9-24-2019


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A Dissertation

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Doctor of Philosophy

in

The Interdepartmental Program in Engineering Science

by

Oluwakemi Aiyedun
B.S., University of Ibadan, 2009
M.S., Louisiana State University, 2013
December 2019
Acknowledgments

I am especially grateful to my committee chair, Dr. Laura Ikuma for her unstinting support and painstaking efforts in reviewing my work and providing useful feedback. Your invaluable guidance and mentoring are deeply appreciated.

My immense gratitude to my committee members, Dr. Isabelina Nahmens, Dr. Sonja Wiley and Dr. Tao Jin for the incredible assistance and recommendations provided throughout this study. Many thanks to Lisa Burns (LCSW), Dan Godbee (MD), the CIHP administrators, community paramedics and staff at East Baton Rouge Parish EMS for their support, and to Sarah Dunn for her contributions. This work would not have been possible without all of your enormous contributions.

Particularly helpful to me during this time were Ms. Maureen and Mr. John Hewitt, Dr. Andrea Morris and her family, and the good families of our community group who were of tremendous help in so many ways. Thanks also to my parents for never doubting that I could do this. I am deeply grateful for your love and prayers.

A very warm and special thanks to my family: Olufemi, Kikiope, Okanmiyo and Mayokun; you made this journey worthwhile and gave me the strength to endure.
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Abstract

This study applied a holistic method of healthcare program assessment, known as systems approach, to evaluate the efficacy of the East Baton Rouge Parish (EBRP) EMS Community-integrated Health Program (CIHP). The author developed assessment metrics following the Quadruple Aim Framework: IHI (Institute for Healthcare Improvement) Triple Aim + Provider Experience.

Results showed that the CP program in this study delivers high ratings on patient experience and provided a 51% return on investment (ROI) through reduced emergency service utilization, ED visits and inpatient hospital admissions. However, findings did not demonstrate meaningful improvement in patients’ health-related quality of life (HRQoL) and self-efficacy (SE). Nevertheless, provider (specially-trained EMS paramedics) experience from the mixed-methods assessment offers suggestions to improving the program, as well as insights into the barriers to healthcare access that are often encountered by the frequent ED user population.
Chapter 1. Introduction

Frequent and non-emergent ED (emergency department) use is a growing menace, which not only drives up healthcare costs and causes ED overcrowding, but patients often receive suboptimal, fragmented, and sparse care. Several programs have been implemented to address this issue, including the recent Health Care Innovation Awards created by the CMS (Centers for Medicare & Medicaid Services). This program is funding up to $1 billion in awards to organizations to implement the most compelling new ideas that deliver better health, improved care and lower costs to those with the highest health care needs.

One of such new ideas is an EMS-led community paramedicine (CP) care program to reduce non-emergent overuse of EMS (emergency medical services) and ED healthcare services. This program is managed by the East Baton Rouge Parish (EBRP) EMS and utilizes existing EMS resources, which includes an expanded paramedic workforce to deliver care to underserved populations within the community. In this CP program, paramedics receive additional training in community-based care for patients staying in their homes. The program aims to reduce avoidable ED visits and hospitalizations through increasing access to primary and preventive care and providing wellness interventions, and secondarily to improve patient experience and clinical outcomes.

In general, there is a dearth of scholarly literature evaluating CP programs. More so, peer-reviewed literature measuring success of community paramedicine programs using standardized instruments is sparse. There is a push to study the effectiveness of these programs in achieving the IHI (Institute for Healthcare Improvement) Triple Aim. In tandem with the program’s aims, this study utilized a systems approach methodology to evaluate the efficacy of the EBRP EMS
CIHP (Community-integrated Health Program), and developed assessment metrics following the Quadruple Aim Framework\textsuperscript{10}: IHI (Institute for Healthcare Improvement) Triple Aim and a fourth dimension – Provider Experience. The IHI framework represents a three-prong approach to improving and measuring the performance of a healthcare system or intervention, by simultaneously pursuing these three dimensions: improving the health of populations; improving the individual experience of care; and reducing the per capita costs of care for populations.

To this end, this study adopts well-validated instruments to measure outcomes of interest: (1) \textbf{health-related quality of life (HRQoL)}: SF-12v2 survey and a single item self-efficacy item; (2) \textbf{patient experience}: modified CG-CAHPS (Clinician & Group – Consumer Assessment of Healthcare provider survey); (3) \textbf{Provider experience}: modified perception surveys from these studies\textsuperscript{11,12} with pilot-tested interview prompts.

