion criteria. Two reviewers (BM & ML) completed screening separately to ensure the inclusion of all relevant articles and the reduction of bias. To meet the inclusion criteria, abstracts needed to indicate paramedics were practicing in expanded roles or with extended scope and describe care planning or case management as an aspect of the study. Studies were excluded if they described care planning or case management within a hospital setting or as part of traditional emergency ambulance transportation. However, studies that investigated emergency response with subsequent non-emergency department destinations were included as these were considered to be non-life-threatening situations (for which the traditional service delivery model was designed). ‘Care planning’ and ‘case management’ were defined by two basic components. First, some form of program enrolment or referral was required to connect the patient with a community paramedic or ECP, to assess eligibility or suitability for subsequent clinical care and intervention. Second, within the program components, some form of care plan was required wherein patients received care or treatment. Described programs also had to include criteria for discharge from care, which may or may not have included a period of follow-up. Following full-text review, any disagreement between reviewers was resolved during an in-person meeting. Title screening the references of the included articles was completed to identify any articles that were not found through the systematic search strategy.

Data extraction

Data was extracted according to the Arksey and O’Malley framework (30). Country of origin and study design provided information on where community paramedics were practicing and the level of research being completed. Information about the model of care provided details about the role of the paramedic, the services they were providing, the timing and location of service provision, and the stated rationale. Details on operational characteristics were collected and provided information about program leadership, patient enrolment, types of assessments, program collaborators, and program evaluation. Components of care planning and case management were synthesized based on the extracted data to generate a comprehensive list of care planning characteristics that was used for author consultation.

Qualitative analysis

Each community paramedicine program described in the articles that were reviewed served as a case for a qualitative assessment of commonly appearing characteristics of models of care. The corresponding author for each of the included articles was contacted by e-mail and asked to provide information about the aspects of care planning that were

included in the respective programs. Authors were provided with a table that detailed all aspects of care planning that had been identified in all included articles. The components that were described in their study were indicated. They were asked to confirm findings or indicate other aspects of the program that were either included or not included and to describe any other aspects of care planning that were not included in the table.

Results

Literature included

After removing duplicates, a total of 1648 titles were screened (Figure 1) from MEDLINE and CINAHL. Reference-screening of the included articles yielded one further study that was considered for subsequent abstract screening. A total of 10 articles (Table 1) met the criteria for full-text review. Study protocols, economic analysis, patient satisfaction, or other sub-analyses related to the programs described in these studies were further detailed in another 16 articles. These related articles were reviewed for any further details related to care planning or case management during the qualitative analysis.

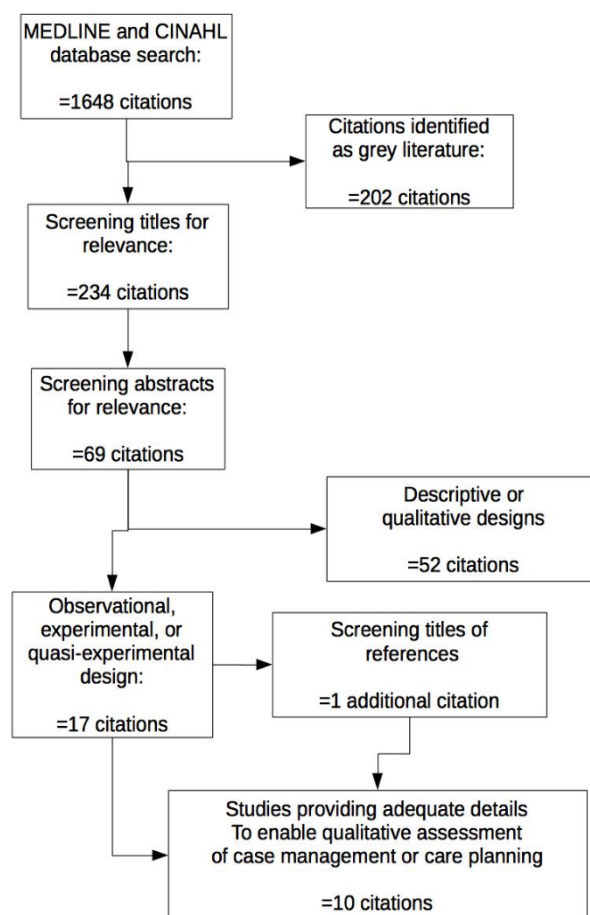


Figure 1: Flow chart illustrating article selection process

The included articles demonstrated a variety of different research designs and resulted in differing levels of evidence; methods used were RCTs (one RCT and two RCT protocols), one quasi-experimental trial, two retrospective studies, one pre/post study, one cross-sectional, and two pilot project reports. The objectives of the studies varied from exploring feasibility of paramedics acting in new roles to rates of hospitalization or repeated emergency calls. Programs were designed for a number of different patient populations including community dwelling older adults, individuals recently discharged from hospital, residents of long-term care, patients with a specific disease diagnosis, and frequent emergency callers. Where outcome comparators were included, these were either based on pre/post analysis or arm of a trial (either cluster-randomized or quasi-

