

Development of sustainable community paramedicine programmes: a case study in Pennsylvania

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ABSTRACT

Background Community paramedicine (CP) models have been applied across rural and urban communities in support of healthcare delivery systems for nearly two decades. However, there is still insufficient information regarding the development of sustainable CP programmes. This study explores the strategies used by active CP programmes and investigates their operational statuses, community demographics, financial models and challenges for programme development.

Methods A series of interviews was conducted with four CP programmes in Pennsylvania, USA, which are affiliated with a local government, a health system, an ambulance service and an emergency medical service, respectively. Each CP programme uses its own model with unique goals, as well as providing corresponding services/care based on the demands from their communities.

Results Three CP programmes in the study were mainly aimed at reducing healthcare resource utilisation (ie, reduce readmissions or ED utilisation), but one of the programmes developed a sustainable model aiding newborn care in the community. Establishing a solid reimbursement mechanism and working closely with collaborators are two major strategies for developing sustainable CP programmes. Complete data collection and a programme evaluation process will also be important to demonstrate the value of its CP models to potential collaborators and policy-makers. However, the cost-effectiveness of a CP model is still not easy to identify due to the separate programmes being developed without uniform goals.

Conclusion The challenges and solutions from the four programmes under study can provide a road map for the development of CP programmes for other communities.

INTRODUCTION

Many active community paramedicine (CP) programmes have presented their programme services, operational models and challenges via technical reports and case studies.^{1–4} Mason *et al* found that paramedics with extended skills in the UK can provide clinically appropriate care allowing elderly patients with acute minor conditions to stay at home.^{5,6} Bigham *et al* concluded that CP programmes effectively improved patient outcomes in UK, Australia and Canada.⁷ However, further investigation is needed to fully understand various strategies and community characteristics from active CP programmes.

The US Congress funded the Medicare Rural Hospital Flexibility Program to integrate emergency medical services (EMS) so as to support rural

Key messages

What is already known on this subject

- Community paramedicine (CP) programmes had been implemented in both rural and urban communities in support of health care delivery systems for nearly two decades.
- Many CP programmes in the USA are in the pilot testing phase due to a lack of comprehensive strategies to implement sustainable programmes.
- Most CP programmes work with multiple stakeholders and are interconnected with different agencies.

What this study adds

- Two major strategies for developing sustainable CP programmes are to establish a solid reimbursement mechanism and to work closely with collaborators.
- Two common challenges for developing a CP programme are to retain legislative support and to obtain buy-in from stakeholders.
- A high-level road map for CP programme implementation plans was developed to transfer successful CP experiences to communities.

healthcare delivery systems.^{8,9} In a rural context, the CP model was designed to increase access to basic services and care through the use of specially trained EMS personnel in an expanded role to provide healthcare support such as performing medical procedures, physical/mental assessments, follow-up postdischarge, and conducting disease prevention and education.^{10–12}

After 20 years of development and evolution of the CP model, programmes are actively supporting healthcare across the country. One example is the Abbeville CP programme in South Carolina, which collaborates with local EMS and one of the critical access hospitals (CAH) in the area.¹³ MedStar, a metropolitan area ambulance authority in Fort Worth, Texas, focuses on reducing ED utilisation and 9-1-1 calls.¹⁴ A CP programme in Washington implemented by EMS aims to reduce hospital readmission rates and to prevent infection after surgery for discharged patients in the communities.¹⁵ Another programme in Eagle County, Colorado, provides various CP services to rural communities, including discharged patient follow-up and chronic disease management.¹⁶ However, the CP programmes have faced many challenges over



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the past few years to sustainably maintaining programmes not only in rural areas, but also in urban communities.¹⁷ Some programmes find it difficult to gain support or buy-ins due to limited understanding of the CP programme.^{18,19} Although some of them received grants to initiate the pilot programmes, over the long term, the programme could not be sustained without a solid reimbursement mechanism.¹⁹ In addition, some states in the USA still need additional legislative support to expand the scope of CP practice due to their current paramedic licensure systems.²⁰

The purpose of this study is to explore how successful CP programmes had organised and dealt with the barriers, and to investigate their operational strategies, community demographics, financial models and challenges. The study can provide insight into developing a sustainable CP programme. Based on our interviews, we provide a road map to allow transfer of these insights to other CP programmes.

