COMMUNITY PARAMEDICINE:
KEY DESCRIPTIONS OF PROGRAMS AND TRAINING

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A Thesis Submitted to the School of Graduate Studies in Partial Fulfilment of
the Requirements for the Degree of Master of Public Health

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Descriptive Note

McMaster University MASTER OF PUBLIC HEALTH (2017) Hamilton, Ontario

TITLE: Community Paramedicine: Key Descriptions of Programs and Training

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NUMBER OF PAGES: ix, 128

Overview of Thesis

Community paramedicine (CP) is an emerging form of health services delivery with programs established internationally. Community paramedics take on expanded paramedicine roles, including community-based health promotion and prevention activities. Studies on CP have focused on health outcomes and cost-effectiveness, but there is no comprehensive understanding about the types of CP programs and training. Through a systematic review of the literature, the goals of this thesis are to describe CP programs and the skills required for each program type, and to use findings to inform recommendations for CP program development and growth. No other literature review provides information on the components of CP programs and their training. Communities interested in CP can use the findings of this thesis to inform the development of their CP programs and training. By discussing challenges facing continued CP growth, this thesis also identifies areas for change at the program and policy levels.

Abstract

Background: Community paramedicine (CP) is an emerging form of health services delivery with the potential to reduce emergency department (ED) visits and to improve access to care.

Rationale: There is growing global interest towards CP. Studies have focused on health outcomes and cost-effectiveness, but there is no comprehensive understanding about the types of CP programs and training; this knowledge may support the development of CP programs, training, and policy.

Objectives: To describe CP programs and the skills for each program type, and to inform recommendations for CP programming and growth.

Methods: A systematic review of MEDLINE and Embase was completed in duplicate by two independent reviewers. The Mixed Methods Appraisal Tool (MMAT) was used to assess studies' methodological quality. A full methodology is available on PROSPERO (CRD42017051774).

Results: The yield of 47 studies captured 44 unique CP programs. CP programs most often served emergency callers and individuals at risk for ED admission or readmission or hospitalization. The most common services provided were physical assessment; and assessment, referral and/or transport to community services. Training was not described by 43% of CP programs, and the mean MMAT score was three out of four criteria met. Study heterogeneity prevented meta-analysis of health outcomes.

Discussion: CP programs have adapted to various populations by providing different services and training. CP training is centred on technical skills and knowledge. Since CP often involves more client interactions and inter-professional collaboration than traditional paramedicine, CP training should also include communication and teamwork skills. Challenges to CP growth include unclear role definition, introducing new healthcare roles, and competing services.

Conclusion: Of the 44 unique CP programs, common services provided included physical assessments and assessing clients for community services. CP training was centred on technical skills and knowledge, but there should be more training on communication and teamwork skills.

Acknowledgements

I would like to thank my thesis supervisor, Dr. Gina Agarwal, of the Department of Family Medicine at McMaster University. Dr. Agarwal demonstrated so much support throughout the thesis by exploring my ideas, discussing my questions, and by providing words of encouragement. I am continually impressed by her ability to manage all of her commitments while still being an effective mentor for her students.

I would like to thank my committee members, Dr. Andrew Costa and Dr. Lauren Griffith, of the Department of Health Research Methods, Evidence, and Impact (HEI) at McMaster University. Your enthusiasm, insight, and willingness to provide feedback on so many drafts, have been very helpful in shaping the thesis. I would also like to thank Matthew Leyenaar, a PhD candidate also at HEI, for his contributions to the search strategy. Building these search strategies for our papers at times felt like piecing a puzzle together but having two brains were better than one.

I would also like to thank our external reader, Dr. Andrew Worster, of the Department of Medicine, Division of Emergency Medicine at McMaster University. Dr. Worster's shared interest in emergency medicine research and his support as an external reader have been much appreciated.

Finally, a huge thank you goes to my family and friends for their encouragement these past two years. When I was adrift in papers and data your conversations and support pulled me back ashore. You have all asked me what my thesis was on, and whether or not you found my answer interesting, it was your kindness that spoke volumes.

Completing my master's thesis and working alongside passionate researchers will always remind me to do good and honest research, and to recognize the impact research can have on people's health and our community's policies.

Thank you,
Joyce H. T. Chan

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List of all Abbreviations and Symbols

CP = Community paramedicine
ED = Emergency department
EMS = Emergency medical services
MIH = Mobile integrated health care (a term used in place of CP in some countries)

Declaration of Academic Achievement

The study research questions and design were developed by Joyce H. T. Chan (thesis student) and Dr. Gina Agarwal (thesis supervisor) in consultation with Drs. Andrew Costa and Lauren Griffith (committee members). The systematic review search strategy was developed by Joyce Chan with input from Dr. Agarwal, Matthew Leyenaar (PhD candidate), and several librarians (McMaster University and St. Michael's Hospital). The screening, data extraction, and quality assessment were completed in duplicate by Joyce Chan and Dr. Agarwal. All data analysis and writing were completed by Joyce Chan, with input from Drs. Agarwal, Costa, and Griffith.

Overview of Study

Community paramedicine (CP) is a relatively new model of care with a growing number of programs across Canada, Australia, the United States, the United Kingdom, among other countries. Community paramedics are paramedics who generally provide services beyond traditional paramedicine. The services provided by community paramedics reflect the health needs of the program's target population(s), and can include health promotion, home assessments, and referral to community services. In Ontario, Canada, the provincial government has invested in CP programs to support healthy community-based living for seniors and individuals with disabilities (Care, 2014).

Studies have explored the effectiveness of CP for health outcomes such as reducing 911 calls and transports to ED, and for target populations such as seniors and children. Despite the variety of CP programs documented, there is not a good understanding of what the types of programs are, and the training used for each type. Knowledge about the variety of CP programs and training can be used to guide the development of similar CP programs, and the planning of regional resources and services.

As a systematic review of the published and some grey literatures, the objective of this thesis was to describe similarities and differences between the CP programs captured and their respective training. This thesis begins with an introduction of CP and rationale for the study, and then through the methods of the systematic review. The 44 CP programs captured in the systematic review are then described, including the programs' target population, location of CP visits, and services provided. Training for community paramedics is also described, including the training format, duration, and subjects covered. Analysis of CP training by programs' target populations and location of CP visits is also presented. Finally, the implications of the results for CP are discussed, along with additional considerations about the future of CP and challenges faced. Although this thesis does not capture all CP programs, the goals are to provide a starting point for classifying CP programs and comparing their training, and to spark discussion about the next steps for CP development.

Introduction

Part I. Exploring care options outside of the Emergency Department

a. Frequent users of Emergency Departments (EDs)

Frequent users of emergency care services are typically characterized as having four or more visits to the ED per year (Krieg, Hudon, Chouinard, & Dufour, 2016). There is no consensus on the threshold number of annual visits considered as frequent. Differences in the extent of development and accessibility of healthcare infrastructure across geographic regions may explain why a frequent user is loosely defined. For instance, compared to the healthcare resources available in a rural region residents in an urban core likely have better access to an ED. A systematic review identified two studies in which an urban residence was significantly associated with increased ED utilization (McCusker, Karp, Cardin, Durand, & Morin, 2003). Rural residents are also frequent users of the ED, with a study finding that the likelihood of visiting the ED is five times greater among rural than urban dwellers (Haggerty, Roberge, Pineault, Larouche, & Touati, 2007). Healthcare services that are too far away or limited (e.g. few primary care or walk-in offices, hospitals), means rural residents often visit the ED for primary and emergency care (Haggerty et al., 2007). Furthermore, frequent users are a heterogeneous rather than homogeneous group. Individuals accessing the ED four times annually can be very different from individuals who access ten or fifteen times annually. Super-frequent ED users, for example, can differ significantly from frequent users in health services use, health status, and socioeconomic factors (Vinton, Capp, Rooks, Abbott, & Ginde, 2014).

Awareness of the health statuses, demographic profiles, and shared characteristics of frequent users can be helpful for healthcare services planning and resource allocation to prevent or divert subsequent ED visits. The literature identifies several demographic groups as frequent users of emergency services. A systematic review seeking to characterize frequent users of the ED in the United States showed that frequent users represented up to 8% of ED users but accounted for almost 30% of all ED visits (LaCalle & Rabin, 2010). Frequent users are more likely to be between the ages of 25 to 44 or age 65 and older, and generally have poorer health statuses compared to occasional ED users (LaCalle, 2010). Not having access to a primary care provider also increases ED use, particularly for individuals age 65 plus (McCusker et al., 2012). A scoping review exploring the individual-level predictors of ED use found that in addition to poor physical health – for which indicators included the presence of a chronic disease(s), previous hospitalization and healthcare use, and use of prescription medications – social and mental health factors such as socioeconomic status, homelessness, mental illness, and substance abuse also contributed to frequent ED use (Krieg et al., 2016).

Older adults represent a growing subgroup of frequent users of the ED. By 2036, almost one in four Canadians will reach the age of 65 or older (Canada, 2016). Worldwide in 2050, this figure will be an estimated 1.5 billion people, accounting for 16% of the projected global population (Aging, 2011). An aging demographic increases the use of healthcare services as well as the demand for community and home-based care. In Canada, 45% of government healthcare expenditure supports service use among seniors age 65 or older, who represent approximately 16% of the population (Canada, 2015; Information, 2013). This healthcare use is explained primarily by seniors' complex health profiles. Multimorbidity, or the concurrent presence of two or more chronic conditions, is increasing in prevalence among older adults, and affects

approximately 75% of seniors in Canada (Fortin, Soubhi, Hudon, Bayliss, & van den Akker, 2007; Information, 2011a). The connection between multimorbidity among seniors and healthcare service use is supported by the observation that one's likelihood of developing multiple chronic conditions increases with age, with the number of chronic conditions being the leading predictor of health care use (Information, 2011b; Smith & O'Dowd, 2007). The combinations of conditions among patients with morbidity also influence healthcare use. Specific combinations of chronic conditions and their synergistic or antagonistic interactions further influence the impact of multimorbidity on patient function, self-management, and health services use (Vogeli et al., 2007). For example, comorbid depression has been shown to double a patient's likelihood of using the ED (Himelhoch, Weller, Wu, Anderson, & Cooper, 2004). Combinations of conditions such as stroke and cognitive impairment can have greater impact on a patient's ability to perform activities of daily living than either condition separately or with other combinations such as stroke and depression (Fultz, Ofstedal, Herzog, & Wallace, 2003).

Given their more complex and vulnerable health status, seniors are also more likely to be admitted to the ED than the general population. In 2015, one in five ED users in Canada were seniors age 65 plus, and approximately 13% of seniors were also frequent users of the ED (Information, 2016). Globally, seniors account for between 12 to 14% of all ED use (Salvi et al., 2007). Common reasons for seniors requiring emergency medical services (EMS) include deterioration in chronic diseases such as diabetes and cardiovascular disease, and injuries from falls (Information, 2011c; Ontario, 2012).

b. The value of working upstream to prevent ED admission

With the average cost of a paramedic and ED visit in Ontario at $1,044, and the average hospital admission in the US at $10,000, preventing ED visits may improve healthcare efficiency (Dawson & Zinck, 2009; Hamilton Spectator, 2010; Pfuntner, Wier, & Steiner, 2006). Yet, there are other motivations for reducing ED use among seniors and other frequent user groups beyond potential cost savings. An ED visit may provide the acute care needed for seniors, but post discharge seniors are highly likely to experience adverse outcomes such as functional decline, hospital admission, return to the ED, and mortality (Aminzadeh & Dalziel, 2002). A cohort study examined hospitalized older adults who had spent 12 or more hours in an ED and found that nearly one fifth developed ED-stay associated delirium during their length of stay, and those who developed delirium had a significantly longer hospital length of stay (Emond et al., 2017). This is mirrored in other studies which found that spending a minimum of 10 or 12 hours in an ED visit were predictors for delirium onset among older adults (Bo et al., 2016; Inouye & Charpentier, 1996). A prospective cohort study found that nearly 20% and 25% of older adults experienced functional decline at three and six months post discharge from the ED, respectively, with cognitively impaired and frail older adults at particular risk (Provencher et al., 2015).

High ED readmission rates also persist among seniors, and studies demonstrate that seniors may not feel that their health concerns have been resolved during the ED admission (Denman, Ettinger, Zarkin, Coon, & Casani, 1989; Deschodt et al., 2015; Provencher et al., 2015). With approximately 70% of older adults at the ED not asked if they are able to care for themselves post-visit, and 20% not fully understanding instructions for self-care, an ED visit and hospitalization today may be ineffective in preventing subsequent ED admissions (Hedges et al., 1992; Lowenstein, Crescenzi, Kern, & Steel, 1986; Provencher et al., 2015).

For seniors, the risk factors for adverse outcomes after discharge from the ED can be health related and include the diagnosis of diabetes, depression, heart disease, and visual and memory impairment (Aminzadeh & Dalziel, 2002). Determinants of health such as social isolation, access to transportation, access to community or in-home care services, and ability to carry out activities of daily living are additional risk factors (Aminzadeh & Dalziel, 2002). There are many determinants of an older adult's health status, and the acute care received during an ED visit or subsequent hospitalization can only address a portion of these factors. Having access to an ED is not a guarantee that the older adult will recover successfully upon discharge, or that the underlying factors that prompted the initial ED visit will have been addressed. These observations underline the value of looking beyond the ED to support the entire spectrum of health care needs and health risk factors among older adults.

Other frequent user groups of the EMS may also benefit from interventions that address the underlying risk factors for ED admission or readmission. For example, patients admitted four or more times per year to ED's in Rhode Island were found to be admitted due to substance abuse or misuse, mental health, taking multiple medications, and medical conditions with reoccurring episodes (e.g. chronic obstructive pulmonary disease) (Norman, Mello, & Choi, 2016). Other facilitators of frequent ED admission include untreated chronic conditions, complex health profiles (e.g. patients presenting with multimorbidity, polypharmacy, and/or a combination of physical and cognitive conditions), and particularly in urban communities, homelessness (Tangherlini, Pletcher, Covec, & Brown, 2010).

In Canada, approximately one in five patients admitted to the ED could have been treated elsewhere (Information, 2014a). The appropriateness of emergency care, which often considers whether emergency care is the best way to treat patients given their health status and availability of other healthcare services, can vary by population (A. Gruneir, Silver, & Rochon, 2011). A systematic review found that older adults had greater appropriate ED use than younger patients (A. Gruneir et al., 2011). In a review of long term care residents between 55 to 77% of transfers to the ED were considered appropriate and 13.1% considered inappropriate (A Gruneir, 2013). Although the ED is appropriate for meeting the acute care needs of most admitted patients, to prevent further ED admissions and provide patients with the most appropriate healthcare provider requires addressing the full spectrum of risk factors upstream of an ED admission.

c. Limitations to existing healthcare services

A determinant of ED use is the degree of access to non-ED healthcare providers and services. In a cross-Canada study by the Canadian Institute for Health Information (CIHI), 47% of respondents sought emergency care because they could not secure a timely appointment with a primary care provider, and only 38% of respondents thought that the ED would provide the optimal care for their condition (Information, 2014b). Not being aware of or informed of health services other than the ED that they could access was also noted by 7% of the respondents (Information, 2014b). In particular, area of residence also affects health status and health services utilization (Sibley & Weiner, 2011). In remote and rural communities, limited access to health services is a predictor of ED use. A cross-sectional study of ten Canadian provinces found that after controlling for demographic, health, and socioeconomic variables, rural residents were less likely to receive an influenza vaccine, to consult with a family and specialist physicians, and to

have regular medical care when compared with urban residents (Sibley & Weiner, 2011). Reduced healthcare access such as to primary care and specialist providers, in turn, affects health status and health services utilization. A cohort study found that adults and seniors with either no primary care physician or specialist made more visits to the ED in a year compared to those who did (McCusker et al., 2012).

Even when there is an adequate number of providers across all levels of healthcare, individuals may still be challenged to access healthcare services that meet their needs. Access is challenged by a lack of information on what the available health services are and how to contact providers (Network, 2014). When connected with a provider, additional factors such as receiving culturally sensitive care, communicating health problems to the provider, and partaking in decision-making all influence the quality of care received by clients (Network, 2014). Healthcare services and prescribed care plans that do not fit patients' unique health profiles, lifestyles, resources, and abilities for self-management pose additional challenges to accessible healthcare (Network, 2014). Accessible healthcare depends not only on the location of services, but also care that overcomes other patient barriers to service use and self-care.

d. Emerging strategies for reducing ED visits

Approaches to reducing ED visits and improving access to care outside of the ED include modifying existing models of healthcare delivery and creating new models of community-based care. A systematic review investigated the impact of five different interventions delivered outside of the ED on reducing ED readmissions, including patient education and pre-hospital diversion. In this review, providing booklets or in-person education either alone or as a supplement of ED care resulted in a reduction of 21 to 80% in future ED use. Interventions that diverted low-acuity patients from the ED to home or community-based care resulted in a 3 to 7% reduction in future ED use (Morgan, Chang, Alqatari, & Pines, 2013).

With regards to creating new models of care to curb ED admission, emerging trends have included the adoption of expanded roles by healthcare professionals. Expanding professional roles may take form of providing non-traditional services and learning new skills. A systematic review found that community-based intervention, such as having a local pharmacist complete medication reviews, resulted in an 18% reduction in ED visits (McCusker & Verdon, 2006). The same study found that in-home interventions, such as home visits and case-management led by nurses and social workers, contributed to significant reductions in ED utilization and a lower rate of ED visits.

When exploring new models of care for reducing ED visits, paramedics are well positioned to adopt expanded roles given their expertise within the delivery and management of emergency care. Across Australia, Canada, the United Kingdom, and the United States there are growing numbers of programs that involve paramedics providing non-acute care to community residents, and gaining new skills through additional training. The paramedics who are adopting an expanded role in order to prevent ED visits are often named *community paramedics* or *extended care paramedics*. For the purposes of this study, the terms *community paramedics* and *community paramedicine* will be used.

Part II. Community paramedicine and its global activities

a. What is Community Paramedicine

Community paramedicine (CP) is an emerging form of health services delivery with the potential to reduce the number of ED visits among seniors and other high frequency user groups while making use of existing paramedic resources. Community paramedics are described as licensed EMS professionals who have completed additional education or training to develop skills beyond paramedics' traditional roles of providing acute care at the time of emergency (JCREC, 2001). Community paramedics adopt a greater role in providing preventative and non-emergency care to community residents. As well, community paramedics may meet directly with community members to address health needs such as through disease management, health promotion, and injury prevention (Agarwal et al., 2015b; Brydges, 2014).

The specific services provided by CP programs depend on the health needs of the community, and on the vision of local stakeholders such as public health and medical organizations (Technicians, 2015abc). In urban communities, the focus of CP programs may include preventing ED admission and providing follow-up on patients discharged from the ED who are at high risk of a return visit. In communities with healthcare shortages, CP programs may adopt a greater role as primary care and non-urgent care providers, helping to increase residents' access to healthcare services outside of the ED. The roles of community paramedics often include providing primary care, conducting follow-up on patients who have been discharged from the ED or hospital, collaborating with existing public health agencies, and carrying out education and health promotion activities with community residents (Rural Health Information Hub, 2017). The focus and context of CP practice further differ from those of general paramedicine in that CP may provide long-term patient assessments and interactions, communication or collaboration with other healthcare providers, and referral to community services depending on patients' health and social needs.

b. Rationale behind a growing global interest in CP

Although CP is a relatively new model of healthcare delivery, CP programs are already established across Australia, Canada, the United Kingdom, and the United States, and there is growing global interest towards expanding CP programs (Iezzoni, Dorner, & Ajayi, 2016). In Ontario, the Seniors Strategy – a province-wide initiative which seeks to understand the healthcare needs and challenges of older adults and identifies future directions required for supporting healthy aging at home – supports the development and expansion of CP as a way to improve acute care for older adults (Sinha, 2012). In particular, older adults who live in rural or northern communities, are frequent users of the ED or hospital care, or are at risk of losing independent living are likely to benefit from access to CP programs and services (Sinha, 2012).

Growing international interest in CP is attributed in part to how CP has been adapted to address the unique healthcare needs of diverse populations. CP programs have been developed for populations across the age spectrum, including infants and seniors at-risk for ED admission (Agarwal et al., 2015b; Brice, Overby, Hawkins, & Fihe, 2006). Community paramedics develop skills beyond standard paramedicine practice, including screening for chronic conditions and supporting self-management (Agarwal et al., 2015b; Blumberg, 2014ab). Furthermore, community paramedics can carry out non-health related tasks, including home assessments and referrals to community services (Agarwal et al., 2015b; Brice et al., 2006).

Some CP programs potentially made more effective use of existing paramedic resources. Paramedics on accommodated duty, including those recovering from post-traumatic stress disorder or are on maternity leave, have adopted the community paramedic role while awaiting return to their regular paramedic role (Agarwal et al., 2015b). Community paramedic responsibilities have also been incorporated into regular paramedicine activities, such as during the downtime between emergency calls (Smeby Jr, 2013).

In addition to paramedicine resources, CP may potentially support more efficient use of other healthcare resources by increasing collaboration between healthcare providers, and facilitating patients' access to appropriate care and services. Community paramedics have worked alongside family physicians, nurses, social workers and other healthcare providers, or have joined a family health team (Abrashkin et al., 2015). Family health teams, a model of primary care in which family physicians collaborate with a team of different healthcare providers, are designed to provide patients with care from the most appropriate providers (Goldman, Meuser, Rogers, Lawrie, & Reeves, 2010). By integrating various healthcare providers in one setting care also becomes closer to home and accessible to patients (Care, 2016a). In family health teams each provider brings a different perspective and expertise to supporting clients' wellbeing (Care, 2016a). In theory, when working alongside other healthcare providers, such as in a family health team, community paramedics can contribute to dialogue and decision making surrounding a patient's care. Yet, as paramedics in British Columbia have noted about integrating CP with existing healthcare systems, it is challenging to define the boundaries of each professional's scope of activities and the types of interactions between professionals (Evashkevich & Fitzgerald, 2014). Community paramedics have also connected clients with home care and social service providers within the community (Agarwal et al., 2015b). CP programs that pair clients with additional services such as transportation and in-home care can help address clients' health risk factors that may not have been identified and resolved through traditional paramedicine and ED visits.

c. Unanswered questions about CP programs and their development

Despite global interest in expanding and adopting CP programs to meet the health needs of different communities and demographics, there is no comprehensive understanding of what the types of CP programs are and the training used. An overview of program types would help identify the populations in which CP has been implemented, and the types of training community paramedics have received for assessing and addressing different conditions. An understanding of these components of CP programs can be used by paramedic services and communities to identify the resources involved in planning CP programs and training. As CP programs expand, EMS regions may want to develop and mandate standardized CP training; in this case, standardized training should include the core skills and training formats that are common to a variety of existing CP programs. Furthermore, knowledge of the key components of CP programs can facilitate resource pooling and sharing between CP programs of neighbouring communities, contributing to more effective use of existing personnel and services.

Rationale, Objectives, and Research Questions

Part I. Rationale

The past literature on CP has focused primarily on client health outcomes and cost-effectiveness, but there lacks a classification of CP programs based on the key differences between programs. Some reports have documented the types of CP programs within a province, in a country, or select programs across countries, but none have looked comprehensively at CP programs globally (Service, 2013; Technicians, 2015abc; Wang, 2011). Developing descriptions of the varieties of CP programs will contribute to a greater understanding of their scope, and will be useful for planning services at a regional and service level. Similar types of CP programs will have shared staffing and training requirements, and can learn from each other for quality improvement exercises. As well, the training used to prepare paramedics for carrying out different CP programs has not been described by previous studies.

Knowledge of the key differences between CP programs and their training will also have implications for policy, particularly in relation to the funding and direction of new CP programs. Already in regions with expanding CP programs, new policies and funding opportunities have been established. In 2014, for example, Ontario's Ministry of Health and Long Term Care announced a $6 million investment to support and expand the province's 30 CP programs, and in 2015 it established CP as a priority for provincial health (Care, 2014, 2016b). As outlined for the province, Ontario's CP programs will aim to support independent living in the community, and to reduce ED visits and hospitalizations. CP activities in Ontario will fall under the three broad categories of providing home visits to seniors and other at-risk patient groups, assessing patient need and making necessary referrals to local community services, and improving patients' abilities to manage chronic diseases through education efforts (Care, 2014).

Part II. Study Objectives

The first objective of this thesis was to describe present and past CP programs, and the combinations of skills required for each program type. The goal was to comprehensively describe CP activities globally, and support service planning at the regional and service levels. Another goal was to identify the training used to prepare paramedics for different CP programs, and to contribute towards developing CP training that can be customized to community needs. Using the findings, the second objective of this thesis was to form recommendations on the future direction of CP programming, and the paramedicine community on CP training and skills.