Lead Author, Year, Reference, Country	Study Design, Sample Size	Study Population	Exclusions	Study Objective	Intervention & Care Planning	Study Outcome Measure(s) & Results	Study Implications & Findings	Other Related Articles
Abrashkin, 2016, (31), USA	Cross-sectional, 1602	Participants enrolled in "Advanced Illness Management" program. Median age, 83, 67.4% female.	NA	Explore feasibility of CP, evaluate response and hospitalization rates.	Program utilized paramedics as "physician extenders" to provide on-demand urgent in-home care.	Patients seen by CPs remained at home 78% of the time and had a higher hospitalization rate if they were transported than those seen by traditional paramedics.	CP-Physician teams can identify patients needing hospital admission. In a fee-for-service model, non-transport can be a barrier to program implementation despite positive feedback from individuals and carers.	
Agarwal, 2015, (32), CAN	Protocol – Randomized Control Trial (RCT)	Residents of a subsidized seniors housing building.	Less than 3 months of residency.	Evaluation of community paramedicine health assessment program.	Paramedics assess, treat and refer patients who voluntarily attend sessions offered within common areas of residential setting.	Comparison with control arm of rate of 9-1-1 use, and changes in blood pressure, CANRISK score, and health behaviour	Program is expected to reduce emergency calls and improve health behaviour.	(9)
Crockett, 2016, (33), USA	Pilot case-series, 6	Patients identified as being at risk for hospital readmission with diagnoses of heart failure.	None (at outset, later revised)	Decrease hospital readmission for patients with heart failure	Post-discharge home visits with focus on education pertaining to medications and chronic disease management	Number of medication related problems addressed and number of readmissions after 3 months.	Pilot project was found to positively received by patients and team members. Revisions to exclusion criteria and program design can be implemented moving forward	
Drennan, 2014, (34), CAN	Protocol - RCT	Family health team patients diagnosed with either chronic obstructive pulmonary disease, heart failure, or diabetes.	Residents of long-term care (LTC) or having cognitive or communication barriers.	Facilitate assessment and treatment and reduce hospitalization rate for patients in chronic disease management program.	Paramedics conduct home visits at 3 month intervals to assess, treat, and educate patients. Findings will be shared with family health care team and care will be provided in coordination with other care providers.	Comparison with control arm of patients receiving standard level of care.	Program is expected to reduce hospitalizations.	(35)

Table 1: Summary of reviewed articles

Lead Author, Year, Reference, Country	Study Design, Sample Size	Study Population	Exclusions	Study Objective	Intervention & Care Planning	Study Outcome Measure(s) & Results	Study Implications & Findings	Other Related Articles
Edwards, 2013, (36), UK	Pre/post case -series, 110	Participants were frequent callers (defined as more than 10 calls per month for 3 consecutive months) or other high utilization patients. Mean age 57.6 (\pm 21.4), 55% female.	NA	Assess whether program addressed frequent caller behaviour.	Paramedics developed individualized dispatch protocols (ISP) or patient specific protocols (PSP) in collaboration with other care providers.	Comparison with patients call history for preceding 3 months showed a decrease in emergency calls.	Intensive case management through ISP or PSP in high frequency callers appears to be effective in a heterogeneous group of patients.	
Jensen, 2016, (37), CAN	Retrospective cohort, 360	Participants were residents of "Care by Design" LTC facilities. Two cohorts with median ages of 84 and 86 years, and 59.4% and 80.1% female.	Based on constraints of query, such as duplicate records, unable to link records, or patient was not resident of facility.	Assess differences in delivery of care between patients seen by ECPs or emergency paramedics.	ECPs provided assessment and treatment above advanced care paramedic (ACP) scope of practice and followed different dispatch protocol to coordinate care with interdisciplinary team	After implementation, there was a decrease in transport and hospitalization rates.	ECPs were shown to facilitate care in-place without increased risk to patient safety.	(38-40)
Mason, 2007, (41), UK	Cluster RCT, 3018	Patients >60 years old who called for an ambulance with a minor complaint. Mean age 82.6 (\pm 8.3), 72.6% female.	Post-hoc exclusion based on cognitive impairment or language barrier.	Evaluate effectiveness and safety of paramedic practitioner service.	Paramedic practitioners provided practical and special skills and had additional options for referrals to patients meeting defined presenting complaint criteria.	Cluster randomization was between weeks where service was available or not. Primary outcome of ED attendance or hospital admission in 28 days following call was less likely in the intervention group.	ECPs provide effective alternate care plans for elderly patients with minor complaints	(17,19, 41-43)

Table 1: Summary of reviewed articles (cont.)