METHODS

Study design

To explore the generalisable CP operational parameters and investigate the performance of the CP programmes, an interview study was conducted to collect feedback and opinions from current CP practitioners in Pennsylvania, USA (PA). The research location was chosen due to the research project was funded by the agency, and it specifically required that the study should only include healthcare practices in Pennsylvania.

The structured interviews contained 22 questions that were specifically developed to gain insights about various aspects of the current CP programmes, such as (1) the current operational status, (2) CP data collection, (3) the staffing plan, (4) stakeholders and collaboration and (5) challenges for the programme. Please see online supplementary appendix A for the complete interview questions. In the first section of the interview, participants were requested to describe the main goals of their CP programmes and to provide detailed information regarding different types of services provided, as well as the workflow of activities within their service areas. In the data-collection section, questions inquired about what data were collected from stakeholders (ie, doctors, insurance companies or hospitals,) to benchmark the programme and what the indicators are to evaluate the programme performance from patient feedback. The third section delved into the staffing issues surrounding the operation of the CP programme, including the following items: staff affiliation (eg, voluntary programme or part-time/full-time staffing), coordination with regular EMS service, scheduling the CP service and the requirements for additional training for performing CP services. In the stakeholders and collaboration section, participants were asked to describe who the stakeholders are and how they work with all the stakeholders to facilitate the CP programme. It also asked the participants about dissemination strategies for outreach and communication with potential collaborators. The last section of the interview focused on soliciting information about challenges to operating a CP programme. Participants were expected to provide key factors for sustaining the CP programme with respect to funding/reimbursement, logistics, policy support and community perception.

Study participants and protocol

To identify CP programmes operating in Pennsylvania, the research team contacted the Pennsylvania Emergency Health Services Council (PEHSC) to explore CP projects within the state. PEHSC is not an authority that supervises any CP programme in

the state, but they have provided contact information for five CP programmes to the team from their records.² The research team contacted these five CP programmes and four of the CP programme supervisors/directors agreed to participate in the study. Two of the programmes are located in western PA, while the other two are located in south central and northwestern PA. Those programmes collaborate with between 3 and 20 hospitals or other care providers in their areas.

After obtaining the initial agreement from potential participants, the research team sent an email to each programme informing them of the following: detailed research team information, the objective of the study, the interview process/protocol and the study consent form with a copy of completed interview questions provided to the identified participants. When the research team received the signed consent form, a research assistant scheduled an interview with the participant. The interviews were conducted over the phone, and each session was between 2 and 2½ hours long. In each session, a trained graduate research assistant served as the moderator and conducted interviews, while two undergraduate research assistants transcribed the discussion verbatim. After the data collection, two undergraduate research assistants verified the reliability of this interview by cross-checking each other's interview result transcription. A graduate research assistant integrated the study results into a worksheet and categorised the qualitative interview results. The faculty investigator monitored and reviewed the interview data to ensure the quality of the interview.

This study was completely voluntary, and all of the participants were required to sign a consent form that specified that there were no adverse consequences for withdrawing from the study. In addition, no personally identifiable information about the medical staff or patients was recorded. All research data were kept confidential. All of the study protocols were reviewed and approved by the Institutional Review Board of the Pennsylvania State University.

RESULTS

The four interviews took place starting in December 2016 and finishing at the end of March 2017. The professional background of interviewees in the study are emergency medical technician (EMT) for programme A; Doctor of Medicine (MD), Master of Business Administration (MBA) and Fellow of the American College of Emergency Physicians (FACEP) for programme B; registered nurse (RN), Bachelor of Science in Nursing (BSN), Certified Emergency Nurse (CEN) for programme C; and EMT for programme D supervisor, respectively. The services provided by the four CP programmes in the study covered: physical assessment, medication review and conciliation, patient status follow-up, chronic disease management (ie, chronic obstructive pulmonary disease (COPD) or congestive heart failure (CHF)), home safety assessment, newborn care education, health education and social support. [Table 1](#) provides the basic information about the four CP programmes and compares their goals, services, challenges, service group information, achievements and dissemination strategies.

