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

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

*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 programmes have been developed to deliver home care as an integral part of the local healthcare system. The programmes 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. The four core components of Community Paramedicine emerged (a) Community engagement, (b) Multi-agency collaboration, (c) Patient-centred prevention and (d) Outcomes of programme: cost-effectiveness and patients' experiences.
*Conclusion:* The Community Paramedicine programmes 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.

**Keywords:** community paramedic, community paramedicine, emergency medical services, expanded scope of practice, prehospital care, primary health care, scoping review.

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## Introduction

The primary care services are challenged between increased demands of home care and number of staff 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 2 years ago and in hospitals there are proximately 2800 beds less than before (1).

Hospital readmissions and frequent nonurgent emergency department visits are huge factors in the rising cost of health care. Iezzoni (2) 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 rehospitalised within 30 days (3). 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 1600 calls every year. From these 'frequent flyers' more than 70% have chronic medical issues which can increase the strain in- and outside the hospital (4–7).

The changes of providing health care 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

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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, many community-based paramedicine programmes provided by EMS, have been developed to deliver home care as an integral part of the local community healthcare system (8).

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 (9). 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 (10). New models of EMS as CP could offer one of the solutions for the myriad changes and needs in the healthcare system (11).

The social and healthcare reforms in Finland and in Norway (The Health & Care 21 strategy) also require integrated people-centred health services and the new innovations from multidisciplinary teams support preventive healthcare methods for citizens, which could reduce hospitalisation (12, 13). Since 2001, when the concept of Community Paramedicine was first described, the CP programmes have tried to be part of home healthcare and community paramedics tried to be an integrated part of the healthcare team (2, 8, 14). 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 programme 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 (15). The effectiveness or interventions of studies are not attempted to be presented. The review can identify research gaps in the evidence base and summarise findings from existing literature regarding the overall state of research activity (15, 16). The inductive content analysis and descriptive summary were 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 and June 2018. The start day of 2005 was chosen because it is the year, when the International Roundtable on Community Paramedicine (IRCP) was founded (17). 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 healthcare programmes, primary care setting or nonemergency 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 organisations (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.

### *Retrieval of studies*

First, the titles and then the abstracts were reviewed. The abstracts were sorted by article type; original research articles, review articles, programme 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.

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 (Table 1). 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 (15) 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 (18). 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.

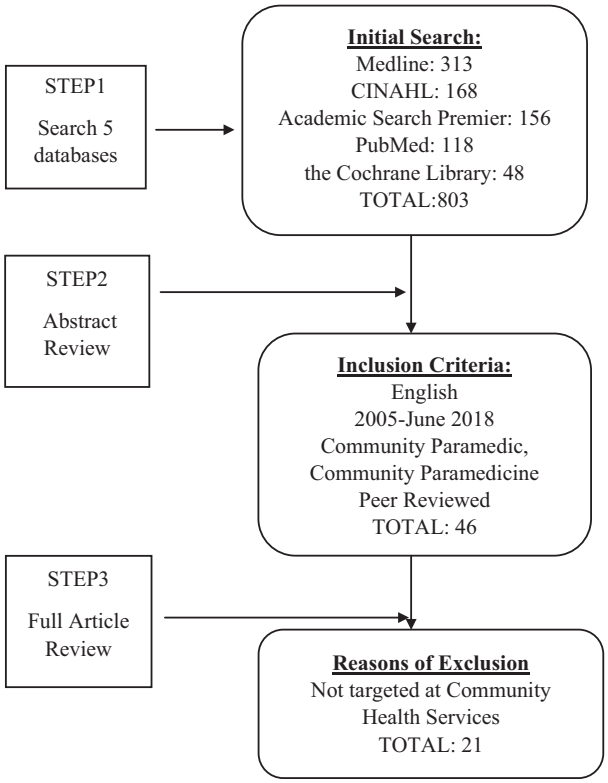


**Figure 1** Search Strategy and mapping process.

## Results

### *Description of the studies*

A total of 21 studies or programme 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).