Lead Author, Year, Reference, Country	Study Design, Sample Size	Study Population	Exclusions	Study Objective	Intervention & Care Planning	Study Outcome Measure(s) & Results	Study Implications & Findings	Other Related Articles
Mason, 2012, (45), UK	Quasi-experimental trial, 5525	Patients presenting to five different intervention services using ECPs. Mean age in control arm: 42.7 (\pm 29.4), 51.5% female. Mean age in intervention arm: 49.4 (\pm 30.8), 58.4% female.	Missing information.	Compare patient disposal pathway of different settings.	Various settings established treatment and referral pathways that could be enacted by emergency care practitioners (including ECPs) leading to various patient dispositions.	Two general headings were evaluated: referral or discharge. In the ambulance setting, practitioners were more likely to discharge patients and more likely to make non-urgent referrals (and less likely to make urgent referrals).	Emergency care practitioners have different impacts in different settings. They appear to be most beneficial when utilized in a mobile setting and where they extend on a pre-existing skillset.	(20,46)
Ruest, 2012, (47), CAN	Retrospective Case-series, 27	Patients enrolled in "Aging at Home" program. Median age 87, 54% female.	NA	Evaluate program impact on emergency calls by participants.	Paramedics provided immediate response to call-bell system for patients waiting placement in LTC.	Level of call-bell system use and number of emergency calls and associated outcomes were described.	Program appeared to reduce number of emergency calls due to complaints being addressed through call-bell system.	(28,48)
Swain, 2012, (26), NZ	Pilot project report, 583	Patients identified at time of dispatch as being suitable for ECP response. 49% of patients were older than 75.	NA	Provide descriptive statistics of pilot program.	ECPs collaborated with other care providers to assess and treat patients in their homes, avoid unnecessary trips to hospital, and reduce demand on emergency services.	38% of patients seen by ECPs were transported.	ECPs provided safe care and improved collaboration with other care providers.	(21,25)

Table 1: Summary of reviewed articles (cont.)

experimental).

The aspects of care planning that were identified in these 10 articles are described and detailed in Table 2. Eight of 10 authors provided confirmation or clarification regarding aspects of care planning or case management. The feedback received from respondents indicated a high level of agreement with the aspects of care planning as we described them. In some circumstances, authors elaborated on aspects of care planning that had not been included in the published articles.

Aspects of care planning

Three program enrolment structures were identified in the 10 articles; program initiated, voluntary/recruited participation, and patient initiated. Program initiated enrolment followed a case management approach designed for frequent paramedic service callers or patients deemed eligible for enrolment through other disease management programs. In total, eight community paramedicine programs described this type of enrolment; in four programs this was the only means of enrolment (31,33,34,36,37,41,45,47). Most programs included more than one means of enrolment (see Table 2). Four programs employed a model of care similar to the ECP model (26,37,41,45) where care was available at a patient's time of need with a focus on care provision "in-place." These programs, along with two other programs (32,34) were classified as having patient initiated enrolment. Three of the four programs that identified themselves as ECP models also indicated that the service could initiate contact with identified individuals (37,41,45) while the fourth indicated that the service also actively recruited participants (26). Two programs described patient recruitment or voluntary enrolment. One followed an ECP model of care (26) while the other described a clinical setting established in public housing apartment buildings where patients could attend voluntarily (32).

The characteristics of care planning that were found can be described within three categories; assessment, intervention, and collaboration. All but one of the programs described paramedics completing a functional assessment or other program-specific assessment (26,31–34,37,41,45,47). The other program described case reviews to facilitate development of individualized dispatch protocols (36). Assessment could also be integrated with chronic disease management activities, found in six programs (26,31–34,47), or advanced care planning, found in three programs (31,37,47). Advances in mobile technologies were found to enhance assessment with all but two programs including some aspect of point-of-care testing (26,31,32,34,37,41,45,47).

Providing care "in-place" is cited as one of the motivations behind these new service delivery models (26,31,37,47) while other programs were interested in decreasing use of emergency services more generally (32,34,36,41,45). All of these programs included an aspect of care planning that included either emergency department avoidance or an individualized dispatch protocol (26,31,32,34,36,37,41,45,47). The one exception to these motivations was a program initiated at hospital discharge with an objective of preventing re-admission (33).

The care provided through these programs could involve both the administration of medication and other non-pharmacological care (26,31,32,34,37,41,45,47). Antibiotics and analgesia were examples of pharmacologic care (26,37,41,45). Wound care was a common example of non-pharmacological care (26,34,37,41,45,47). The exact intervention provided was dependent on level of certification and autonomy of paramedics. Additionally, half of the programs indicated that health promotion or disease prevention were included as aspects of care planning (26,32–34,47).