Challenges for the CP Programmes

Financial supports

One of the biggest challenges to the CP program was reimbursement for the services provided to financially maintain the programs.—CP programme C supervisor

In the beginning, programme A relied on a state-wide grant funding support for the first 2 years of its programme. The

Table 1 Goals and services for four CP programmes in Pennsylvania

CP programme	Programme A	Programme B	Programme C	Programme D
Starting year	2013	2013	2012	2013
Location	Western PA (Urban)	South central PA (rural)	Northwestern PA (urban)	Western PA (rural)
Service area	The metropolis and its surrounding suburbs and communities.	Spans 5 counties (~1 hour driving distance from the patient).	One county, population of ~280 000 residents.	30-mile service area radius to a township.
Affiliation	Local government	Health system	Ambulance service	EMS
Collaborations	20 hospitals; 45 ambulance services; 17 EMS.	Internal units (ie, cardiovascular unit or wound centre) within 3 hospitals.	3 regional hospitals; local healthcare providers.	1 insurance agency, several OB/GYN clinics.
Staffing	7 paramedics (2 full-time and 5 part-time).	2 paramedics (1 full-time and 1 part-time). No 9-1-1 calls.	3 full-time paramedics with specialised training in CHF and chronic health conditions.	3 full-time paramedics within the EMS (CP home visits are usually performed during the weekend or evenings; visit schedules by demand).
Target service group and information	<ul style="list-style-type: none"> ▶ Chronic disease patients, high ED service users and recently discharged patients. ▶ The patient average age is 64 years. ▶ 43% of them live alone. ▶ 54% of them received some form of mental health diagnosis. 	▶ Patients with chronic disease and high risk for readmission (eg, CHF, COPD, chronic kidney disease, asthma).	<ul style="list-style-type: none"> ▶ Recently discharged patients, patients with multiple chronic diseases and behavioural health conditions. ▶ Patients referred from hospitals or care providers. ▶ Residents with memberships (fees range from \$25 to \$50). 	<ul style="list-style-type: none"> ▶ Families with newborns. ▶ New parents and their family members or neighbours. ▶ \$150 for one training session and home visit).
Goals	Reduce 30-day readmissions	✓	✓	✓
	Reduce ED utilisation	✓		✓
	Reduce 9-1-1 calls	✓		✓
	Reduce cost	✓	✓	
	Others			✓
Services	Physical assessment	✓	✓	✓
	Medication conciliation	✓	✓	
	Patient status follow-up	✓	✓	✓
	Disease management	✓	✓	✓
	Home safety assessment			✓
	Newborn care education			✓
	Health education	✓		✓
	Social support	✓		
	Transportation for cares	✓		✓
Challenges	Sustainable funding	✓		✓
	Legislative barriers	✓		✓
	Care coordination	✓	✓	
	Promoting the programme			✓
	Work with insurances		✓	✓
	No data collection		✓	✓
	Competition with others	✓		✓
Programme achievements	In 2015 and 2016, 269 patients received services. Reported savings of \$1.8 million from fewer 9-1-1 calls, ED visits, hospital readmission.	In 2015, reduction in readmission rate for CHF (12%) and COPD (10%). Programme did not collect data to assess programme performance or cost-effectiveness.	-	In 2016, 224 people received child safety training. Made 14 home visits. Contract with insurance agency resulted in 40% users reimbursed.

Continued

Table 1 Continued

CP programme	Programme A	Programme B	Programme C	Programme D
Dissemination strategies	<ul style="list-style-type: none"> ▶ Website with detailed goals, services, contact information and testimonies from the members of target group.²² 	<ul style="list-style-type: none"> ▶ Marketed at health fairs. ▶ Disseminated brochures to potential collaborators. 	<ul style="list-style-type: none"> ▶ Met potential collaborators and stakeholders in the area. ▶ Promoted the programme in community and state-wide committee meetings. ▶ Website.²³ 	<ul style="list-style-type: none"> ▶ Advertised to local OB/GYN and hospitals with printed brochures. ▶ Information on the programme sent to new parents through insurance network.