**Table 1** Inclusion and exclusion criteria

| *Criterion* | *Inclusion* | *Exclusion* |
|---|---|---|
| Time | January 2005 – June 2018 | Any study outside these dates |
| Language | English | Non-English |
| Type of article | Peer-reviewed research articles, programme reports, preliminary data | Opinion articles, commentaries, letters to the editors |
| Target group | Nonemergency patients | Emergency patients |
| Study focus | Community Paramedicine programme(s) Extended care programme (s) | No connected in any CP- or extended care programme (s) |
| Profession | Paramedic, nurses, emergency medical technician | Other professions |

### *Core components of Community Paramedicine*

During thematic analysis, the core components of CP were identified as (a) community engagement, (b) multiagency collaboration, (c) patient-centred prevention and (d) outcomes of programme: cost-effectiveness 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 (19–29). After the risk assessment, the local healthcare needs were identified and CP provided care as a tailored programme. 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 (19, 27–31). Subsidised seniors were visited and their fall risks were assessed, they got health education, and if needed they were connected to other local healthcare resources (32, 33).

**Table 2** Summary of the 21 included articles

| *Author(s), (year), country* | *Purpose* | *Participant (n)* | *Study design* | *Main results* |
|---|---|---|---|---|
| Stirling et al. (2007), (19) Australia | To explore community engagement and how the new role of paramedics contribute to primary health care | Informants from EMS (n = 17) | Triangulation: Semi-structured interviews, observation of the key processes and events, and the review of documents Triangulati | The new role of paramedics promotes the health of 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 |
| Mullholland et al. (2009), Australia | To describe the expanded role for the rural paramedic and determine what factors facilitate this role | Local EMS providers and co-workers (n = 17) | Triangulation: Interview, observation and document review | Rural paramedic practice needs multidisciplinary and community-based response to patient care including Community involvement, Organisational support, Professional support, Education & Training. These should be rooted in a footing of informality |
| O'Meara et al. (2012), (21) Australia | To examine the evolution of rural paramedic practice | EMS providers (n = 17) | Interview | In small rural communities, the paramedics' role is increasing as the first line primary healthcare providers developing additional responsibilities in the cycle of care. The core components of the new role were rural community engagement, emergency response, situated practice, and primary health care called: RESP-model |
| Bigham et al. (2013), (23) Canada | To describe existing community paramedic programmes | Articles (n = 11) | Systematic review | The scope of CP is tailored to the needs of the local communities. Nontraditional pathways included e.g. protocol-driven referrals to radiography clinics, and district nurses. Outcomes ranged from clinical indicators (ED attendance and length of stay), operational outcomes (time on task, and transport rates) to patient satisfaction scores and economic impacts on health systems |
| Kizer (2013), (11) USA | To describe the history, the development and the current perspectives on CP in California/USA | Programme reports (n = 6)<br>Stakeholders from different organisations (n = 37) | Reviews<br>Interviews | Paramedics are trained to perform patient assessments and to provide care in home and community setting under medical care condition. They are available 24/7/365, and are trusted and respected by the public. CP service programmes could be divided prehospital, posthospital, and community health services. Prehospital services included transport to alternate destination, nonemergency assessment, refer or release the patient, address the needs of frequent 911 callers. Post-Hospital or Community Health Services provided follow-up care for persons recently discharged or support for persons with diabetes, asthma, congestive heart failure, or multiple chronic conditions or community paramedics worked as partner with community health workers to provide preventive care such as flu vaccines or education about injury prevention EMS is essential to the health care system but it is not well integrated. The outcomes of CP programmes need to be measured and the needs vary in urban or rural. The exchange of information should be better and electronic. The paramedics need additional training and possibilities to maintain their urgent and also nonemergency skills. Could there be a new profession: primary care technician? |

