

Please note! This is a self-archived version of the original article.

Huom! Tämä on rinnakkaistallenne.

To cite this Article / Käytä viittauksessa alkuperäistä lähdettä:

Rasku, T., Kaunonen, M., Thyer, E., Paavilainen, E. & Joronen, K. (2019) The core components of Community Paramedicine – integrated care in primary care setting: a scoping review. Scandinavian Journal of Caring Science; 2019; 33: 508– 521.

DOI: https://dx.doi.org/10.1111/scs.12659

The core components of Community Paramedicine – integrated care in primary care setting; a scoping review

Tuija Rasku RN (Doctoral Researcher/ Lecturer) <sup>1</sup> <sup>2</sup>, Marja Kaunonen PhD (Professor) <sup>2</sup>, Elizabeth Thyer PhD (Senior Lecturer) <sup>3</sup>, Eija Paavilainen PhD (Professor)<sup>2</sup>. Katja Joronen PhD (Docent)<sup>2</sup>

<sup>1</sup> University of Applied Sciences, School of Health Care and Social Services, Tampere, Finland
<sup>2</sup> Faculty of Social Sciences, University of Tampere, Tampere, Finland
<sup>3</sup>School of Science & Health, University of Western Sydney, Penrith, Australia

# ABSTRACT

**Background:** Since the beginning of 2000 the primary healthcare services around the globe are challenged between demands of home care and number of staff delivering it. The delivery of healthcare needs new models to reduce the costs, patient's readmission and increase their possibilities to stay at home. Several paramedicine programs have been developed to deliver home care as an integral part of the local healthcare system. The programs varied in nature and the concept of Community Paramedicine (CP) has not been established, demanding clarity. The aim of this review was to identify and describe the core components of CP, and identify research gaps for the further study.

**Method:** A scoping review was performed using five electronic databases: Medline; CINAHL; Academic Search Premier; PubMed and the Cochrane Library for the period 2005 – June 2018. The references of articles were checked and papers were assessed against inclusion criteria and appraised for quality.

**Results:** From 803 initial articles 21 met the criteria and were included. Inductive content analysis was carried out. Four the core components of Community Paramedicine emerged a) Community engagement, b) Multi-agency collaboration, c) Patient-centred prevention, and d) Outcomes of program: cost-effectiveness, and patients' experiences.

**Conclusion:** The Community Paramedicine programs are perceived to be promising. However, Community Paramedicine research data are lacking. Further research is required to understand whether this novel model of healthcare is reducing costs, improving health and enhancing people's experiences.

**Key words:** community paramedicine, primary healthcare, prehospital care, emergency medical services, community paramedic, expanded scope of practice, scoping review

# Introduction

The primary care services are challenged between increased demands of home care and number of staffs delivering it, because nowadays the patients are discharged sooner from the hospital than before, and more care can be done at home. In Finnish home care, there are approximately 3000 clients more than two years ago and in hospitals there are proximately 2800 beds less than before <sup>1</sup>.

Hospital readmissions and frequent non-urgent emergency department visits are huge factors in the rising cost of healthcare. Iezzoni <sup>2</sup> has estimated that about 15% of persons transported by ambulance to Emergency Department (ED) could safely have received care at home. From discharged patients almost one fifth (19,6%) have been rehospitalized within 30 days <sup>3</sup>. If a person is taken again to the ED every couple of days, obviously something is incorrect. In United States the top 50 callers to 911 are on track to make 1,600 calls every year. From these "frequent flyers" more than 70% have chronic medical issues which can increase the strain in- and outside the hospital <sup>4-7</sup>.

The changes of providing healthcare, have sparked calls for increased use of allied health professionals and reoriented teamwork to carry out assessments and treatments. Around the world prehospital healthcare providers (e.g. nurses, paramedics) have been an important resource to provide services being uniquely mobile. Historically, Emergency Medical Service (EMS) has focused only on providing emergency treatment in acute medical problems and transporting ill or injured persons to hospital or between hospitals. However, a number of community-based paramedicine programs provided by EMS, have been developed to deliver home care as an integral part of the local community healthcare system <sup>8</sup>.

The World Health Organization (WHO) defines integrated care having the comprehensive needs (health and diseases) of people and communities at the centre of health services which empowers citizen to have more active role in their own health <sup>9</sup>. The role of EMS is in the middle of communities and the EMS health professions (nurses, paramedics and nurse-paramedics) have trained to assess the patient's health at home and on the scene. Today from EMS providers families and patients are expecting more information to be able to keep up and assist the patient at home while EMS providers themselves have found challenging to confirm and ensure continuity of care instructions <sup>10</sup>. New models of EMS as CP could offer one of the solutions for the myriad changes and needs in the health care system <sup>11</sup>.

The social and healthcare reforms in Finland and in Norway (The Health & Care 21 strategy) also requires integrated people-centred health services and the new innovations from multi-disciplinary teams support preventive healthcare methods for citizens, which could reduce hospitalization <sup>12,13</sup>. Since 2001, when the concept of Community Paramedicine was first described, the CP programs have tried to be part of home healthcare and community paramedics tried to be an integrated part of the healthcare team <sup>2,8,14-16</sup>. Despite positive outcomes, there is a lack of a comprehensive review of the core components of Community Paramedicine, to find more possibilities and useful forms of this mobile, and fragmented care in primary care setting.

# Aim

The aim of this scoping review was to describe and analyse published empirical studies and program reports describing Community Paramedicine (CP) to find out the core components of CP. This study was conducted to estimate the size and scope of the available literature and to chart the areas requiring further study. The question was: *What is known from the existing literature about Community Paramedicine and its core components?* 

# Method

#### Scoping review

A scoping review enables examination of all relevant literature on the topic, regardless of study design or location of publication, also including 'grey literature' published by large organisations instead of peer reviewed <sup>17</sup>. The effectiveness or interventions of studies are not attempted to be presented. The review can identify research gaps in the evidence base and summarize findings from existing literature regarding the overall state of research activity <sup>17,18</sup>. The inductive content analysis and descriptive summary was used to identify the research gaps, and to identify the core components of Community Paramedicine.

#### Literature search

Prior to conducting the literature search, the purpose of the study and a specific question were established, leading to the clarification of the inclusion criteria. The search was limited to papers written in English and produced between 2005 – June 2018. The start day of 2005 was chosen because it is the year, when the International Roundtable on Community Paramedicine (IRCP) was founded <sup>19</sup>. Inclusion criteria for the current review were that in the article writer/writers were using the concept of Community Paramedicine and/or the topic was directly about EMS and health care programs, primary care setting or non-emergency services.

A systematic search was performed between September 2017 and June 2018. The search terms were mapped and narrowed from a list of approximately 20 terms to: *Community Paramedicine\**, *Primary Health Care\**, *Prehospital Care\**, *Emergency medical services\**, *Community Paramedic\**, *and Expanded scope practice\**. The search involved electronic databases, reference lists, hand-searching of key journals, existing networks (e.g. IRCP), relevant organizations (e.g. WHO, Ministry of Social Affairs and Health) and conferences. The final version of key concepts was first used on the MEDLINE database and then converted for CINAHL, Academic Search Premier, PubMed and the Cochrane Library. In addition, two international senior researchers with expertise in Community Paramedicine were consulted to locate relevant articles and studies. The search results downloaded, and references were imported into the web-based bibliographic manager RefWorks where the duplicate articles were removed.