CHF, congestive heart failure; COPD, chronic obstructive pulmonary disease; CP, community paramedicine; EMS, emergency medical services; OB/GYN, obstetrics and gynaecology.

supervisor mentioned that the Community Paramedicine Act bill is still in the early stages of the legislative process and would create credentialing criteria for administering a CP programme and establish a funding mechanism through Medicaid which is a joint federal and state programme that helps with medical costs for some people with limited income in the USA.

Legislative supports play critical roles for developing a financial reminiscent model for the program—CP programme A supervisor

Thus, the medium-term plan for programme A is to work on contracts with local health systems, care providers and health insurance agencies to support their operational costs.

The most important thing to work with collaborators is to have a centralized referral center to coordinate patients from all of the stakeholders, and a standardized intervention process is needed to ensure that paramedics provide consistent patient assessments and health education services.—CP programme B supervisor

Additionally, there are many stakeholders (ie, EMS, ambulance services, hospitals, etc) in the region due to the large geographical service area. The CP programme A collaborates with stakeholders as many as possible, rather than competing with them.

We terminated the conventional wellness check program (ie, where the goals were to reduce 9-1-1 calls and 30 day readmissions within the community), because of financial issues and that the service overlapped with another program in the region.—CP programme D supervisor

After the township was awarded ‘the best place to raise children in Pennsylvania’ in 2013, the EMS looked at regional demographic data and demand when developing this unique and successful child care safety training CP programme D.

Data collection for programme evaluation

We are lacking information to estimate financial benefits generated from the program.—CP programme B supervisor

Although the current funding source for the programme is from the health system, CP programme B expects to seek out external financial support in the near future. The programme did not collect any data to demonstrate the saving from preventing patients from being readmitted to the hospital within a month. The programme is now working on establishing a cost-effective model for an internal evaluation and will use this model to seek out external support and collaborations.

CP programme C is currently supported through contracts with hospitals, healthcare providers and the membership fee from residents. Programme C also had an issue relating to the establishment of a data-collection mechanism for programme evaluation.

Every CP program should provide supporting evidence that they can effectively enhance patient care and reduce healthcare costs.—CP programme C supervisor

Those evidence-based data are the key factors for promoting the programme, persuading stakeholders to collaborate and convincing residents to enrol in the programme.

Road map for CP programme development

Although the four CP programmes have unique operational models, their experience can be assimilated to provide a high-level road map for CP programme development. Steps for this development based on our respondent feedback are summarised and shown in [figure 1](#).

Develop the CP programme goals

We try to work with the local practitioners and facilities as closely as possible so that we better meet and understand the needs of their patient care plans.—CP programme C supervisor

The goals for a CP programme will not only be determined by the missions of the organisations, but will also consider the targeted population’s needs and the collaborators’ interests. Sometimes, the programme generates the goals according to the needs of communities such as developing specific services to meet local demands based on demographic characteristics. For example, CP programme B works with hospitals and focuses on specific patient groups to achieve a few particular goals for cost reduction. CP programme D concentrates on a new parent safety training programme because the community was awarded as the best place to raise children in Pennsylvania in 2013.

Develop detailed CP services

Although parents read the manual and carefully installed the car seat for the babies, we provide a unique and meaningful service such as ensuring the car seats are installed correctly and securely.—CP programme D supervisor

Once the programme goals are decided, a series of CP services need to be developed based on these goals. Those services are the specific tasks for delivering care to meet the needs of the patients and the collaborators.

The Program needs to review comprehensively and carefully the regulations about their practices for developing relevant CP services for the community.—CP programme C supervisor

In fact, to develop the detailed services, the programme needs to confirm that there is legislative support for allowing paramedics to perform particular clinical activities (eg, prescribing antibiotics or ordering radiographic tests, etc).