The present thesis described CP programs and their training, but did not explore how the CP programs were developed and implemented. Effectiveness of CP programs for different populations, and how effectiveness was measured, were also not investigated. The thesis also identified shared features between different CP programs, but an amalgamated definition of CP was not proposed since community paramedics' roles are generally tailored to local care needs and resources.

Part III. Study Research Questions

The two research questions addressed by this thesis are as follows. The descriptors of CP programs and training were determined prior to data extraction and analysis. The types of descriptors used were informed by exploration of some CP literature and consultation with committee members. All descriptors were used as stated throughout data extraction. Descriptors that are underlined were not included in the results and analysis as studies provided too little or no information.

(1) What are the key differences between CP programs?

Where key program elements to describe and classify programs are:

- Descriptions of the CP program: name, location, paramedic service, type of paramedic enrolled, years of operation, number of paramedics involved, and other professionals collaborating with paramedics
- Information on participants enrolled in CP programs: target population or demographic, mean or median age, diseases or conditions targeted by CP program, CP services provided, health impacts or outcomes of CP programs, and control or comparator outcomes

(2) What is the training required for each type of CP program?

Where descriptions of CP training are:

- Training provider: Name of training provider, title of training program or curriculum
- Training curriculum: Programs or curriculum upon which the CP training was based, topics and subjects covered
- Training format: How the training is completed, duration, assessment method, presence and/or frequency of retraining or renewal, and whether paramedics receive certification
- Post-CP training outcomes: paramedics' success rates, paramedics' confidence in performing CP, and additional areas of training paramedics identified as useful

Methods

A systematic review the literature was conducted in accordance to the Cochrane methodology for systematic reviews (Collaboration, 2011). A full methodology is available on PROSPERO under the title, *Key elements and training required among existing community paramedicine programs* (registration number: CRD42017051774).

Part I. Rationale for a systematic review

A systematic review was chosen in order to methodically summarize the existing evidence on CP programs and training. The standards for conducting systematic reviews, as outlined by the PRISMA-P guidelines for systematic review protocols, help guide and ensure methodological rigor of this study design. Similar to a systematic review, a scoping review is a synthesis method that also seeks to systematically collect and summarize knowledge based on a defined research question(s) (Arksey & O'Malley, 2005). Scoping reviews are appropriate for research questions that aim to explore an area or field in order to identify main concepts and gaps in the existing literature. Generally, research questions in scoping reviews are broad and exploratory in nature (Colquhoun, 2016). However, a systematic review was considered more appropriate for the present study because the research questions were specific and well defined. Unlike a scoping review, a systematic review requires quality assessment of included studies such as by using a quality assessment tool (Arksey & O'Malley, 2005). A systematic review would provide users with an understanding of the existing evidence, and help users identify quality evidence to inform the development of CP programs and training. Knowledge about evidence quality is integral when using evidence to inform decision making.

Part II. Data sources and search strategy

A systematic search of the published literature on MEDLINE and Embase databases was conducted to identify all relevant articles published in the English language anytime up until October 22, 2016. The design of the search strategy was informed by the nomenclature used in frequently cited articles within the existing CP literature, experts, and several librarians. The three part search strategy combines terms from three themes: (1) paramedicine and paramedics, (2) community setting, and (3) CP and Mobile Integrated Healthcare (MIH) (Appendix A1). Additional relevant articles were identified by hand-searching the bibliographies of all included articles, conducting further searches of CP programs mentioned within included articles, and by speaking with experts in CP.

Part III. Data selection: Inclusion and exclusion criteria, and screening process

All articles that described a CP program were included. There was no restriction on the types of study designs included. Articles not written in English were excluded (Table 1 or Appendix A2). Title and abstract (Level 1 or L1) and full-text (Level 2 or L2) screening were completed in duplicate by two independent reviewers (JC, GA). A L1 pilot of 200 titles and abstracts was conducted by both reviewers; having reached a raw agreement of over 80%, the remaining L1 screening was completed. Similarly, a L2 pilot of 11 full texts was completed by both reviewers and having reached a raw agreement of over 80%, the remaining L2 screening was completed. Cohen's kappa statistic (κ) was used to measure inter-rater agreement, accounting for chance agreement. All discrepancies between the two reviewers were resolved by discussion or consultation with a third independent reviewer (AC or LG) when necessary.

Table 1. Inclusion and exclusion criteria used during screening

	Inclusion Criteria	Exclusion Criteria
1.	Article is about a CP program or mentions a CP program*.	Article is not about a CP program, and does not mention a CP program.
2.	Article describes the CP program (services offered, population serviced, goals etc.).	Article does not describe the CP program. (In the cases where CP program is not described in the article answer UNCLEAR, and a follow-up a grey literature search will be conducted. If follow-up search does not yield information about the program, then the article will be excluded.).
3.	Training for the CP program, or key skills developed by the community paramedics, is described	Training for the CP program, or key skills developed by the community paramedics, is not described. (In the cases where training is not described in the article answer UNCLEAR, and a follow-up a grey literature search will be conducted. If follow-up search does not yield information about the training, then the article will be excluded.).
4.	Article is written in English	Article is not written in English
5.	Article is published anytime up until present day (specify date when search is run)	
6.	No limits on study design	

*Synonyms for 'program' that will also be considered: group, organization, service, and team.

Part IV. Data Extraction

Two independent reviewers (JC, GA) extracted the following information from the included studies into a data-abstraction form: (1) the key elements of the CP program, and (2) the training required for paramedics adopting the CP role (Appendix A). Discrepancies between reviewers were resolved through discussion and by consultation with a third independent reviewer (AC or LG) when necessary.

Part V. Study quality assessment

The 2011 version of the Mixed Methods Appraisal Tool (MMAT) was used to evaluate the methodological quality of the included studies with a defined study design. Developed by at McGill University (Pluye et al., 2011), the MMAT is designed to appraise the methodological quality of qualitative, quantitative, and mixed-methods studies captured in systematic reviews. The content validity and reliability of the MMAT tool has been examined, and the MMAT has been used in over 50 systematic reviews worldwide (Pluye et al., 2011). As the current study is a

systematic review, it was appropriate to use the MMAT. Given the heterogeneity of the included studies, use of the MMAT was advantageous as it could be used to appraise and compare the quality of all included study designs.

The MMAT evaluates methodological quality using a four star system, with four stars indicating that all four criteria were met, and zero stars meaning none were met. There are different sets of criteria for each type of study design (qualitative, quantitative randomized controlled trails, quantitative non-randomized, quantitative descriptive and mixed method studies). Evaluating mixed methods studies involves two sets of criteria, one each for the qualitative and quantitative components, and the overall MMAT score takes the lower score between the two sets.

The MMAT evaluates studies solely on methodological quality, such as how the study was completed, and the relevance and completeness of results as they pertain to each study's research questions. The MMAT score is independent of whether a study is able to answer the thesis' research questions. For example, a study may receive a high MMAT score but not provide any information about CP training.

Results

Part I. Search and Screening Processes

a) Search Yield

The search strategy identified 2,769 results (Figure 1 or Appendix A3.1). After excluding 534 results as duplicates, 2,235 studies proceeded to L1 screening. A total of 2,153 studies were not about CP, and in failing to meet the inclusion criteria, were excluded from the review. Of the 82 studies that underwent full-text review, 50 were excluded as they did not adequately describe CP programs (Appendix B). The bibliographies of the 32 included studies were searched, resulting in the identification of 16 potentially relevant studies. Of the 16 studies, 14 were eventually excluded as they were not about a CP program or were already captured. An additional literature search was conducted for studies mentioned within the 32 included studies (e.g. if the study was a systematic review or a report outlining various CP programs in a state); of the 18 studies mentioned, 5 were excluded as they were not about a CP program, leaving 13 included for data extraction and analysis (Figure 2 or Appendix A3.2). In total, the systematic review included 47 studies, representing 44 unique CP programs.

Figure 1. PRISMA flow diagram for records identified through search strategy

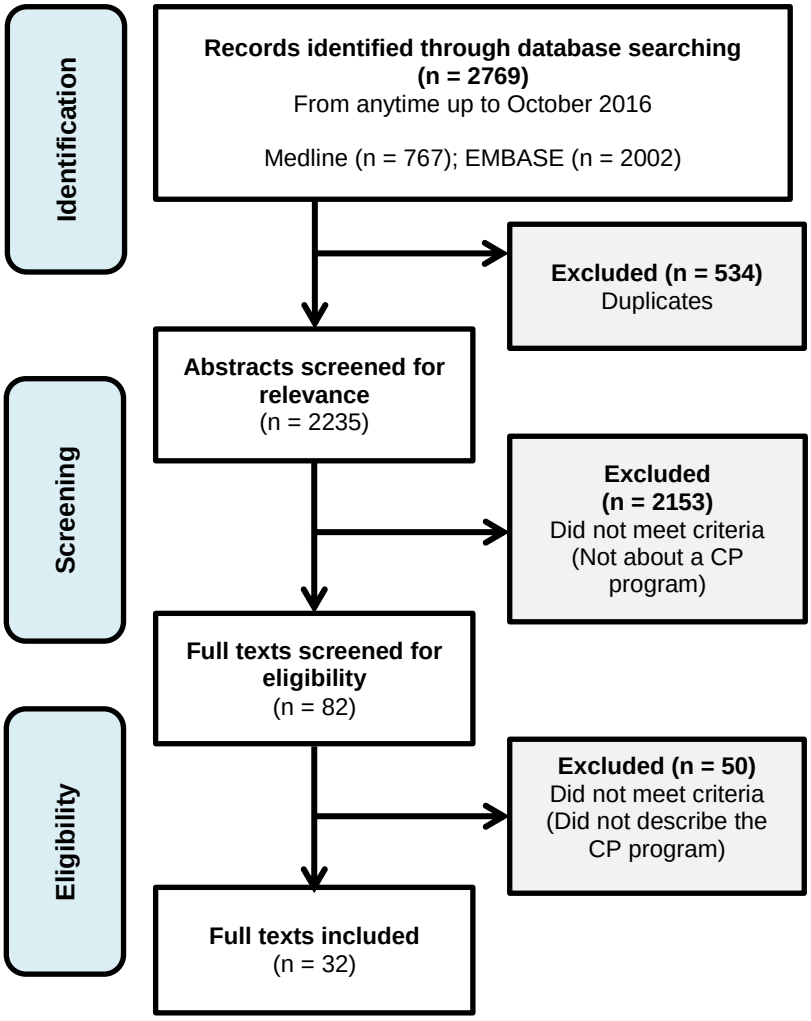
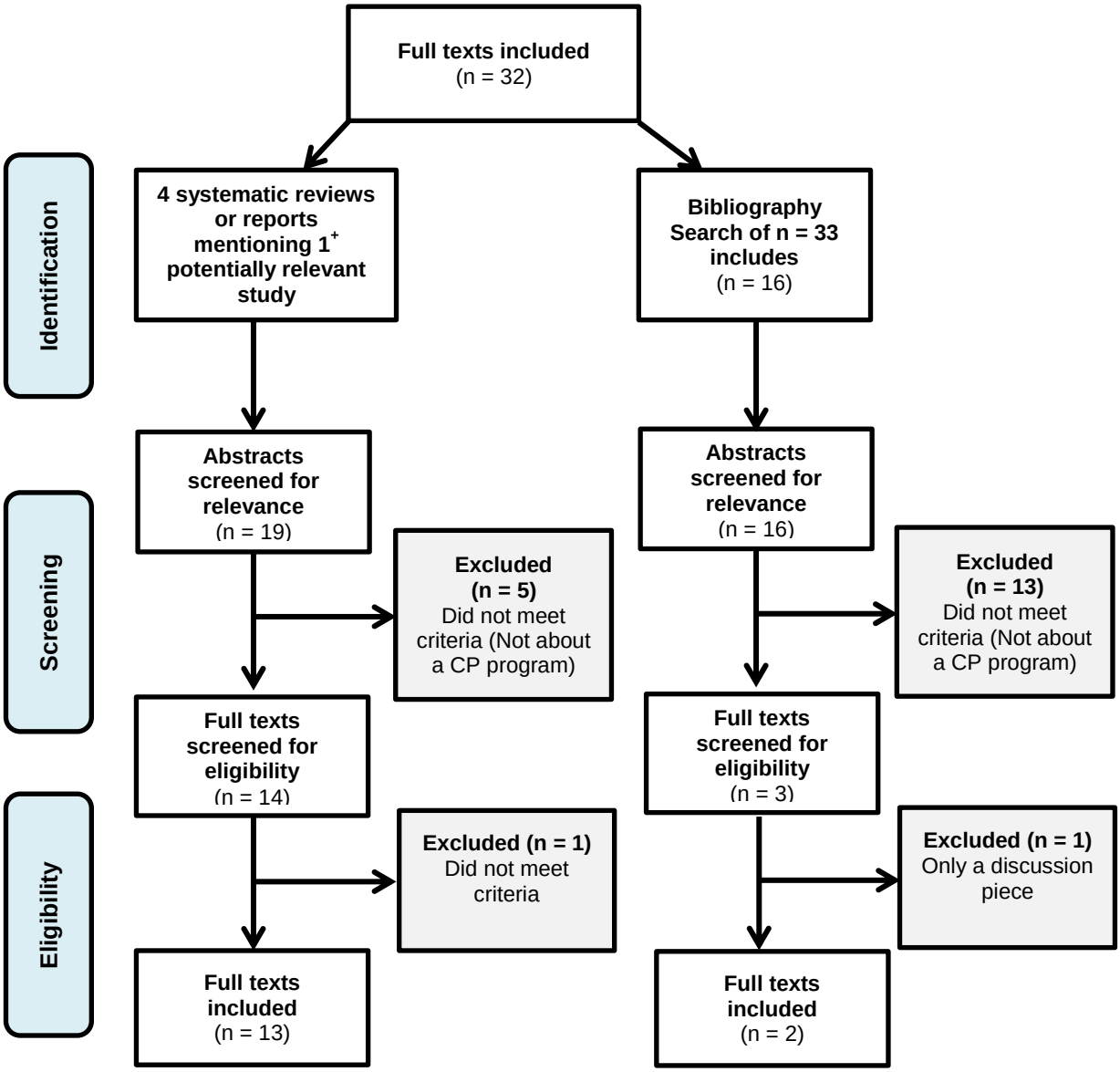


Figure 2. PRIMSA flow diagram for additional studies identified



b) Screening Yield

All titles and abstracts (Level 1, L1) and full-texts (Level 2, L2) screening was completed in duplicate. The agreement (%) and corresponding kappa (κ) coefficient for each stage of screening are as follows:

Table 2. Agreement (%) and Kappa coefficients (κ) during screening

Screening Stage	Agreement (%)	Kappa coefficient (κ)
L1 pilot (n = 200)	0.94	0.78
L1 total (n = 2035)	0.95	0.42
L2 pilot (n = 11)	0.73	0.42
L2 total (n = 56)	1.00	1.00
L1 within study finds (n = 19)	1.00	1.00
L2 within study finds (n = 14)	1.00	1.00
L1 bibliography search finds (n = 16)	1.00	1.00
L2 bibliography search finds (n = 3)	1.00	1.00

A moderate inter-rater reliability corresponds to a coefficient between 0.41 and 0.60, a substantial reliability is between 0.61 and 0.80, and a near perfect or perfect reliability is 0.81 to 1.0 (McHugh, 2012). The kappa coefficient for L1 total and L2 pilot indicate that inter-rater reliability can just barely be considered moderate. Despite the moderate inter-rater reliability, any discrepancies were resolved through discussion until agreement was achieved by both reviewers. Despite good raw agreement between reviewers the calculated kappa coefficients at times suggest only moderate inter-rater reliability. The relatively low kappa coefficients can be due to only a few of the total studies screened being included. The kappa coefficient is influenced by prevalence, where extremely low or high prevalence of something (in this case, a study being screened is included) the kappa coefficient will be lower than if there was a 50% prevalence (Mandrekar, 2011).

Part II. Features of the 47 studies captured

a) Types of study designs (Table 3 or Appendix B1)

Of the 47 studies captured, 22 (46.8%) studies had a defined study design and 25 (53.2%) had no study design (i.e. paper only describes the CP program, is a literature review). Among studies with a defined study design, five (10.6%) were quantitative randomized studies (e.g. RCT), six (12.8%) were quantitative non-randomized studies (e.g. case control, cohort), eight (17.0%) were qualitative descriptive studies (e.g. observational, incidence/ prevalence study without comparator), and three (6.4%) were mixed methods studies (e.g. cluster RCT with qualitative interviews).

Table 3. Study designs of included studies

	Study design	**Number of studies** (% out of 47 studies)	**Author(s), Year(s)**
Potential for MMAT assessment	Quantitative randomized (e.g. RCT)	5 (10.6%)	1. Agarwal, 2015b 2. Arendts, 2011 3. Drennan, 2014 4. Dixon, 2009 5. Mason, 2003, 2007, 2008
	Quantitative non-randomized (e.g. observational case control, retrospective cohort, cross-sectional, other)	6 (12.8%)	1. Abrashkin, 2016 2. Brice, 2006 3. Gray, 2008 4. Jensen, 2013 5. Jensen, 2016 6. Snooks, 2004
	Qualitative descriptive (e.g. observational, incidence/prevalence study without comparison group)	8 (17.0%)	1. Agarwal, 2014 2. Crockett, 2016 3. Everden, 2003 4. Gerson, 1992 5. MedStar Mobile Healthcare, 2017a 6. MedStar Mobile Healthcare, 2017b 7. Shah, 2010 8. Tangherlini, 2016
	Mixed methods (e.g. cluster RCT with qualitative interviews; cohort study with qualitative interviews)	3 (6.4%)	1. Cooper, 2004 2. Martin-Misener, 2009 3. Snooks, 2012
	No study design (e.g. describes CP program only, literature review, feasibility study)	25 (53.2%)	1. Abrashkin, 2015 2. Agarwal, 2013a 3. Agarwal, 2013b 4. Agarwal, 2015a 5. Andrew, 2011 6. Brice, 2009 7. Bigham, 2013 8. Blumberg, 2014 9. Choi, 2016 (lit search) 10. ED Management, 2014 11. ED Management, 2013 12. Hauswald, 2005 13. Hospital Case Management, 2014 14. Hospital Case Management, 2016

			15. Kusel, 2015 16. Marshall, 2015 17. Mason, 2003 18. Mason, 2008 19. Misner, 2005 20. National Association of Emergency Medical Technicians (NAEMT), 2015 21. Stevens, 2013 22. Swain, 2010 23. The California Health Care Foundation, 2017 24. MedStar Mobile Healthcare, 2016 Exchange, 2016 25. Wilcox, 2016
Total studies included		**47**	

b) Methodological quality (Table 4 or Appendix B2; Appendix B3, B4)
The MMAT quality appraisal tool was applied to the 19 studies with defined study designs. Of the 19 studies evaluated using the MMAT, four (21.1%) studies had a score of four stars, seven (36.8%) studies had three stars and eight (42.1%) studies had two stars; the mean score was three stars. The MMAT tool, which scores studies partly on their quality and reporting of outcomes, was not applied to three protocols (15.8%).

Table 4. Studies eligible for MMAT assessment

Study design	**Number of studies**	**Author(s), Year(s)**
Quantitative randomized (e.g. RCT)	3	1. Agarwal, 2015b 2. Dixon, 2009 3. Mason, 2007
Quantitative non-randomized (e.g. observational case control, retrospective cohort, cross-sectional)	6	1. Abrashkin, 2016 2. Brice, 2006 3. Gray, 2008 4. Jensen, 2013 5. Jensen, 2016 6. Snooks, 2004
Qualitative descriptive (e.g. observational, incidence/prevalence study without comparison group)	8	1. Agarwal, 2014 2. Crockett, 2016 3. Everden, 2003 4. Gerson, 1992 5. MedStar Mobile Healthcare, 2017a 6. MedStar Mobile Healthcare, 2017b 7. Shah, 2010 8. Tangherlini, 2016
Mixed methods (e.g. cluster RCT with qualitative interviews; cohort study with qualitative interviews)	2	1. Cooper, 2004 2. Martin-Misener, 2009
Total studies included for MMAT assessment	19	

Part III. Features of the 44 CP programs captured
An overview of the 44 CP programs captured is available in Appendix C1.

a) Number of paramedics (Appendix C2)
Only 13 (29.5%) CP programs reported the number of community paramedics involved, with median average of eight community paramedics per program (range of two to 220 community paramedics).

b) Inter-professional collaboration (Appendix C3)
Approximately 41% of programs had community paramedics collaborating with at least one other professional. Professionals included nurses, physicians, family doctors alone, primary care teams (includes family doctors), case managers, pharmacists, social workers, and other. Approximately 52% of CP programs involved solely community paramedics and three (6.8%) CP programs did not describe the professionals with whom community paramedics worked.

c) Location of CP visits (Appendix C4)
The location of CP visits was known for all 44 CP programs captured. The majority of CP programs operated only through home visits (56.8%), with some programs additionally offering a community clinic (4.5%) and telephone services (2.3%). Approximately 23% of CP programs took place from where the client had made an emergency call (i.e. place of incidence). One (2.3%) CP program operated solely at a hospice and one other at a long term care (LTC) facility. Of the 44 programs, 37 (84.1%) programs were located in urban areas, four (9.1%) in rural areas, and for three programs the rural or urban location was unclear.

d) Target population (Appendix C5)
The target population of 21 (47.7%) programs were emergency callers (e.g. called 911), with eight (18.2% of total CP programs captured) of these programs targeting 911 callers with low acuity conditions, and six (13.6%) directed to frequent 911 callers or EMS users. There were 17 (38.6%) programs targeted to individuals at risk for ED admission or readmission or hospitalization. Overall, nearly one fifth of CP programs were for older adults living in the community or a LTC facility.

e) Target condition(s) (Appendix C6)
Approximately 70% of CP programs did not target a specific health condition(s). Among the CP programs that did, the most common conditions were diabetes mellitus (9.1%), heart failure (6.8%), and chronic obstructive pulmonary disease (6.8%).

f) Method of patient enrollment in CP program (Appendix C7)
Eighteen (40.9%) CP programs identified that client enrollment was initiated by an emergency call (e.g. 911); six of these programs specified that the client had made an emergency call and was assessed to be appropriate for the CP program. Seven (15.9%) CP programs each enrolled clients based on referral from a healthcare provider or clients were directly enrolled (such as by a healthcare provider) to receive CP services. Clients voluntarily enrolled in six (13.6%) CP programs after having, for example, received an invitation to participate directly from the CP program.

g) Services provided

g1. In general (Appendix C8)

The main categories of services provided included assessment and screening, acute care and treatment, transport and referral, education and patient support, communication, and other. Within assessment and screening, the most common services provided by CP programs were physical assessment (43.2%), medication management (e.g. protocol led dispensing, medication review; 36.4%), and non-physical assessment (e.g. assessments for mental health, social needs; 29.5%). Providing acute care, such as assessing and treating minor issues and conditions, was reported by 34.1% of the CP programs. Assessment, referral and/or transport to community services were provided by 43.2% of CP programs. More than one fifth (22.7%) of CP programs provided education (e.g. on health management, navigating the health care system) and greater than one tenth (11.4%) reviewed care plans with the client. Almost one 30% of CP programs were communicating with healthcare providers to, for example, co-determine care plans or relay information.

g2. CP services by target population (Appendix E1)

Among the 21 CP programs that target 911 callers, the most common services provided were physical assessments, acute care, and transport to ED or urgent care centres; each service was present in 10 out of 21 programs. Among the 16 CP programs for individuals at risk for ED readmission or admission or hospitalization, home assessment and addressing home risks; medication management; and assessing, referring, and/or transporting to community services were the most common services provided; each service was present in seven out of 16 programs.
Among the four CP programs for seniors living in the community (not facility), the most common services provided were physical assessments; and assessing, referring, and/or transporting to community services; each service was provided by three out of four programs.

g3. CP services by location of CP visits (Appendix E2)

Among the 25 CP programs that operated through home visits, the most common services were home assessment and addressing home risks (10 of 25 programs); medication management (12 of 25 programs); and assessing, referring, and/or transporting to community services (10 of 25 programs). For the 10 CP programs that attend clients at their place of 911 call incidence, assessing, referring, and/or transporting to community services (six of 10 programs); non-physical assessment (five of 10 programs); and assess and/or transport to other healthcare providers (three of 10 programs).

h) Health outcomes (Appendix C9)

Health outcomes were extracted per unique study (n=47) instead of per CP program, because different studies of the same program may evaluate different health outcomes. Of the 47 studies, 13 (27.7%) did not report any health outcomes. The most commonly reported health outcomes were transport to ED (17 studies, 36.6%), hospital admission (14 studies, 29.8%), and 911 calls (nine studies, 19.1%).

i) Urban and Rural CP Programs

Of the 44 studies, only four (9.1%) were located in rural communities. Details of CP services by urban/rural location and CP training subjects by urban/rural location are described in Appendix E5 and E6, respectively.