Collaboration with other care providers was present in all included studies (26,31–34,36,37,41,45,47). One article described pharmacist and paramedic collaboration in a home visit program with a focus on medication adherence (33). While this article provided extensive details on a collaborative approach to medication management, this aspect of care planning was present in five other programs (26,32,34,37,47) but only two of these included collaboration with a pharmacist (26,47). Paramedics often practice with medical oversight provided by emergency care physicians. We found that in community paramedicine programs, medical oversight from emergency care was present in seven of the programs (26,31,34,37,41,45,47). This same level of collaboration existed with specialized care (26,33,34,37,41,45,47) and with social workers (26,33,36,37,41,45,47). Fewer programs included collaboration with mental health care (26,36,47), home care

(26,32,34,47), or pharmacists (26,33,47). All programs had care plans that included collaboration with primary care providers or family doctors (26,31–34,36,37,41,45,47).

	Definition	Abrahamkin	Agarwal	Crockett*	Drennan	Edwards*	Jensen	Mason (2007)	Mason (2012)	Swain	Ruest
Enrollment	Program initiated	The paramedic service, in collaboration with program partners, identify potential individuals and initiate contact with individual for the purposes of community paramedicine program	X		X	X	X	X	X		X
	Voluntary or Recruited	The paramedic service, in collaboration with program partners, advertise information regarding the community paramedicine program for the purposes of recruiting program participants.		X						X	
	Patient initiated	The community paramedicine program offers readily available services that may be accessed at patient's time of need (within operational context of service delivery model).		X	X		X	X	X	X	
Assessment & Management	Functional assessment	A standardized means to describe the interaction between an individual's health, environment, and social situation and their ability to perform daily tasks and activities.	X	X	X			X	X		X
	Other program-specific assessment	A standardized means to describe an individual's well-being specific to some criteria as pre-defined by the model of care.	X	X	X		X	X	X	X	X
	Medication management	One or more of the following aspects intended to improve use of medications; assessment of medication adherence, education or consultation on indications for medication use, or reconciliation of prescriptions.		X	X	X	X			X	X
	Chronic disease management	Education and facilitation of activities and practices that assist in the care, improvement, or mitigation of chronic disease processes.	X	X	X	X				X	X
	Advance care planning or end-of-life care	Discussing or fulfilling decisions or arrangements regarding end-of-life and/or situations wherein an individual is not capable of making choices regarding the care they wish to receive.	X				X				X
	Point-of-care testing	A diagnostic process or procedure that can be carried out on-site and provides immediate results.	X	X	X		X	X	X	X	X
	Pharmacologic care	Provision or dispensing of medication	X		X		X	X	X	X	
Intervention & Care	Non-pharmacologic care	Provision of medical treatment without the use of medications.	X	X	X		X	X	X	X	X
	Health promotion or disease prevention	Education and facilitation of activities and practices that assist in the enhancement or improvement of a healthy lifestyle and/or mitigation of disease processes or progression.		X	X	X				X	X
	ED avoidance	Patients are provided with a formalized alternative to ambulance transport and care in a hospital emergency department.	X	X	X		X	X	X	X	X
	Individualized dispatch or care protocol	Enrolled patients have a formalized directive available to dispatchers or responding paramedics in emergency situations.	X			X	X			X	
Collaboration	On-call physician	A community paramedic has the ability to discuss case management or care planning with a medical doctor at time of need.	X		X		X	X	X	X	X
	Communication with emergency care		X		X		X	X	X	X	X
	Communication with mental health care					X				X	X
	Communication with primary care or family doctor		X	X	X	X	X	X	X	X	X
	Communication with home care	A formalized mechanism for the exchange of information regarding patient condition with respective disciplines.		X	X					X	X
	Communication with specialized care			X	X		X	X	X	X	X
	Communication with social worker			X		X	X	X	X	X	X
	Communication with pharmacist			X						X	X

Table 2. Summary of aspects of care planning as described in included articles. (* denotes findings not confirmed by lead author)

Discussion

The findings of this study provide guidance about comprehensive community paramedicine program models of care and can be used to inform future research that will build an evidence base for community paramedicine practice. Ten articles that met the inclusion criteria defined aspects of care planning and identified program components that were part of care planning and case management processes. The articles utilized differing research designs, served differing populations, and evaluated different outcome measures. The aspects of care planning and case management detailed through case study analysis illustrate the emergence of the paramedic as a health care provider that can establish on-going patient-clinician relationships and collaboration with other care providers.

Synthesizing the aspects of care planning and case management from the 10 articles resulted in 22 individual components that could be part of a community paramedicine program. The components were grouped into four themes; enrolment, assessment and management, intervention and care, and collaboration. A high level of response from corresponding authors confirmed the presence or absence of components as defined. To the best of our knowledge, no other summary of community paramedicine program care planning components exists.