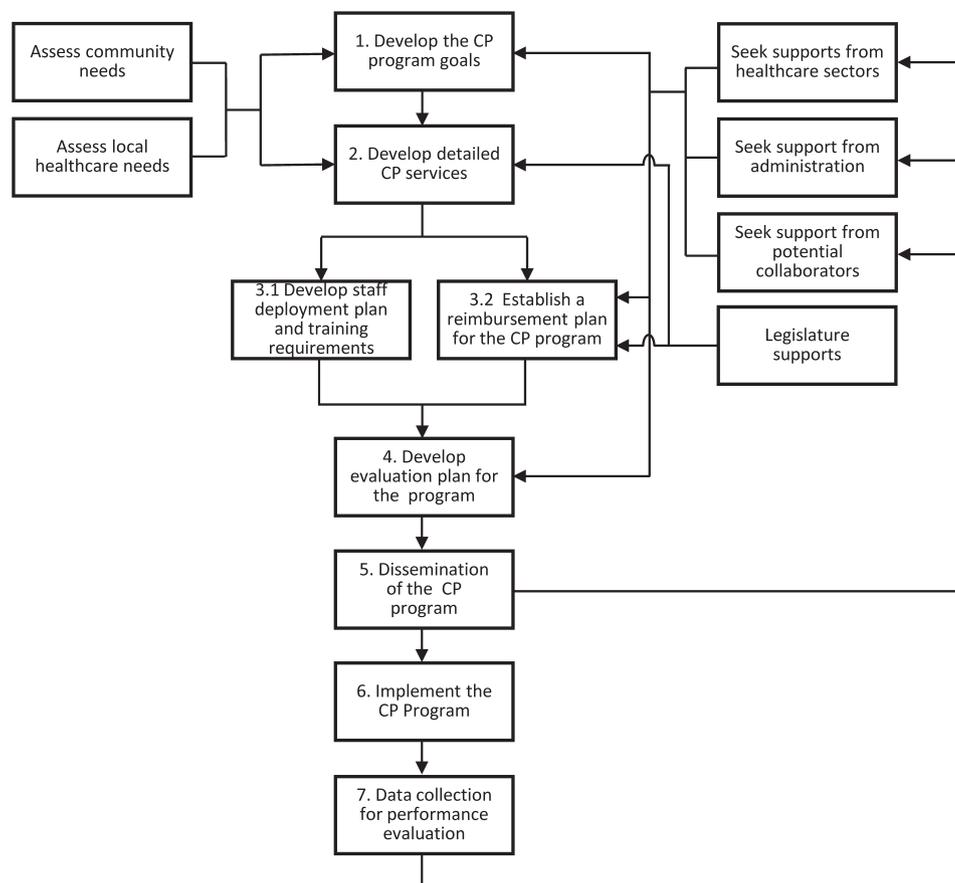


Figure 1 Road map for CP programme development. CP, community paramedicine.

Establish staff deployment plan and training requirements

To develop the deployment plan, the program needs to consider the range of the service area, the number of staff, and the volume of the service demand.—CP programme A supervisor

Once the goals and detailed CP services have been developed, the programme needs to properly establish the staff deployment plan for dispatching the service. For example, some programmes have all full-time paramedics working in the CP services (eg, paramedics in CP programme C do not perform regular EMS tasks), and some programmes let their full-time paramedics perform the CP services in the evening or over weekends (eg, CP programme D usually performs the home safety assessments over the weekend).

Once the program goals and services are decided, the program also needs to ensure that paramedics have the relevant training to perform those practices.—CP programme A supervisor

Because a CP programme expands the role of paramedics, some paramedics may need to enhance their skills to accommodate the new services/care. For example, paramedics in CP programme C received extensive cardiopulmonary resuscitation (CPR) training to educate the public about the skill.

Establish a reimbursement plan for the CP programme

It is critical to have a completed reimbursement mechanism for a sustainable CP program.—CP programme A supervisor

The reimbursement model usually develops simultaneously with the staff deployment and training plan because those are the major costs within the programme. Regarding the reimbursement plan, the programme could work with insurance companies (eg, an insurance company contracts with CP programme D for their new parent safety training programme), government agencies (eg, CP programme A is supported by local government), care providers (eg, CP programme B was established by a health system), as well as being supported by the membership (eg, CP programme D). In addition, the programme sometimes also requires legislative action to establish the reimbursement model, and those legislative regulations may vary from state to state.