Starting from the latter outcome, this report is written in journal style and presents detailed accounts of findings from the CP program assessments research in this format:

- Chapter 2: Journal Article 1. Provider experience
- Chapter 3: Journal Article 2. Patient experience & cost analysis
- Chapter 4: Journal Article 3. Health-related quality of life (HRQoL) & self-efficacy (SE)
- Chapter 5: Conclusion and Recommendations

\textbf{References}


Chapter 2. Community Paramedics’ Perception of Frequent ED Users and the CP Program: A Mixed-Methods Study

2.1 Introduction

Traditionally, EMS (emergency medical services) paramedics’ roles are reactive in nature, however, alternative models of paramedic practice such as community paramedicine (CP) focus on proactively supporting people in the community. EMS-led CP program is a collaborative, community-based intervention, ideally integrated with primary care clinics, hospital EDs and long-term care homes. It recruits paramedics to deliver care to patients since paramedics are well-known and trusted figures in the community, always available, and can provide individualized healthcare in the patients’ homes and other community-based settings. EMS-led CP programs target frequent ED (emergency department) users (FEUs) and have been linked with improved quality of life, reduction in emergency calls, and high levels of satisfaction among patients and caregivers.

In the 2012 National Agenda for Community Paramedicine Research conference, stakeholders identified the need to investigate the experiences, characteristics, job satisfaction, and career aspirations of EMS personnel that make CP a desirable career path. However, the few published papers on CP programs are largely quantitative studies and lacking operational details. Few published studies have explored the motivations of paramedics entering CP, their current expanded practice and need for additional resources, or their role in health education. In a recent study, Steeps et al. examined the attitudes of EMS professionals towards CP programs and if they are willing to participate, while Brydges et al. examined how CP patients perceived paramedics, but little is known about these professionals’ perceptions of CP patients.
Paramedic perspectives provide especially rich insights into under-explored, non-clinical and contextual factors. Perceptions of paramedics’ expanding roles will likely influence the nature, breadth and quality of the care provided. In the US, very few studies have examined community paramedics’ perception of their role or work satisfaction in relation to FEU and patients within the CP, and the majority of published literature focus on programs in the UK (e.g. Rees et al), Australia (e.g. McCann et al), and Canada (e.g. Martin & O’Meara).

The aim of this study is to explore the perspectives and experiences of paramedics currently involved with a CP program in the US, called Community Integrated Health Program (CIHP). The author presents a mixed study of CIHP paramedics’ perceptions of both FEUs and the CP program. These findings can improve future implementations or expansions of CP programs, including interventions to control inappropriate frequent ED use. This paper addresses the following research questions:

1. What are the views of paramedics towards FEUs and underlying causes?
2. What are the views of the paramedics about the CP program related to its relevance and administration, and to their personal experiences and professional competencies?

2.2 Methods

Study design. The study used an explanatory mixed-method sequential study design comprising of a survey (Appendix 3) followed by audio-taped qualitative semi-structured interviews with paramedics participating in the CIHP program. All data collection took place from December 2017 to December 2018, at the East Baton Rouge Parish (EBRP) EMS headquarters, a public agency funded by property tax and insurance billing, and providing emergency healthcare.
services to the city’s population of over 400K.\textsuperscript{18} The Institutional Review Board of Louisiana State University (IRB# 3978) approved this study (Appendixes 1 and 1B).

**The CIHP model of community paramedicine.** CIHP is a proactive, innovative approach to providing preventative, primary care service to underserved populations in a community-based setting. The primary goal is to improve health by providing patient-centered care to FEUs in their own homes and connecting them to outpatient healthcare resources within their local communities. It is also a chronic disease management strategy focused on reducing EMS calls, ED visits, and hospital admission rates for FEUs. More program details can be accessed here.\textsuperscript{19} CIHP is managed daily by certified paramedics who have successfully undergone the rigorous didactic and clinical training that equips them to provide community-based health care. Every month, two paramedics, together with a social worker, and a supervisor/patient navigator manage a cohort of about 15 patients. CP-trained paramedics rotate between the CIHP and regular ambulance shifts on a monthly basis. A supervisor and a social worker assist with navigation of clinic and community resources, and a medical director provides general oversight for the entire program.

**Setting and participants.** The two paramedics participating in CIHP each month were surveyed and interviewed toward the end of their month rotation. Altogether, 16 CIHP paramedics, which are all the CP-certified paramedics available, participated in the study.