**Table 2** (Continued)

| *Author(s), (year), country* | *Purpose* | *Participant (n)* | *Study design* | *Main results* |
|---|---|---|---|---|
| O'Meara (2014), (23) Australia | To examine the extent, range and nature of research activity of the community paramedic role | Literature (n = 23) | Scoping review | The CP literature had three categories: theoretical studies; empirical studies measuring outcomes; and reviews. There are few peer-reviewed articles, a growing number of empirical studies as a result of programme evaluations. Only few reviews are focused on innovations in paramedic practice. There is a 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), (30) USA | To exam the evidence base for CP in rural communities, the role of Community Paramedic, and the faced challenges | State EMS officials and directors, programme coordinators, local EMS and hospital providers (n = 37) | Survey, Interviews, review of state Flex grant applications, and a literature review of peer-reviewed literature focusing on the integration of EMS into local healthcare delivery system | Many rural CP programmes are in pilot stages. Most community paramedics work within an expanded role rather than an expanded scope of practice. The sustainability of CP programmes has challenges in funding and reimbursement. In Flex Programme the CP provider does not get paid if the patient is readmitted within 30 days. Collaboration at local and state level is essential for the success of CP programmes |
| Brydges et al. (2015), (24) Canada | To explore paramedic experiences with referral programmes to identify opportunities and challenges in their practice | Paramedics (n = 23) | Interviews | Paramedics experienced the role confusion, and that their knowledge based was inadequate. They have got inadequate feedback, and described undefined accountability when their referral moving 'off into a black hole', with the 'hope' that someone would provide care to the patient. Paramedics sense of their role as patient advocates |
| Nolan et al. (2015), (31) Canada | To provide an evidence-based toolkit for EMS/Community referrals | Literature on CP + evolving Community Paramedic initiatives + evaluation of provincial community paramedic toolkit components (n = 11) patient referrals (n = 4000) | Systematic review<br>Qualitative and quantitative analysis | Existing literature shows feasibility, positive evaluation, and cost-effectiveness. Evidence-based components to support and implement best practices for community referrals are<br>• Education and Training Online<br>• Clinical Prediction Rule:<br>○ Paramedics assessing Elders for Independence Loss (PERIL) Assessment Tool<br>○ Paramedic and Community Care Team (PAACT) programmes<br>○ Community Referral from Emergency Medical Service (CREMS) and Electronic Referral<br>A standardised referral form was developed within a collaborative framework. The referral is designed to increase opportunities to mitigate future repeat use of the frequency healthcare users |

**Table 2** (Continued)

| *Author(s), (year), country* | *Purpose* | *Participant (n)* | *Study design* | *Main results* |
|---|---|---|---|---|
| Zavadsky et al. (2015), (25) USA | To add to the EMS profession's understanding of the development, characteristics and status of MIH-CP in the United States | EMS agencies that were either known or thought to have an MIH-CP programme (n = 103) | Survey | 54% CP programmes operate in urban area. 20% of MIH-CP programmes have operated 2 years or longer. One long-term goal is to reach members of the community before they become frequent users of EMS systems and hospitals. 70% of programmes are team-based and incorporates multiple providers. 69% of programmes received referrals from hospitals. 62% of programmes referred patients to Social Service Agencies and 66% to home health. The clinical services included history and physical assessment (89%), laboratory services from glucose checks (70%) to stood collection (13%) and throat swab cultures (12%). 61% of programmes included weight checks added respiratory and cardiovascular services. 79% of programmes offered the post-discharge follow-up 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 was a significant obstacle. 90% of respondents were collecting data and 81% of programmes have succeed in reducing costs, 911 use and ED visits |
| Abrashkin et al. (2016), (35) USA | To compare a CP model and traditional EMS within an Advanced Illness Management (AIM) programme | Individuals/Patients (n = 773)<br>Patients and caregivers (n = 116) | Observation<br>Mailed survey within 1 week of the CP response | 78% of CP response were treated in the home. From those transported to hospital 82.2% of CP patients were hospitalised and from traditional EMS patients 68.9% were hospitalised<br>All respondents (agreed or strongly agreed) felt that CP delivered high-quality services and care |
| Brydges et al. (2016), (26) Canada | To examine participants' perceptions of paramedics providing a CP programme | Participants (n = 15) | Observation + Interviews | Three themes emerged: (1) The CP programme sessions were individualised, 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), (34) USA | To describe the mobile integrated health care and CP (MIH-CP) | Programmes (n = 26) | Review | MIH and CP are models of health care delivery that use EMS personnel to fill gaps in local health care infrastructure. In 2014 the term 'community paramedic' was updated to 'community paramedicine provider' because all providers were not paramedics. A self-assessment tool was developed in 2012 having three major benchmark areas: local need assessment, appropriate policy development, and assurance to fulfil of service obligations (medical oversight, cost-effectiveness, competent workforce). CP provider's additional training should include expanded psychomotor, diagnostic, and triage skills added with the knowledge of cultural sensitivity, chronic disease pathophysiology, and facility with community resources |