Part IV. Features of CP training

a) Type of CP training

a1. In general (Appendix D1)

CP training was sorted into the groupings: acute care, assessment and screening, care of specific populations, education and health promotion, special knowledge, as well as communication and leadership. Approximately 43% of CP programs did not describe their training. Where descriptions were provided training was composed of one or more components (e.g. training that would include acute care and care of specific populations). Among the 16 (36.4%) programs involving training for acute care, three (7.8%) programs trained community paramedics in diagnostic work (e.g. point-of-care testing). Training for community paramedics also involved some focus on acute care (27.3%) and emergency care (2.3%).

There were 56.8% of programs that provided training related to assessment and screening tasks. The most common tasks included medication management (e.g. drug interactions, medication review; 20.5%), and conducting overall health assessments (including assessing physical, social, and mobility needs; 15.9%). Mental health assessment and environmental assessments were each involved in the training for 6.8% of programs.

Almost 30% of CP programs involved training specifically related to caring for older adults (20.5%) and children (9.1%). Community paramedics in 21 (47.7%) programs were trained to carry out tasks related to education and health promotion. The most common tasks in this category included assisting clients with health management (e.g. managing chronic conditions, health coaching; 25.0%), and health promotion (e.g. preventative activities; 13.6%). Special knowledge of community services (22.7%), intervention-specific materials and procedures (20.5%), law enforcement (2.3%), and substance abuse (2.3%) were represented in CP training, alongside "soft skills" such as communication (2.3%) and leadership (2.3%).

a2. Types of CP training by target population (Appendix E3)

Of the 21 CP programs directed to 911 callers, the most common types of training for the paramedics were acute care (six of 21, or 28.6%), intervention-specific materials (six of 21, or 28.6%), knowledge of community services (five of 21, or 23.8%), and health management (five of 21, or 23.8%). Of the 16 CP programs designed for people at risk for an ED admission or readmission or hospitalization, the most common training subjects were health management (seven of 16, or 43.8%), providing acute care (six of 16, or 37.5%), and medication management (six of 16, or 37.5%).

a3. Types of CP training by location of CP visits (Appendix E4)

For the four CP programs for seniors living in the community (not facility), training for paramedics included environmental assessments, health assessments, and overall health assessments. Additional training included how to care for older adults, health management, and health promotion.

b) Training provider (Appendix D2)

Training to become a CP can involve more than one type of provider. Of the 15 (34.1%) CP programs that described a training provider(s), six (13.6%) involved a university, such as a school of medicine; four (9.1%) involved a college, such as a technical college; and six (13.6%)

involved healthcare professionals. Community services and representatives and hospitals were involved in the training of two (4.5%) programs each, and the local public health department was involved in one (2.3%) program.

c) Origins of CP training curriculum (Appendix D3)
Only seven (15.9%) of CP programs described how their training was developed. Among the seven studies, resources used in the development of CP training included consulting subject matter experts, literature, and materials from another CP program. Pre-existing training programs and courses were also incorporated into CP training. One CP program in Minnesota provided training in accordance to the state EMS regulatory board mandated curriculum (E. Management, 2014a,b).

d) Training format (Appendix D4)
A CP program can train its community paramedics with one or more training formats. Among the 16 (36.4%) of CP programs that described the training format, three (6.8%) involved clinical observation, and eight (18.2%) required clinical practice. There were 13 (29.5%) programs that had training that paramedics attended in-person (e.g. a classroom setting; 29.5%), and one (2.3%) program that involved online training.

e) Training duration (Appendix D5)
Only 13 (29.5%) CP programs provided clear information about the duration of their training; the median total training time was 160 hours, with a range of four to 980 hours.

f) CP training assessment method (Appendix D6)
Five (11.4%) CP programs described how the community paramedics were assessed. Assessments ranged from multiple choice tests, clinical examinations or an "OSCE" to regular ongoing audits (Agarwal et al., 2015b; Dixon et al., 2009; Mason et al., 2007; Mason, Knowles, Freeman, & Snooks, 2008; Mason, Wardrope, & Perrin, 2003; Swain, Hoyle, & Long, 2010).

Part V. Assessing opportunity for Meta-Analysis

Originally a meta-analysis was planned for combining the quantitative health outcomes across comparable studies. The study type, target population, and demographic information were particularly important for assessing comparability between studies. The main health outcomes of greatest interest for a meta-analysis were 911 calls, hospitalization, and transport to ED. However, a meta-analysis could not be completed because many studies did not provide results for the health outcomes (e.g. study was a protocol). For studies that investigated the same health outcome(s), their study populations were not comparable (e.g. seniors in LTC compared to adults who are homeless). In the future it would be worth following up on the studies that currently do not have results in order to reconsider the possibility of a meta-analysis.

Discussion

Part I. Patterns in the data for CP services and training

a) Diversification of the traditional paramedicine role may call for more communication and collaboration skills

In the 44 CP programs captured in this systematic review, there was a variety of target demographics, services provided, and training required for community paramedics. Program diversity supports the notion that CP services can adapt to the health needs of their local communities. The diversity of CP programs also reflects an expansion of paramedics' duties as they take on new professional responsibilities as community paramedics. For example, CP programs that help clients manage chronic diseases and substance abuse adopt the principles of prevention and health promotion that traditionally have belonged to public health. In other CP programs community paramedics can refer clients to relevant community services and programs, suggesting tightened partnerships between paramedics and community organizations.

Almost half (47.7%) of the CP programs included some form of client education and health promotion activities, including case management, health coaching, and education; these are examples of CP roles that are not traditionally carried out by paramedics and for which community paramedics receive additional training. The prevalence of education and health promotion activities in CP programs increases the importance of community paramedics being proficient in the skills needed to carry out these activities, including skills in communication, teamwork, and leadership. Yet, there was relatively little training for the skills involved in these activities. Only two (4.5%) CP programs captured in the systematic review included communication or leadership as training subjects. The vast majority of CP training is centred on helping paramedics develop the technical skills directly related to the services provided, including acute care (38.6% of CP programs) and assessment and screening (56.8%). Although traditional paramedicine may have provided paramedics with some training and experience in skills such as communicating with patients, the trends in CP services suggest that CP training should place greater emphasis on developing paramedics' communication and collaboration skills in addition to the technical skills already taught.

Interestingly, only eight (18.2%) of the CP programs captured had seniors as their sole target demographic, and nine (20.5%) of programs provided training on caring for senior populations. The number of CP programs that serve seniors is likely underestimated. Seniors are likely in other demographic groups captured in this review, including individuals at risk for ED admission, readmission or hospitalization, as well as frequent 911 callers and ED users. For example, in a systematic review of EDs in the United States, frequent users are more likely to be between the ages of 25 to 44 or age 65 and older compared to occasional users (LaCalle, 2010).

b) Breadth of CP training

Among the CP programs for 911 callers and clients at risk for ED admission, readmission, or hospitalization, which represented 37 of 44 (84.1%) of programs captured, there was greater overlap in training subjects than there were differences. Looking across training subjects for all CP programs, programs often covered knowledge of materials specific to each program's interventions (20.5%). Acute care, which is a traditional paramedic service, was also provided by 15 (34.1%) programs and present in the training of 12 (27.3%) programs. This

overlap suggests that acute care skills are part of the paramedic and community paramedic roles. Overlapping skills may also indicate that paramedics are in a good position to adopt the CP role as they already have some of the skills for CP. Although overlap in training subjects suggests there may be a core skillset for community paramedics, the overall picture shows community paramedics learning a wide spectrum of training that often includes skills specific to their programs' activities, and ultimately to their community's needs. The breadth of CP training and the resulting skillsets developed show how one community paramedic can "wear many hats". Particularly in areas where healthcare services are sparse or inaccessible to the target population(s), community paramedics may be a provider of one-stop care that is close to home.

c) Tailored CP training and exploring standardized training

Different training formats, ranging from in-person, online, and a mix of lecture and hands-on work, suggest that CP training can be developed depending on the resources available and what training providers want to teach. A lecture-style format may lend itself to learning some skills, while other CP skills are better developed through hands-on work. Since the quality of CP training was not evaluated, and no programs reported on post-CP training outcomes (e.g. paramedics' confidence, success), it is not possible to determine which learning formats were most effective. The specific skills in each learning environment could also not be identified because included studies generally did not describe training to this level of detail. Further exploration of the types of learning that are facilitated in each training format may help inform and streamline CP training.

The variety of training providers, including colleges, healthcare providers, and community organization representatives, demonstrates the role that local resources have in shaping CP training. By incorporating the expertise of local healthcare providers and organizations to guide and teach the skills for community paramedics, this may create CP training that optimizes trainees' capacities to respond effectively to the needs of each community. Learning from community-based organizations may equip trainees with a more holistic understanding of clients' health and non-health needs. For example, in CP programs for clients managing substance abuse, trainees may learn from organizations providing mental health and medication management services. Not only is there greater collaboration between these organizations with the paramedicine community, but community paramedics may develop a greater understanding of the services and their potential value to client wellbeing, and when it is appropriate to refer clients to these services.

The CP programs captured in the review did not use standardized training, with the exception of programs based in Minnesota, USA where CP certification followed a state-wide curriculum (Health, 2017). The skills and knowledge common to different CP programs suggests some sort of core skillset. The diversity of CP programs also suggests that training can cover an array of subject areas, and is often specific to the program (e.g. knowledge of materials and procedures unique to the program). It is outside the scope of this review to discuss whether standardized training for CP is appropriate, but this is a valuable question to explore as CP grows.

Part II. Challenges and Next Steps as CP Expands

a) Defining the CP role

Although CP has gained traction globally, several considerations may challenge its continued growth. These challenges include unclear role definition, availability of client data, introducing new healthcare roles, and competing healthcare services. The services and skills provided by CP teams are often determined by local healthcare needs. Adopting unique roles has allowed CP to address a wide variety of health and non-health related issues in their communities, but has also made it challenging to define the components that belong distinctly to CP. Although the broad concepts are that community paramedics are paramedics with additional training and they often provide health prevention and promotion services, this does not entirely capture the expanse of what community paramedics provide. The variety of program objectives and health outcomes measured may contribute to ambiguity about the purpose of CP in the larger healthcare system. Creating a refined and comprehensive definition of CP can help distinguish it from other existing healthcare professions. An up-to-date and comprehensive definition of CP may also help communities understand what services can be provided in CP, and whether establishing a CP program would be of benefit.

b) CP training for inter-professional collaboration

The present systematic review found that in nearly 41% of CP programs involved community paramedics collaborating with other healthcare professionals, including family health teams, social workers, and community organization representatives. The creation of new relationships between community paramedics, health, and non-health personnel should bring into consideration the challenges of effective inter-professional relationships, and the skills and resources needed at the professional and healthcare system levels.

A literature review on inter-professional collaboration explained that providers in traditional healthcare models usually work autonomously, whereas collaboration requires some mixture of ingredients such as shared resources and decision-making, interdependency, dynamic partnerships, and transcending traditional role boundaries (D'Amour, Ferrada-Videla, San Martin Rodriguez, & Beaulieu, 2009). In their traditional roles paramedics and other healthcare professionals interact sporadically whenever there is a client requiring emergency or acute care. The types of information exchanged about the patient generally follow set protocols. Communication between paramedics and other healthcare providers is also short-term, with little follow-up with the patient or provider after patient handover. In contrast, the CP role often involves more long-term interactions with clients and collaboration with healthcare providers and community organization representatives.

Developing effective collaborative relationships between community paramedics and other providers and organizations can be challenged by an unclear understanding of each member's professional role. The process of collaboration involves "two or more individuals, often from different disciplines [working] to achieve shared aims and objectives" and requires intentional knowledge exchange and shared responsibility for patients (Houldin, Naylor, & Haller, 2004; Lindeke & Sieckert, 2005). When the role (e.g. responsibilities) of the new healthcare professional is unclear, this may result in team members feeling confused, and resisting role integration and collaboration (D'Amour et al., 2009; Delamaire & Lafortune, 2010; Sangster-Gormley, Martin-Misener, Downe-Wamboldt, & Dicenso, 2011). A multi-case study

found that having planned role clarification activities – such as having a leader inform team members about each other's roles, and team members discussing roles – optimized the integration of primary healthcare nurse practitioners to clinics in Quebec, Canada (Brault et al., 2014). Having clearly defined roles for community paramedics within an inter-professional team, and having opportunities to negotiate responsibilities in client care, are important for developing CP programs, integrating community paramedics into healthcare teams, and for inter-professional collaboration.

Despite the inter-professional setting of many CP programs, none of the programs captured had provided training in teamwork or collaboration. Only two programs covered skills that would likely facilitate collaboration: one program trained paramedics in communication (although this was communication skills when asking patients potentially sensitive questions) and another program provided training on leadership (Brice, Kingdon, & Runyan, 2009; Brice et al., 2006; Cooper et al., 2004). CP training generally focuses on the technical knowledge and skills in patient care, with little to no attention on the skills needed for community paramedics to collaborate, communicate, and integrate among other healthcare professionals and service providers. Although some skills for inter-professional collaboration are likely acquired during traditional paramedicine training, the extent of collaboration in CP is much greater and as a result, so is the value of receiving communication, teamwork, and leadership training. CP programs that involve inter-professional collaboration should consider greater emphasis on building paramedics' communication and collaboration skills. As interaction time with clients is likely longer in CP than in traditional paramedicine, CP programs should also consider training in effective patient communication. Opportunities for in-clinic hours and shadowing, as provided through training in some CP programs, may also help community paramedics develop patient communication skills.

c) Better understanding of the CP client populations to inform CP training

An understanding of the target population's characteristics and needs can inform the knowledge and skills taught in CP training, and possibly enhance program effectiveness. For example, community paramedics who will be serving older adults with diabetes would likely need different knowledge and skills than when working with older adults with diabetes and dementia. Yet, the data available to CP programs may not provide a comprehensive understanding of clients. Health data often report on patients' age, health conditions, and use of healthcare services, but may lack other information important for CP program design. For example, knowing patients' primary spoken language and cultural background can contribute to designing linguistically and culturally sensitive CP programs. Usefulness of provincial and national-level data may also be limited if they do not reflect the unique characteristics of a particular community. From a knowledge translation standpoint, being able to understand and transform data so that it becomes useful for CP program and training development at the local level may pose additional challenges.

d) Overlapping roles with other healthcare professions

Overlapping responsibilities and roles between CP and other health professions, and resulting pushback from these established professions, may be barriers to CP growth. In Ontario, the Registered Nurses' Association of Ontario (RNAO) was concerned that the proposed responsibilities of community paramedics could already be provided by Registered Nurses

(RNs), primary and home care providers, and community services (Registered Nurses Association of Ontario, 2014). Existing nurse-based models of care, the RNAO suggested, were already working towards the same goals as CP, such as reducing unnecessary 911 calls and transports to the ED. Given that CP has received provincial funding to continue in Ontario, achieving collaboration between CP and other professional groups in the province will be especially important. Approximately 41% of CP programs captured in this systematic review had community paramedics collaborating with one or more health professionals, including nurses, social workers, and primary care providers. Each participating member likely adopted some change in their professional roles (i.e. role boundary changes) in order to come together as a team. As one literature review suggests, transcending established role boundaries is a component of inter-professional collaboration (D'Amour et al., 2009). Greater recognition of CP as an option that can co-exist with other health professionals may increase its integration into, and acceptance by, communities and professional groups.

Part III. Next steps for CP

a) Considerations for rural expansion

Of the 44 CP programs captured only four (9.1%) took place in a rural setting. Perhaps the smaller number of residents and logistics of reaching out to a more sparse community did not justify creating new CP programs. Yet, rural dwellers tend to have reduced access to care family and specialist care, and visit the ED more often for primary and emergency care compared to urban residents (Haggerty et al., 2007; Sibley & Weiner, 2011). Knowing that reduced access to healthcare services, and especially to primary care, can increase chances of ED visits, expanding CP programs in rural communities may help provide residents with more regular healthcare access, reduce dependency on EDs, and improve health outcomes (McCusker et al., 2012).

In Ontario, Canada, the Ministry of Health and Long-Term Care (MOHLTC) recognizes that residents of rural and remote communities are challenged to find accessible and quality healthcare. In a report by the Rural and Northern Health Care Panel (RNHC Panel) to the MOHLTC, recommendations for addressing this challenge include attracting and retaining health professionals, and increasing collaboration and coordination between providers (Care, 2011a). Two recommendations specific to emergency care are to integrate emergency medical service providers with the planning and delivery of health services (R3.1), and to improve non-urgent transportation; non-urgent transportation is used when an individual needs access to healthcare services to address a non-emergency issue (R3.2) (Care, 2011a). These gaps in availability of healthcare professionals and non-urgent care can potentially be filled by community paramedics.

In rural areas with healthcare shortages paramedics are already providing more primary care services (Raven, Tippett, Ferguson, & Smith, 2006). Of the CP programs identified in this systematic review, those operating in rural communities were providing services such as acute care, referral to community services, communicating with clients' other healthcare providers, as well as client assessments and monitoring. The expanded roles that rural paramedics are already adopting, or can adopt through CP training, may improve healthcare services access and continuity of care for these communities. In recommendations R3.1 and R3.2 of the report, the RNHC Panel underlines the value of inter-professional care and support towards enhancing providers' (including paramedics) scope of practice in order to increase access (Care, 2011b).

Community paramedicine may be an option for addressing the recommendations set out by the RNHC Panel.

Yet, expanding the CP model of care can present its own unique set of challenges. The RNHC Panel identifies recruitment of healthcare personnel, as well as ensuring healthcare services are responsive to community needs and are culturally and linguistically appropriate, as ongoing challenges to providing access to quality care (Care, 2011b). Establishing CP programs requires considerations of the unique population profiles and resources available in rural communities. CP programs that were effective in urban communities cannot simply be transplanted into rural communities and expected to be equally effective. Rural and remote communities present their own set of healthcare challenges, and CP programming should be responsive to these challenges.

b) Evidence and knowledge sharing

Increasing availability of quality evidence and knowledge sharing between CP programs may support the growth of CP internationally. Of the 47 studies captured in the systematic review only 22 (46.8%) had a specified study design, of which just five were randomized controlled trials (RCTs) and one was a systematic review. The majority of studies (53.2%) had no study design and, for example, only described the CP program.

Of the 19 studies assessed using the MMAT tool, only four (21.1%) met all criteria for methodological quality, seven (36.8%) met most of the criteria, and eight (42.1%) met only half of the criteria. Although no quality assessment tool is perfect, being able to compare study quality can help decision makers select information they feel confident about using. Appraising evidence quality and extracting relevant information allow decision makers to use the evidence to inform programming and policies (Ciliska, 2012). Better evidence available about CP may bolster the case for CP, and better inform decision-making for communities considering a CP program. Furthermore, enabling CP programs to produce good evidence, such as by conducting quality RCTs, cohort, and case-control studies, may strengthen the CP literature. A lack of resources may be a limiting factor to CP programs completing high quality studies and disseminating evidence. CP programs with only enough funding and personnel to cover program operations (i.e. to provide the CP services) are not in a position to design, conduct, and evaluate the program, or to write and disseminate the results. Outside of research at the program level, there also few literature reviews on CP.

In addition to creating evidence, programs need to have the resources that allow them to share their findings in the published and grey literatures, and in other avenues of communication relevant to the CP community. Increasing the availability of information in the published and grey literatures and other avenues may help increase the evidence base surrounding CP, and contribute towards identifying best practices for CP programming and training. Improving the accessibility of CP evidence – for instance, in the form of knowledge dissemination activities and publishing in avenues outside of traditional journals – can also help decision-makers learn about CP and make informed decisions about the use and design of a CP program in their communities. Greater knowledge sharing and communication between CP programs can mean that programs learn from each other, and share strategies for addressing challenges that arise.

In addition to the availability of quality information, there is inconsistent reporting about the CP programs and their training. In the present systematic review, the components of training were not described for 43.2% of CP programs, and 100% of CP programs did not include information about paramedics' training success (e.g. pass/fail rate) and confidence in becoming a community paramedic. Studies also track different health outcomes, or adopt different ways of measuring the same health outcome. The heterogeneity that exists between CP programs in terms of target demographics and services provided already make it difficult to compare CP programs and evaluate program effectiveness. The resources available to a CP program also influence if and how a CP program conducts program evaluation and the health outcomes that are measured. Where possible, standardization of the health outcomes and their methods of measurements may enable better assessment of CP effectiveness beyond the individual program level.

Part IV: Strengths, limitations, and next steps for systematic review

Currently, there are only a handful of literature reviews about CP, namely, two systematic reviews and a targeted literature search (Bigham, Kennedy, Drennan, & Morrison, 2013; Choi, Blumberg, & Williams, 2016; Pang et al., 2016). None of the reviews shared the objectives of the current systematic review which are to describe the key differences between CP programs and the training for each type of program. The present systematic review captured CP programs spanning a variety of demographic groups, geographic locations, services provided, and health outcomes. An extensive amount of data was also extracted from each program, with additional stratification of CP program training and services provided based on target population, location of CP visits, and urban or rural location. The results of the systematic review allow readers to understand individual CP programs and training, and compare CP programs.

Limitations include that the review does not capture all CP programs. A lot of CP programs are described only in the grey literature, and even then there are programs that are not present in either the published or grey literatures. Although within-study and bibliography searching was done to follow up on excluded programs, having only two independent reviewers and a limited timeframe prevented a more extensive grey literature search. A meta-analysis of the top three health outcomes (i.e. 911 calls, transport to ED, hospitalization) could also not be completed due to the heterogeneity in health outcomes and target populations reported by studies evaluating these outcomes. CP programs that measured the same health outcomes either had vastly different population groups or did not have actual results yet (e.g. protocol only). Comparing CP programs was also challenged by a lack of reporting on training descriptors and outcomes from 43% of programs. Since direct follow-up with researchers was not conducted due to resource and time limitations, it was not possible to confirm whether it was their decision not to evaluate or report that led to the lack of reporting on certain program and training outcomes.

The present study only describes the training used in CP programs, but it would be interesting to identify the facilitators and barriers that CP programs faced when training paramedics. Knowledge of what did and did not go well during training can be used to inform CP training design. As knowledge dissemination is essential for CP growth and advancement, next steps for this project include efforts to share findings in ways accessible to relevant use groups such as paramedics, municipal governments, and policy makers.

Future CP studies may also consider evaluating a broader spectrum of outcomes. The majority of studies reported on clinical outcomes such as 911 calls, ED admission, and hospitalization. Although these common outcomes are important for evaluating CP programs, they are a narrow definition of what constitutes effective CP programs. Other important aspects of program effectiveness, spanning from CP training to client outcomes are either not evaluated or underreported. Client satisfaction was described by only a handful of studies, and none of the studies reported on post-CP training outcomes such as paramedics' confidence in adopting the community paramedicine role. Increasing interest towards evaluating and reporting on additional client and paramedic outcomes, and ensuring CP programs have the resources to do so, can diversify the available evidence and better inform CP program and training development.

Conclusion

In conclusion, the objectives of this thesis were to describe the differences between CP programs and the types of training involved for each program type, as well as to use these results to inform recommendations on CP training and growth. The systematic review identified 44 unique CP programs with a wide range of target populations and services provided. CP training was equally diverse with paramedics being trained to acquire a variety of skills; some skills such as acute care overlapped with traditional paramedicine roles, whereas skills such as health promotion reflected community paramedics' expanded healthcare roles. Overlap in certain training subjects such as acute care suggests some core skillset for CP, but overall it seems that training is unique to the program's interventions and community's health needs. The majority of CP training focused on technical skills and knowledge, with only two programs reporting training on communication and leadership. In light of community paramedics now interacting long-term with patients, and working in collaboration with other health and non-health professionals, CP training should also help develop skills in communication and teamwork.

Few CP programs captured in the review took place in rural communities. Although CP may be considered an option for improvement access to healthcare services in rural and remote communities, programs will need to adapt to and accommodate for the healthcare challenges unique to these communities. Developing clearer definitions of a community paramedic's responsibilities and services provided, particularly when there is role overlap with other health professions, may facilitate adoption of CP by more communities and contribute to effective inter-professional collaboration. Enabling CP programs to prepare and disseminate quality evidence may identify strategies for CP programming and training, and strengthen the CP literature.

The present study is one of only a few literature reviews on CP, and the only one known to focus on CP training. Although not all CP programs are captured, this study provides readers with many angles from which to compare programs and training. It may be valuable for future work to explore the facilitators and barriers to providing different types of CP training.

Appendices

Part A. Search strategy
A1. Search strategies
MEDLINE

Theme 1. Paramedicine Combined using OR	**First, AND** Themes **1 & 2**	**Theme 2. Service, Community** Combined using OR	Then, OR everything with Theme 3	**Theme 3 Key Phrases** Combined using OR
Emergency care practitioner*.mp. Paramedic*.mp. Paramedical personnel.mp. Para medical personnel.mp.		Community care.mp. Community.mp. Communities.mp.		Community paramedic*.mp. Mobile integrated healthcare.mp. Mobile integrated health care.mp. MIH-CP.mp. Community paramedicine program*.mp.