Figure 1 Search Strategy and mapping process

# Retrieval of studies

First the titles and then the abstracts were reviewed. The abstracts were sorted by article type; original research articles, review articles, program reports and opinion papers. Finally, opinion papers, and letters to the editor were excluded. The criteria for the inclusion and exclusion were applied during the whole search process.

Criterion	Inclusion	Exclusion
Time	January 2005 – June 2018	Any study outside these dates
Language	English	Non-English
Type of article	peer-reviewed research articles,	opinion articles, commentaries,
	program reports, preliminary data	letters to the editors
Target group	non-emergency patients	emergency patients
Study focus	Community Paramedicine program(s)	no connected in any CP- or extended
	Extended care program (s)	care program (s)
Profession	paramedic, nurses, emergency medical	other professions
	technician	

 Table 1 Inclusion and exclusion criteria

The references of articles were checked to ensure that eligible articles would not be missed. After the review and coding of 803 abstracts, 42 articles were identified for additional examination. After full article review, those articles, which failed to meet the inclusion criteria, were excluded. The selection method and search flow for the scoping review are represented in Figure 1.

# Analysis of the studies

The information from each article that met the inclusion criteria were analysed and charted in terms of the author(s), the year and country of publication, the purpose of the study, the sample, the study design, and the main results. (Table 2). According to Arksey and O'Malley <sup>17</sup> to inform and validate the findings of the scoping review, two EMS field managers and a researcher were consulted to confirm whether the process had captured all significant peer-reviewed studies which are related to Community Paramedicine.

The scoping study provides an overview of all material reviewed but without assessing quality of evidence. Data synthesis is minimal, and the findings provide an overview of the research but not an assessment of the quality of individual studies. <sup>20</sup> After charting the information from studies, the words or sentences were condensed, and those containing aspects related to each other were grouped together into subcategories for the core components of Community Paramedicine.

#### Results

## Description of the studies

A total of 21 studies or program reports were included in the review (Figure 1). The selected articles and reports were published between 2005 and June 2018 and covered Australia (n=5), Canada (n=7), and the United States (n = 9). There were four mixed-method studies, thirteen qualitative studies and four quantitative studies. Two of the four quantitative study designs reported an intervention (Table 2).

#### Core components of Community Paramedicine

During thematic analysis, the core components of CP were identified as a) community engagement, b) multi-agency collaboration, c) patient-centred prevention, and d) outcomes of program: costeffectiveness and patients' experiences.

#### Community engagement

Community engagement was described as an assessment of local healthcare needs, bridging the gaps of community healthcare, and community response and also the gaps between primary health care and hospital emergency <sup>21-31</sup>. After the risk assessment, the local healthcare needs were identified and CP provided care as a tailored program. The needs from the community included the wellness assessment, preventive health promotion, the discharged patient's home safe checking, first aid training or providing care for chronically ill <sup>21,29-33</sup>. Subsidized seniors were visited and their fall risks were assessed, they got health education, and if needed they were connected to other local healthcare resources <sup>34,35</sup>.

CP is a method to fill the gaps in local healthcare infrastructure like limited availability of primary care services due to shortage of primary care physicians or long distances to the nearest hospital <sup>11</sup>. Zavadsky et al <sup>27</sup> identified 111 CP programs in the United States and 46% of them were operating in rural areas. Rural communities have lower availability of primary care, and particularly specialty care. A first CP program (Red River, New Mexico, United States 1995 – 2000) was expanding EMS services to fill healthcare gaps in a town which closest hospital was 60 minutes away. CP providers administered medications, and performed simple procedures (e.g. suturing) <sup>11,21,32,36</sup>. A community based CP program allowed paramedics to target their efforts effectively, preventive and without emergency <sup>11,21,30</sup>. Additionally, community engagement also meant collaboration with other local healthcare providers, and volunteers sharing of responsibility and the resources <sup>22</sup>.

## Multi-agency collaboration

The multi-agency collaboration was described in terms of partnership, multidisciplinary, collaboration, and integrated care <sup>11,14,21-30,33,36-38</sup>. Two of the articles and reports identified Community Paramedicine as a model of integrated healthcare (MIH) providing care for patients at home or in other non-urgent settings outside the hospital <sup>27,36</sup>. CP focused on longer period coordinated care than the typical Emergency Medical Service calls, with physicians and primary care including e.g. approval of care plans, and telemedicine consultation <sup>27,37</sup>. MIH-CP was written to be "fully integrated, collaborative, data driven, patient-centred and team-based" <sup>27,36</sup>. MIH-CP activities can provide telephone advice instead of resource dispatch, from preventive and chronic disease management to post-discharge follow-up, transport if needed or referral to other health or social care provider instead of hospital emergency department <sup>27</sup>.

Most of the 31 CP programs researched by Patterson et al. <sup>29</sup> were engaged with primary healthcare (67.7%). Other partners were emergency departments, hospitals, home health agencies, nursing homes, substance abuse units, and mental health facilities. <sup>22,23,29,30,33</sup>. Furthermore, there was also a requirement to develop a stronger relationship with local social services and faith-based organizations <sup>30</sup>. Mulholland <sup>22</sup> identified that informality, the "morning cuppa" with other healthcare providers had an important meaning to establish and develop collaboration. The majority of EMS professionals were willing to attend additional CP education and to perform CP duties as preventive, multi-agency collaboration <sup>39</sup>. However, the CP providers could be also seen as competitors and the community paramedics expanded role can cause resistance from other health care professionals. <sup>11,30,36</sup>. The tensions were lower when the CP program team included a delegate

from other multi-agency services and collaboration has helped to understand and support CP as the novel model of healthcare <sup>30</sup>.

The levels of roles and required attributes in multidisciplinary practice of CP included community involvement, organisational support, professional support, and education and training (the COPE-boat model)<sup>22</sup>. Collaborative CP, working seamlessly with other health agencies, provided patient-centered qualified healthcare <sup>14,23,31,35</sup>.

# Patient-centred prevention

Patients were described in terms of frequent caller, discharged patient, home-bound, senior and long-term patient <sup>11,21-26,28-30,32,33,36-38,40</sup>. The prevention methods of CP varied. During the home visit paramedics assessed the patient's medical and social condition and his/her possibilities to stay at home in the future. The goal was to prevent emergency events before they occur so the community paramedics encouraged and educated the patient to manage the health and safety risks as advocate, and linked the patient to the primary healthcare provider's support net if needed. <sup>23,26,27</sup>. During periodic checks the discharged patient needed help to follow the medical care regimen, or to schedule the follow-up doctor visits. Telemedicine was used to connect patients with caregivers elsewhere and to provide telephone advice to non-urgent 911 callers instead of sending an ambulance crew <sup>11,27,32,33,38</sup>. Lee et al <sup>40</sup> created a Paramedics assessing Elders at Risk Independence Loss (PERIL) tool for the risk-assessment during the home visits. The tool includes three questions (about home safety, 911 calls in the last 30 days and patient's medication). Patients had as 93% possibility to have an adverse outcome within 30 days if the answers were yes for all three questions <sup>33,40</sup>.