**Table 2** (Continued)

| *Author(s), (year), country* | *Purpose* | *Participant (n)* | *Study design* | *Main results* |
|---|---|---|---|---|
| Lee et al. (2016), (38) Canada | To derive and test the reliability of a clinical prediction rule to identify high-risk older adults using paramedics' observation | Assessment documents (n = 764) | Intervention study | From 43 yes or no questions was derived four-questions rule: (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 could be used by emergency physician and paramedic services to target preventative interventions for seniors identified as high-risk |
| O'Meara et al. (2016), (14) Australia | To identify and analyse how community paramedics create and maintain new role, boundaries and identities in terms of flexibility and permeability | Community members (patients, family and carers), paramedics, EMS managers, educators, physician, health economists and health service managers (n = 40; focus groups, n = 34 interviews) | Observation of practice, informal discussions, interviews and focus groups<br>Thematic analysis and boundary theory to develop a CP model of care | A CP model of care (distinguishing CP from other paramedic service innovations) follows 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<br>Successful CP programme is integrated with health, aged care and social services and benefit from strong governance and paramedic leadership. Community engagement and situated practice distinguish CP models of care from other paramedicine and out-of-hospital health care models |
| Patterson et al. (2016), (27) USA | To exam goals, activities, and outcomes of 31 rural-serving CP programmes | Documents (n = 31)<br>Programme leaders (n = 31) | A systematic review<br>Interviews | Most common goal was managing chronic disease (90.3%), secondly reducing ED visits, hospital admissions/readmissions or costs (83.9%). In programmes, the targeted groups were chronically ill (90.3%), discharge patients (54.8%), and frequent EMS users (64.5%). Referrals were used mostly with primary care facilities (67.7%). Programmes provided assessment, testing, preventive care, and post-discharge services. Only few programmes used evaluation methods |
| Martin et al. (2016), (32) Canada | To evaluate a CP programme through the perceptions and experiences of consumers | Adult consumers (n = 14) | Observation, informal discussions, interviews | 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 empowerment for enhanced health management. Consumers had accepted the paramedics in nontraditional preventative healthcare roles |