EMBASE

Theme 1. **Paramedicine** Combined using OR	First, AND Themes 1 & 2	Theme 2. **Service, Community** Combined using OR	Then, OR everything with Theme 3	Theme 3 **Key Phrases** Combined using OR
Emergency care practitioner*.mp. Paramedic*.mp. Paramedical personnel/ Paramedical personnel.mp. Para medical		Community care/ Community/ Community.mp. Communities.mp.		Community paramedic*.mp. Mobile integrated healthcare.mp. Mobile integrated health care.mp. MIH-CP.mp. Community

personnel.mp.				paramedicine program*.mp.

A2. Inclusion and exclusion criteria

	Inclusion Criteria	Exclusion Criteria
1.	Article is about a CP program or mentions a CP program*.	Article is not about a CP program, and does not mention a CP program.
2.	Article describes the CP program (services offered, population serviced, goals etc.).	Article does not describe the CP program. (In the cases where CP program is not described in the article answer UNCLEAR, and a follow-up a grey literature search will be conducted. If follow-up search does not yield information about the program, then the article will be excluded.).
3.	Training for the CP program, or key skills developed by the community paramedics, is described	Training for the CP program, or key skills developed by the community paramedics, is not described. (In the cases where training is not described in the article answer UNCLEAR, and a follow-up a grey literature search will be conducted. If follow-up search does not yield information about the training, then the article will be excluded.).
4.	Article is written in English	Article is not written in English
5.	Article is published anytime up until present day (specify date when search is run)	
6.	No limits on study design	

*Synonyms for 'program' that will also be considered: group, organization, service, and team.

L1 (title and abstract) screening rules:

Situations when we would exclude an article from Level 2 screening: Reviewer's final L1 decision is NO

1. NO on Q1 (not about CP program) → Exclude
2. NO on Q5 (not in English) → Exclude

Situations when we would include an article for Level 2 Screening: Reviewer's final L1 decision is YES

1. (YES on Q1, Q4, Q5, Q6) + (YES or UNCLEAR for Q2 and Q3)

L2 (full-text and follow-up search) screening rules:

Situations when we would exclude from systematic review: Reviewer's final L2 decision is NO

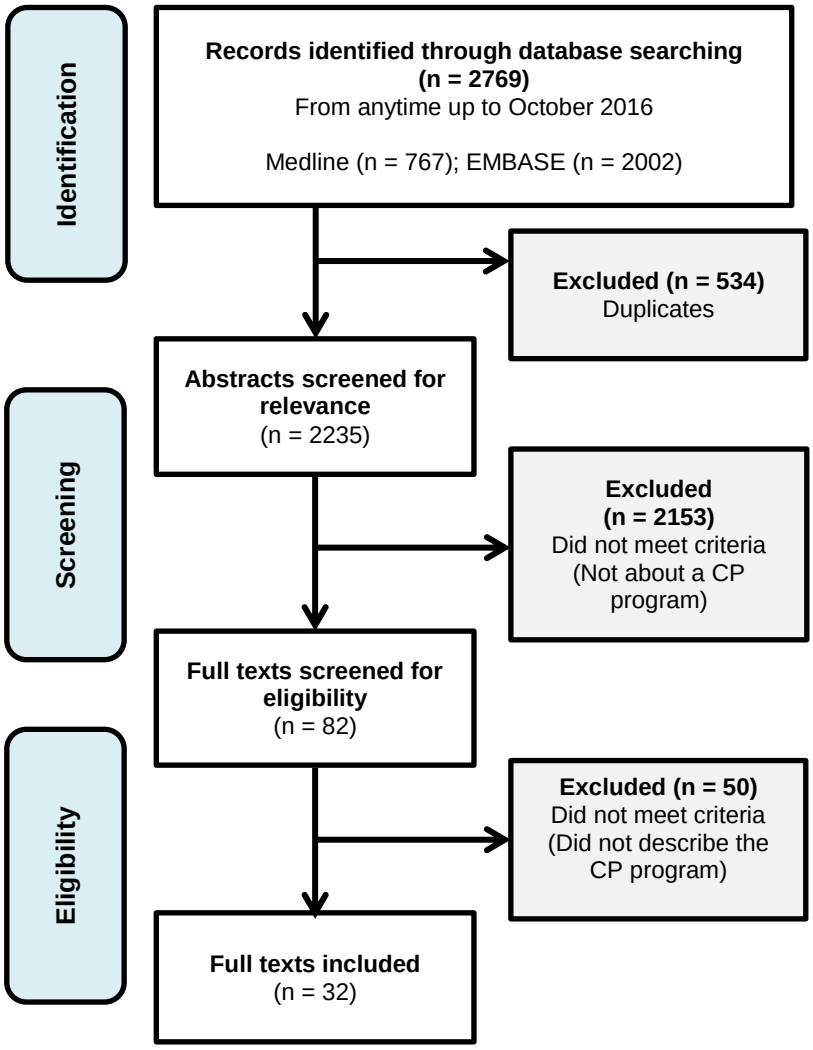
1. Fails follow-up searches on Q2 (CP program not described) and/or Q3 (training for CP program not described) → Exclude (i.e. failing on either Q2 or Q3 warrants exclusion)

Situations when we would include an article for systematic review: Reviewer's final L2 decision is YES

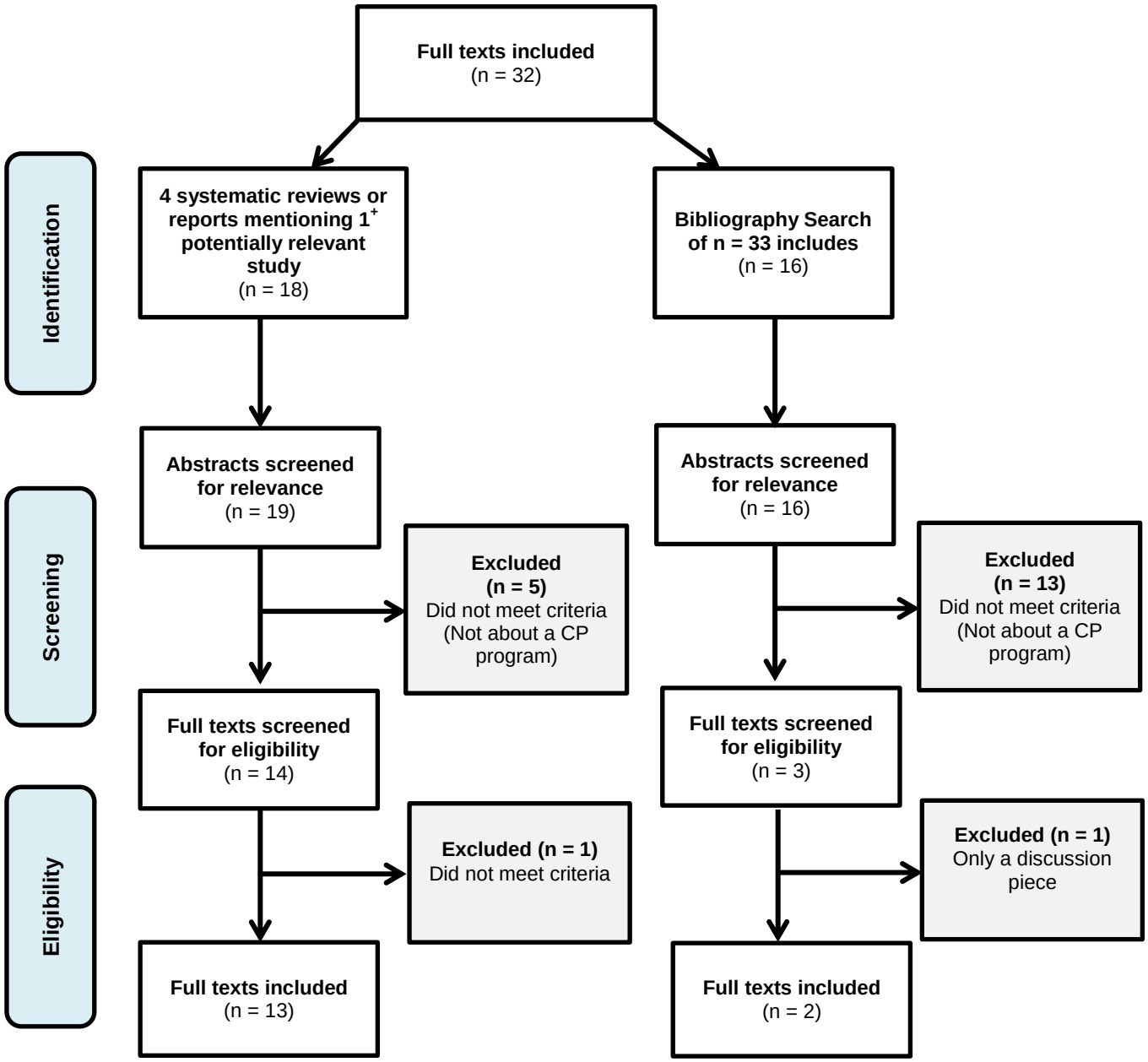
1. Passes follow-up searches on Q2 (CP program is described) and Q3 (training for CP program is described) → Include (i.e. must satisfy both Q2 and Q3 to include)

A3. PRISMA flow diagrams

A3.1. PRISMA flow diagram for records identified in initial literature search



A3.2. PRISMA flow diagrams for studies identified from the included full texts



Part B. Studies captured in systematic review

B1. Study designs of included studies

	Study design	Number of studies (% out of 47 studies)	Author(s), Year(s)	Citation
Potential for MMAT assessment	Quantitative randomized (e.g. RCT)	5 (10.6%)	1. Agarwal, 2015b 2. Arendts, 2011 3. Drennan, 2014 4. Dixon, 2009 5. Mason, 2007	1. (Agarwal et al., 2015b) 2. (Arendts, Sim, Johnston, & Brightwell, 2011) 3. (Drennan et al., 2014) 4. (Dixon et al., 2009) 5. (Mason et al., 2007)
	Quantitative non-randomized (e.g. observational case control, retrospective cohort, cross-sectional, other)	6 (12.8%)	1. Abrashkin, 2016 2. Brice, 2006 3. Gray, 2008 4. Jensen, 2013 5. Jensen, 2016 6. Snooks, 2004	1. (Abrashkin et al., 2016) 2. (Brice et al., 2006) 3. (Gray & Walker, 2008) 4. (Jensen et al., 2013) 5. (Jensen et al., 2016) 6. (Snooks et al., 2004)
	Qualitative descriptive (e.g. observational, incidence/prevalence study without comparison group)	8 (17.0%)	1. Agarwal, 2014 2. Crockett, 2016 3. Everden, 2003 4. Gerson, 1992 5. MedStar Mobile Healthcare, 2017a 6. MedStar Mobile Healthcare, 2017b 7. Shah, 2010 8. Tangherlini, 2016	1. (Agarwal et al., 2014) 2. (Crockett et al., 2016) 3. (Everden, Eardley, Lorgelly, & Howe, 2003) 4. (Gerson, Schelble, & Wilson, 1992) 5. (Healthcare, 2017a) 6. (Healthcare, 2017b) 7. (Shah et al., 2010) 8. (Tangherlini et al., 2010)
	Mixed methods (e.g. cluster RCT with qualitative interviews; cohort study with qualitative interviews)	3 (6.4%)	1. Cooper, 2004 2. Martin-Misener, 2009 3. Snooks, 2012	1. (Cooper et al., 2004) 2. (Martin-Misener, Downe-Wamboldt, Cain, & Girouard, 2009) 3. (Snooks et al., 2012)
	No study design (e.g. describes CP program only, literature	25 (53.2%)	1. Abrashkin, 2015 2. Agarwal, 2013a 3. Agarwal, 2013b	1. (Abrashkin et al., 2015) 2. (Agarwal et al., 2013a)

	review, feasibility study)		4. Agarwal, 2015a 5. Andrew, 2011 6. Brice, 2009 7. Bigham, 2013 8. Blumberg, 2014 9. Choi, 2016 10. ED Management, 2014 11. ED Management, 2013 12. Hauswald, 2005 13. Hospital Case Management, 2014 14. Hospital Case Management, 2016 15. Kusel, 2015 16. Marshall, 2015 17. Mason, 2003 18. Mason, 2008 19. Misner, 2005 20. National Association of Emergency Medical Technicians (NAEMT), 2015 21. Stevens, 2013 22. Swain, 2010 23. The California Health Care Foundation, 2017 24. MedStar Mobile Healthcare, 2016 25. Wilcox, 2016	3. (Agarwal et al., 2013b) 4. (Agarwal et al., 2015a) 5. (Andrew, 2011) 6. (Brice et al., 2009) 7. (Bigham et al., 2013) 8. (Blumberg, 2014ab) 9. (Choi et al., 2016) 10. (E. Management, 2014a,b) 11. (E. Management, 2013) 12. (Hauswald, Raynovich, & Brainard, 2005) 13. (H. C. Management, 2014) 14. (H. C. Management, 2016) 15. (Kusel & Savino, 2015) 16. (Marshall, Clarke, Peddle, & Jensen, 2015) 17. (Mason et al., 2003) 18. (Mason et al., 2008) 19. (Misner, 2005) 20. (Technicians, 2015abc) 21. (Stevens & Weinstein, 2013) 22. (Swain et al., 2010) 23. (Foundation, 2017) 24. (Healthcare, 2016) 25. (Wilcox, 2016)
Total studies included		**47**		

B2. Studies eligible for MMAT assessment

Study design	Number of studies	Author(s), Year(s)
Quantitative randomized (e.g. RCT)	3	4. Agarwal, 2015b 5. Dixon, 2009 6. Mason, 2007
Quantitative non-randomized (e.g. observational case control, retrospective cohort, cross-sectional)	6	7. Abrashkin, 2016 8. Brice, 2006 9. Gray, 2008 10. Jensen, 2013 11. Jensen, 2016 12. Snooks, 2004
Qualitative descriptive (e.g. observational, incidence/prevalence study without comparison group)	8	9. Agarwal, 2014 10. Crockett, 2016 11. Everden, 2003 12. Gerson, 1992 13. MedStar Mobile Healthcare, 2017a 14. MedStar Mobile Healthcare, 2017b 15. Shah, 2010 16. Tangherlini, 2016
Mixed methods (e.g. cluster RCT with qualitative interviews; cohort study with qualitative interviews)	2	3. Cooper, 2004 4. Martin-Misener, 2009
Total studies included for MMAT assessment	19	

B3. MMAT Assessment Criteria (Pluye et al., 2011)

General Questions	A	Are there clear qualitative and quantitative research questions (or objectives*), or a clear mixed methods question (or objective*)?
	B	Do the collected data allow the study to address the research question (objective)? E.g. Consider whether the follow-up period is long enough for the outcome to occur (for longitudinal studies or study components)
Study type	**Criteria**	
Qualitative studies	1.1	Are the sources of qualitative data (archives, documents, informants, observations) relevant to address the research question (objective)?
	1.2	Is the process for analyzing qualitative data relevant to address the research question (objective)?
	1.3	Is appropriate consideration given to how findings relate to the context, e.g., the setting, in which the data were collected?
	1.4	Is appropriate consideration given to how findings relate to researchers' influence, e.g., through their interactions with participants?
Quantitative randomized controlled (trials)	2.1	Is there a clear description of the randomization (or an appropriate sequence generation)?
	2.2	Is there a clear description of the allocation concealment (or blinding when applicable)?
	2.3	Are there complete outcome data (80% or above)?
	2.4	Is there low withdrawal/drop-out (below 20%)?
Quantitative non-randomized	3.1	Are participants (organizations) recruited in a way that minimizes selection bias?
	3.2	Are measurements appropriate (clear origin, or validity known, or standard instrument; and absence of contamination between groups when appropriate) regarding the exposure/intervention and outcomes?
	3.3	In the groups being compared (exposed vs. non-exposed; with intervention vs. without; cases vs. controls), are the participants comparable, or do researchers take into account (control for) the difference between these groups?
	3.4	Are there complete outcome data (80% or above), and, when applicable, an acceptable response rate (60% or above), or an acceptable follow-up rate for cohort studies (depending on the duration of follow-up)?
Quantitative descriptive	4.1	Is the sampling strategy relevant to address the quantitative research question (quantitative aspect of the mixed methods question)?
	4.2	Is the sample representative of the population understudy?
	4.3	Are measurements appropriate (clear origin, or validity known, or standard instrument)?
	4.4	Is there an acceptable response rate (60% or above)?
Mixed-Methods*	5.1	Is the mixed methods research design relevant to address the qualitative and quantitative research questions (or objectives), or the qualitative and quantitative aspects of the mixed methods question (or objective)?
	5.2	Is the integration of qualitative and quantitative data (or results*) relevant to address the research question (objective)?
	5.3	Is appropriate consideration given to the limitations associated with this integration, e.g., the divergence of qualitative and quantitative data (or results*) in a triangulation design?
*Mixed-Methods studies: In addition to the criteria for the mixed-methods component (5.1 – 5.3), criteria for the qualitative component (1.1 – 1.4), and quantitative component (2.1 – 2.4, or 3.1 – 3.4, or 4.1 – 4.4), are used. The overall MMAT score reflects the lowest scoring component included.		

B4. MMAT assessment results

Authors, Primary	MMAT study category	**Criteria**		**1. Qualitative studies** (Yes/No/Can't tell/ n/a) Only yes = *				**2. Quantitative randomized controlled (trials)** (Yes/No/Can't tell/ n/a) Only yes = *				**3. Quantitative non-randomized** (Yes/No/Can't tell/ n/a) Only yes = *				**4. Quantitative descriptive** (Yes/No/Can't tell/ n/a) Only yes = *				**5. Mixed methods** (Yes/No/Can't tell/ n/a) Only yes = *			**Overall score out of ****** *Protocols (no data) could not be assessed
		A	B	1.1	1.2	1.3	1.4	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4.1	4.2	4.3	4.4	5.1	5.2	5.3	
Crockett, 2016	Quantitative descriptive	Y	Y													Y	Y	Y	Y				****
Everden, 2003	Quantitative descriptive	Y	Y													Y	Y	Y	Y				****
Snooks, 2004	Quantitative non-randomized	Y	Y									Y	Y	Y	Y								****
Tangherlini, 2016	Quantitative descriptive	Y	Y													Y	Y	Y	Y				****
Gerson, 1992	Quantitative descriptive	Y	Y													N	Y	Y	Y				***
Gray, 2008	Quantitative non-randomized	Y	Y									Y	Y	CT	Y								***
Jensen, 2013	Quantitative non-randomized	Y	Y									Y	Y	CT	Y								***
Jensen, 2016	Quantitative non-randomized	Y	Y									Y	Y	N	Y								***
Martin-Misener, 2009	Mixed methods	Y	Y	Y	Y	Y	N					N	Y	Y	Y								***

Mason, 2007	Quantitative randomized	Y	Y					Y	Y	N	Y												***
Abrashkin, 2016	Quantitative non-randomized	Y	Y									Y	Y	N	Y								***
Agarwal, 2014	Quantitative descriptive	Y	Y													Y	Y	CT	CT				**
Agarwal,2015b	Quantitative randomized	Y	Y					Y	Y	n/a	n/a												**
Brice, 2006	Quantitative non-randomized	Y	Y									Y	Y	CT	CT								**
Cooper, 2004	Mixed methods	Y	Y	Y	Y	N	CT					Y	N	CT	Y					Y	Y	Y	**
Dixon, 2009	Quantitative randomized	Y	Y					N	N	Y	Y												**
MedStar Mobile Healthcare, 2017a	Quantitative descriptive	Y	Y													Y	CT	Y	CT				**
MedStarMobile Healthcare, 2017b	Quantitative descriptive	Y	Y													Y	CT	Y	CT				**
Shah, 2010	Quantitative descriptive	Y	Y													Y	CT	CT	Y				**
Arendts, 2011	Quantitative randomized	Y	Y					Y	N	n/a	n/a												Cannot be assessed
Drennan, 2014	Quantitative randomized	Y	Y					Y	Y	n/a	n/a												Cannot be assessed
Snooks, 2012	Mixed methods	Y	Y	Y	Y	n/a	n/a	N	N	n/a	n/a									Y	n/a	N	Cannot be assessed

Part C. The CP programs captured

C1. Overview of 44 CP programs captured

Author(s), Year(s)	CP program	Country	Urban/ Rural	Start Date	End Date*	Paramedic service	Type of paramedic intervention	Number of paramedics enrolled	Target population
Abrashkin, 2015, 2016	Advanced Illness Management (AIM)	USA	Urban	October 2013	Unknown	Northwell Health (previously North Shore LIJ) EMS	Community paramedic	Unknown	911 callers (presenting with low acuity conditions, and are seniors in the community)
Agarwal, 2015a, 2014, 2013a, 2013b	Community Health Assessment Program through EMS (CHAP-EMS) – Hamilton only	Canada	Urban	Unknown	Unknown	Hamilton EMS	Community paramedic	2	Seniors living in the community (not facility)
Agarwal, 2015b	Community Health Assessment Program through EMS (CHAP-EMS) – across Ontario	Canada	Urban	Unknown	Unknown	Local EMS in each of those sites	Community paramedic	Unknown	Seniors living in the community (not facility)
Andrew, 2011	New South Wales (NSW) Extended Care Paramedic Program	Australia	Urban	Unknown	Unknown	New South Wales (NSW) Ambulance Service	Extended care paramedic	58	911 callers (presenting with low acuity conditions)

Arendts, 2011	ParaMED Home	Australia	Urban	Unknown	Unknown	St. John Ambulance Australia	Paramedic	Unknown	911 callers (presenting with low acuity conditions)
Blumberg, 2014	REMSA CP Program	USA	Urban	June 2013	Unknown	Regional Emergency Medical Services Authority	Community paramedic	Unknown	At risk for ED re/admission or hospitalization (in general)
Blumberg, 2014	REMSA Ambulance Transport Alternatives Program	USA	Urban	December 2012	Unknown	Regional Emergency Medical Services Authority	Community paramedic	Unknown	911 callers (presenting with low acuity conditions)
Brice, 2006, 2009	Welcome to the World (WTTW)	USA	Urban	1998	2003	Orange County (North Carolina) EMS	Extended care paramedic	15	Other (families with newborns)
Cooper, 2004	None	United Kingdom	Urban	October 2002	March 2003	Westcountry Ambulance Service NHS Trust	Emergency care paramedic	4	911 callers (in general)
Crockett, 2016	Community Paramedicine Team (CPT)	USA	Urban	Unknown	Unknown	Indianapolis EMS	Community paramedic	Unknown	At risk for ED re/admission or hospitalization (in general)
Dixon, 2009; Mason, 2003, 2007, 2008	Paramedic practitioner in older people's support (PPOPS) scheme	United Kingdom	Urban	September 2003	September 2004	South Yorkshire Ambulance Service	Paramedic	7	911 callers (presenting with low acuity conditions, and are seniors in LTC homes)
Drennan, 2014	Expanding Paramedicine in the Community (EPIC)	Canada	Urban	Unknown	Unknown	York Region EMS	Community paramedic	7	At risk for ED re/admission or hospitalization (in general)

ED Management, 2014a	None	USA	Urban	2010	2013	Wake County EMS	Community paramedic	16	
ED Management, 2014b	None	USA	Urban	October 2012	Unknown	North Memorial Medical Centre	Community paramedic	8	At risk for ED re/admission or hospitalization (in general)
ED Management, 2013; Stevens, 2013	Treat the Streets: Pre-Hospital Pediatric Asthma Intervention Model to Improve Child Health Outcomes	USA	Urban	January 2014	Unknown	Indianapolis EMS	Community paramedic	3	At risk for ED re/admission or hospitalization (children)
Everden, 2003	Appropriate Care at Point of Need (ACAPON) system	United Kingdom	Urban	2002	Unknown	East Anglican Ambulance Servce	Community paramedic	Unknown	911 callers (in general)
Gerson, 1992	None	USA	Urban	Unknown	Unknown	Akron Fire Department EMS	Firefighter paramedic	130	Seniors living in the community (not facility)
Gray, 2008	None	United Kingdom	Urban	Unknown	Unknown	Yorkshire Ambulatory Service	Emergency care paramedic	Unknown	911 callers (in general)
Hauswald, 2005	Expanded Emergency Medical Services (E-EMS) program	USA	Unclear	1992	1997	Unknown	Emergency care paramedic	16	911 callers (presenting with low acuity conditions)