CP programs helped community nursing (e.g., immunizations), or navigate patients as care coordinators. The long-term patients have been frequently transported to ED which could have been an uncomfortable and unfamiliar environment, with risks of acute infection including lengthy periods waiting on the uncomfortable ambulance stretcher. Community paramedics either took care of the patient at home or transported him/her direct to receiving unit or department; avoiding waiting time in ED <sup>11,24,29,31,32,34-37</sup>.

#### Outcomes of Programme; Cost-effectiveness

One of the CP primary goals was the reduction in non-urgent 911 calls which also reduced the costs of ED care <sup>30</sup>. Community Paramedic assessed and, treated the patient as required and then determined whether it was appropriate to refer or release an individual rather than to transport him/her to an ED. If needed, the patient was directly transported to the mental health facility, to the sobering centre, or to the primary care physician <sup>11</sup>.

The fixed costs associated with operating and maintaining emergency care services are high. The CP healthcare services are prevention-oriented, and it was difficult to add a cost on this service. However, Pearson et al. <sup>32</sup> have developed a Cost-Avoidance Formula and the Cost-Avoidance Formula for Hospital Readmission's to calculate the cost savings for preventing hospital readmissions. Additionally, another reimbursement strategy was the cost-avoidance strategy. The CP program did not get paid if the patient was readmitted within 30 days or the service received a percentage of the cost savings of each patient not readmitted within 30 days <sup>32</sup>.

CP offered interventions to reduce hospital attendance, to enhance access to primary care and to provide more appropriate use resources as cost-efficient benefit <sup>11,21,30,32-34</sup>. The CP program of the non-urgent 911 callers managed to achieve 20% reduction of transports, and patient's satisfaction increased 6% <sup>30</sup>. In Nevada, the CP program helped to avoid 1, 795 visits to ED, 354 ambulance transports, and 28 hospital readmissions; together USD \$7.9 million in charge <sup>36</sup>. CP program provided home visits to those 21 patients who had been transported over 800 times in a 12-month period to ED. The patients got education about medication, nutrition and exercise. Following 12 months the patient's hospital admissions decreased 47% and the ambulance transports to the ED decreased 44% <sup>11</sup>.

## Outcomes of program; patient's experiences

Patient experiences included trust, care, respect, fun, close relationships, acceptance, increased sense of security, support and empowerment <sup>24,28,29,31,34</sup>. According one participant: "They are like family and that's how they make everyone feel" <sup>28</sup>. The participants were thankful for the support, trust, care and respect which they got in their lives from CP providers. Participants felt individually taken care of and during visits they had been able to socialize and have fun while discussing their medical concerns <sup>28</sup>. In Ontario, the winter weather made people home-bound and workforce shortages prolonged the waiting times for medical appointment. The doctor can generally be seen

every three months and distances to appointments were challenging for ageing residents. The CP program provided community paramedics as health advocates with a holistic view of health, dietary concerns and opportunities for social engagement. The community paramedics were welcomed into people's home and the participants felt that the care provided a sense of support, continuity and security for them <sup>28,31,34</sup>.

The HOME (Homeless Outreach and Medical Emergency) Team – CP program provided care to the individuals (n=59) who had used emergency services at least four times per month during last 15 months. From the target population 38.0% were homeless, 88.9% has a substance abuse disorder at time of contact, and 83.0% had a history of psychiatric disorder. The main goal was to find frequent users, connect them to community-based care (e.g. medical detoxification, substance abuse treatment programs, primary care), and advocate for long term care when necessary. This clinical planning brought new long term care placement options for dual-diagnosis patients with both mental health and substance abuse conditions  $^{11}$ .

The results of CP healthcare services had also physiological outcomes. One program focused on inhabitants of a residential building that generated a high volume of EMS calls. Community paramedics, after additional training, visited there weekly and used individualized action plans considering health-risk reduction. The participant's blood pressure were collected one year and senior's diabetes risk were assessed at baseline and after 6-12 months. The participant's systolic blood pressure decreased significantly by the third visit (p<0.05). From the participants 15% managed to drop one Canadian Diabetes Risk assessment (CANRISK) score during the intervention. During two years, the EMS calls from those apartments decreased 25%  $^{35}$ . Abrashkin et al (2016) mailed a post-survey to participants and 35% from 329 individuals or caregivers agreed or strongly agreed that CP delivered high-quality services and care  $^{37}$ .

# Discussion

The purpose of this review was to explore the core components of CP. From these 20 articles or reports between 2005 -2017 were identified four core components: community engagement, multi-agency collaboration, patient-centred prevention, and as the outcomes of program: cost-effectiveness and patients' experiences.

CP has been delivered as pilot healthcare programs. In Australia, Canada and the Unites States of America there has been a systematic effort to improve the home-delivered non-emergency and preventive care, particularly in rural and remote areas. In Scandinavia same components in CP can be found from non-emergency prehospital nursing but no English language articles were found. In United Kingdom CP components can be found from extended scope of paramedicine <sup>41</sup>. Paramedics may practice within an "expanded scope" (applying trained specialized skills and protocols) or "expanded role" (working in non-traditional roles using existing skills) <sup>41</sup>. CP and Mobile Integrated Healthcare (MIH) are both prehospital models of health care <sup>14,37</sup>. CP model provider is called community paramedic (paramedic after additional training) <sup>36</sup> when MIH provides services utilizing a range of allied healthcare professionals e.g. nurses, paramedics, physician assistants and physicians <sup>27,42</sup>. These kind of non-emergency, community engaged healthcare models offer possibilities for those paramedics and also prehospital nurses which work in modified duty (e.g. injured, pregnant) <sup>38</sup>.

The results of this review indicated that the *community engagement* of CP existed and varied. It meant that the risk-assessment helped to find the individual's or community's healthcare needs and gaps. The healthcare providers created the net-work and provided the services to bridge those gaps. Undoubtedly in rural areas, where the infrastructure has its limits, CP programs have more gaps to fill but also in urban areas the number of home-bound citizens is growing and demand for non-emergency healthcare at home is bigger than before.

Another core component emerging from the data was the strong need to build seamless *multi-agency collaboration* with health and social care providers. To work together means that the roles of team members must be clear. Despite many challenges that likely exist, the providers can find innovative strategies to optimize their energy and possibilities. Behind the success of the CP program is the strong teamwork, clear and active communication and collaboration with allied healthcare workers. The organisation of out-of-hours primary care in OECD countries <sup>43</sup> have published their concern about the paramedics and nurse practitioners possibility to tackle workforce shortages and deliver out-of-hours care, particularly in rural and remote areas. CP can have the vital components for this with establishing integrated partnerships out-of-hospital. However, the challenge is to control costs, keep the quality of care and to coordinate many involved organisations. Integrated care, as defined by Leutz <sup>44</sup> is a broad inter-sectorial system approach that aims to align the healthcare system (acute, primary care) with long-term care, education, and housing services. Integrated care partnerships rely on networks based on professional autonomy in the context of reliability and the relationships are heavily based on informality (e.g. morning tea from the results of this review) <sup>45</sup>. The team worker's roles and scope need to be clear and

understood to avoid misunderstandings. With the collaboration of healthcare providers, the patient gets the right care for his/her unique needs, in the right time, at the right place.