Develop evaluation plan for the programme

A CP program with a continuous evaluation plan will receive more buy-ins from potential collaborators and attract the attention of policymakers for legislative support.—CP programme B supervisor

Every CP programme should develop an evaluation plan for assessing programme performance. The plan includes a comprehensive data-collection procedure to document detailed CP service activities, patient outcomes and community wellness conditions. For instance, CP programme B tracked hospital operational performance and concluded that they successfully reduced readmission rates for patients with CHF and COPD. Once the programme evaluation plan is established, programme

performance data provide strong evidence for demonstrating the value of the CP programme to insurance companies, care providers, collaborators and patients.

Dissemination of the CP programme

Reaching out to stakeholders/collaborators and disseminating information about the CP services are critical for program development.—CP programme B supervisor

The dissemination plan not only provides marketing of the programme goals and its value to the targeted population, but also attracts potential collaborators and updates programme performance information for current stakeholders for continued support. For example, CP programme B presents their programme at health fairs to increase its visibility, while CP programme C seeks legislative support to expand CP applications and value to the public.

Programme implantation, data collection and performance evaluation

Program implementation is not the final step, but is just the start of the continuous program improvement project.—CP programme supervisor D

Once the programme kicks off, all the data collection and performance evaluation processes need to take place at the same time. The programme performance data may be used for demonstrating the value of the CP programme to external stakeholders, and can be used for conducting internal programme improvement as well. For example, CP programme D retained their new parent safety training programme, but cut off the community wellness check programme which was more focused on reducing 9-1-1 calls and hospital readmission.

DISCUSSION

As O'Meara *et al* mentioned in their case study, a comprehensive CP programme should include community engagement, situated practice, be integrated with healthcare, ageing care and social services, and be supported by strong governance and paramedic leadership.²¹ The four CP programmes under study have common goals of facilitating healthcare and enhancing community wellness. Each of them demonstrated unique CP service models to achieve these goals, and none of them established their programmes under the same conditions. These CP programmes were implemented in different communities, targeting different service groups with unique goals, collaborating with different providers and operating under different reimbursement strategies. However, their experience is common in many ways. In particular, due to the lack of a thorough CP programme evaluation and data collection plan, the cost effectiveness of the CP programme may not be easily demonstrated. Although the costs of equipment, personnel and transportation can be estimated, various goals may not directly contribute specific returns to the programme.¹³ This could also be caused by the fact that CP programmes usually work with multiple stakeholders and are interconnected with different agencies. Communication and collaboration with stakeholders have been shown to play a tremendous role in facilitating successful CP programme development at every stage.

Study limitation

Because communities usually have their own goals and missions for developing a sustainable CP programme, it is not easy to draw conclusions and suggest a one size fits all CP implementation

formula to develop a similar programme. Thus, this study had several limitations regarding generalisable issues that need to be addressed. First, the study was only conducted in Pennsylvania, USA. Many other states and countries will have different legislative constraints or regulations that would affect the development of their programmes. The study attempted to use the operational strategies of the four programmes to demonstrate a practical road map for a CP programme development plan. The study has described a variety of implementation plans, dissemination approaches and challenges to current CP programmes in Pennsylvania but these insights will have applicability beyond locations being studied.

In addition, this interview study was conducted with four CP programmes without reaching all programmes in Pennsylvania. To garner the valuable feedback from CP programme supervisors, a robust study sample should be acquired. At the start, the research team reached out to a total of 15 CAH in PA to inquire about the availability of CP programmes in rural areas. However, none of them have a programme. Thus, the team reached out to PEHSC to obtain contact information for five programmes, only four of which responded and agreed to participate in the study. In fact, there is not one organisation that has a full list of all the active CP programmes in the state. This finding alone indicates the need for greater integration of these services into the health-care infrastructure.

Lastly, this interview study was only conducted with four CP programme directors without involving any active paramedics from the programmes. Some detailed CP service details and activities may not be captured comprehensively. Although the study focused on demonstrating the high-level operating statuses and challenges for CP programme, the feedback from front-line community paramedics will be valuable to collect in the future.

CONCLUSIONS

This qualitative study of four unique CP programmes in one US state has enabled the development of a road map for the development and sustainability of CP programmes.

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