Hospital Case Management, 2016	Mobile Integrated Healthcare Program	USA	Urban	August 2014	February 2016	Valley Hospital Department of Emergency Services	Mobile healthcare paramedic	Unknown	At risk for ED re/admission or hospitalization (in general)
Hospital Case Management, 2014	None	USA	Urban	Unknown	Unknown	City of Scottsdale Fire Department (paramedic from fire department) and Scottsdale Health System	Firefighter paramedic	Unknown	911 callers (presenting with low acuity conditions)
Jensen, 2013, 2016; Marshall, 2015	Care by Design (CBD) program	Canada	Unclear	February 2011	Unknown	Emergency Health Services (EHS) of Nova Scotia	Extended care paramedic	7-15	911 callers (presenting with low acuity conditions, and are seniors in LTC homes)
Kusel, 2015	Mobile integrated healthcare and community paramedicine (MIH-CP)	USA	Urban	Unknown	Unknown	Alameda County EMS	Community paramedic	Unknown	911 callers (frequent 911 callers/ EMS users)
Misner, 2005; Martin-Misener,	Long and Brier Community Paramedicine Program	Canada	Rural	2003	Unknown	Emergency Health Services (EHS) of Nova	Community paramedic	Unknown	At risk for ED re/admission or hospitalization (in general)

2009						Scotia			
MedStar Mobile Healthcare, 2016, 2017a	MedStar Community Health Program using Mobile Healthcare Practitioners - for frequent 911 callers	USA	Urban	July 2009	Unknown	Area Metropolitan Ambulance Authority (MedStar)	Mobile healthcare paramedic	2 per week	911 callers (frequent 911 callers/ EMS users)
MedStar Mobile Healthcare, 2017b	MedStar Community Health Program using Mobile Healthcare Practitioners - for CHF patients	USA	Urban	June 2010	June 2014	Area Metropolitan Ambulance Authority (MedStar)	Mobile healthcare paramedic	Unknown	At risk for ED re/admission or hospitalization (in general)
National Association of Emergency Medical Technicians (NAEMT), 2015a	Tri-County EMS CP Program	USA	Urban	December 2013	Unknown	Tri-County Health Care EMS	Community paramedic	Unknown	At risk for ED re/admission or hospitalization (in general)
National Association of Emergency Medical Technicians (NAEMT), 2015b	Acadian Ambulance CP Program	USA	Urban	2003	Unknown	Acadian Ambulance	Mobile healthcare paramedic	Unknown	911 callers (frequent 911 callers/ EMS users)

National Association of Emergency Medical Technicians (NAEMT), 2015c	Colorado Springs Fire Department CP program	USA	Urban	2002	Unknown	Colorado Springs Fire Department	Paramedic	Unknown	911 callers (frequent 911 callers/ EMS users)
Shah, 2010	Livingston County EMS CP Program	USA	Rural	April 2006	December 2007	Livingston County EMS	Emergency care paramedic	Unknown	Seniors living in the community (not facility)
Snooks, 2004	"Treat and Refer" protocols for ambulance crews	United Kingdom	Urban	May 2000	August 2000	London Ambulance Service	Paramedic	5	911 callers (presenting with low acuity conditions)
Snooks, 2012	Support and assessment for fall emergency referrals (SAFER 2)	United Kingdom	Urban	Unknown	Unknown	Three ambulance services in England and Wales	Emergency care paramedic	220	911 callers (presenting with low acuity conditions, and are seniors in the community)
Swain, 2010	Urgent Community Care (UCC) Program	New Zealand	Unclear	May 2009	Unknown	Wellington Free Ambulance	Extended care paramedic	Unknown	911 callers (presenting with low acuity conditions)
Tangherlini, 2016	Homeless Outreach and Medical Emergency (HOME) Team	USA	Urban	Unknown	Unknown	San Francisco Fire Department	Paramedic	Unknown	911 callers (frequent 911 callers/ EMS users)
The California Health Care Foundation, 2017a	Post Discharge CP Program	USA	Urban	Unknown	Unknown	Alameda County, Los Angeles, San Bernardino County, Sierra	Community paramedic	Unknown	At risk for ED re/admission or hospitalization (in general)

						Sacramento Valley, Solano County EMS agencies			
The California Health Care Foundation, 2017b	Frequent EMS Users CP Program	USA	Urban	Unknown	Unknown	Alameda County, San Diego EMS Agencies	Community paramedic	Unknown	911 callers (frequent 911 callers/ EMS users)
The California Health Care Foundation, 2017c	Directly observed therapy for tuberculosis CP Program	USA	Urban	Unknown	Unknown	Ventura EMS Agency	Community paramedic	Unknown	At risk for ED re/admission or hospitalization (in general)
The California Health Care Foundation, 2017d	911 Hospice CP Program	USA	Urban	Unknown	Unknown	Ventura EMS Agency	Community paramedic	Unknown	Hospice patients
The California Health Care Foundation, 2017e	Alternate destination - Behavioural health CP Program	USA	Urban	Unknown	Unknown	Stanislaus County EMS Agency	Community paramedic	Unknown	At risk for ED re/admission or hospitalization (in general)
The California Health Care Foundation, 2017f	Alternate destination - medical care CP Program	USA	Urban	Unknown	Unknown	Los Angeles, Orange County, San Diego EMS Agencies	Community paramedic	Unknown	911 callers (presenting with low acuity conditions)

The California Health Care Foundation, 2017g	Sobering centre pilot CP program	USA	Urban	2017	Unknown	Unknown	Community paramedic	Unknown	Unknown
Wilcox, 2016a	Rice County CP program	USA	Urban	Unknown	Unknown	Minnesota Ambulance Association	Community paramedic	Unknown	At risk for ED re/admission or hospitalization (in general)
Wilcox, 2016b	Wadena County CP program	USA	Rural	Unknown	Unknown	Minnesota Ambulance Association	Community paramedic	Unknown	At risk for ED re/admission or hospitalization (in general)
Wilcox, 2016c	Scott County CP program	USA	Rural	Unknown	Unknown	Minnesota Ambulance Association	Community paramedic	Unknown	At risk for ED re/admission or hospitalization (in general)

*In instances where the end date of the CP program is unknown, the end of study date (when available) was provided instead

C2. Number of community paramedics in CP programs

Number of community paramedics	**Number of CP programs** (% out of 44 CP programs)	**Author(s), Year(s)**	**CP program name**
1 to 5	4 (9.1%)	1. Agarwal, 2015a; 2014, 2013a, 2013b 2. Cooper, 2004 3. ED Management, 2013; Stevens, 2013 4. Snooks, 2014	1. Community Health Assessment Program through EMS (CHAP-EMS) – Hamilton only 2. None 3. Treat the Streets: Pre-Hospital Pediatric Asthma Intervention Model to Improve Child Health Outcomes 4. "Treat and Refer" protocols for ambulance crews
6 to 10	3 (6.8%)	1. Drennan, 2014 2. ED Management, 2014b 3. Dixon, 2009; Mason, 2003, 2007, 2008	1. Expanding Paramedicine in the Community (EPIC) 2. None 3. Paramedic practitioner in older people's support (PPOPS) scheme
10 to 15	2 (4.5%)	1. Brice, 2006, 2009 2. Jensen, 2013, 2016; Marshall, 2015*	1. Welcome to the World (WTTW) 2. Care by Design (CBD) program
16 to 20	1 (2.3%)	ED Management, 2014a	None
50 to 100	1 (2.3%)	Andrew, 2011	New South Wales (NSW) Extended Care Paramedic Program
101 to 200	1 (2.3%)	Gerson, 1992	None
201+	1 (2.3%)	Snooks, 2012	Support and assessment for fall emergency referrals (SAFER 2)
Median number of CPs (among n=13 programs with known number)	**8 community paramedics**		

Unclear (e.g. reported two CPs per week, or 16 CPs initially)	2 (4.5%)	1. Hauswald, 2005 2. MedStar Mobile Healthcare, 2016, 2017a	1. Expanded Emergency Medical Services (E-EMS) program 2. MedStar Community Health Program using Mobile Healthcare Practitioners - for frequent 911 callers
Unknown	29 (65.9%)		
Total	**44 Programs**		
*The CP program described by Jensen 2013, 2016, and Marshall 2015 involved 7 to 15 community paramedics; 15 was used for the mean calculation.			

C3. Description of inter-professional team

Note: CP program can have more than one type of inter-professional team member.

Part of an Inter-professional Team	**Number of CP Programs** (% out of 44 CP programs)	**Author(s), Year(s)**	**CP program name**
Part of an inter-professional team: n = 18 (40.9%) (i.e. community paramedic collaborates with *at least* one other different professional)			
• Nurse	6 (13.6%)	1. Hospital Case Management, 2016 2. Hospital Case Management, 2014 3. MedStar Mobile Healthcare, 2016, 2017a 4. National Association of Emergency Medical Technicians (NAEMT), 2015a 5. Tangherlini, 2016 6. The California Health Care Foundation, 2017d	1. Mobile Integrated Healthcare Program 2. None 3. MedStar Community Health Program using Mobile Healthcare Practitioners - for frequent 911 callers 4. Tri-County EMS CP Program 5. Homeless Outreach and Medical Emergency (HOME) Team 6. 911 Hospice CP Program
• Physician	2 (4.5%)	1. Jensen, 2013; Jensen, 2016; Marshall, 2015 2. MedStar Mobile Healthcare, 2017b	1. Care by Design (CBD) program 2. MedStar Community Health Program using Mobile Healthcare Practitioners - for CHF patients
• Family doctor	2 (4.5%)	1. Drennan, 2014 2. Kusel, 2015	1. Expanding Paramedicine in the Community (EPIC) 2. Mobile integrated healthcare and community paramedicine (MIH-CP)
• Primary care team (including family doctor)	4 (9.1%)	1. Abrashkin, 2015, 2016 2. Everden, 2003 3. Misner, 2005; Martin-Misener, 2009 4. Swain, 2010	1. Advanced Illness Management (AIM) 2. Appropriate Care at Point of Need (ACAPON) system

			3. Long and Brier Community Paramedicine Program 4. Urgent Community Care (UCC) Program
• Case manager	2 (4.5%)	1. Shah, 2010 2. Wilcox, 2016a	1. Livingston County EMS CP Program 2. Rice County CP program
• Pharmacist	1 (2.3%)	Crockett, 2016	Community Paramedicine Team (CPT)
• Social worker	5 (11.4%)	1. Abrashkin, 2015, 2016 2. Crockett, 2016 3. National Association of Emergency Medical Technicians (NAEMT), 2015a 4. Swain, 2010 5. Tangherlini, 2016	1. Advanced Illness Management (AIM) 2. Community Paramedicine Team (CPT) 3. Tri-County EMS CP Program 4. Urgent Community Care (UCC) Program 5. Homeless Outreach and Medical Emergency (HOME) Team
• Other	3 (6.8%)	1. Gerson, 1992 2. Tangherlini, 2016 3. Wilcox, 2016a	1. None 2. Homeless Outreach and Medical Emergency (HOME) Team 3. Rice County CP program
None	23 (52.3%)		
Unknown	3 (6.8%)		

C4. Location of CP visits

Location of CP visits	**Number of CP programs** (% out of 44 CP programs)	**Author(s), Year(s)**	**CP program name**
Common area in residence building	2 (4.5%)	1. Agarwal, 2015a; 2014, 2013a, 2013b 2. Agarwal, 2015b	1. Community Health Assessment Program through EMS (CHAP-EMS) – Hamilton only 2. Community Health Assessment Program through EMS (CHAP-EMS) – across Ontario
Community clinic (mobile and stationary)	1 (2.3%)	Wilcox, 2016c	Scott County CP program
Hospice	1 (2.3%)	The California Health Care Foundation, 2017d	911 Hospice CP Program
LTC facility	1 (2.3%)	Jensen, 2013, 2015; Marshall, 2015	Care by Design (CBD) program
Patient home	25 (56.8%)	1. Abrashkin, 2015, 2016 2. Andrew, 2011 3. Arendts, 2011 4. Blumberg, 2014a 5. Brice, 2006, 2009 6. Crockett, 2016 7. Drennan, 2014 8. ED Management, 2014b 9. ED Management, 2013; Stevens, 2013 10. Everden, 2003 11. Gerson, 1992 12. Hauswald, 2005 13. Hospital Case Management, 2016 14. Hospital Case Management, 2014 15. Kusel, 2015 16. MedStar Mobile Healthcare, 2017b 17. National Association of Emergency Medical Technicians (NAEMT), 2015a 18. National Association	1. Advanced Illness Management (AIM) 2. New South Wales (NSW) Extended Care Paramedic Program 3. ParaMED Home 4. REMSA CP Program 5. Welcome to the World (WTTW) 6. Community Paramedcine Team (CPT) 7. Expanding Paramedicine in the Community (EPIC) 8. None 9. Treat the Streets: Pre-Hospital Pediatric Asthma Intervention Model to Improve Child Health Outcomes 10. Appropriate Care at Point of Need (ACAPON) system 11. None

		of Emergency Medical Technicians (NAEMT), 2015b 19. National Association of Emergency Medical Technicians (NAEMT), 2015c 20. Snooks, 2012 21. The California Health Care Foundation, 2017a 22. The California Health Care Foundation, 2017b 23. The California Health Care Foundation, 2017c 24. Wilcox, 2016a 25. Wilcox, 2016b	12. Expanded Emergency Medical Services (E-EMS) program 13. Mobile Integrated Healthcare Program 14. None 15. Mobile integrated healthcare and community paramedicine (MIH-CP) 16. MedStar Community Health Program using Mobile Healthcare Practitioners - for CHF patients 17. Tri-County EMS CP Program 18. Acadian Ambulance CP Program 19. Colorado Springs Fire Department CP program 20. Support and assessment for fall emergency referrals (SAFER 2) 21. Post Discharge CP Program 22. Frequent EMS Users CP Program 23. Directly observed therapy for tuberculosis CP Program 24. Rice County CP program 25. Wadena County CP program
Patient home and LTC facility	1 (2.3%)	Dixon, 2009; Mason, 2003, 2007, 2008	Paramedic practitioner in older people's support (PPOPS) scheme
Patient home and community clinic	2 (4.5%)	1. Misner, 2005; Martin-Misener, 2009 2. Swain, 2010	1. Long and Brier Community Paramedicine Program 2. Urgent Community

			Care (UCC) Program
Patient home and via telephone	1 (2.3%)	MedStar Mobile Healthcare, 2016, 2017a	MedStar Community Health Program using Mobile Healthcare Practitioners - for frequent 911 callers
Place of 911 call incidence (where exact location is not specified)	10 (22.7%)	1. Blumberg, 2014b 2. Cooper, 2004 3. ED Management, 2014a 4. Gray, 2008 5. Shah, 2010 6. Snooks, 2004 7. Tangherlini, 2016 8. The California Health Care Foundation, 2017e 9. The California Health Care Foundation, 2017f 10. The California Health Care Foundation, 2017g	1. REMSA Ambulance Transport Alternatives Program 2. None 3. None 4. None 5. Livingston County EMS CP Program 6. "Treat and Refer" protocols for ambulance crews 7. Homeless Outreach and Medical Emergency (HOME) Team 8. Alternate destination - Behavioural health CP Program 9. Alternate destination - medical care CP Program 10. Sobering centre pilot CP program
Total	**44**		

C5. Target population

Target population	Number of CP programs (% out of 44 CP programs)	Author(s), Year(s)	CP program name
911 callers (n = 21, (47.7%))			
• In general	3 (6.8%)	1. Cooper, 2004 2. Everden, 2003 3. Gray, 2008	1. None 2. Appropriate Care at Point of Need (ACAPON) system 3. None
• Presenting with low acuity conditions	8 (18.2%)	1. Andrew, 2011 2. Arendts, 2011 3. Blumberg, 2014b 4. Hauswald, 2005 5. Hospital Case Management, 2014 6. Snooks, 2004 7. Swain, 2010 8. The California Health Care Foundation, 2017f	1. New South Wales (NSW) Extended Care Paramedic Program 2. ParaMED Home 3. REMSA Ambulance Transport Alternatives Program 4. Expanded Emergency Medical Services (E-EMS) program 5. None 6. "Treat and Refer" protocols for ambulance crews 7. Urgent Community Care (UCC) Program 8. Alternate destination - medical care CP Program
• Presenting with low acuity conditions, and are seniors in the community	2 (4.5%)	1. Abrashkin, 2015, 2016 2. Snooks, 2012	1. Advanced Illness Management (AIM) 2. Support and assessment for fall emergency referrals (SAFER 2)
• Presenting with low acuity conditions, and are seniors in LTC homes	2 (4.5%)	1. Jensen, 2013, 2015; Marshall, 2015 2. Dixon, 2009; Mason, 2003, 2007, 2008	1. Care by Design (CBD) program 2. Paramedic practitioner in older people's support (PPOPS) scheme
• Frequent 911 callers/ EMS users	6 (13.6%)	1. Kusel, 2015 2. MedStar Mobile Healthcare,	1. Mobile integrated healthcare and community

		2016, 2017a 3. National Association of Emergency Medical Technicians (NAEMT), 2015b 4. National Association of Emergency Medical Technicians (NAEMT), 2015c 5. Tangherlini, 2016 6. The California Health Care Foundation, 2017b	paramedicine (MIH-CP) 2. MedStar Community Health Program using Mobile Healthcare Practitioners - for frequent 911 callers 3. Acadian Ambulance CP Program 4. Colorado Springs Fire Department CP program 5. Homeless Outreach and Medical Emergency (HOME) Team 6. Frequent EMS Users CP Program
At risk for ED re/admission or hospitalization (n = 17, (38.6%))			
• In general	15 (34.1%)	1. Blumberg, 2014a 2. Crockett, 2016 3. Drennan, 2014 4. ED Management, 2014a 5. ED Management, 2014b 6. Hospital Case Management, 2016 7. Misner, 2005; Martin-Misener, 2009 8. MedStar Mobile Healthcare, 2017b 9. National Association of Emergency Medical Technicians (NAEMT), 2015a 10. The California Health Care Foundation, 2017a	1. REMSA CP Program 2. Community Paramedcine Team (CPT) 3. Expanding Paramedicine in the Community (EPIC) 4. None 5. None 6. Mobile Integrated Healthcare Program 7. Long and Brier Community Paramedicine Program 8. MedStar Community Health Program using Mobile Healthcare Practitioners - for CHF patients 9. Tri-County EMS CP Program 10. Post Discharge CP Program

		11. The California Health Care Foundation, 2017c 12. The California Health Care Foundation, 2017e 13. Wilcox, 2016a 14. Wilcox, 2016b 15. Wilcox, 2016c	11. Directly observed therapy for tuberculosis CP Program 12. Alternate destination - Behavioural health CP Program 13. Rice County CP program 14. Wadena County CP program 15. Scott County CP program
• Children	1 (2.3%)	ED Management 2013; Stevens, 2013	1. Treat the Streets: Pre-Hospital Pediatric Asthma Intervention Model to Improve Child Health Outcomes 2. 911 Hospice CP Program
Hospice patients	1 (2.3%)	The California Health Care Foundation, 2017d	911 Hospice CP Program
Seniors living in the community (not facility) (n = 4, (9.1%))			
• In general	4 (9.1%)	1. Agarwal, 2015a, 2014, 2013a, 2013b 2. Agarwal, 2015b 3. Gerson, 1992 4. Shah, 2010	1. Community Health Assessment Program through EMS (CHAP-EMS) – Hamilton only 2. Community Health Assessment Program through EMS (CHAP-EMS) – across Ontario 3. None 4. Livingston County EMS CP Program
Other (e.g. Families with newborns)	1 (2.3%)	Brice, 2006, 2009	Welcome to the World (WTTW)
Unknown	1 (2.3%)	The California Health Care Foundation, 2017g	Sobering centre pilot CP program
Total	**44**		

C6. Target condition(s)
Note: a program can target none, one, or more conditions

Target condition(s)	**Number of CP programs** (% out of 44 programs)	**Author(s), Year(s)**	**CP program name**
Addiction	2 (4.5%)	1. ED Management, 2014a 2. National Association of Emergency Medical Technicians (NAEMT), 2015b	1. None 2. Acadian Ambulance CP Program
Asthma	1 (2.3%)	ED Management, 2013; Stevens 2013	Treat the Streets: Pre-Hospital Pediatric Asthma Intervention Model to Improve Child Health Outcomes
Behavioural health/ Mental health	2 (4.5%)	1. ED Management, 2014a 2. The California Health Care Foundation, 2017e	1. None 2. Alternate destination - Behavioural health CP Program
Blood pressure	1 (2.3%)	Agarwal, 2015a; 2014, 2013a, 2013b	Community Health Assessment Program through EMS (CHAP-EMS) – Hamilton only
Cardiovascular disease	1 (2.3%)	Agarwal, 2015a; 2014, 2013a, 2013b	Community Health Assessment Program through EMS (CHAP-EMS) – Hamilton only
Congestive heart failure	2 (4.5%)	1. Abrashkin, 2015, 2016 2. MedStar Mobile Healthcare, 2017b	1. Advanced Illness Management (AIM) 2. MedStar Community Health Program using Mobile Healthcare Practitioners - for CHF patients
Chronic obstructive pulmonary disease	3 (6.8%)	1. Abrashkin, 2015, 2016 2. Drennan, 2014 3. Hospital Case	1. Advanced Illness Management (AIM)

		Management, 2016	2. Expanding Paramedicine in the Community (EPIC) 3. Mobile Integrated Healthcare Program
Dementia	1 (2.3%)	Abrashkin, 2015, 2016	Advanced Illness Management (AIM)
Diabetes mellitus	4 (9.1%)	1. Abrashkin, 2015, 2016 2. Agarwal, 2015a; 2014, 2013a, 2013b 3. Drennan, 2014 4. National Association of Emergency Medical Technicians (NAEMT), 2015b	1. Advanced Illness Management (AIM) 2. Community Health Assessment Program through EMS (CHAP-EMS) – Hamilton only 3. Expanding Paramedicine in the Community (EPIC) 4. Acadian Ambulance CP Program
Falls	1 (2.3%)	Snooks, 2012	Support and assessment for fall emergency referrals (SAFER 2)
Heart failure	3 (6.8%)	1. Crockett, 2016 2. Drennan, 2014 3. Hospital Case Management, 2016	1. Community Paramedicine Team (CPT) 2. Expanding Paramedicine in the Community (EPIC) 3. Mobile Integrated Healthcare Program
Hypertension	1 (2.3%)	Agarwal, 2015a; 2014, 2013a, 2013b	Community Health Assessment Program through EMS (CHAP-EMS) – Hamilton only

Tuberculosis	1 (2.3%)	The California Health Care Foundation, 2017c	Directly observed therapy for tuberculosis CP Program
None	31 (70.5%)		
Unknown	1 (2.3%)		
Total	**44**		

C7. Method of patient enrollment in CP program

How does the participant enroll in CP program	**Number of CP programs** (% out of 44 programs)	**Author(s), Year(s)**	**CP Program**
Emergency call (e.g. 911, 999, 111, 000) (n = 18 (40.9%))			
• In general	12 (27.3%)	1. Andrew, 2011 2. Arendts, 2011 3. Blumberg, 2014b 4. Cooper, 2004 5. Gray, 2008 6. Hauswald, 2005 7. Jensen, 2013; Jensen, 2016; Marshall, 2015 8. Shah, 2010 9. Snooks, 2004 10. Snooks, 2012 11. Swain, 2010 12. The California Health Care Foundation, 2017f	1. New South Wales (NSW) Extended Care Paramedic (ECP) Program 2. ParaMED Home 3. REMSA Ambulance Transport Alternatives Program 4. No name 5. No name 6. Expanded Emergency Medical Services (E-EMS) program 7. Care by Design (CBD) program 8. Livingston County EMS CP Program 9. "Treat and Refer" protocols for ambulance crews 10. Support and assessment for fall emergency referrals (SAFER 2) 11. Urgent Community Care (UCC) program 12. Alternate destination - medical care CP Program
• Selected or referred for enrollment	6 (13.6%)	1. Abrashkin, 2015, 2016 2. Hospital Case	1. Advanced Illness Management (AIM) 2. No name

(e.g. triaged or deemed appropriate for CP) after making emergency call		Management, 2014 3. Dixon, 2009; Mason, 2003, 2007, 2008 4. MedStar Mobile Healthcare, 2016, 2017a 5. Tangherlini, 2016 6. The California Health Care Foundation, 2017e	3. Paramedic practitioner in older people's support (PPOPS) scheme 4. MedStar Community Health Program using Mobile Healthcare Practitioners - for frequent 911 callers 5. Homeless Outreach and Medical Emergency (HOME) Team 6. Alternate destination - Behavioural health CP Program
Upon hospital discharge	1 (2.3%)	1. Blumberg, 2014a	2. REMSA CP Program
By referral (e.g. from case worker, nurse, family)	7 (15.9%)	1. ED Management, 2014a 2. ED Management, 2014b 3. ED Management, 2013; Stevens, 2013 4. Hospital Case Management, 2016 5. National Association of Emergency Medical Technicians (NAEMT), 2015a 6. National Association of Emergency Medical Technicians (NAEMT), 2015b 7. The California Health Care Foundation, 2017d	1. No name (Raleigh location) 2. No name (Robbinsdale location) 3. "Treat the Streets: Pre-Hospital Pediatric Asthma Intervention Model to Improve Child Health Outcomes" 4. Mobile Integrated Healthcare Program 5. Tri-County EMS CP Program 6. Acadian Ambulance CP Program 7. 911 Hospice CP Program
By referral (e.g. from case worker, nurse, family), but is ultimately voluntary	1 (2.3%)	1. Misner, 2005; Martin-Misener, 2009	2. Long and Brier Community Paramedicine Program
Selected for enrollment	7 (15.9%)	1. Crockett, 2016 2. Everden, 2003	1. Community Paramedicine Team (CPT)