Based on this review, the *patient-centred prevention* in CP has many fragmentations mostly focused to avoid the readmissions and support for the good life at home. CP is a patient-centred holistic approach focused on the improvement of patient outcomes. Community Paramedics are in a unique position to observe and assess many of the social and environmental determinants of patient's health at home <sup>33</sup>. This study highlights that in CP the providers, additional trained community paramedics, had dual roles as advocates for health and wellbeing and as experts in providing emergency care. As an advocate, paramedics support the patients in decision making and representing the patient's concerns or wishes to other healthcare providers. Participants felt safety and it was reassuring to know someone was taking care <sup>28</sup>. The interventions targeted to the loneliness can help to avoid ED visits and benefit the well-being of the frail older person <sup>46</sup>.

The WHO argue that the future of care requires an equal and reciprocal relationship between clinical and non-clinical professionals together with the individuals using care services, their families and communities. Alma-Ata Declaration of 1978 emphasized the need to bring a holistic perspective to health while organizing services close to people's homes. The transformation is focusing innovative models to integrate primary health and social care, particularly due to the rising needs of the growing elderly population <sup>47</sup>. According Goodwin <sup>48</sup> integrated care represents an approach to the delivery of services seeking to coordinate care with person, family and surrounding community. People have a more active role in his/her own health while using integrated people-centred health services. Community Paramedicine Care services were tailored to meet an individual's or group's specific needs and goals that emerge from their personal social determinants of health.

The COPD-Home model with joint visits, telephone checks, a support call centre, an individual self-management plan with pharmacological and non-pharmacological interventions can offer needed components for a novel CP models <sup>49</sup>. The CP models in this review are mostly considering seniors but in the future the demand for preventive family nursing is growing specially families with small children <sup>50</sup>.

Despite the challenges, the Community Paramedicine programs are going forward. Many of the opportunities and challenges discussed above make the CP innovative preventive healthcare model. *"The fire-service-based EMS has always been good at pulling individuals out of the river – and now* 

# with Community Paramedicine EMS providers are moving upstream to keep them from falling in to begin with" <sup>51</sup>.

CP models have to show their *cost-efficiency*. In three of reviews studies the cost-efficiency were mentioned but more evidence is needed. The duties of EMS are expensive. First, the Units must be prepared 24/7. Second, this healthcare service must handle routine but also unexpected, sometimes life-threatening problems. As many as 30% - 50% of patients transported to ED by EMS are discharged without significant treatment or referral <sup>41</sup>. CP models offered the possibilities to prevent unnecessary visits to ED having the efficient outcomes <sup>27,29,30,37,38</sup>.

Throughout the years 2005 – 2017 there were few studies of *patients' outcomes and experiences* from CP programs <sup>27,34</sup>. CP has an opportunity to influence citizens' expectations and possibilities to take care of their health. This review indicated that patients attended by CP providers were less likely to visit hospital EDs and reduced the need for subsequent referral to unscheduled care services. Most of the patients (86,4%) reported that the CP providers had been clear about their assessment. Over half of the participants (58%) reported having better "health" after assessment and most of the patients treated at home were satisfied with the care provided and had clear desire to be treated at home if possible <sup>52-54</sup>. The social and healthcare reform requires the evaluation of patient's outcomes and experiences and comparison of the costs, quality and effectiveness of healthcare services. A suggestion for the national performance measurement framework for social and health Services in Finland is based on the Triple Aim framework: costs, effectiveness and quality (accessibility, safety, and customer experience) The Triple Aim <sup>55</sup> has become a guiding force drawing attention to the healthcare improvement initiatives globally and also in Finland. Ultimately, the Triple Aim outcomes entail the domains of quality, cost and experience; not only patients' experiences but also the experiences of providers working in inter professional teams as well <sup>34,39</sup>. However, the researchers have found it difficult to collect the data from participants of CP. Specifically, patient satisfaction surveys are needed from CP; hopefully the use of new collection methods such as tele technique, apps and e-surveys might facilitate this.

## Limitations of the review

As with all research, this scoping review has some limitations. The researchers drew on the experience of specialists, reviewed search terms and references lists, and double reviewed the

selected 46 articles to comprehensively identify all articles. But because the concept of Community Paramedicine has not been long established and differs between countries, it is possible that some articles have been missed. Only in English language peer reviewed articles, with an abstract and full-text available, were included in the review. Articles on Community Paramedicine could have been published in other languages and are not represented in these findings. Qualification may differ across different countries and for instance Community Paramedicine in one country may have different roles in another and this could have affected the findings <sup>11,23,24,41</sup>.

## Conclusion

This review identified the core components of Community Paramedicine (community engagement, multi-agency collaboration, patient-centred prevention, cost-effectiveness, and patient's experiences) and presented evidence on how CP programs contributed to healthcare improvement. Community paramedics worked in a broad range of community settings providing care and company that can be targeted towards patients with different aged, different healthcare or social problems. They provide services also as advocate navigating the patient through the most convenient healthcare services. The findings generally support the efficacy of CP programs, although to avoid professional boundary issues, community paramedics need organisational support to interdisciplinary relations. Community paramedics view CP as a welcomed opportunity to maintain and extend their skills. CP can offer solutions and interventions to the social welfare and healthcare reform to achieve horizontal and vertical integration of person-centered healthcare services. EMS providers and educators can use this information in their practice when developing programs or curriculums. However, further research is needed to explore and analyses the possibilities of these core components of CP to improve patients' experiences, effectiveness, quality and reduce costs in the integrated primary care.

## **Ethical approval**

Ethical approval was not needed as this scoping review consisted of reviewed and collected data from public available materials.

# References

# \*Article included in the review

1. Kehusmaa S. Kotihoidon asiakasmäärä kasvanut, mutta henkilöstön määrä vähentynyt. (more clients in home care, but less staff)

. <u>https://www.thl.fi/fi/-/kotihoidon-asiakasmaara-kasvanut-mutta-henkiloston-maara-vahentynyt</u>. Updated 2017. Accessed 14.4., 2017.

2. Iezzoni LI, Dorner SC, Ajayi T. Community paramedicine--addressing questions as programs expand. *N Engl J Med.* 2016;374(12):1107-1109.

http://elib.tamk.fi/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=ccm&AN=114 336742&site=ehost-live. doi: 10.1056/NEJMp1516100.

3. Jencks SF, Williams MV, Coleman EA. Rehospitalizations among patients in the medicare feefor-service program. *The New England Journal of Medicine*. 2009;360(14):1418-1428. <u>http://content.nejm.org/cgi/content/abstract/360/14/1418</u>. doi: 10.1056/NEJMsa0803563.