**Survey.** A survey instrument to address EMS professionals’ perceptions of a CP program was adapted from two previously developed instruments on the attitudes, knowledge and perceptions of primary care physicians and trainees towards obesity.\textsuperscript{20,21} The survey required less than 10 minutes to complete and examined four major constructs: (1) Adequacy of CP training; (2)
Knowledge of frequent ED use, (3) Attitudes towards CP patients and CP interventions; and (4) Perceived self-confidence and efficacy of CP program. Responses were given as 5-point Likert scales, with strongly disagree and disagree categorized as disagree, and strongly agree and agree categorized as agree for data aggregation. Put together, these items examined paramedics’ agreement or disagreement with statements regarding the nature of frequent ED use as a public health issue, the long-term prognosis for this behavior, and attitudes about the efficacy of CP interventions.

**Data collection.** Data collection consisted of the survey, followed by individual, semi-structured in-depth interviews. An initial template for the interviews evolved iteratively to explore developing concepts (Table 2.1). After obtaining informed consent (Appendix 2), researchers guided the paramedics through informal discussions, open-ended non-judgmental questions and probes crafted to elicit paramedics’ perception of FEUs, opinions of CP patients, experiences during CP rotations, and any desired attributes or frustrations with the CP program. No questions or discussions on any particular individuals’ care or health problems were taken nor recorded.

Demographic information such as age, gender, ethnicity, highest educational attainment and years of experience in CP and overall emergency service were collected for descriptive purposes. The average recorded interview was 20.8 min in length (range 8.3–33 minutes). To ensure consistency, all interviews were conducted in-person and digitally recorded in a private room at the EMS headquarters, after which they were transcribed verbatim. Saturation of themes was achieved by the 13th interview, however, this study recruited all eligible paramedics to reduce the chance of missed themes and to ensure completeness.
Methodological approach. This study uses a thematic content analysis methodology similar to Martin and colleagues\textsuperscript{22}, and as described by Bengtsson.\textsuperscript{23} Qualitative content analysis focuses on the analysis of written texts, with an overall objective of describing the central content of the text, identifying similarities and differences, and then expressing them in different themes. This technique allowed investigators to construct a robust, flexible explanatory framework, through the identification of common themes, without the need to explain how themes are interconnected – a restriction imposed by highly structured, conceptual approaches.\textsuperscript{24} This methodological approach takes an inductive approach to identify, analyze, and report patterns within the data.

<table>
<thead>
<tr>
<th>Table 2.1: Initial topic list for the semi-structured interviews</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Perception of FEU</strong></td>
</tr>
<tr>
<td>What is your perception about frequent ambulance/ED use?</td>
</tr>
<tr>
<td>Do you think patients deliberately misuse the EMS (911) system?</td>
</tr>
<tr>
<td>a. If so, in what ways?</td>
</tr>
<tr>
<td>b. If not, why not?</td>
</tr>
<tr>
<td>What factors do you believe contribute to inappropriate EMS use?</td>
</tr>
<tr>
<td><strong>Perception of CP program</strong></td>
</tr>
<tr>
<td>What is your perception of the CP (CIHP) program?</td>
</tr>
<tr>
<td>What is your most favorite aspect of the program?</td>
</tr>
<tr>
<td>What do you find most impressionable about the program?</td>
</tr>
<tr>
<td>Do you have any experience or any event you have had with a patient that in your opinion describes the essence of this program?</td>
</tr>
<tr>
<td>What is your least favorable aspect of the program?</td>
</tr>
<tr>
<td>What would you change about the program?</td>
</tr>
<tr>
<td>What are the challenges you’ve encountered during your CP rotations?</td>
</tr>
<tr>
<td>What competitive edge do you think CP have over traditional healthcare models?</td>
</tr>
<tr>
<td><strong>Other remarks</strong></td>
</tr>
<tr>
<td>Do you have any other remarks or insights that you would like to share?</td>
</tr>
</tbody>
</table>

Analysis. Qualitative strand. The interviews were transcribed, and line-by-line initial coding was carried out by attaching descriptive codes to segments of the text in each transcript. The interview questions (Table 2.1) guided the analysis, and text data was analyzed using an inductive approach, where the paramedics’ statements were openly coded through a thematic step-by-step method.\textsuperscript{25} The author independently screened the interview transcripts for topics or
issues that could be used as a centralizing concept for a theme. The author reviewed the analysis to further refine, clarify and condense the codes or topic-oriented categories into fewer analytic themes, and discussed periodically to ensure consistency and rigor in interpretation. Several strategies were used to ensure the trustworthiness of the results. The author analyzed transcripts independently, then compared and reviewed codes to achieve consensus. Themes were presented back to the paramedics to establish confirmability and trustworthiness of data and analysis. Finally, two experts in qualitative research reviewed the transcripts and results, and their feedback was incorporated in the analysis. These strategies enhance credible descriptions of community paramedics’ first-hand experiences that can be valuable to understanding their perceptions, and generate practical knowledge that can be used by EMS professionals/administrators. Data were managed using Quirkos qualitative data analysis software (Quirkos Limited, Version 2.0, 2018).