Due to the heterogeneity of research design and the fact that no single program included all 22 aspects of care planning, we cannot infer that any one aspect was a direct contributor to programs reaching or failing to reach their intended objectives. Furthermore, we cannot determine whether other aspects of care planning were missed or may be required. For example, we identified seven specific care partners that community paramedics collaborated with but it is expected that more than seven care partners could be involved in providing care—depending on the context of the program capacity or objective.

Paramedic involvement in care planning and case management builds on past reviews about community paramedicine and extended care paramedics (14–16,22). For example, one scoping study indicated that published literature on community paramedicine often focused on referral pathways (15). We decided to exclude articles focusing on referral pathways to focus on paramedics who were acting with expanded roles or extended scope in the process of developing care plans. The same study also excluded ECPs due to the responsive domains where they are often deployed (15). We decided to include these studies for two reasons. First, although these articles described paramedics practicing with expanded roles, their responsive nature was determined not to be to “emergency” situations. By this, we defined an emergency as an immediate threat to life or limb. Second, the role of ECPs has been adopted such that these practitioners are being utilized in non-ambulance settings within the UK (45).

Integration with the broader health care sector represents an important aspect for community paramedicine that aligns with the other studies that met the inclusion criteria. These roles represent a differentiated practice for paramedics from their traditional role as emergency responders to incidents that are theoretically isolated events (in spite of potential repeated use). The issue of repeated use and calls for issues that are not isolated events relates to another study that considered alternatives to traditional EMS dispatch and transport (16). Alternative to dispatch or transport is expected to be predicated on the absence of an immediate threat to life or limb (the same definition that we used for inclusion of ECP models of care). However, Jensen et al. identified the expanded paramedic role as one of a number of different interventions that have been evaluated as alternatives to transport (16).

Our findings provide guidance for future research by delineating the necessary assessments, interventions, and collaborations for alternative models of care. A previous systematic review and meta-analysis on the ECP model indicated that paramedics acting in ECP roles reduced transportation rate to the ED and increased discharge rates on scene but it was unclear whether this model reduced subsequent ED use (22). Patient safety and adverse events are often raised as concerns about alternate paramedic service delivery models (16) indicating the importance of care planning. In the case of care planning by ECPs, we found that this was addressed through a variety of collaborative relationships with other care providers. Primarily, the care planning conducted by ECPs appears to facilitate improved primary care just as much as providing ED avoidance. Our analysis

showed that having on-call primary care physician conferencing available (31,34,37,47) was more common than having an on-call emergency physician available (21,41,45), which is the traditional medical oversight option for paramedics.

Clinical implications

Aspects of care planning that involved assessment and intervention varied between studies. This is not unexpected as paramedic education and certification varies between jurisdictions. However, considering the additional education that was provided to paramedics to allow them to practice in these expanded roles, the educational focus was placed on assessment of specific disease management and the treatments that would be provided. In some cases, this did not require any additional training beyond orientation to the purpose of the interventions being performed (32). Three articles described enhanced education that ranged from one to ten weeks with the upper level resulting in paramedics receiving a new designation of practice (31,41,45). Future work should consider scope of assessment, process for re-assessment, and process for physician consultation that guide paramedics practicing within new models of service delivery. Opportunity exists to draw on the aspects of care planning we have described to develop a standardized assessment for community paramedicine that captures the full breadth of paramedic observations, not limited to one specific disease management process.

In a previous scoping study of community paramedicine, O'Meara indicated that one of the weaknesses of the published literature was ambiguity towards "the theoretical underpinnings of the community paramedicine model" and uncertainty as to how community paramedicine "fits into the wider health care system." (15) By investigating the aspects of care planning and by identifying collaborative roles, our findings can be used to reduce this ambiguity in future community paramedicine programs. The aspects of care planning described in Table 2 can serve as a framework for service providers to describe how future community paramedicine programs may be integrated within the broader health care system.

Limitations

Past reviews have pointed to the small number of published studies regarding community paramedicine (14,15,22). Although these reviews have indicated a favorable trend towards implementation of this service delivery model, the diversity of approaches taken and a lack of RCTs has led to difficulty in determining the strength of the evidence (14,22). This trend is continued here where only two trials and protocols for another two RCTs were included. The remainder of articles were either cross-sectional or retrospective cohort studies. While this may pose a limitation to developing the evidence base, the approach taken here can provide guidance to future research with respect to the factors that may be included in development of a service delivery model and the outcomes associated with the care provided therein. It is also noteworthy that RCTs may not serve as the most appropriate study design given the difficulties that would be encountered in processes of recruitment, randomization, and blinding.