(e.g. identified by healthcare personnel, invited)		3. Gerson, 1992 4. MedStar Mobile Healthcare, 2017b 5. National Association of Emergency Medical Technicians (NAEMT), 2015c 6. The California Health Care Foundation, 2017a 7. The California Health Care Foundation, 2017b	2. Appropriate Care at Point of Need (ACAPON) system 3. No name 4. MedStar Community Health Program using Mobile Healthcare Practitioners - for CHF patients 5. Colorado Springs Fire Department CP program 6. Post Discharge CP Program 7. Frequent EMS Users CP Program
Voluntary	6 (13.6%)	1. Agarwal, 2015a, 2014, 2013a, 2013b 2. Agarwal, 2015b 3. Brice, 2006, 2009 4. Drennan, 2014 5. Kusel, 2015 6. Wilcox, 2016c	1. Community Health Assessment Program through EMS (CHAP-EMS) in Hamilton only 2. Community Health Assessment Program through EMS (CHAP-EMS) across Ontario 3. Welcome to the World (WTTW) 4. Expanding Paramedicine in the Community (EPIC) 5. Mobile integrated healthcare and community paramedicine (MIH-CP) 6. Scott County CP program
Unknown	4 (9.1%)	1. The California Health Care Foundation, 2017c 2. The California Health Care Foundation, 2017g 3. Wilcox, 2016a 4. Wilcox, 2016b	1. Directly observed therapy for tuberculosis CP Program 2. Sobering centre pilot CP program 3. Rice County CP program 4. Wadena County CP program
Total	**44**		

C8. Services provided
Note: A CP program can provide more than one service

Service	**Number of CP programs** (% out of 44 programs)	**Author(s), Year(s)**	**CP program name**
Assessment and Screening			
Collect patient history information (e.g. medical history)	4 (9.1%)	1. Crockett, 2016 2. Drennan, 2014 3. Hauswald, 2005 4. Snooks, 2004	1. Community Paramedcine Team (CPT) 2. Expanding Paramedicine in the Community (EPIC) 3. Expanded Emergency Medical Services (E-EMS) program 4. "Treat and Refer" protocols for ambulance crews
Depression screening	1 (2.3%)	Shah, 2010	Livingston County EMS CP Program
Home assessment and/or address home risks	12 (27.3%)	1. Kusel, 2015 2. National Association of Emergency Medical Technicians (NAEMT), 2015a 3. The California Health Care Foundation, 2017a 4. Hospital Case Management, 2016 5. Misner, 2005; Martin-Misener, 2009 6. National Association of Emergency Medical Technicians (NAEMT), 2015b 7. The California Health Care Foundation, 2017b 8. Wilcox, 2016a 9. Wilcox, 2016b	1. Mobile integrated healthcare and community paramedicine (MIH-CP) 2. Tri-County EMS CP Program 3. Post Discharge CP Program 4. Mobile Integrated Healthcare Program 5. Long and Brier Community Paramedicine Program 6. Acadian Ambulance CP Program 7. Frequent EMS Users CP Program 8. Rice County CP program 9. Wadena County CP program

		10. ED Management, 2013; Stevens, 2013 11. Shah, 2010 12. Brice, 2006, 2009	10. Livingston County EMS CP Program 11. Welcome to the World (WTTW)
Medication management (e.g. protocol-led dispensing, reconciliation, medication review, prescription checks)	16 (36.4%)	1. Andrew, 2011 2. Hauswald, 2005 3. Hospital Case Management, 2014 4. Abrashkin, 2015, 2016 5. Dixon, 2009; Mason, 2003, 2007, 2008 6. MedStar Mobile Healthcare, 2016, 2017a 7. The California Health Care Foundation, 2017a 8. ED Management, 2014b 9. Hospital Case Management, 2016 10. National Association of Emergency Medical Technicians (NAEMT), 2015a 11. The California Health Care Foundation, 2017b 12. The California Health Care Foundation, 2017c 13. Wilcox, 2016b 14. ED Management, 2013; Stevens, 2013 15. The California Health Care Foundation, 2017d 16. Shah, 2010	1. New South Wales (NSW) Extended Care Paramedic Program 2. Expanded Emergency Medical Services (E-EMS) program 3. None 4. Advanced Illness Management (AIM) 5. Paramedic practitioner in older people's support (PPOPS) scheme 6. MedStar Community Health Program using Mobile Healthcare Practitioners - for frequent 911 callers 7. Post Discharge CP Program 8. None 9. Mobile Integrated Healthcare Program 10. Tri-County EMS CP Program 11. Frequent EMS Users CP Program 12. Directly observed therapy for tuberculosis CP Program 13. Wadena County CP program 14. Treat the Streets: Pre-Hospital Pediatric Asthma Intervention Model to Improve Child

			Health Outcomes 15. 911 Hospice CP Program 16. Livingston County EMS CP Program
Monitor patient (e.g. side effects/symptoms, mental health)	5 (11.4%)	1. Hauswald, 2005 2. The California Health Care Foundation, 2017a 3. The California Health Care Foundation, 2017c 4. Wilcox, 2016a 5. Wilcox, 2016b	1. Expanded Emergency Medical Services (E-EMS) program 2. Post Discharge CP Program 3. Directly observed therapy for tuberculosis CP Program 4. Rice County CP program 5. Wadena County CP program
Non-physical assessment (e.g. mental health, psychological, neurological, social needs)	13 (29.5%)	1. Hospital Case Management, 2014 2. Snooks, 2004 3. Dixon, 2009; Mason, 2003, 2007, 2008 4. Kusel, 2015 5. MedStar Mobile Healthcare, 2016, 2017a 6. Tangherlini, 2016 7. The California Health Care Foundation, 2017b 8. ED Management, 2014a 9. Misner, 2005; Martin-Misener, 2009 10. The California Health Care Foundation, 2017d 11. Wilcox, 2016a 12. The California Health Care Foundation, 2017e 13. Shah, 2010	1. None 2. Support and assessment for fall emergency referrals (SAFER 2) 3. Paramedic practitioner in older people's support (PPOPS) scheme 4. Mobile integrated healthcare and community paramedicine (MIH-CP) 5. MedStar Community Health Program using Mobile Healthcare Practitioners - for frequent 911 callers 6. Homeless Outreach and Medical Emergency (HOME) Team 7. Frequent EMS Users CP Program 8. None

			9. Long and Brier Community Paramedicine Program 10. 911 Hospice CP Program 11. Rice County CP program 12. Alternate destination - Behavioural health CP Program 13. Livingston County EMS CP Program
Physical assessment (e.g. vital signs, falls risk, BP)	19 (43.2%)	1. Abrashkin, 2015 2. Agarwal, 2015a; 2014, 2013a, 2013b 3. Agarwal, 2015b 4. Crockett, 2016 5. Drennan, 2014 6. Hauswald, 2005 7. Hospital Case Management, 2016 8. Hospital Case Management, 2014 9. Misner, 2005; Martin-Misener, 2009 10. Dixon, 2009; Mason, 2003, 2007, 2008 11. MedStar Mobile Healthcare, 2016, 2017a 12. National Association of Emergency Medical Technicians (NAEMT), 2015c 13. Shah, 2010 14. Snooks, 2004 15. Swain, 2010 16. Tangherlini, 2016 17. The California Health Care Foundation, 2017b	1. Advanced Illness Management (AIM) 2. Community Health Assessment Program through EMS (CHAP-EMS) – Hamilton only 3. Community Health Assessment Program through EMS (CHAP-EMS) – across Ontario 4. Community Paramedcine Team (CPT) 5. Expanding Paramedicine in the Community (EPIC) 6. Expanded Emergency Medical Services (E-EMS) program 7. Mobile Integrated Healthcare Program 8. None 9. Long and Brier Community Paramedicine Program 10. Paramedic practitioner in older people's support

		18. The California Health Care Foundation, 2017d 19. Wilcox, 2016a	(PPOPS) scheme 11. MedStar Community Health Program using Mobile Healthcare Practitioners - for frequent 911 callers 12. Colorado Springs Fire Department CP program 13. Livingston County EMS CP Program 14. "Treat and Refer" protocols for ambulance crews 15. Urgent Community Care (UCC) Program 16. Homeless Outreach and Medical Emergency (HOME) Team 17. Frequent EMS Users CP Program 18. 911 Hospice CP Program 19. Rice County CP program
Preventative health screening (e.g. risk for diabetes; not for depression)	6 (13.6%)	1. Agarwal, 2015a; 2014, 2013a, 2013b 2. Andrew, 2011 3. Crockett, 2016 4. Misner, 2005; Martin-Misener, 2009 5. National Association of Emergency Medical Technicians (NAEMT), 2015b 6. The California Health Care Foundation, 2017g	1. Community Health Assessment Program through EMS (CHAP-EMS) – Hamilton only 2. New South Wales (NSW) Extended Care Paramedic Program 3. Community Paramedcine Team (CPT) 4. Long and Brier Community Paramedicine Program 5. Acadian Ambulance CP Program 6. Sobering centre pilot

			CP program
Acute care and Treatment			
Acute care (e.g. assess and treat minor issues/conditions)	15 (34.1%)	1. Abrashkin, 2015 2. Andrew, 2011 3. Arendts, 2011 4. Blumberg, 2014b 5. Cooper, 2004 6. Drennan, 2014 7. ED Management, 2014b 8. ED Management, 2013; Stevens, 2013 9. Everden, 2003 10. Hauswald, 2015 11. Jensen, 2013, 2016; Marshall, 2015 12. Misner, 2005; Martin-Misener, 2009 13. Dixon, 2009; Mason, 2003, 2007, 2008 14. Swain, 2010 15. Wilcox, 2016b	1. Advanced Illness Management (AIM) 2. New South Wales (NSW) Extended Care Paramedic Program 3. ParaMED Home 4. REMSA Ambulance Transport Alternatives Program 5. None 6. Expanding Paramedicine in the Community (EPIC) 7. None 8. Treat the Streets: Pre-Hospital Pediatric Asthma Intervention Model to Improve Child Health Outcomes 9. Appropriate Care at Point of Need (ACAPON) system 10. Expanded Emergency Medical Services (E-EMS) program 11. Care by Design (CBD) program 12. Long and Brier Community Paramedicine Program 13. Paramedic practitioner in older people's support (PPOPS) scheme 14. Urgent Community Care (UCC) Program 15. Wadena County CP program
Immunization	1 (2.3%)	Misner, 2005; Martin-	Long and Brier

		Misener, 2009	Community Paramedicine Program
Point-of-care lab tests (e.g. blood draws, toxicology screening)	5 (11.4%)	1. Blumberg, 2014a 2. Jensen, 2013, 2016; Marshall, 2015 3. National Association of Emergency Medical Technicians (NAEMT), 2015a 4. National Association of Emergency Medical Technicians (NAEMT), 2015c 5. Wilcox, 2016b	1. REMSA CP Program 2. Care by Design (CBD) program 3. Tri-County EMS CP Program 4. Colorado Springs Fire Department CP program 5. Wadena County CP program
Transport and Referral			
Assess, refer, and/or transport to community services (e.g. sobering centre, detox centres, mental health crisis centre, mental health hospital)	19 (43.2%)	1. Agarwal, 2015b 2. Andrew, 2011 3. Blumberg, 2014b 4. Brice, 2006, 2009 5. Cooper, 2004 6. ED Management, 2014a 7. ED Management, 2014b 8. ED Management, 2013; Stevens, 2013 9. Gerson, 1992 10. Hospital Case Management, 2016 11. Kusel, 2015 12. Misner, 2005; Martin-Misener, 2009 13. National Association of Emergency Medical Technicians (NAEMT), 2015a 14. National Association of Emergency Medical Technicians (NAEMT), 2015c 15. Shah, 2010 16. Snooks, 2012 17. Swain, 2010 18. The California Health Care	1. Community Health Assessment Program through EMS (CHAP-EMS) – across Ontario 2. New South Wales (NSW) Extended Care Paramedic Program 3. REMSA Ambulance Transport Alternatives Program 4. Welcome to the World (WTTW) 5. None 6. None 7. None 8. Treat the Streets: Pre-Hospital Pediatric Asthma Intervention Model to Improve Child Health Outcomes 9. None 10. Mobile Integrated Healthcare Program 11. Mobile integrated healthcare and community paramedicine (MIH-CP)

		Foundation, 2017e 19. The California Health Care Foundation, 2017g	12. Long and Brier Community Paramedicine Program 13. Tri-County EMS CP Program 14. Colorado Springs Fire Department CP program 15. Livingston County EMS CP Program 16. Support and assessment for fall emergency referrals (SAFER 2) 17. Urgent Community Care (UCC) Program 18. Alternate destination - Behavioural health CP Program 19. Sobering centre pilot CP program
Refer and/or transport to additional healthcare providers (e.g. pharmacist, physician, hospital diagnostic imaging)	8 (18.2%)	1. Arendts, 2011 2. ED Management, 2013; Stevens, 2013 3. Hospital Case Management, 2014 4. Jensen, 2013, 2016; Marshall, 2015 5. National Association of Emergency Medical Technicians (NAEMT), 2015b 6. National Association of Emergency Medical Technicians (NAEMT), 2015c 7. Swain, 2010 8. Tangherlini, 2016	1. ParaMED Home 2. Treat the Streets: Pre-Hospital Pediatric Asthma Intervention Model to Improve Child Health Outcomes 3. None 4. Care by Design (CBD) program 5. Acadian Ambulance CP Program 6. Colorado Springs Fire Department CP program 7. Urgent Community Care (UCC) Program 8. Homeless Outreach and Medical Emergency (HOME) Team
Transport to ED/ urgent care centre	11 (25.0%)	1. Abrashkin, 2015, 2016	1. Advanced Illness Management (AIM)

(e.g. walk-in clinic)		2. Arendts, 2011 3. Blumberg, 2014b 4. ED Management, 2014b 5. Everden, 2013 6. Gray, 2008 7. Jensen, 2013, 2016; Marshall, 2015 8. Kusel, 2015 9. Dixon, 2009; Mason, 2003, 2007, 2008 10. Swain, 2010 11. The California Health Care Foundation, 2017f	2. ParaMED Home 3. REMSA Ambulance Transport Alternatives Program 4. None 5. Appropriate Care at Point of Need (ACAPON) system 6. None 7. Care by Design (CBD) program 8. Mobile integrated healthcare and community paramedicine (MIH-CP) 9. Paramedic practitioner in older people's support (PPOPS) scheme 10. Urgent Community Care (UCC) Program 11. Alternate destination - medical care CP Program
Education and Patient Support			
Care plan review (e.g. review discharge instructions; to ensure understanding, improve adherence)	5 (11.4%)	1. Blumberg, 2014a 2. Kusel, 2015 3. MedStar Mobile Healthcare, 2016, 2017a 4. National Association of Emergency Medical Technicians (NAEMT), 2015a 5. The California Health Care Foundation, 2017a	1. REMSA CP Program 2. Mobile integrated healthcare and community paramedicine (MIH-CP) 3. MedStar Community Health Program using Mobile Healthcare Practitioners - for frequent 911 callers 4. Tri-County EMS CP Program 5. Post Discharge CP Program
Coaching (e.g. goal setting, personalized health	1 (2.3%)	National Association of Emergency Medical Technicians (NAEMT),	Acadian Ambulance CP Program

coach)		2015b	
Counselling (e.g. support for patient or family)	3 (6.8%)	1. Brice, 2006, 2009 2. The California Health Care Foundation, 2017d 3. Wilcox, 2016a	1. Welcome to the World (WTTW) 2. 911 Hospice CP Program 3. Rice County CP program
Education (e.g. chronic disease management; navigating health system)	10 (22.7%)	1. Agarwal, 2015a; 2014, 2013a, 2013b 2. Agarwal, 2015b 3. Brice, 2006, 2009 4. Cooper, 2004 5. Drennan, 2014 6. ED Management, 2014b 7. ED Management, 2013; Stevens, 2013 8. Hospital Case Management, 2016 9. MedStar Mobile Healthcare, 2017b 10. National Association of Emergency Medical Technicians (NAEMT), 2015c	1. Community Health Assessment Program through EMS (CHAP-EMS) – Hamilton only 2. Community Health Assessment Program through EMS (CHAP-EMS) – across Ontario 3. Welcome to the World (WTTW) 4. None 5. Expanding Paramedicine in the Community (EPIC) 6. None 7. Treat the Streets: Pre-Hospital Pediatric Asthma Intervention Model to Improve Child Health Outcomes 8. Mobile Integrated Healthcare Program 9. MedStar Community Health Program using Mobile Healthcare Practitioners - for CHF patients 10. Colorado Springs Fire Department CP program
Phone consultation	3 (6.8%)	1. MedStar Mobile Healthcare, 2016, 2017a 2. MedStar Mobile Healthcare, 2017b	1. MedStar Community Health Program using Mobile Healthcare Practitioners - for

		3. The California Health Care Foundation, 2017a	frequent 911 callers 2. MedStar Community Health Program using Mobile Healthcare Practitioners - for CHF patients 3. Post Discharge CP Program
Communication			
Communicate with healthcare providers (e.g. GP, nurse, social workers) e.g. to co-determine care plan or relay information	13 (29.5%)	1. Abrashkin, 2015, 2016 2. Agarwal, 2015b 3. Crockett, 2016 4. Drennan, 2014 5. Hospital Case Management, 2016 6. Jensen, 2013, 2016; Marshall, 2015 7. Kusel, 2015 8. Misner, 2005; Martin-Misener, 2009 9. Shah, 2010 10. Tangherlini, 2016 11. The California Health Care Foundation, 2017a 12. The California Health Care Foundation, 2017d 13. Wilcox, 2016a	1. Advanced Illness Management (AIM) 2. Community Health Assessment Program through EMS (CHAP-EMS) – across Ontario 3. Community Paramedcine Team (CPT) 4. Expanding Paramedicine in the Community (EPIC) 5. Mobile Integrated Healthcare Program 6. Care by Design (CBD) program 7. Mobile integrated healthcare and community paramedicine (MIH-CP) 8. MedStar Community Health Program using Mobile Healthcare Practitioners - for frequent 911 callers 9. Livingston County EMS CP Program 10. Homeless Outreach and Medical Emergency (HOME) Team 11. Post Discharge CP Program

			12. 911 Hospice CP Program 13. Rice County CP program
Communicate with patient's family/caregivers	1 (2.3%)	The California Health Care Foundation, 2017d	911 Hospice CP Program
Other			
Unknown	1 (2.3%)	Wilcox, 2016c	Scott County CP program

C9. Health outcomes investigated and/or reported

Note: The table counts number of studies (n=47) looking at a specific health outcome, and not the number of CP programs (n=44). A study can look at more than one health outcome; different studies on the same CP program may look at different health outcomes.

Health outcomes	**Number of CP studies** (% out of 47 studies)	**Author(s), Year(s)**	**CP program name**
911 call	9 (19.1%)	1. Agarwal, 2014, 2. Agarwal, 2015b 3. Arendts, 2011 4. Drennan, 2014 5. Kusel, 2015 6. MedStar Mobile Healthcare, 2016 7. Snooks, 2012 8. Tangherlini, 2016 9. The California Health Care Foundation, 2017b	1. Community Health Assessment Program through EMS (CHAP-EMS) in Hamilton only 2. Community Health Assessment Program through EMS (CHAP-EMS) across Ontario 3. ParaMED Home 4. Expanding Paramedicine in the Community (EPIC) 5. Mobile integrated healthcare and community paramedicine (MIH-CP) 6. MedStar Community Health Program using Mobile Healthcare Practitioners - for frequent 911 callers 7. Support and assessment for fall emergency referrals (SAFER 2) 8. Homeless Outreach and Medical Emergency (HOME) Team 9. Frequent EMS Users CP Program
Adverse outcomes	6 (12.8%)	1. Arendts, 2011 2. Dixon, 2009 3. Drennan, 2014 4. Mason, 2007 5. Snooks, 2012 6. The California Health Care Foundation, 2017a	1. ParaMED Home 2. Paramedic Practitioner Older People's Support scheme 3. Expanding Paramedicine in the Community (EPIC) 4. Paramedic practitioner in older people's support (PPOPS) 5. Support and assessment for

			fall emergency referrals (SAFER 2) 6. Post Discharge CP Program
ED admission	7 (14.9%)	1. Arendts, 2011 2. Blumberg, 2014 3. Misner, 2005; Martin-Misener, 2009 4. Mason, 2007 5. MedStar Mobile Healthcare, 2016 6. MedStar Mobile Healthcare, 2017a 7. The California Health Care Foundation, 2017b	1. ParaMED Home 2. REMSA CP Program 3. Long and Brier Community Paramedicine Program 4. Paramedic practitioner in older people's support (PPOPS) 5. MedStar Community Health Program using Mobile Healthcare Practitioners - for frequent 911 callers 6. MedStar Community Health Program using Mobile Healthcare Practitioners - for frequent 911 callers 7. Frequent EMS Users CP Program
Clinical improvements or changes	6 (12.8%)	1. Agarwal, 2014 2. Agarwal, 2015b 3. Dixon, 2009 4. Drennan, 2014 5. ED Management, 2013 6. Mason, 2003	1. Community Health Assessment Program through EMS (CHAP-EMS) in Hamilton only 2. Community Health Assessment Program through EMS (CHAP-EMS) across Ontario 3. Paramedic Practitioner Older People's Support scheme 4. Expanding Paramedicine in the Community (EPIC) 5. "Treat the Streets: Pre-Hospital Pediatric Asthma Intervention Model to Improve Child Health Outcomes" 6. Paramedic practitioner in older people's support (PPOPS)
Healthcare utilization (non-ED)	6 (12.8%)	1. Agarwal, 2015b 2. Arendts, 2011 3. ED Management, 2014a 4. Martin-Misener, 2009 5. Mason, 2007	1. Community Health Assessment Program through EMS (CHAP-EMS) across Ontario 2. ParaMED Home 3. No name

		6. Snooks, 2012	4. Long and Brier Community Paramedicine Program 5. Paramedic practitioner in older people's support (PPOPS) 6. Support and assessment for fall emergency referrals (SAFER 2)
Hospital admission	14 (29.8%)	1. Abrashkin, 2016 2. Arendts, 2011 3. Crockett, 2016 4. Dixon, 2009 5. Drennan, 2014 6. ED Management, 2014a 7. ED Management, 2013 8. Everden, 2003 9. Jensen, 2016 10. Kusel, 2015 11. Mason, 2007 12. MedStar Mobile Healthcare, 2016 13. MedStar Mobile Healthcare, 2017b 14. Snooks, 2004 15. The California Health Care Foundation, 2017a	1. Advanced Illness Management (AIM) 2. ParaMED Home 3. Community Paramedcine Team (CPT) 4. Paramedic Practitioner Older People's Support scheme 5. Expanding Paramedicine in the Community (EPIC) 6. No name 7. "Treat the Streets: Pre-Hospital Pediatric Asthma Intervention Model to Improve Child Health Outcomes" 8. Appropriate Care at Point of Need (ACAPON) system 9. Care by Design (CBD) program 10. Mobile integrated healthcare and community paramedicine (MIH-CP) 11. Paramedic practitioner in older people's support (PPOPS) 12. MedStar Community Health Program using Mobile Healthcare Practitioners - for frequent 911 callers 13. MedStar Community Health Program using Mobile Healthcare Practitioners - for CHF patients 14. "Treat and Refer" protocols for ambulance crews 15. Post Discharge CP Program