**Table 2** (Continued)

| *Author(s), (year), country* | *Purpose* | *Participant (n)* | *Study design* | *Main results* |
|---|---|---|---|---|
| Pearson et al. (2017), (28) USA | To describe the possibilities, outcomes and lessons learned from the Maine CP programmes | CP programmes (n = 12)<br>Community Paramedic's home visits (n = 3775) | A case study 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<br>**Key lessons learned:**<br>1 implement requires effort<br>2 data collection inconsistent<br>3 the cost savings attributable impossible<br>4 economic<br>5 patient satisfaction measurement needed<br>6 data to provide training and technical assistance |
| Steeps et al. (2017), (37) USA | To evaluate the perceptions of EMS professionals towards the concept of a CP programme | EMS professionals (n = 283) | A cross-sectional study e-SURVEY | 70% indicated understood what a CP programme entails. 58% were ready to additional training and 66% were willing to perform CP duties; women were more willing than men |
| Agarwal et al. (2018), (33) Canada | To determine if a CP programme can reduce the number of ambulance calls to subsidised housing for older adults | Of 22 subsidised-housing buildings for older adults<br>In both the intervention and control buildings<br>n = 129/n = 129 | An open-label pragmatic cluster-randomized controlled trial (RTC) with parallel intervention and control groups | The quality-adjusted life years showed significant improvement for residents in the intervention buildings compared with those living in the control buildings. Systolic blood pressure decreased significantly by the participant's third visit to programme and diastolic decreased by the fifth visit. 15% of participants dropped one CANRISK category during the intervention. The number of EMS calls from 2 years before the programme decreased 25% during 1 ear of intervention |
| Dainty et al. (2018), (29) USA | To understand the experiences and perspectives of patients and families involved with the Expanding Paramedicine in the Community (EPIC) programme | n = 30 patients and 10 family members | Interviews from patients and/or family members + 60 hours of observation | A core theme of EPIC programme addressed patient vulnerability by providing 'safety-net'. The participants felt that the programme was a source of health education and has a big meaning while building the bridge between the community paramedics and the patients |

Community Paramedicine 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 (11). Zavadsky et al. (25) identified 111 CP programmes 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 programme (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) (11, 19, 30, 34). A community-based CP programme allowed paramedics to target their efforts effectively, preventive and without emergency (11, 19, 28). Additionally, community engagement also meant collaboration with other local healthcare providers, and volunteers sharing of responsibility and the resources (20).

### *Multi-agency collaboration*

The multi-agency collaboration was described in terms of partnership, multidisciplinary, collaboration, and integrated care (11, 14, 19–28, 31, 34–36). 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 nonurgent settings outside the hospital (25, 34). CP focused on longer period coordinated care than the typical Emergency Medical Service calls, with physicians and primary care including, for example approval of care plans, and telemedicine consultation (25, 35). MIH-CP was written to be 'fully integrated, collaborative, data driven, patient-centred and team-based' (25, 34). MIH-CP activities can provide telephone advice instead of resource dispatch, from preventive and chronic disease management to postdischarge follow-up, transport if needed or referral to other health or social care provider instead of hospital emergency department (25).

Most of the 31 CP programmes researched by Patterson et al. (27) 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. (20, 21, 27, 28, 31). Furthermore, there was also a requirement to develop a stronger relationship with local social services and faith-based organisations (28). Mulholland (20) 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 (37). However, the CP providers could be also seen as competitors and the community paramedics expanded role can cause resistance from other healthcare professionals (11, 28, 34). The tensions were lower when the CP programme team included a delegate from other multi-agency services and collaboration has helped to understand and support CP as the novel model of health care (28).

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) (20). Collaborative CP, working seamlessly with other health agencies, provided patient-centred qualified health care (14, 21, 29, 33).

### *Patient-centred prevention*

Patients were described in terms of frequent caller, discharged patient, home-bound, senior and long-term patient (11, 19–24, 26–28, 30, 31, 34–36, 38). 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 (21, 24, 25). 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 nonurgent 911 callers instead of sending an ambulance crew (11, 25, 30, 31, 36). Lee et al. (38) 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 (31, 38).

Community Paramedicine programmes 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 (11, 22, 27, 29, 30, 32–35).

### *Outcomes of Programme; Cost-effectiveness*

One of the CP primary goals was the reduction in nonurgent 911 calls which also reduced the costs of ED care

(28). 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 (11).

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, Gale & Shaler (30) 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 programme 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 (30).

Community Paramedicine offered interventions to reduce hospital attendance, to enhance access to primary care and to provide more appropriate use resources as cost-efficient benefit (11, 19, 28, 30–32). The CP programme of the nonurgent 911 callers managed to achieve 20% reduction of transports, and patient's satisfaction increased 6% (28). In Nevada, the CP programme helped to avoid 1, 795 visits to ED, 354 ambulance transports, and 28 hospital readmissions; together USD $7.9 million in charge (34). CP programme 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% (11).