The aspects of care planning included in Table 2 were not mutually exclusive, meaning that a community paramedicine program could incorporate all aspects of care planning that we described. We would not suggest that this should be considered as an indicator of program quality but that it could be an indicator of program comprehensiveness. In that regard, the most comprehensive program included 19 aspects (26) followed by another highly comprehensive program that had 18 aspects (47). Future work should compare program comprehensiveness and quality of care. The ability to standardize aspects of care planning in community paramedicine can facilitate this research by clarifying interventions and outcomes.

Qualitative and descriptive articles that were not included in this study may have implications with respect to the findings described. Other aspects of care planning were potentially described in these articles. Strategies for their evaluation could be adapted as they may offer valuable insight with respect to these practices that should not be discounted.

Conclusion

One definition of community paramedicine has referred to paramedics practicing with expanded roles or extended scope in non-traditional settings (15). Based on these findings, it may be necessary to consider a revised definition including patient enrolment, assessment, intervention, and collaboration that are included in these programs. New standards for community paramedicine define it as a model of care whereby paramedics can apply their education to provide immediate or scheduled primary, urgent and/or specialized healthcare to vulnerable patient populations by focusing on improving equity in healthcare access across the continuum of care (49).

The findings of this scoping study enabled 22 aspects of care planning in community paramedicine to be described. This provides a structured framework that can guide both service providers in the delivery of their care and researchers in defined outcome measures to be assessed. The findings show a continued evolution of community paramedic service delivery models. Subtle differences exist between ECP and community paramedicine models of care but our findings show that a great deal of common aspects of care planning exist between these two models. Most notably, all articles included collaboration with primary care providers. This presents an important avenue for future program development and research. It also implies that community paramedicine is aligned with the domain of primary care, as opposed to emergency medicine. By summarizing care planning within community paramedicine programs, ongoing program development can embrace collaboration with other care providers to help insure that patients receive the appropriate care.

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References

1. Shah MN. The formation of the emergency medical services system. *Am J Public Health*. 2006;96(3):414–23.
2. Brennan J, Krohmer J. *Principles of EMS systems*. Jones & Bartlett Learning; 2006.
3. Cone DC, Middleton PM, Marashi Pour S. Analysis and impact of delays in ambulance to emergency department handovers. *EMA - Emerg Med Australas*. 2012;24(5):525–33.
4. Yong G, Dent AW, Weiland TJ. Handover from paramedics: Observations and emergency department clinician perceptions. *EMA - Emerg Med Australas*. 2008;20(2):149–55.
5. McCusker J, Ionescu-Ittu R, Ciampi A, Vadeboncoeur A, Roberge D, Larouche D, et al. Hospital Characteristics and Emergency Department Care of Older Patients Are Associated with Return Visits. *Acad Emerg Med*. 2007;14(5):426–33.
6. Aminzadeh F, Dalziel WB. Older adults in the emergency department: A systematic review of patterns of use, adverse outcomes, and effectiveness of interventions. *Ann Emerg Med*. 2002;39(3):238–47.
7. Schull MJ, Kiss A, Szalai JP. The Effect of Low-Complexity Patients on Emergency Department Waiting Times. *Ann Emerg Med*. 2007;49(3).
8. McHale P, Wood S, Hughes K, Bellis MA, Demnitz U, Wyke S. Who uses emergency departments inappropriately and when - a national cross-sectional study using a monitoring data system. *BMC Med [Internet]*. 2013 Dec 13 [cited 2017 Feb 24];11(1):258. Available from: <http://bmcmmedicine.biomedcentral.com/articles/10.1186/1741-7015-11-258>
9. Brydges M, Denton M, Agarwal G. The CHAP-EMS health promotion program :