4. LaCalle E. Frequent users of emergency departments: The myths, the data, and the policy implications. *Ann Emerg Med.* 2010;56(1):42-48.

https://www.sciencedirect.com/science/article/pii/S0196064410001058. doi:

10.1016/j.annemergmed.2010.01.032.

 Althaus F, Paroz S, Hugli O, et al. Effectiveness of interventions targeting frequent users of emergency departments: A systematic review. *Annals of Emergency Medicine*. 2011;58(1):4-52.e42. <u>https://www.sciencedirect.com/science/article/pii/S0196064411002125</u>. doi: 10.1016/j.annemergmed.2011.03.007.

6. Essoyan S. Chronic 911 callers to get aid from 'community paramedics'.
<u>https://search.proquest.com/docview/1115522761</u>. Updated 2012. Accessed 10.11., 2017.

 Drennan IR, Dainty KN, Hoogeveen P, et al. Expanding paramedicine in the community (EPIC): Study protocol for a randomized controlled trial. <u>http://www.ncbi.nlm.nih.gov/pubmed/25467772</u>. Updated 2014.

Kizer K. Community paramedicine builds a much-needed bridge to quality care. *Aging Today*.
 2016;37(5):11. <u>https://search.proquest.com/docview/1822362572</u>.

9. WHO. WHO framework on integrated people-centred health services.
 <u>http://www.who.int/servicedeliverysafety/areas/people-centred-care/en/</u>. Updated 2017. Accessed 30.4., 2018.

10. Paavilainen E, Mikkola R, Salminen-Tuomaala M, Leikkola P. Counseling patients and family members in out-of-hospital emergency situations: A survey for emergency staff. *BMC nursing*.
2017;16(1):11. <u>https://www.ncbi.nlm.nih.gov/pubmed/28250716</u>. doi: 10.1186/s12912-017-0205-7.

11. Kizer K, Shore K, Moulin A. Community paramedicine: A promising model for integrating emergency and primary care. *UCDAVIS Institute for Population Health Improvement*. 2013;1.

12. Muuri A, Kroh M, Rautavuori P. Social welfare and health care reform.

https://thl.fi/en/web/social-welfare-and-health-care-reform. Updated 2018. Accessed 30.4., 2018.

13. Aas G, Lie E. National strategy for the health and care sector launched.

https://www.forskningsradet.no/prognett-

helseomsorg/Nyheter/National strategy for the health and care sector launched/1253997380256 /p-1. Updated 2016. Accessed 30.4., 2018.

14. O'Meara P, Stirling C, Ruest M, Martin A. Community paramedicine model of care: An observational, ethnographic case study. *BMC Health Serv Res.* 2016;16(39):1-11.

http://elib.tamk.fi/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=ccm&AN=112 763786&site=ehost-live. doi: 10.1186/s12913-016-1282-0.

Ahlers M, Betterton K, Blackburn S, et al. *Community health paramedicine*. 1st ed. Sudbury:
 Jones & Bartlett Learning; 2017.

http://ebookcentral.proquest.com/lib/[SITE\_ID]/detail.action?docID=4835239.

16. Williams B. FirstNet's nationwide network: A promising opportunity for community paramedicine programs. <u>https://www.ems1.com/paramedic-chief/articles/229778048-FirstNets-</u> <u>Nationwide-Network-A-promising-opportunity-for-community-paramedicine-programs/</u>. Updated 2017. Accessed 30.4., 2018.

17. Arksey H, O'Malley L. Scoping studies: Towards a methodological framework. *International Journal of Social Research Methodology*. 2005;8(1):19-32.

http://www.tandfonline.com/doi/abs/10.1080/1364557032000119616. doi:

10.1080/1364557032000119616.

 Levac D, Colquhoun H, O'Brien KK. Scoping studies: Advancing the methodology. *Implementation science : IS*. 2010;5(1):69. <u>http://www.ncbi.nlm.nih.gov/pubmed/20854677</u>. doi: 10.1186/1748-5908-5-69.

19. Wingrove G, O'Meara P, Nolan M. The international roots of community paramedicine. *EMS WORLD*. 2015;44(11):32-34.

http://elib.tamk.fi/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=ccm&AN=110 870732&site=ehost-live.

20. Armstrong R, Hall BJ, Doyle J, Waters E. Cochrane update. 'scoping the scope' of a cochrane review. *J Public Health (Oxf)*. 2011;33(1):147-150.

http://elib.tamk.fi/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=cmedm&AN= 21345890&site=ehost-live. doi: 10.1093/pubmed/fdr015.

21. Stirling CM, O'Meara P, Pedler D, Tourle V, Walker J. Engaging rural communities in health care through a paramedic expanded scope of practice. *Rural and remote health*. 2007;7(4):1-9. http://www.ncbi.nlm.nih.gov/pubmed/18062741.

22. Mulholland P, O'Meara P, Walker J, Stirling C, Tourle V. Multidisciplinary practice in action:
The rural paramedic -- it's not only lights and sirens. *J EMERG PRIM HEALTH CARE*.
2009;7(2):11p.

http://elib.tamk.fi/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=ccm&AN=105 421153&site=ehost-live.

23. O'Meara PF, Tourle V, Stirling C, Walker J, Pedler D. Extending the paramedic role in rural australia: A story of flexibility and innovation. *RURAL REMOTE HEALTH*. 2012;12(2):1-13. <u>http://elib.tamk.fi/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=ccm&AN=104</u> 484622&site=ehost-live.

24. Bigham BL, Kennedy SM, Drennan I, Morrison LJ. Expanding paramedic scope of practice in the community: A systematic review of the literature. *Prehospital Emergency Care*.
2013;17(3):361-372. <u>http://www.ncbi.nlm.nih.gov/pubmed/23734989</u>. doi: 10.3109/10903127.2013.792890.

25. O'Meara P. Community paramedics: A scoping review of their emergence and potential impact. *International Paramedic Practice*. 2014;4(1):5-12. doi: 10.12968/ippr.2014.4.1.5.

26. Brydges M, Spearen C, Birze A, Tavares W. A culture in transition: Paramedic experiences with community referral programs. *CJEM*. 2015;17(6):631-638.

http://www.ncbi.nlm.nih.gov/pubmed/25989813. doi: 10.1017/cem.2015.6.

27. Zavadsky M, Hagen T, Hinchey P, McGinnis K, Bourn S, Myers B. Mobile integrated health care and community paramedicine (MIH-CP). *National Association of Emergency Medical Technicians*. 2015:1-28.

Brydges M, Denton M, Agarwal G. The CHAP-EMS health promotion program: A qualitative study on participants' views of the role of paramedics. *BMC health services research*.
 2016;16(1):435. <u>http://www.ncbi.nlm.nih.gov/pubmed/27557895</u>. doi: 10.1186/s12913-016-1687-9.

29. Patterson DG, Coulthard C, Garberson LA, Wingrove G, Larson EH. What is the potential of community paramedicine to fill rural health care gaps? *Journal of Health Care for the Poor and Underserved*. 2016;27(4A):144-158. <u>https://search.proquest.com/docview/1845145449</u>. doi: 10.1353/hpu.2016.0192.