Medication adherence	2 (4.3%)	1. Crockett, 2016 2. The California Health Care Foundation, 2017c	1. Community Paramedicine Team (CPT) 2. Directly observed therapy for tuberculosis CP Program
Non-healthcare resources utilization	3 (6.4%)	1. ED Management, 2014 2. Jensen, 2013 3. The California Health Care Foundation, 2017b	1. No name 2. Care by Design (CBD) program 3. Frequent EMS Users CP Program
Satisfaction	9 (1.9%)	1. Abrashkin, 2015 2. Andrew, 2011 3. Dixon, 2009 4. ED Management, 2013; Stevens, 2013 5. Gerson, 1992 6. Misner, 2005; Martin-Misener, 2009 7. Mason, 2003, 2007, 2008 8. Snooks, 2004 9. Snooks, 2012	1. Advanced Illness Management (AIM) 2. New South Wales (NSW) Extended Care Paramedic (ECP) Program 3. Paramedic Practitioner Older People's Support scheme 4. "Treat the Streets: Pre-Hospital Pediatric Asthma Intervention Model to Improve Child Health Outcomes" 5. No name 6. Long and Brier Community Paramedicine Program 7. Paramedic practitioner in older people's support (PPOPS) 8. "Treat and Refer" protocols for ambulance crews 9. Support and assessment for fall emergency referrals (SAFER 2)
Transport to ED	17 (36.2%)	1. Abrashkin, 2015 2. Abrashkin, 2016 3. Andrew, 2011 4. Blumberg, 2014a 5. Blumberg, 2014b 6. Cooper, 2004 7. Dixon, 2009 8. ED Management, 2013 9. Everden, 2003 10. Jensen, 2013	1. Advanced Illness Management (AIM) 2. Advanced Illness Management (AIM) 3. New South Wales (NSW) Extended Care Paramedic (ECP) Program 4. REMSA CP Program 5. REMSA Ambulance Transport Alternatives Program

		11. Jensen, 2016 12. Marshall, 2015 13. MedStar Mobile Healthcare, 2017a 14. Swain, 2010 15. The California Health Care Foundation, 2017b 16. The California Health Care Foundation, 2017d 17. The California Health Care Foundation, 2017e	6. No name 7. Paramedic Practitioner Older People's Support scheme 8. "Treat the Streets: Pre-Hospital Pediatric Asthma Intervention Model to Improve Child Health Outcomes" 9. Appropriate Care at Point of Need (ACAPON) system 10. Care by Design (CBD) program 11. Care by Design (CBD) program 12. Care by Design (CBD) program 13. MedStar Community Health Program using Mobile Healthcare Practitioners - for frequent 911 callers 14. Urgent Community Care (UCC) 15. Frequent EMS Users CP Program 16. 911 Hospice CP Program 17. Alternate destination - Behavioural health CP Program
Transport to non-ED facility	0		
Treated on-scene	4 (8.5%)	1. Cooper, 2004 2. Everden, 2003 3. Jensen, 2013 4. Snooks, 2004	1. No name 2. Appropriate Care at Point of Need (ACAPON) system 3. Care by Design (CBD) program 4. "Treat and Refer" protocols for ambulance crews
Other	14 (29.79%)		
None	13 (27.7%)		
Unclear	0		

Part D. CP Training
D1. Types of CP training
Note: A CP program can include more than one training topic

CP training	**Number of CP programs** (% out of 44 programs)	**Author(s), Year(s)**	**CP program name**
Acute Care (n = 17 (38.6%))			
Acute care	12 (27.3%)	1. Abrashkin, 2015, 2016 2. Cooper, 2004 3. ED Management, 2014b 4. ED Management, 2013; Stevens, 2013 5. Everden, 2013 6. Hauswald, 2005 7. Jensen, 2013, 2016; Marshall, 2015 8. Misner, 2005; Martin-Misener, 2009 9. Dixon, 2009; Mason, 2003, 2007, 2008 10. Wilcox, 2016a 11. Wilcox, 2016b 12. Wilcox, 2016c	1. Advanced Illness Management (AIM) 2. None 3. None 4. Treat the Streets: Pre-Hospital Pediatric Asthma Intervention Model to Improve Child Health Outcomes 5. Appropriate Care at Point of Need (ACAPON) system 6. Expanded Emergency Medical Services (E-EMS) program 7. Care by Design (CBD) program 8. Long and Brier Community Paramedicine Program 9. Paramedic practitioner in older people's support (PPOPS) scheme 10. Rice County CP program 11. Wadena County CP program 12. Scott County CP program
Diagnostics (e.g. point-of-care testing)	4 (9.1%)	1. Drennan, 2014 2. Jensen, 2013, 2016; Marshall, 2015	1. Expanding Paramedicine in the Community (EPIC)

		3. Misner, 2005; Martin-Misener, 2009 4. Dixon, 2009; Mason, 2003, 2007, 2008	2. Care by Design (CBD) program 3. Long and Brier Community Paramedicine Program 4. Paramedic practitioner in older people's support (PPOPS) scheme
Emergency care	1 (2.3%)	Cooper, 2004	None
Assessment and Screening (n = 25 (56.8%))			
Environmental assessment	3 (6.8%)	1. Brice, 2006, 2009 2. ED Management, 2013; Stevens, 2013 3. Gerson, 1992	1. Welcome to the World (WTTW) 2. Treat the Streets: Pre-Hospital Pediatric Asthma Intervention Model to Improve Child Health Outcomes 3. None
Health risk assessment	1 (2.3%)	Gerson, 1992	None
Medication management (e.g. drug interactions, administering meds)	9 (20.5%)	1. Andrew, 2011 2. Crockett, 2016 3. Drennan, 2014 4. ED Management, 2014a 5. ED Management, 2014b 6. ED Management, 2013; Stevens, 2013 7. Hauswald, 2005 8. Misner, 2005; Martin-Misener, 2009 9. Dixon, 2009; Mason, 2003, 2007, 2008	1. New South Wales (NSW) Extended Care Paramedic Program 2. Community Paramedcine Team (CPT) 3. Expanding Paramedicine in the Community (EPIC) 4. None 5. None 6. Treat the Streets: Pre-Hospital Pediatric Asthma Intervention Model to Improve Child Health Outcomes 7. Expanded Emergency Medical Services (E-EMS) program 8. Long and Brier Community Paramedicine Program 9. Paramedic practitioner in older people's

			support (PPOPS) scheme
Mental health assessment	3 (6.8%)	1. Andrew, 2011 2. ED Management, 2014a 3. ED Management, 2014b	1. New South Wales (NSW) Extended Care Paramedic Program 2. None 3. None
Overall health assessment (e.g. physical, social, mobility needs)	7 (15.9%)	1. Agarwal, 2015b 2. Cooper, 2004 3. Crockett, 2016 4. Drennan, 2014 5. Everden, 2013 6. Dixon, 2009; Mason, 2003, 2007, 2008 7. Snooks, 2012	1. Community Health Assessment Program through EMS (CHAP-EMS) – across Ontario 2. None 3. Community Paramedcine Team (CPT) 4. Expanding Paramedicine in the Community (EPIC) 5. Appropriate Care at Point of Need (ACAPON) system 6. Paramedic practitioner in older people's support (PPOPS) scheme 7. Support and assessment for fall emergency referrals (SAFER 2)
Patient history	1 (2.3%)	Hauswald, 2005	Expanded Emergency Medical Services (E-EMS) program
Physical assessment	1 (2.3%)	Dixon, 2009; Mason, 2003, 2007, 2008	Paramedic practitioner in older people's support (PPOPS) scheme
Care of specific populations (n = 13 (29.5%))			
Care of specific populations (children)	5 (11.4%)	1. Abrashkin, 2015, 2016 2. Brice, 2006, 2009 3. Wilcox, 2016a 4. Wilcox, 2016b 5. Wilcox, 2016c	1. Advanced Illness Management (AIM) 2. Welcome to the World (WTTW) 3. Rice County CP program 4. Wadena County CP program 5. Scott County CP program

Care of specific populations (geriatrics)	8 (18.2%)	1. Abrashkin, 2015, 2016 2. Andrew, 2011 3. Jensen, 2013, 2016; Marshall, 2015 4. Shah, 2010 5. Snooks, 2012 6. Wilcox, 2016a 7. Wilcox, 2016b 8. Wilcox, 2016c	1. Advanced Illness Management (AIM) 2. New South Wales (NSW) Extended Care Paramedic Program 3. Care by Design (CBD) program 4. Livingston County EMS CP Program 5. Support and assessment for fall emergency referrals (SAFER 2) 6. Rice County CP program 7. Wadena County CP program 8. Scott County CP program
Education and Health promotion (n = 22 (50.0%))			
Case management	1 (2.3%)	National Association of Emergency Medical Technicians (NAEMT), 2015c	Colorado Springs Fire Department CP program
Education	3 (6.8%)	1. Brice, 2006, 2009 2. Crockett, 2016 3. MedStar Mobile Healthcare, 2016, 2017a	1. Welcome to the World (WTTW) 2. Community Paramedcine Team (CPT) 3. MedStar Community Health Program using Mobile Healthcare Practitioners - for frequent 911 callers
Health management (e.g. chronic disease, behavioural health, health coaching)	12 (27.3%)	1. Crockett, 2016 2. ED Management, 2014b 3. ED Management, 2013; Stevens, 2013 4. Hauswald, 2005 5. Hospital Case Management, 2014 6. Misner, 2005; Martin-Misener, 2009 7. Dixon, 2009; Mason, 2003, 2007, 2008 8. MedStar Mobile Healthcare, 2016, 2017a	1. Community Paramedcine Team (CPT) 2. None 3. Treat the Streets: Pre-Hospital Pediatric Asthma Intervention Model to Improve Child Health Outcomes 4. Expanded Emergency Medical Services (E-EMS) program 5. None

		9. National Association of Emergency Medical Technicians (NAEMT), 2015c 10. Wilcox, 2016a 11. Wilcox, 2016b 12. Wilcox, 2016c	6. Long and Brier Community Paramedicine Program 7. Paramedic practitioner in older people's support (PPOPS) scheme 8. MedStar Community Health Program using Mobile Healthcare Practitioners - for frequent 911 callers 9. Colorado Springs Fire Department CP program 10. Rice County CP program 11. Wadena County CP program 12. Scott County CP program
Health promotion (e.g. preventative care, disease prevention)	6 (13.6%)	1. Agarwal, 2015b 2. Andrew, 2011 3. Cooper, 2004 4. Drennan, 2014 5. Hauswald, 2005 6. Hospital Case Management, 2014	1. Community Health Assessment Program through EMS (CHAP-EMS) – across Ontario 2. New South Wales (NSW) Extended Care Paramedic Program 3. None 4. Expanding Paramedicine in the Community (EPIC) 5. Expanded Emergency Medical Services (E-EMS) program 6. None
Special Knowledge (n = 21 (47.7%))			
Community services	10 (22.7%)	1. Cooper, 2004 2. ED Management, 2014b 3. ED Management, 2013; Stevens, 2013 4. Hauswald, 2005 5. MedStar Mobile Healthcare, 2016, 2017a 6. Snooks, 2004 7. Snooks, 2012	1. None 2. None 3. Treat the Streets: Pre-Hospital Pediatric Asthma Intervention Model to Improve Child Health Outcomes 4. Expanded Emergency Medical Services (E-

		8. Wilcox, 2016a 9. Wilcox, 2016b 10. Wilcox, 2016c	EMS) program 5. MedStar Community Health Program using Mobile Healthcare Practitioners - for frequent 911 callers 6. "Treat and Refer" protocols for ambulance crews 7. Support and assessment for fall emergency referrals (SAFER 2) 8. Rice County CP program 9. Wadena County CP program 10. Scott County CP program
Intervention-specific materials (e.g. video conferencing, protocols)	9 (20.5%)	1. Brice, 2006, 2009 2. Cooper, 2004 3. Hauswald, 2005 4. Hospital Case Management, 2014 5. Dixon, 2009; Mason, 2003, 2007, 2008 6. Shah, 2010 7. Snooks, 2004 8. The California Health Care Foundation, 2017f 9. The California Health Care Foundation, 2017g	1. Welcome to the World (WTTW) 2. None 3. Expanded Emergency Medical Services (E-EMS) program 4. None 5. Paramedic practitioner in older people's support (PPOPS) scheme 6. Livingston County EMS CP Program 7. "Treat and Refer" protocols for ambulance crews 8. Alternate destination - medical care CP Program 9. Sobering centre pilot CP program
Law enforcement	1 (2.3%)	ED Management, 2014a	None
Substance abuse	1 (2.3%)	ED Management, 2014a	None
Communication and Leadership (n = 2 (4.5%))			
Communication	1 (2.3%)	Brice, 2006, 2009	Welcome to the World (WTTW)
Leadership	1 (2.3%)	Cooper, 2004	None
Unknown	19 (43.2%)		

D2. Types of training providers

Note: a CP program may use more than one type of provider

Provider type	**Number of CP Programs** (% out of 44 programs)	**Author(s), Year(s)**	**CP program name**
University (e.g. school of medicine)	6 (13.6%)	1. Andrew, 2011 2. Brice, 2006, 2009 3. Cooper, 2004 4. ED Management, 2013; Stevens, 2013 5. Hauswald, 2005 6. Dixon, 2009; Mason, 2003, 2007, 2008	1. New South Wales (NSW) Extended Care Paramedic (ECP) Program 2. Welcome to the World (WTTW) 3. No name 4. Treat the Streets: Pre-Hospital Pediatric Asthma Intervention Model to Improve Child Health Outcomes 5. Expanded Emergency Medical Services (E-EMS) program 6. Paramedic practitioner in older people's support (PPOPS)
College (e.g. technical colleges)	4 (9.1%)	1. Drennan, 2014 2. Wilcox, 2016a 3. Wilcox, 2016b 4. Wilcox, 2016c	1. Expanding Paramedicine in the Community (EPIC) 2. Rice County CP program 3. Wadena County CP program 4. Scott County CP program
Healthcare professionals (e.g. paramedics, care of elderly specialists)	6 (13.6%)	1. Brice, 2006, 2009 2. Crockett, 2016 3. Gerson, 1992 4. Hauswald, 2005 5. Dixon, 2009; Mason, 2003, 2007, 2008 6. National Association of Emergency Medical Technicians (NAEMT), 2015c	1. Welcome to the World (WTTW) 2. Community Paramedcine Team (CPT) 3. No name 4. Expanded Emergency Medical Services (E-EMS) program 5. Paramedic practitioner in older people's support (PPOPS) 6. Colorado Springs Fire Department CP program

Community services and representatives (e.g. social services)	2 (4.5%)	1. Brice, 2006, 2009 2. ED Management, 2014a	1. Welcome to the World (WTTW) 2. No name
Hospital	2 (4.5%)	1. Abrashkin, 2015, 2016 2. Brice, 2006, 2009	1. Advanced Illness Management (AIM) 2. Welcome to the World (WTTW)
Public health department	1 (2.3%)	Brice, 2006, 2009	Welcome to the World (WTTW)
Unknown	29 (65.9%)		

D3. Origins of CP training curriculum

How was CP training developed? (i.e. based on which program(s) or curriculum(s) was the CP training developed?)	**Number of CP programs** (% out of 44 programs)	**Author (s), Year(s)**	**CP program name**
CP training developed using or based on: 1. Subject matter experts, literature, program-specific needs 2. Higher Education Ambulance Development Group 3. Developed by the college providing CP training 4. Existing government course 5. State EMS regulatory board mandated curriculum 6. Existing materials from another CP program 7. Geriatrics Education for EMS (GEMS) course	7 (15.9%)	In order listed: 1. Abrashkin, 2015, 2016 2. Cooper, 2004 3. Drennan, 2014 4. ED Management, 2014a 5. ED Management, 2014b 6. ED Management, 2013; Stevens, 2013 7. Shah, 2010	In order listed: 1. Advanced Illness Management (AIM) 2. None 3. Expanding Paramedicine in the Community (EPIC) 4. None 5. None 6. Treat the Streets: Pre-Hospital Pediatric Asthma Intervention Model to Improve Child Health Outcomes 7. Livingston County EMS CP Program
Unknown	37 (84.1%)		
Total	**44**		

D4. Training format

CP training format	**Number of CP studies** (% out of 44 CP programs)	**Author(s), Year(s)**	**CP program name**
Clinical observation (e.g. shadowing)	3 (6.8%)	1. Abrashkin, 2015, 2016 2. Agarwal, 2015b 3. ED Management, 2014	1. Advanced Illness Management (AIM) 2. Community Health Assessment Program through EMS (CHAP-EMS) across Ontario 3. No name
Clinical practice (e.g. hands on training)	8 (18.2%)	1. Drennan, 2014 2. ED Management, 2014b 3. ED Management, 2013; Stevens, 2013 4. Hauswald, 2005 5. Jensen, 2013; Jensen, 2016; Marshall, 2015 6. Martin-Martin, 2005, 2009 7. Dixon, 2009; Mason, 2003, 2007, 2008 8. MedStar Mobile Healthcare, 2016, 2017a	1. Expanding Paramedicine in the Community (EPIC) 2. No name 3. "Treat the Streets: Pre-Hospital Pediatric Asthma Intervention Model to Improve Child Health Outcomes" 4. Expanded Emergency Medical Services (E-EMS) program 5. Care by Design (CBD) program 6. Long and Brier Community Paramedicine Program 7. Paramedic practitioner in older people's support (PPOPS) 8. MedStar Community Health Program using Mobile Healthcare Practitioners - for frequent 911 callers

In-person classroom	13 (29.5%)	1. Abrashkin, 2015, 2016 2. Brice, 2006, 2009 3. Drennan, 2014 4. ED Management, 2013; Stevens, 2013 5. Gerson, 1992 6. Hauswald, 2005 7. Jensen, 2016; Marshall, 2015 8. Martin-Martin, 2005, 2009 9. Dixon, 2009; Mason, 2003, 2007, 2008 10. MedStar Mobile Healthcare, 2016, 2017a 11. Shah, 2010 12. Snooks, 2004 13. Swain, 2010	1. Advanced Illness Management (AIM) 2. Welcome to the World (WTTW) 3. Expanding Paramedicine in the Community (EPIC) 4. "Treat the Streets: Pre-Hospital Pediatric Asthma Intervention Model to Improve 5. Child Health Outcomes" 6. No name 7. Expanded Emergency Medical Services (E-EMS) program 8. Care by Design (CBD) program 9. Long and Brier Community Paramedicine Program 10. Paramedic practitioner in older people's support (PPOPS) scheme 11. MedStar Community Health Program using Mobile Healthcare Practitioners - for frequent 911 callers 12. Livingston County EMS CP Program 13. "Treat and Refer" protocols for ambulance crews 14. Urgent Community Care (UCC) program
Online (e.g. online course, modules)	1 (2.3%)	1. Agarwal, 2015b	2. Community Health Assessment Program through EMS (CHAP-EMS) across Ontario
Unknown	28 (63.6%)		

D5. Training duration

Author(s), Year(s)	**CP program name**	**CP Training duration**	**Hours** (if stated or can be inferred)
Abrashkin, 2015, 2016	Advanced Illness Management (AIM)	40 hours in didactic training and physician observation	40
Agarwal, 2015b	Community Health Assessment Program through EMS (CHAP-EMS) across Ontario	3-4 hours	4
Andrew, 2011	New South Wales (NSW) Extended Care Paramedic (ECP) Program	10 weeks intensive education program + 12 months clinical/ongoing education	Cannot infer
Brice, 2006, 2009	Welcome to the World (WTTW)	Half-day* training session led by two paramedics, plus periodic updates on pediatric injury topics	4
Cooper, 2004	No name	Two year part-time	Cannot infer
Dixon, 2009	Expanding Paramedicine in the Community (EPIC)	6 weeks	Cannot infer
Drennan, 2014	No name	240 hours (in addition to having seen at least 750 patients in system)	240
ED Management, 2014a	No name	300 hours	300
ED Management, 2014b	No name	1.5 months	Cannot infer
Everden, 2013	Appropriate Care at Point of Need (ACAPON) system	two monthly four-hour run reviews	8
Gray, 2008	Expanded Emergency Medical Services (E-EMS) program	380 contact hours plus 600 clinical hours	980
Jensen, 2013; Jensen 2016; Marshall, 2015	Care by Design (CBD) program	Two weeks	Cannot infer
Dixon, 2009; Mason, 2003, 2007, 2008	Paramedic practitioner in older people's support (PPOPS)	3 weeks plus 45 days	Cannot infer

MedStar Mobile Healthcare, 2016, 2017a	MedStar Community Health Program using Mobile Healthcare Practitioners – for frequent 911 callers	80 hours classroom and 80 hours field training	160
Shah, 2010	Livingston County EMS CP Program	One day*	8
Snooks, 2004	"Treat and Refer" protocols for ambulance crews	3 days*	24
Wilcox, 2016a	Rice County CP program	144 hours of classroom instruction + 196 hours of clinical training	340
Wilcox, 2016b	Wadena County CP program	144 hours of classroom instruction + 196 hours of clinical training	340
Wilcox, 2016c	Scott County CP program	144 hours of classroom instruction + 196 hours of clinical training	340
Median, (Range)			**160 (4, 980) hours**
*Based on assumption that full workday is eight hours			

D6. CP training assessment method

Type of assessment method	Author(s), Year(s)	CP Program Name
Multiple choice test after each subject module	Agarwal, 2015b	Community Health Assessment Program through EMS (CHAP-EMS) - across Ontario
• OSCE examinations for knowledge and skills • Two essays (one for reflective practice, another involving skills and knowledge) • Create a learning portfolio used for future reference	Dixon, 2009; Mason, 2003, 2007, 2008	Paramedic practitioner in older people's support (PPOPS) scheme
• Competency assessment for correct use of materials (e.g. treat and refer protocols)	Snooks, 2004	“Treat and Refer" protocols for ambulance crews
• Regular audit of patient report forms by Medical Director help to provide regular feedback to ECPs	Swain, 2010	Urgent Community Care (UCC) program

Part E. Data stratified based on CP services provided, location of CP visits, and CP training subjects

E1. CP services provided based on target population

			Services Provided																					
			Assessment and Screening								Acute Care			Transport and Referral			Education and Patient Support					Communication		Other
Target population Number of CP programs (% out of 44 programs)		**Author(s), Year(s)**	Collect patient history	Depression screening	Home assessment , address risks	Medication management	Monitor patient	Non-physical assessment	Physical assessment	Preventative health screening	Acute care	Immunization	Point-of-care lab tests	Assess, refer, and/or transport to community services	Refer and/or transport to other healthcare providers	Transport to ED/ urgent care centre	Care plan review	Counselling	Education	Health coaching	Phone consultation	Communicate with healthcare providers	Communicate with patient's family/ caregivers	Unknown
911 callers n = 21 (47.7%)		**Total**	**2**	**0**	**3**	**7**	**1**	**7**	**10**	**2**	**10**	**0**	**2**	**7**	**7**	**10**	**2**	**0**	**2**	**1**	**1**	**4**	**0**	**0**
In general n = 3 (6.8%)		Cooper, 2004									Y			Y					Y					
		Everden, 2003									Y					Y								
		Gray, 2008														Y								
		Sub-Total									2			1		2			1					
Presenting with low acuity conditions n = 8 (18.2%)		Andrew, 2011				Y				Y	Y			Y										
		Arendts, 2011									Y				Y	Y								
		Blumberg, 2014b									Y			Y		Y								
		Hauswald, 2005	Y			Y	Y		Y		Y													
		Hospital Case				Y		Y	Y						Y									

	Management, 2014																						
	Snooks, 2004	Y					Y	Y															
	Swain, 2010							Y		Y			Y	Y	Y								
	The California Health Care Foundation, 2017f														Y								
	Sub-Total	2			3	1	2	4	1	5			3	3	4								
Presenting with low acuity conditions, and are seniors in the community n = 2 (4.5%)	Abrashkin, 2015, 2016				Y			Y		Y					Y						Y		
	Snooks, 2012												Y										
	Sub-Total				1			1		1			1		1						1		
Presenting with low acuity conditions, and are seniors in LTC homes n = 2 (4.5%)	Jensen, 2013, 2016; Marshall, 2015									Y		Y		Y	Y						Y		
	Dixon, 2009; Mason, 2003, 2007, 2008				Y		Y	Y		Y					Y								
	Sub-Total				1		1	1		2		1		1	2						1		
Frequent 911 callers/ EMS users n = 6 (13.6%)	Kusel, 2015			Y			Y						Y		Y	Y					Y		
	MedStar Mobile Healthcare, 2016, 2017a				Y		Y	Y								Y				Y			
	National Association of Emergency Medical Technicians (NAEMT), 2015b			Y					Y					Y					Y				

	National Association of Emergency Medical Technicians (NAEMT), 2015c							Y				Y	Y	Y				Y						
	Tangherlini, 2016						Y	Y						Y							Y			
	The California Health Care Foundation, 2017b			Y	Y		Y	Y																
	Sub-Total			3	2		4	4	1			1	2	3	1	2		1	1	1	2			
At risk for ED re/admission or hospitalization n = 16, (36.4%)	**Total**	**2**	**0**	**7**	**7**	**4**	**4**	**5**	**2**	**5**	**1**	**3**	**7**	**1**	**1**	**3**	**1**	**5**	**0**	**2**	**6**	**0**	**1**
In general n = 15 (34.1%)	Blumberg, 2014a											Y				Y								
	Crockett, 2016	Y						Y	Y												Y			
	Drennan, 2014	Y						Y		Y								Y			Y			
	ED Management, 2014a						Y						Y											
	ED Management, 2014b				Y					Y			Y		Y			Y						
	Hospital Case Management, 2016			Y	Y			Y					Y					Y			Y			
	Misner, 2005; Martin-Misener, 2009			Y			Y	Y	Y	Y	Y		Y								Y			
	MedStar Mobile Healthcare, 2017b																	Y		Y				