- a qualitative study on participants' views of the role of paramedics. *BMC Health Serv Res* [Internet]. 2016;1–9. Available from: <http://dx.doi.org/10.1186/s12913-016-1687-9>
10. Martin A, O'Meara P, Farmer J. Consumer perspectives of a community paramedicine program in rural Ontario. *Aust J Rural Health*. 2016;24:278–83.
 11. Wingrove G. International Roundtable on Community Paramedicine. *J Emerg Prim Heal Care*. 2011;9(1):9–11.
 12. Mason S, Wardrope J, Perrin J, Street R. Developing a community paramedic practitioner intermediate care support scheme for older people with minor conditions. *Emerg Med J*. 2003;20(2):196–8.
 13. Choi BY, Blumberg C, Williams K. Mobile Integrated Health Care and Community Paramedicine : An Emerging Emergency Medical Services Concept. *Ann Emerg Med* [Internet]. 2016;67(3):361–6. Available from: <http://dx.doi.org/10.1016/j.annemergmed.2015.06.005>
 14. Bigham BL, Kennedy SM, Drennan I, Morrison LJ. Expanding Paramedic Scope of Practice in the Community: A Systematic Review of the Literature. *Prehospital Emerg Care*. 2013;17(3):361–72.
 15. O'Meara P. Community paramedics : a scoping review of their emergence and potential impact. *Int Paramed Pract*. 2014;4(1):5–12.
 16. Jensen JL, Carter AJE, Rose J, Visintini S, Bourdon E, Brown R, et al. Alternatives to Traditional EMS Dispatch and Transport: A Scoping Review of Reported Outcomes. *Can J Emerg Med*. 2015;17(5):532–50.
 17. Patterson DG, Coulthard C, Garberson LA, Wingrove G, Larson EH. What Is the Potential of Community Paramedicine to Fill Rural Health Care Gaps? *J Health Care Poor Underserved* [Internet]. 2016 [cited 2016 Nov 10];27(4A):144–58. Available from: <https://muse.jhu.edu/article/634884>
 18. Woollard M. The Role of the Paramedic Practitioner in the UK. *J Emerg Prim Heal Care*. 2006;4(1).
 19. O'Meara P, Tourle V, Stirling C, Walker J, Pedler D. Extending the paramedic role in rural Australia : a story of flexibility and innovation. *Rural Remote Health*. 2012;12.
 20. O'Keefe C, Mason S, Knowles E. Patient experiences of an extended role in healthcare : comparing emergency care practitioners (ECPs) with usual providers in different emergency and urgent care settings. *Emerg Med J*. 2014;31:673–4.
 21. Swain AH, Al-salami M, Hoyle SR, Larsen PD. Patient satisfaction and outcome using emergency care practitioners in New Zealand. *EMA - Emerg Med Australas*. 2012;24:175–80.
 22. Tohira H, Williams T a, Jacobs I, Bremner A, Finn J. The impact of new prehospital practitioners on ambulance transportation to the emergency department: a systematic review and meta-analysis. *Emerg Med J* [Internet]. 2013;1–7. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/24243486>
 23. Squires JP, Mason S. Developing alternative ambulance response schemes: analysis of attitudes, barriers, and change. *Emerg Med J* [Internet]. 2004 Nov [cited 2016 Dec 28];21(6):724–7. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/15496710>
 24. Mason S, Coleman P, Keefe CO, Ratcliffe J, Nicholl J. The evolution of the emergency care practitioner role in England: experiences and impact. *Emerg Med J*. 2006;23:435–9.
 25. Hoyle S, Swain AH, Fake P, Larsen PD. Introduction of an extended care

- paramedic model in New Zealand. *EMA - Emerg Med Australas*. 2012;24:652–6.
26. Swain AH, Hoyle SR, Long AW. The changing face of prehospital care in New Zealand: the role of extended care paramedics. *J New Zeal Med Assoc NZMJ* [Internet]. 2010;19(123):11–4. Available from: <http://www.nzma.org.nz/journal/123-1309/3985/>
 27. Martin-Misener R, Downe-Wamboldt B, Cain E, Girouard M. Cost effectiveness and outcomes of a nurse practitioner–paramedic–family physician model of care: the Long and Brier Islands study. *Prim Health Care Res Dev*. 2009;10(1):14.
 28. O’Meara P, Stirling C, Ruest M, Martin A. Community paramedicine model of care: an observational, ethnographic case study. *BMC Health Serv Res* [Internet]. 2015 Dec 2 [cited 2016 Oct 26];16(1):39. Available from: <http://www.biomedcentral.com/1472-6963/16/39>
 29. Evans R, McGovern R, Birch J, Newbury-Birch D. Which extended paramedic skills are making an impact in emergency care and can be related to the UK paramedic system? A systematic review of the literature. *Emerg Med J* [Internet]. 2013 Apr 10 [cited 2016 Sep 19];594–603. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/23576227>
 30. Arksey H, O’Malley L. Scoping studies: towards a methodological framework. *Int J Soc Res Methodol* [Internet]. 2005;8(1):19–32. Available from: <http://www.scopus.com/inward/record.url?eid=2-s2.0-14644388070&partnerID=tZOtx3y1>
 31. Abrashkin KA, Washko J, Zhang J, Poku A, Kim H, Smith KL. Providing Acute Care at Home : Community Paramedics Enhance an Advanced Illness Management Program — Preliminary Data. *J Am Geriatr Soc* [Internet]. 2016 Dec [cited 2016 Dec 28];64(12):2572–6. Available from: <http://doi.wiley.com/10.1111/jgs.14484>
 32. Agarwal G, Mcdonough B, Angeles R, Pirrie M, Marzanek F, Mcleod B, et al. Rationale and methods of a multicentre randomised controlled trial of the effectiveness of a Community Health Assessment Programme with Emergency Medical Services (CHAP-EMS) implemented on residents aged 55 years and older in subsidised seniors’ housing b. *BMJ Open* [Internet]. 2015;5(6):e008110–e008110. Available from: <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=4466604&tool=pmcentrez&rendertype=abstract>
 33. Crockett BM, Jasiak KD, Walroth TA, Degenkolb KE, Stevens AC, Jung CM. Pharmacist Involvement in a Community Paramedicine Team. *J Pharm Pract* [Internet]. 2016 Mar 21 [cited 2016 Dec 28]; Available from: <http://www.ncbi.nlm.nih.gov/pubmed/27000138>
 34. Drennan IR, Dainty KN, Hoogeveen P, Atzema CL, Barrette N, Hawker G. Expanding Paramedicine in the Community (EPIC): study protocol for a randomized controlled trial. *Trials* [Internet]. 2014;15(473):1–10. Available from: <http://www.trialsjournal.com/content/15/1/473>
 35. Heinelt M, Drennan IR, Kim J, Lucas S, Grant K, Spearen C, et al. Prehospital Identification of Underlying Coronary Artery Disease by Community Paramedics. 2015;3127(November 2016).
 36. Edwards MJ, Bassett G, Sinden L, Fothergill RT. Frequent callers to the ambulance service: patient profiling and impact of case management on patient utilisation of the ambulance service. *Emerg Med J* [Internet]. 2014;32:1–5. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/25312857>
 37. Jensen JL, Marshall EG, Carter AJE, Boudreau M, Burge F, Travers AH. Impact of a Novel Collaborative Long-Term Care-EMS Model: A Before-and-After Cohort Analysis of an Extended Care Paramedic Program. *Prehospital Emerg Care*. 2016;20(1):111–6.