30. Pearson K, Shaler G. Community paramedicine pilot programs: Lessons from maine. *Journal of Health and Human Services Administration*. 2017;40(2):141-185.

https://search.proquest.com/docview/1931599164.

31. Dainty KN, Seaton MB, Drennan IR, Morrison LJ. Home visit-based community paramedicine and its potential role in improving patient-centered primary care: A grounded theory study and framework. *Health services research*. 2018. <u>https://www.ncbi.nlm.nih.gov/pubmed/29542111</u>. doi: 10.1111/1475-6773.12855.

32. Pearson K, Gale J, Shaler G. Community paramedicine in rural areas: State and local findings and the role of the state flex program. *University of Southern Maine*. 2014;1.

33. Nolan M, Gale N, Ruest M, et al. Paramedic referral toolkit. *Ontario Association of Community Care Acess Centres*. 2015:1-38.

34. Martin A, O'Meara P, Farmer J. Consumer perspectives of a community paramedicine program in rural ontario. *Australian Journal of Rural Health*. 2016;24(4):278-283. doi: 10.1111/ajr.12259.

35. Agarwal D, Angeles R, Pirrie M, et al. Evaluation of a community paramedicine health promotion and lifestyle risk assessment program for older adults who live in social housing: A cluster randomized trial. *Canadian Medical Association Journal*. 2018;190(21):E638-E647. https://www.clinicalkey.es/playcontent/1-s2.0-S0820394618304516. doi: 10.1503/cmaj.170740.

36. Choi BY, Blumberg C, Williams K. Mobile integrated health care and community paramedicine: An emerging emergency medical services concept. *Ann Emerg Med.* 2016;67(3):361-366.

http://elib.tamk.fi/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=ccm&AN=113 255023&site=ehost-live. doi: 10.1016/j.annemergmed.2015.06.005.

37. Abrashkin KA, Washko J, Zhang J, Poku A, Kim H, Smith KL. Providing acute care at home: Community paramedics enhance an advanced illness management Program—Preliminary data. *Journal of the American Geriatrics Society*. 2016;64(12):2572-2576.

http://onlinelibrary.wiley.com/doi/10.1111/jgs.14484/abstract. doi: 10.1111/jgs.14484.

38. Agarwal G, Angeles R, Pirrie M, et al. Effectiveness of a community paramedic-led health assessment and education initiative in a seniors residence building: The community health assessment program through emergency medical services (CHAP-EMS). *BMC Emergency Medicine*. 2017;17(8):1-8. <u>https://search.proquest.com/docview/1882967057</u>. doi: 10.1186/s12873-017-0119-4.

39. Steeps R, Wilfong D, Hubble M, Bercher D. Emergency medical services professionals attitudes about community paramedic programs. *Western Journal of Emergency Medicine*. 2017;18(4):630-639.

40. Lee JS, Verbeek PR, Schull MJ, et al. Paramedics assessing elders at risk for independence loss (PERIL): Derivation, reliability and comparative effectiveness of a clinical prediction rule. *CJEM*. 2016;18(2):121-132. <u>http://www.ncbi.nlm.nih.gov/pubmed/26988720</u>. doi: 10.1017/cem.2016.14.

41. Snooks HA, Kingston MR, Anthony RE, Russell IT. New models of emergency prehospital care that avoid unnecessary conveyance to emergency department: Translation of research evidence into practice? *The Scientific World Journal*. 2013;2013:1-6.

https://doaj.org/article/8c42a5ed59ee48f380b46a4d681ebf6f. doi: 10.1155/2013/182102.

42. American Academy of Orthopaedic Surgeons. *Community health paramedicine*. 1st ed. Sudbury: Jones & Bartlett Learning; 2017:2-4.

http://ebookcentral.proquest.com/lib/[SITE\_ID]/detail.action?docID=4835239.

43. Berchet C, Nader C. The organisation of out-of-hours primary care in OECD countries. *OECD Health Working Papers*. 2016;1(89):1-46. <u>https://search.proquest.com/docview/1826880522</u>. doi: 10.1787/5ilr3czbqw23-en.

44. Leutz W. Reflections on integrating medical and social care: Five laws revisited. *Journal of Integrated Care*. 2005;13(5):3-12.

http://www.emeraldinsight.com/doi/abs/10.1108/14769018200500034. doi:

10.1108/14769018200500034.

45. Lüdecke D. Patient centredness in integrated care: Results of a qualitative study based on a systems theoretical framework. *International journal of integrated care*. 2014;14(4):e031. http://www.ncbi.nlm.nih.gov/pubmed/25411573. doi: 10.5334/ijic.1361.

46. Taube E, Kristensson J, Sandberg M, Midlöv P, Jakobsson U. Loneliness and health care consumption among older people. *Scandinavian Journal of Caring Sciences*. 2015;29(3):435-443. <u>https://onlinelibrary.wiley.com/doi/abs/10.1111/scs.12147</u>. doi: 10.1111/scs.12147.

47. WHO. New WHO advisory group launched in almaty to shape the future of primary health care . <u>http://www.euro.who.int/en/health-topics/Health-systems/primary-health-</u> <u>care/news/news/2017/06/new-who-advisory-group-launched-in-almaty-to-shape-the-future-of-</u> <u>primary-health-care</u>. Updated 2017. Accessed 24.3., 2018.

48. Goodwin N. Thinking differently about integration: People-centred care and the role of local communities. *International journal of integrated care*. 2014;14(3):e026. http://www.ncbi.nlm.nih.gov/pubmed/25337063. doi: 10.5334/ijic.1736.

49. Sunde S, Walstad RA, Bentsen SB, et al. The development of an integrated care model for patients with severe or very severe chronic obstructive pulmonary disease (COPD): The COPD– Home model. *Scandinavian Journal of Caring Sciences*. 2014;28(3):469-477.

https://onlinelibrary.wiley.com/doi/abs/10.1111/scs.12069. doi: 10.1111/scs.12069.

50. Tanninen H, Häggman-Laitila A, Pietilä A, Kangasniemi M. The content and effectiveness of home-based nursing interventions to promote health and well-being in families with small children: A systematic review. *Scandinavian Journal of Caring Sciences*. 2016;30(2):217-233. <u>https://onlinelibrary.wiley.com/doi/abs/10.1111/scs.12251</u>. doi: 10.1111/scs.12251. 51. Caid LP. The shift toward community-integrated paramedicine. *Firehouse*. 2016;41(5):62-65. <u>http://elib.tamk.fi/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=ccm&AN=115</u> <u>170391&site=ehost-live</u>.

52. Mason S, Knowles E, Colwell B, et al. Effectiveness of paramedic practitioners in attending 999 calls from elderly people in the community: Cluster randomised controlled trial. *BMJ*.
2007;335(7626):919-922. <u>http://dx.doi.org/10.1136/bmj.39343.649097.55</u>. doi: 10.1136/bmj.39343.649097.55.

53. Halter M, Marlow T, Mohammed D, Ellison GTH. A patient survey of out-of-hours care provided by emergency care practitioners. *BMC Emergency Medicine*. 2007;7(1):4. http://www.ncbi.nlm.nih.gov/pubmed/17573959. doi: 10.1186/1471-227X-7-4.