	National Association of Emergency Medical Technicians (NAEMT), 2015a			Y	Y							Y	Y			Y							
	The California Health Care Foundation, 2017a			Y	Y	Y										Y				Y	Y		
	The California Health Care Foundation, 2017c				Y	Y																	
	The California Health Care Foundation, 2017e						Y						Y										
	Wilcox, 2016a			Y		Y	Y	Y									Y				Y		
	Wilcox, 2016b			Y	Y	Y				Y		Y											
	Wilcox, 2016c																						Y
	Sub-Total	2		6	6	4	4	5	2	4	1	3	6		1	3	1	4		2	6		1
Children n = 1 (2.3%)	ED Management, 2013; Stevens, 2013			Y	Y					Y			Y	Y				Y					
	Sub-Total			1	1					1			1	1				1					
Hospice patients	**Total**	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0
1 (2.3%)	The California Health Care Foundation, 2017d				Y		Y	Y									Y				Y	Y	
Seniors living in the community (not facility)	**Total**	**0**	**1**	**1**	**1**	**0**	**1**	**3**	**1**	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**2**	**0**	**0**
In general n = 4 (9.1%)	Agarwal, 2015a, 2014, 2013a, 2013b							Y	Y									Y					

	Agarwal, 2015b							Y					Y					Y			Y			
	Gerson, 1992												Y											
	Shah, 2010		Y	Y	Y		Y	Y					Y								Y			
	Sub-Total		1	1	1		1	3	1				3					2			2			
Other	**Total**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	
Families with newborns n = 1 (2.3%)	Brice, 2006, 2009			Y									Y				Y	Y						
Unknown	**Total**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
n = 1 (2.3%)	The California Health Care Foundation, 2017g								Y				Y											
Grand Total		4	1	12	16	5	13	19	6	15	1	5	19	8	11	5	3	10	1	3	13	1	1	

E2. CP services provided based on location of CP visits

		Services provided																					
Target population Number of CP programs (% out of 44 programs)	**Author(s), Year(s)**	Assessment and Screening								Acute Care			Transport and Referral			Education and Patient Support						Communication		Other
		Collect patient history	Depression screening	Home assessment , address risks	Medication management	Monitor patient	Non-physical assessment	Physical assessment	Preventative health screening	Acute care	Immunization	Point-of-care lab tests	Assess, refer, and/or transport to community services	Refer and/or transport to other healthcare providers	Transport to ED/ urgent care centre	Care plan review	Counselling	Education	Health coaching	Phone consultation	Communicate with healthcare providers	Communicate with patient's family/ caregivers	Unknown
Common area in residence building n = 2 (4.5%)	Agarwal, 2015a; 2014, 2013a, 2013b							Y	Y									Y					
	Agarwal, 2015b							Y					Y					Y			Y		
	Sub-Total							2	1				1					2			1		
Community clinic (mobile and stationary) n = 1 (2.3%)	Wilcox, 2016c																						Y
	Sub-Total																						1
Hospice n = 1 (2.3%)	The California Health Care Foundation, 2017d				Y		Y	Y									Y				Y	Y	
	Sub-Total				1		1	1									1				1	1	

LTC facility n = 1 (2.3%)	Jensen, 2013, 2016; Marshall, 2015									Y		Y		Y	Y						Y		
	Sub-Total									1		1		1	1						1		
Patient home n = 25 (56.8%)	Abrashkin, 2015, 2016				Y			Y		Y					Y						Y		
	Andrew, 2011				Y				Y	Y			Y										
	Arendts, 2011									Y				Y	Y								
	Blumberg, 2014a											Y				Y							
	Brice, 2006, 2009			Y									Y				Y	Y					
	Crockett, 2016	Y						Y	Y												Y		
	Drennan, 2014	Y						Y		Y								Y			Y		
	ED Management, 2014b				Y					Y			Y		Y			Y					
	ED Management, 2013; Stevens, 2013			Y	Y					Y			Y	Y				Y					
	Everden, 2003									Y					Y								
	Gerson, 1992												Y										
	Hauswald, 2005	Y			Y	Y		Y		Y													
	Hospital Case Management, 2016			Y	Y			Y					Y					Y			Y		
	Hospital Case Management, 2014				Y		Y	Y						Y									
	Kusel, 2015			Y			Y						Y		Y	Y					Y		
	MedStar Mobile Healthcare, 2017b			Y	Y							Y	Y			Y							
	National Association of Emergency Medical Technicians (NAEMT), 2015a			Y					Y					Y					Y				
	National Association of Emergency Medical Technicians (NAEMT), 2015b							Y				Y	Y	Y				Y					
	National Association of Emergency												Y										

	Medical Technicians (NAEMT), 2015c																						
	Snooks, 2012			Y	Y	Y									Y				Y	Y		
	The California Health Care Foundation, 2017a			Y	Y		Y	Y														
	The California Health Care Foundation, 2017b				Y	Y																
	The California Health Care Foundation, 2017c			Y		Y	Y	Y								Y				Y		
	Wilcox, 2016a			Y	Y	Y				Y		Y										
	Wilcox, 2016b			Y	Y							Y	Y			Y						
	Sub-Total	3	0	10	12	5	4	9	3	9	0	4	10	5	5	4	2	7	1	2	7	0	0
Patient home and LTC facility n = 1 (2.3%)	Dixon, 2009; Mason, 2003, 2007, 3008				Y		Y	Y		Y					Y								
	Sub-Total	0	0	0	1	0	1	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0
Patient home and community clinic n = 2 (4.5%)	Misner, 2005; Martin-Misener, 2009			Y			Y	Y	Y	Y	Y		Y							Y		
	Swain, 2010							Y		Y			Y	Y	Y							
	Sub-Total	0	0	1	0	0	1	2	1	2	1	0	2	1	1	0	0	0	0	0	1	0	0
Patient home and via telephone n = 1 (2.3%)	MedStar Mobile Healthcare, 2016, 2017a				Y		Y	Y								Y				Y			
	Sub-Total	0	0	0	1	0	1	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0
Place of 911 call incidence (where exact location is not specified) n = 10 (22.7%)	Blumberg, 2014b									Y			Y		Y								
	Cooper, 2004									Y			Y					Y					
	ED Management, 2014a						Y						Y										
	Gray, 2008														Y								
	Shah, 2010		Y	Y	Y		Y	Y					Y								Y		
	Snooks, 2004	Y					Y	Y															
	Tangherlini, 2016						Y	Y						Y							Y		

	The California Health Care Foundation, 2017e						Y						Y											
	The California Health Care Foundation, 2017f														Y									
	The California Health Care Foundation, 2017g								Y				Y											
	Sub-Total	1	1	1	1	0	5	3	1	2	0	0	6	1	3	0	0	1	0	0	2	0	0
Grand Total		4	1	12	16	5	13	19	6	15	1	5	19	8	11	5	3	10	1	3	13	1	1

E3. CP training subjects based on target population

			Services Provided																							
			Acute Care			Assessment and Screening							Care of specific populations		Education and Health Promotion				Special Knowledge				Communication and Leadership		Unknown
Target population	**Number of CP programs**	**Author(s), Year(s)**	Acute Care	Diagnostics	Emergency Care	Environmental Assessment	Health Risk Assessment	Mental Health	Medication Management	Overall Health Assessment	Patient history	Physical Assessment	Care of Children	Care of Older Adults	Case Management	Education	Health Management	Health Promotion	Community Services	Intervention Materials	Law Enforcement	Substance Abuse	Communication	Leadership	Unknown
911 callers n = 21 (47.7%)		**Total**	**6**	**2**	**1**	**0**	**0**	**1**	**3**	**4**	**1**	**1**	**1**	**4**	**1**	**1**	**5**	**4**	**5**	**6**	**0**	**0**	**0**	**1**	**8**
In general	3 (6.8%)	Cooper, 2004	Y		Y					Y								Y	Y	Y				Y	
		Everden, 2003	Y							Y															
		Gray, 2008																							Y
		Sub-Total	2		1					2								1	1	1				1	1
Presenting with low acuity conditions	8 (18.2%)	Andrew, 2011						Y	Y					Y				Y							
		Arendts, 2011																							Y
		Blumberg, 2014b																							Y
		Hauswald, 2005	Y						Y		Y						Y	Y	Y	Y					
		Hospital Case Management, 2014															Y	Y		Y					

		Snooks, 2004																	Y	Y					
		Swain, 2010																							Y
		The California Health Care Foundation, 2017f																		Y					
		Sub-Total	1					1	2		1			1			2	3	2	4					3
Presenting with low acuity conditions, and are seniors in the community	2 (4.5%)	Abrashkin, 2015, 2016	Y										Y	Y											
		Snooks, 2012								Y				Y					Y						
		Sub-Total	1							1			1	2					1						
Presenting with low acuity conditions, and are seniors in LTC homes	2 (4.5%)	Jensen, 2013, 2016; Marshall, 2015	Y	Y										Y											
		Dixon, 2009; Mason, 2003, 2007, 2008	Y	Y					Y	Y		Y					Y			Y					
		Total	2	2					1	1		1		1			1			1					
Frequent 911 callers/ EMS users	6 (13.6%)	Kusel, 2015																							Y
		MedStar Mobile Healthcare, 2016, 2017a														Y	Y		Y						
		National Association of Emergency Medical Technicians (NAEMT), 2015b																							Y
		National Association of Emergency													Y		Y								

		Medical Technicians (NAEMT), 2015c																							
		Tangherlini, 2016																							Y
		The California Health Care Foundation, 2017b																							Y
		Total													1	1	2		1						4
At risk for ED re/admission or hospitalization n = 16, (36.4%)		**Total**	**6**	**2**	**0**	**1**	**0**	**2**	**6**	**2**	**0**	**0**	**3**	**3**	**0**	**1**	**7**	**1**	**5**	**0**	**1**	**1**	**0**	**0**	**7**
In general	15 (34.1%)	Blumberg, 2014a																							Y
		Crockett, 2016							Y	Y						Y	Y								
		Drennan, 2014		Y					Y	Y								Y							
		ED Management, 2014a						Y	Y												Y	Y			
		ED Management, 2014b	Y					Y	Y								Y		Y						
		Hospital Case Management, 2016																							Y
		Misner, 2005; Martin-Misener, 2009	Y	Y					Y								Y								
		MedStar Mobile Healthcare, 2017b																							Y
		National Association of Emergency Medical																							Y

		Technicians (NAEMT), 2015a																						
		The California Health Care Foundation, 2017a																						Y
		The California Health Care Foundation, 2017c																						Y
		The California Health Care Foundation, 2017e																						Y
		Wilcox, 2016a	Y										Y	Y			Y		Y						
		Wilcox, 2016b	Y										Y	Y			Y		Y						
		Wilcox, 2016c	Y										Y	Y			Y		Y						
		Sub-Total	5	2				2	5	2			3	3		1	6	1	4		1	1			7
Children	1 (2.3%)	ED Management, 2013; Stevens, 2013	Y			Y			Y								Y		Y						
		Sub-Total	1			1			1								1		1						
Hospice patients		**Total**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**
	1 (2.3%)	The California Health Care Foundation, 2017d																						Y
Seniors living in the community (not facility)		**Total**	**0**	**0**	**0**	**1**	**1**	**1**	**0**	**1**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**1**
In general	4 (9.1%)	Agarwal, 2015a, 2014, 2013a, 2013b																						Y
		Agarwal, 2015b								Y								Y							
		Gerson, 1992				Y	Y																		
		Shah, 2010												Y						Y					

		Sub-Total				1	1			1				1				1		1					1
Other (e.g. Families with newborns)		**Total**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**1**	**0**	**0**	**0**	**1**	**0**	**0**	**1**	**0**	**0**
	1 (2.3%)	Brice, 2006, 2009				Y							Y			Y				Y			Y		
Unknown		**Total**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**
	1 (2.3%)	The California Health Care Foundation, 2017g																		Y					
Grand Total			**12**	**4**	**1**	**3**	**1**	**9**	**3**	**7**	**1**	**1**	**5**	**8**	**1**	**3**	**12**	**6**	**10**	**9**	**1**	**1**	**1**	**1**	**17**

E4. CP training subjects based on location of CP visit

			Training topics/ subjects																						
			Acute Care n = 16 (36.4%)			Assessment and Screening n = 25 (56.8%)							Care of specific populations n = 13 (29.5%)		Education and Health promotion n = 21 (47.7%)				Special Knowledge n = 21 (47.7%)				Communication and Leadership n = 2 (4.5%)		Unknown, n = 19 (43.2%)
Location of CP visit	**Number of CP programs** (% out of 44 programs)	**Author(s), Year(s)**	Acute Care	Diagnostics	Emergency Care	Environmental Assessment	Health Risk Assessment	Medication Management	Mental Health	Overall Health Assessment	Patient history	Physical Assessment	Care of Children	Care of Older Adults	Case Management	Education	Health Management	Health Promotion	Community Services	Intervention Materials	Law Enforcement	Substance Abuse	Communication	Leadership	Unknown
Common area in residence building	2 (4.5%)	Agarwal, 2015a; 2014, 2013a, 2013b																							Y
		Agarwal, 2015b								Y								Y							
		Sub-Total	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
Community clinic (mobile and stationary)	1 (2.3%)	Wilcox, 2016c	Y										Y	Y			Y		Y						
		Sub-Total	1	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0	1	0	0	0	0	0	0
Hospice	1 (2.3%)	The California Health Care																							Y

		Foundation, 2017d																							
		Sub-Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
LTC facility	1 (2.3%)	Jensen, 2013, 2016; Marshall, 2015	Y	Y										Y											
		Sub-Total	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Patient home	25 (56.8%)	Abrashkin, 2015, 2016	Y										Y	Y											
		Andrew, 2011						Y	Y					Y				Y							
		Arendts, 2011																							Y
		Blumberg, 2014a																							Y
		Brice, 2006, 2009				Y							Y			Y				Y			Y		
		Crockett, 2016						Y		Y						Y	Y								
		Drennan, 2014		Y				Y		Y								Y							
		ED Management, 2014b	Y					Y	Y								Y		Y						
		ED Management, 2013; Stevens, 2013	Y			Y		Y									Y		Y						
		Everden, 2003	Y							Y															
		Gerson, 1992				Y	Y																		
		Hauswald, 2005	Y					Y			Y						Y	Y	Y	Y					
		Hospital Case																							Y

		Management, 2016																							
		Hospital Case Management, 2014														Y	Y		Y					
		Kusel, 2015																							Y
		MedStar Mobile Healthcare, 2017b																							Y
		National Association of Emergency Medical Technicians (NAEMT), 2015a																							Y
		National Association of Emergency Medical Technicians (NAEMT), 2015b																							Y
		National Association of Emergency Medical Technicians (NAEMT), 2015c													Y		Y								
		Snooks, 2012								Y				Y					Y						
		The California																							Y

		Health Care Foundation, 2017a																							
		The California Health Care Foundation, 2017b																							Y
		The California Health Care Foundation, 2017c																							Y
		Wilcox, 2016a	Y										Y	Y			Y		Y						
		Wilcox, 2016b	Y										Y	Y			Y		Y						
		Sub-Total	7	1	0	3	1	6	2	4	1	0	4	5	1	2	8	4	6	3	0	0	1	0	10
Patient home and LTC facility	1 (2.3%)	Dixon, 2009; Mason, 2003, 2007, 3008	Y	Y				Y		Y		Y					Y			Y					
		Sub-Total	1	1	0	0	0	1	0	1	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0
Patient home and community clinic	2 (4.5%)	Misner, 2005; Martin-Misener, 2009	Y	Y				Y									Y								
		Swain, 2010																							Y
		Sub-Total	1	1	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
Patient home and via telephone	1 (2.3%)	MedStar Mobile Healthcare, 2016, 2017a														Y	Y		Y						
		Sub-Total	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0
Place of	10	Blumberg, 2014b																							Y

911 call incidence (where exact location is not specified)	(22.7%)	Cooper, 2004	Y		Y					Y								Y	Y	Y				Y	
		ED Management, 2014a						Y	Y												Y	Y				
		Gray, 2008																								Y
		Shah, 2010												Y						Y						
		Snooks, 2004																	Y	Y						
		Tangherlini, 2016																								Y
		The California Health Care Foundation, 2017e																								Y
		The California Health Care Foundation, 2017f																		Y						
		The California Health Care Foundation, 2017g																		Y						
		Sub-Total	1	0	1	0	0	1	1	1	0	0	0	1	0	0	0	1	2	5	1	1	0	1	4
Grand Total			**12**	**4**	**1**	**3**	**1**	**9**	**3**	**7**	**1**	**1**	**5**	**8**	**1**	**3**	**12**	**6**	**10**	**9**	**1**	**1**	**1**	**1**	**17**

E5. CP services provided by Urban/ Rural location

		Services Provided																					
		Assessment and Screening								Acute Care			Transport and Referral			Education and Patient Support					Communication		Other
Urban/ Rural	**Author(s), Year(s)**	Collect patient history	Depression screening	Home assessment , address risks	Medication management	Monitor patient	Non-physical assessment	Physical assessment	Preventative health screening	Acute care	Immunization	Point-of-care lab tests	Assess, refer, and/or transport to community services	Refer and/or transport to other healthcare providers	Transport to ED/ urgent care centre	Care plan review	Counselling	Education	Health coaching	Phone consultation	Communicate with healthcare providers	Communicate with patient's family/ caregivers	Unknown
Urban	**Total**	**4**	**0**	**9**	**15**	**5**	**11**	**17**	**5**	**13**	**0**	**4**	**18**	**8**	**11**	**5**	**3**	**10**	**1**	**3**	**11**	**1**	**0**
	Cooper, 2004									Y			Y					Y					
	Everden, 2003									Y					Y								
	Gray, 2008														Y								
	Andrew, 2011				Y				Y	Y			Y										
	Arendts, 2011									Y				Y	Y								
	Blumberg, 2014b									Y			Y		Y								
	Hauswald, 2005	Y			Y	Y		Y		Y													
	Hospital Case Management, 2014				Y		Y	Y						Y									
	Snooks, 2004	Y					Y	Y															

	Swain, 2010							Y		Y			Y	Y	Y								
	The California Health Care Foundation, 2017f														Y								
	Abrashkin, 2015, 2016				Y			Y		Y					Y						Y		
	Snooks, 2012												Y										
	Jensen, 2013, 2016; Marshall, 2015									Y		Y		Y	Y						Y		
	Dixon, 2009; Mason, 2003, 2007, 2008				Y		Y	Y		Y					Y								
	Kusel, 2015			Y			Y						Y		Y	Y					Y		
	MedStar Mobile Healthcare, 2016, 2017a				Y		Y	Y								Y				Y			
	National Association of Emergency Medical Technicians (NAEMT), 2015b			Y					Y					Y					Y				
	National Association of Emergency Medical Technicians (NAEMT), 2015c							Y				Y	Y	Y				Y					
	Tangherlini, 2016						Y	Y						Y							Y		
	The California Health Care Foundation, 2017b			Y	Y		Y	Y															
	Blumberg, 2014a											Y				Y							
	Crockett, 2016	Y						Y	Y												Y		
	Drennan, 2014	Y						Y		Y								Y			Y		
	ED Management, 2014a						Y						Y										
	ED Management, 2014b				Y					Y			Y		Y			Y					
	Hospital Case Management, 2016			Y	Y			Y					Y					Y			Y		
	MedStar Mobile Healthcare, 2017b																	Y		Y			
	National Association of Emergency Medical Technicians (NAEMT),			Y	Y							Y	Y			Y							

	2015a																						
	The California Health Care Foundation, 2017a			Y	Y	Y									Y				Y	Y		
	The California Health Care Foundation, 2017c				Y	Y																
	The California Health Care Foundation, 2017e						Y						Y									
	Wilcox, 2016a			Y		Y	Y	Y									Y				Y		
	ED Management, 2013; Stevens, 2013			Y	Y					Y			Y	Y				Y					
	The California Health Care Foundation, 2017d				Y		Y	Y									Y				Y	Y	
	Agarwal, 2015a, 2014, 2013a, 2013b							Y	Y									Y					
	Agarwal, 2015b							Y					Y					Y			Y		
	Gerson, 1992												Y										
	Brice, 2006, 2009			Y									Y				Y	Y					
	The California Health Care Foundation, 2017g								Y				Y										
Rural	**Total**	**0**	**1**	**3**	**2**	**1**	**2**	**2**	**1**	**2**	**1**	**1**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**1**
	Misner, 2005; Martin-Misener, 2009			Y			Y	Y	Y	Y	Y		Y								Y		
	Wilcox, 2016b			Y	Y	Y				Y		Y											
	Wilcox, 2016c																						Y
	Shah, 2010		Y	Y	Y		Y	Y					Y								Y		

E6. CP training subjects by Urban/ Rural location

		Training topics/ subjects																						
		Acute Care n = 17 (38.6%)			Assessment and Screening n = 25 (56.8%)							Care of specific populations n = 13 (29.5%)		Education and Health promotion n = 22 (50.0%)				Special Knowledge n = 21 (47.7%)				Communication, Leadership n = 2 (4.5%)		Unknown, n = 19 (43.2%)
	Author(s), Year(s)	Acute Care	Diagnostics	Emergency Care	Environmental Assessment	Health Risk Assessment	Medication Management	Mental Health	Overall Health Assessment	Patient history	Physical Assessment	Care of Children	Care of Older Adults	Case Management	Education	Health Management	Health Promotion	Community Services	Intervention Materials	Law Enforcement	Substance Abuse	Communication	Leadership	Unknown
Urban	**Total**	**9**	**3**	**1**	**3**	**1**	**8**	**3**	**7**	**1**	**1**	**3**	**5**	**1**	**3**	**9**	**6**	**8**	**8**	**1**	**1**	**1**	**1**	**17**
	Agarwal, 2015a; 2014, 2013a, 2013b																							Y
	Agarwal, 2015b								Y								Y							
	The California Health Care Foundation, 2017d																							Y
	Jensen, 2013, 2016; Marshall, 2015	Y	Y										Y											
	Abrashkin, 2015, 2016	Y										Y	Y											
	Andrew, 2011						Y	Y					Y				Y							
	Arendts, 2011																							Y
	Blumberg, 2014a																							Y

	Brice, 2006, 2009				Y							Y			Y				Y			Y		
	Crockett, 2016						Y		Y						Y	Y								
	Drennan, 2014		Y				Y		Y									Y						
	ED Management, 2014b	Y					Y	Y								Y			Y					
	ED Management, 2013; Stevens, 2013	Y			Y		Y									Y			Y					
	Everden, 2003	Y							Y															
	Gerson, 1992				Y	Y																		
	Hauswald, 2005	Y					Y			Y						Y	Y	Y	Y					
	Hospital Case Management, 2016																							Y
	Hospital Case Management, 2014															Y	Y		Y					
	Kusel, 2015																							Y
	MedStar Mobile Healthcare, 2017b																							Y
	National Association of Emergency Medical Technicians (NAEMT), 2015a																							Y
	National Association of Emergency Medical Technicians (NAEMT), 2015b																							Y
	National Association of Emergency Medical Technicians (NAEMT), 2015c													Y		Y								

	Snooks, 2012								Y				Y					Y						
	The California Health Care Foundation, 2017a																							Y
	The California Health Care Foundation, 2017b																							Y
	The California Health Care Foundation, 2017c																							Y
	Wilcox, 2016a	Y										Y	Y			Y		Y						
	Dixon, 2009; Mason, 2003, 2007, 3008	Y	Y				Y		Y		Y					Y			Y					
	Swain, 2010																							Y
	MedStar Mobile Healthcare, 2016, 2017a														Y	Y		Y						
	Blumberg, 2014b																							Y
	Cooper, 2004	Y		Y					Y									Y	Y	Y				Y	
	ED Management, 2014a						Y	Y													Y	Y			
	Gray, 2008																							Y
	Snooks, 2004																		Y	Y					
	Tangherlini, 2016																							Y
	The California Health Care Foundation, 2017e																							Y
	The California Health Care Foundation, 2017f																		Y					
	The California Health Care																		Y					

	Foundation, 2017g																							
Rural	**Total**	3	1	0	0	0	1	0	0	0	0	2	3	0	0	3	0	2	1	0	0	0	0	0
	Misner, 2005; Martin-Misener, 2009	Y	Y				Y									Y								
	Shah, 2010												Y						Y					
	Wilcox, 2016b	Y										Y	Y			Y		Y						
	Wilcox, 2016c	Y										Y	Y			Y		Y						

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