38. Marshall EG, Clarke B, Peddle S, Jensen J. Care by Design: New model of coordinated on-site primary and acute care in long-term care facilities. *Can Fam Physician* [Internet]. 2015;61(3):129–34. Available from: <http://www.cfp.ca/content/61/3/e129.short>
39. Jensen JL, Travers AH, Bardua DJ, Dobson T, Cox B, Mcvey J, et al. Transport outcomes and dispatch determinants in a paramedic long-term care program : a pilot study. *Can J Emerg Med*. 2013;15(4):206–13.
40. Jensen JL, Travers AH, Emily G, Cain E, Leadlay S, Alix JE. Insights into the Implementation and Operation of a Novel Paramedic Long-term Care Program. *Prehospital Emerg Care*. 2014;18(1):86–91.
41. Mason S, Knowles E, Colwell B, Dixon S, Wardrope J, Gorringer R, et al. Effectiveness of paramedic practitioners in attending 999 calls from elderly people in the community: cluster randomised controlled trial. *BMJ*. 2007;335(7626):1–6.
42. Mason S, Knowles E, Freeman J, Snooks H. Safety of Paramedics with Extended Skills. *Soc Acad Emerg Med*. 2008;15(7):607–12.
43. Dixon S, Mason S, Knowles E, Colwell B, Wardrope J, Snooks H, et al. Is it cost effective to introduce paramedic practitioners for older people to the ambulance service? Results of a cluster randomised controlled trial. *Emerg Med J* [Internet]. 2009;26(6):446–51. Available from: <http://emj.bmj.com/content/26/6/446.abstract>
44. Knowles E, Mason S, Colwell B. An initiative to provide emergency healthcare for older people in the community : the impact on carers. *Emerg Med J*. 2011;28:316–20.
45. Mason S, O’Keeffe C, Knowles E, Bradburn M, Campbell M, Coleman P, et al. A pragmatic quasi-experimental multi-site community intervention trial evaluating the impact of Emergency Care Practitioners in different UK health settings on patient pathways (NEECaP Trial). *Emerg Med J* [Internet]. 2012 Jan [cited 2016 Sep 23];29(1):47–54. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/22186262>
46. O’Keeffe C, Mason S, Bradburn M, Iheozor-Ejiofor Z. A community intervention trial to evaluate emergency care practitioners in the management of children. *Arch Dis Child* [Internet]. 2011 Jul [cited 2016 Dec 28];96(7):658–63. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/21505224>
47. Ruest M, Stichman A, Day C. Evaluating the impact on 911 calls by an in-home programme with a multidisciplinary team. *Int Paramed Pract*. 2012;1(4):125–32.
48. O’Meara P, Ruest M, Martin A. Integrating a Community Paramedicine program with local health, aged care and social services: An observational ethnographic study. *Australas J Paramed* [Internet]. 2015;12(5). Available from: <http://ajp.paramedics.org/index.php/ajp/article/view/238>
49. Community Paramedicine: Framework for program development. Toronto, ON: CSA Group; 2017.