54. Swain AH, Al-Salami M, Hoyle SR, Larsen PD. Patient satisfaction and outcome using emergency care practitioners in new zealand. *Emergency Medicine Australasia*. 2012;24(2):175-180. <u>http://onlinelibrary.wiley.com/doi/10.1111/j.1742-6723.2011.01525.x/abstract</u>. doi: 10.1111/j.1742-6723.2011.01525.x.

55. Berwick DM, Nolan TW, Whittington J. The triple aim: Care, health, and cost. *Health Affairs*.
2008;27(3):759-769. <u>http://content.healthaffairs.org/cgi/content/abstract/27/3/759</u>. doi:
10.1377/hlthaff.27.3.759.

Author(s), year,	Purpose of	Sample	Study design	Main results
country	the study			
Stirling et al. 2007, Australia	to explore community engagement by paramedics in an expanded scope role contributes to primary health care and to an overall improved emergency response in rural communities	N=17 key informants from each of the four EMS Each four EMS named examples of rural ESP	Triangulation: Semi-structured interviews + Observation of key processes and events + review of documents that described the paramedic role and the available organizational and educational support	Expanded scope paramedics community engagement promotes the health or rural communities in three key ways: increasing community response capacity, linking communities more closely to ambulance services, and undertaking health promotion and illness prevention work at the community level. The gain came through the transfer of knowledge and skills to other community members. Leadership, management and communication skills are important for paramedics undertaking ESP roles.
Mullhollalnd et al. 2009, Australia	to describe the ESP and facilitating factors for this role	N=17 key informants (3 local general practitioners, 5 volunteer ambulance officers, 5 paramedics, 1 director of nursing, 1 radiographer, 1 police officer, and 1 local council employee	Interview, observation and document review Triangulation	Rural paramedic practice needs multidisciplinary and community-based response to patient care including Community involvement, Organizational support, Professional support, Education & Training. These should be rooted in a footing of informality.
O-Meara et al. 2012, Australia	the evolution of rural paramedic practice (trends, key characteristics,	N=17 key informants from four ambulance service (paramedics, volunteers, nurses,	Theme Interviews (community engagement, clinical response, scope of	Paramedics as first line primary healthcare providers in small rural communities can develop additional responsibilities. Rural community engagement encompassed more active community role as health education and screening. Emergency response role is still a highly valued component. Situated practice could

# Table 1 Summary of the 21 Included Articles

	roles & expected outcomes) for a Rural Expanded Scope of Practice (RESP) model	doctors, community members)	practice extension, educational requirements) sociological framework	take place in out-of-hospital and inside hospital. Health promotion and preventative services, and the treatment of minor injuries could be integrated in activities.
Bigham et al. 2013, Canada	to describe existing community paramedic programs	N=11	Systematic review	There is no consensus what Community paramedic should do, and the science should support the safety and effectiveness of the practice, help to understand the potential benefits and risks of CP for health systems and patients alike.
Kizer 2013, USA	to assess the feasibility of developing CP programs in California Is paramedic's expanded role a practical option for California communities?	N=3 Prehospital CP N=3 post-hospital or community health services CP N=37 stakeholders from different organizations	Program reviews	<ul> <li>Prehospital: 1.Transport to alternate destinations; San Francisco, (HOME-team), 2.Assess, treat as needed, and refer or release: the Orange Country EMS agency/North Carolina, 3. Addressing the needs of frequent 911 c4allers or visitors to EDs: San Diego Program leveraged technology with real-time EMS and computer-aided device surveillance.</li> <li>Post-Hospital or Community health services:</li> <li>1.recently discharged and at increased risk of readmission,</li> <li>2.support for chronical ill; periodic checks and education; Forth Worth/Texas and</li> <li>3. Collaboration providing preventive care</li> </ul>
			Interviews	There is limited understanding of CP and the EMS system. EMS is essential to the health care system but it is not well integrated. Specific CP activities need support and CP services need additional payment. CP program outcome need measurement, need in urban and rural may vary. Better and ideally electronic exchange of information is needed. There are concerns about paramedic skills, training and capacity. There are alternatives to supporting development of CP and the vigilance must be maintained. Could there be a new profession: primary care technician? CP program require more clarity about purpose, education, training, scope of practice, and medical supervision.

Jensen et al. 2014, Canada	to identify insights gained and lessons learned during an extended-care paramedic implemented to provide emergency assessment and care on site to long-term care residents suffering acute illness or injury	N=21 (6 ECP, 3 physicians, 5 decision makers, 6 paramedics 6 1 CO)	Interviews	<ul> <li>the key themes:</li> <li>1)program implementation</li> <li>*advanced-level paramedic with geriatric training, thinking</li> <li>"outside the box" and have "soft skills"</li> <li>2)Extended-care paramedic's process of care</li> <li>*Time on calls; stop and discuss before contact, decision making</li> <li>3)communications</li> <li>*liaise communication, for family/patient e.g. what could be done in the ED</li> <li>4)End-of-life care</li> <li>*preparation &amp; discussions from DNR to Comfort care only</li> </ul>
O'Meara 2014, Australia	to examine the community paramedics' emergence and potential impact	N=23	Scoping Review	There is an emerging research literature that is contributing to the development of CP program models. The UK literature focuses on extended care paramedics (ECP), in North American literature focused on community paramedicine. In Australia and New Zealand the literature of CP has inspiration from both approaches and is more theoretically orientated. There is considerable overlap between ECPs and Community paramedic clinical competences. In UK researchers are developing measurement tools for quality and safety. There is need to measure community engagement and integration with other healthcare providers. The empirical studies of CP models need more a theoretical basis.
Pearson et al. 2014, USA	to exam the evidence base for CP in rural communities, the role of Cparamedic, and the faced challenges	N=37 (state EMS officials and directors, Flex Program coordinators	Survey and Interviews + review of state Flex grant applications and literature focusing on the integration of EMS into local healthcare delivery system	Many rural CP programs are in pilot stages Colorado has the longest history, Minnesota the most developed programs and Maine launched 12 pilot programs in 2013.In Georgia local hospital has given permission to allow access to their electronic health record. In Nebraska one CP program in on rural, one on suburban and one on urban area. Some of the rural areas have a shortage of fulltime medical directors. This expanded role is not taking away jobs from other health care professionals. CP is also a way of recruiting and retaining paramedics. Cost-