*Outcomes of programme; patient's experiences*

Patient experiences included trust, care, respect, fun, close relationships, acceptance, increased sense of security, support and empowerment (22, 26, 27, 29, 32). According one participant: 'They are like family and that is how they make everyone feel' (26). 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 socialise and have fun while discussing their medical concerns (26). 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 3 months and distances to appointments were challenging for ageing residents. The CP programme 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 (26, 29, 32).

The HOME (Homeless Outreach and Medical Emergency) Team – CP programme 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% had 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 programmes, 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 programme 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 individualised action plans considering health-risk reduction. The participant's blood pressure was collected 1 year and senior's diabetes risk was 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 2 years, the EMS calls from those apartments decreased 25% (33). Abrashkin et al. (35) 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.

## Discussion

The purpose of this review was to explore the core components of CP. From these, 21 articles or reports between 2005 and 2017 were identified four core components: community engagement, multi-agency collaboration, patient-centred prevention, and as the outcomes of programme: cost-effectiveness and patients' experiences.

Community Paramedicine has been delivered as pilot healthcare programmes. In Australia, Canada and the Unites States of America there has been a systematic effort to improve the home-delivered nonemergency and preventive care, particularly in rural and remote areas. In Scandinavia, same components in CP can be found from nonemergency prehospital nursing but no English language articles were found. In United Kingdom, CP components can be found from extended scope of paramedicine (39). Paramedics may practice within an 'expanded scope' (applying trained specialised skills and protocols) or 'expanded role' (working in nontraditional

roles using existing skills) (39). CP and Mobile Integrated Healthcare (MIH) are both prehospital models of health care (14, 35). CP model provider is called community paramedic (paramedic after additional training) (34) when MIH provides services utilising a range of allied healthcare professionals, for example nurses, paramedics, physician assistants and physicians (25). These kind of nonemergency, community engaged healthcare models offer possibilities for those paramedics and prehospital nurses which work in modified duty (e.g. injured, pregnant) (36).

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 network and provided the services to bridge those gaps. Undoubtedly in rural areas, where the infrastructure has its limits, CP programmes have more gaps to fill but also in urban areas the number of homebound citizens is growing and demand for nonemergency health care 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 optimise their energy and possibilities. Behind the success of the CP programme 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 (40) has 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 (41), 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) (42). 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 (31). This study highlights that in CP the providers, additional trained community paramedics, had dual roles as advocates for health and well-being 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 (26). The interventions targeted to the loneliness can help to avoid ED visits and benefit the well-being of the frail older person (43).

The WHO argues that the future of care requires an equal and reciprocal relationship between clinical and nonclinical professionals together with the individuals using care services, their families and communities. Alma-Ata Declaration of 1978 emphasised the need to bring a holistic perspective to health while organising 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 (44). According Goodwin (45), integrated care represents an approach to the delivery of services seeking to coordinate care with person, family and surrounding community. The COPD-Home model with joint visits, telephone checks, a support call centre, an individual self-management plan with pharmacological and nonpharmacological interventions can offer needed components and were tailored to meet an individual's specific needs that emerge from their personal social determinants of health (46). 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 (47). People could have a more active role in his/her own health while using integrated people-centred health services.

Despite the challenges, the Community Paramedicine programmes 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*' (48). However, the CP models must 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 (39). CP models offered the possibilities to

prevent unnecessary visits to ED having the efficient outcomes (25, 27, 28, 35, 36).

Throughout the years 2005–2017, there were few studies of *patients' outcomes and experiences* from CP programmes (25, 32). 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 (49–51). 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 (52) 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 (32, 37). 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 42 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 (11, 21, 22, 39).

## Conclusion

This review identified the core components of Community Paramedicine (community engagement, multiagency collaboration, patient-centred prevention, cost-effectiveness and patient's experiences) and presented evidence on how CP programmes 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 health care 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 programmes, 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-centred healthcare services. EMS providers and educators can use this information in their practice when developing programmes 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.

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