Brydges et al. 2015, Canada	to explore paramedic interaction with referral programs to identify opportunities and challenges in their practice	N=23 frontline paramedics	interviews	Paramedics view referral programs as a welcome opportunity to address patients' needs in their everyday practice but the role has not been incorporated into the profession. The success of referral programs may be limited if role is confused, the knowledge base is inadequate, the accountability is undefined, and paramedics are patient's advocate.
OAPC 2015, Canada	to develop a best practice framework for community referrals that improve access to the appropriate patient-centred care	N=11 articles Interviews, inductive thematic analysis N=prox4000 patient referrals	Systematic review Qualitative and quantitative analysis	eReferral to the appropriate community service connects each patient with the right care, supporting their unique needs and providing timely access to the appropriate care. Paramedic Referral Tool Kit to support and implement best practices for community referrals made by Paramedic Services. The toolkit includes: -supporting research for CParamedic program -education and training -clinical prediction rule *Paramedic assessing Elders for Independence oss (PERIL) Assessment Tool ; PERIL : 3/3 98% or 2/3 68% an adverse outcome within 30 days *Paramedic and Community Care Team (PAACT) programs *Community Referral from Emergency Medical Service (CREMS) -referral process -electronic referral A standardized referral form was developed within a collaborative framework.
Zavadsky et al. 2015, USA	to add to the EMS prfession's understanding of the development, characteristics and status of	N=103 (EMS agencies)	Survey	The concept of community paramedicine started in rural areas, and now 54% operate in urban area. 20% of MIH-CP programs have operated two years or longer. One long-term goal is to reach members of the community before they become frequent users of EMS systems and hospitals because of their health or psychosocial issues. 70% of programs are team-based and incorporates multiple providers (clinical and non-clinical). 69%

avoidance or shared savings strategy does not allow CP program get payment if the patient is readmitted within 30 days.

	MIH-CP in the United States			of programs received referrals from hospitals. 62% of programs referred patients to Social Service Agencies and 66% to home health. The clinical services included mostly history and physical assessment (89%), laboratory services from glucose checks (70%) to stood collection (13%) and throat swab cultures (12%). 61% of programs included also weight checks added respiratory and cardiovascular services. 79% of programs offered the post-discharge follow-up services, from prevention services 43% offered nutrition assessment and patient education services were from hypertension screening and education (62%) to cancer self-exam awareness (3%). Mostly (89%) the reimbursement/funding was a significant obstacle. 90% of respondents were collecting data and 81% of programs in operation have succeed in reducing costs, 911 use and ED visits for defined groups of patients.
Abrashkin et al. 2016, USA	to compare a CP model and traditional EMS within an Advanced Illness Management (AIM) program	N=773 individual (664 CP response and 1,091 traditional EMS transports	Observation	78% of CP response were treated in the home. From those transported to hospital 82.2% of CP patients were hospitalized 82.2% and from traditional EMS patients 68.9% were hospitalized.
	(Aniv) program	and caregivers	+ post-CP survey	All respondents (agreed or strongly agreed) felt that CP delivered high-quality services and care.
Brydges et al. 2016, Canada	How Community Paramedics are perceived by their clients in CP program?	N = 15	Observation + Interviews	Three themes emerged: 1) The CP program sessions were individualized, caring and trusty. 2)Paramedics were having dual identities as health advocate and a traditional role as emergency experts.3) Elements of paramedic's "emergency" role remained important and valuable.
Choi et al. 2016, USA	The history of MIH-CP and is there any outcomes?	N=	REVIEW; observations from existing program data	Three main categories: history and outcomes of MIH-CP and training for providers. The first program was to address rural health care needs. MIH-CP In 2014 the term "community paramedic" was updated to "community paramedicine provider" because all providers were not paramedics. Between January 2010 to February 2015, 146 patients avoided 1,893 transports to the ED in Readmission Prevention Program (a charge avoidance of USD 21,627. The participants of the CHF readmission prevention program reported an overall patient satisfaction

				score of 4.9 out of 5. A self-assessment tool was developed in 2012 having three major benchmark areas: local need assessment, appropriate policy development, and assurance to fulfill of service obligations (medical oversight, cost-effectiveness, competent workforce). CP provider's additional skill set should have expanded psychomotor, diagnostic, and triage skills added with the knowledge of cultural sensitivity, chronic disease pathophysiology, and facility with community resources.
Lee et al. 2016, Canada	to derive and test the reliability of a clinical prediction rule to identify high-risk older adults using paramedics' observation	N=1,065 subjects, of which 764 had complete data	Intervention study by the Paramedics assessing Elders at Risk of Independence Loss (PERIL) checklist of 43 yes or no questions, including the Identifying Seniors at Risk (ISAR) tool items.	Inter-observer reliability was good or excellent for 40/43 questions. Four-item rule was derived: 1)Problems in the home contributing to adverse outcomes? 2) Called 911 in the last 30 days? 3) male and 4) lacks social support. The four-item PERIL rule has good interobserver reliability and adherence. ISAR is an acceptable alternative, with lower adherence.
O'Meara et al. 2016, Australia	to identify and analyze how community paramedics create and maintain new role, boundaries and identities in terms of flexibility and permeability		interviews, focus group, field observation Thematic analysis and boundary theory to develop a CP model of care	A model of care following the mnemonic RESPIGHT: Response to emergencies; Engaging with community; Situated practice; Primary health care; Integration with health, aged care and social services; Governance and leadership; Higher education, and Treatment and transport options. Successful CP program is integrated with health, aged care and social services and benefit from strong governance and paramedic leadership.
Patterson et al. 2016, USA	to exam goals, activities, and outcomes of 31 rural-serving CP programs	N=31 (program leaders) + N=11	Interviews + document review	Most common goal included managing chronic disease (90.3%) and secondly reducing ED visits (83.9%). The most targeted group was the chronically ill (90.3%), secondly post-hospital discharge patients (54.8%). Programs provided assessment, testing, preventive care, and post-discharge services.
Martin et al. 2016, Canada	to evaluate a CP program in rural Ontario, Canada, through the	N=14	An observational ethnographic study:	Three main interlinked themes were identified: improved *health monitoring and primary health care access close to home *sense of security and support for vulnerable residents in the community * consumer education and

	perceptions and experiences of consumers		informal discussions, interviews and direct observation	empowerment for enhanced health management. Consumers had accepted the paramedics in non-traditional preventative health care roles.
Agarwal et al. 2017, Canada	to exam the effectiveness of the CHAP-EMS program to reduce blood pressure, diabetes risk, and EMS calls	N=79	Intervention study + Survey	Systolic blood pressure decreased significantly by the participant's third visit to program and diastolic decreased by the fifth visit. 15% of participants dropped one CANRISK category during the intervention. The number of EMS calls from two years before the program decreased 25% during one year of intervention.
Pearson et al. 2017, USA	to describe the possibilities, outcomes and lessons learned from the Maine CP programs	N=12 CP pilot sites programs + N=3,775 home visits by CP providers monitoring the number of CP home visits by analysing data from Maine EMS Run Report System	a questionnaire and interview protocols based on the HRSA Community Paramedicine Evaluation Tool (Office of Rural Health Policy, 2012)	Developed an overall cost-avoidance formula and an cost- avoidance formula for hospital readmission <b>Key lessons learned:</b> 1)implement requires effort 2)data collection inconsistent 3)the cost savings attributable impossible 4)economic 5)patient satisfaction measurement needed 6)data to provide training and technical assistance
Steeps et al. 2017, USA	to evaluate the perceptions of EMS professionals toward the concept of a CP program	N=283 (EMS professionals)	a cross-sectional study e-SURVEY	70% indicated understood what a CP program entails. 58% were ready to additional training and 66% were willing to perform CP duties; females were more willing than males.