Quantitative strand. Each item of the survey was analyzed using descriptive statistics, specifically frequency distributions.

Mixed-methods phase. During the mixed-methods phase of the analysis, the author read through transcripts to identify data that could provide a complementary understanding of the quantitative results.

2.3 Results

Both the survey and interview phase of the study had 100% response rate. Table 2.2 summarizes the demographic characteristics of the paramedics. Responses from the interviews and surveys were divided into two hierarchies depending on whether they focused on paramedics’ perceptions of FEUs or the CP program. Under these two hierarchies, five major interconnected themes emerged (Table 2.3): (1) Paramedics’ perception of frequent utilizers; (2) Paramedics’
opinion of underlying causes of frequent use (individual- and system-level); (3) General impressions of the CP program; (4) Commendations for CP program; and (5) Frustrations with the CP program (patient- and program-level) and suggestions for improvement. Table 2.4 and Figure 2.1 summarize the results of the surveys.

<table>
<thead>
<tr>
<th>Demographic information</th>
<th>n (%) or mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, mean (SD)</td>
<td>41 (8.95)</td>
</tr>
<tr>
<td>Gender, n (%)</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>6 (37.5)</td>
</tr>
<tr>
<td>Male</td>
<td>10 (62.5)</td>
</tr>
<tr>
<td>Race, n (%)</td>
<td></td>
</tr>
<tr>
<td>African American</td>
<td>1 (6.25)</td>
</tr>
<tr>
<td>Caucasian</td>
<td>15 (93.75)</td>
</tr>
<tr>
<td>Highest education, n (%)</td>
<td></td>
</tr>
<tr>
<td>High school</td>
<td>1 (6.25)</td>
</tr>
<tr>
<td>Associates</td>
<td>4 (25)</td>
</tr>
<tr>
<td>Some college</td>
<td>9 (56.25)</td>
</tr>
<tr>
<td>Bachelors</td>
<td>2 (12.5)</td>
</tr>
<tr>
<td>Years of EMS experience, mean (SD)</td>
<td>16 (9.74)</td>
</tr>
<tr>
<td>Years of CP experience, mean (SD)</td>
<td>2 (0.39)</td>
</tr>
<tr>
<td>Subject</td>
<td>Themes</td>
</tr>
<tr>
<td>---------</td>
<td>--------</td>
</tr>
</tbody>
</table>
| Perception of frequent utilizers | Characteristics of frequent utilizers | Significant physical illness  
Mental illness  
Addiction  
“Not bad people”  
Willful ED abusers  
Immature |
| Underlying causes of frequent use | | Individual:  
Ignorance  
Poverty  
Patient loneliness  
Perceived urgency |
| | | System:  
Navigation  
Proximity to resources |
| | General impressions | Purpose  
Future & expansion  
Personal toll |
| | | Patient Level:  
Noncompliance  
Lack of patient ownership |
| Perception of CP Program | Frustration with program | Program Level:  
Rotation  
Lack of communication  
Suggestions for improvement |
| | | Patient interaction  
Education  
Advocacy  
Accountability  
Advantages over current system |
Table 2.4. Paramedics’ responses to survey

<table>
<thead>
<tr>
<th>Constructs</th>
<th>Question Item</th>
<th>Disagree n (%)</th>
<th>Neutral n (%)</th>
<th>Agree n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived Adequacy of CP Training</td>
<td>Q1: Self-reported hours of CP-instruction received, related to working with FEUs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Response options:</td>
<td>0-1 hour = 2 (12.5%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2-5 hours = 3 (18.75%)</td>
<td>6-10 hours = 1 (6.25%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>11-15 hours = 2 (12.5%)</td>
<td>16-20 hours = 8 (50%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q2: I have undergone adequate training to be a community paramedic</td>
<td>3 (19%)</td>
<td>2 (13%)</td>
<td>11 (69%)</td>
</tr>
<tr>
<td>Knowledge of Frequent ED Use(r)</td>
<td>Q3: I believe frequent ED use is a public health issue</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>16 (100%)</td>
</tr>
<tr>
<td></td>
<td>Q5: I believe frequent ED use is associated with serious medical conditions</td>
<td>5 (31%)</td>
<td>5 (31%)</td>
<td>6 (38%)</td>
</tr>
<tr>
<td></td>
<td>Q6-21: Factors contributing to frequent ED use</td>
<td>Results presented in Figure 2.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attitude to FEUs</td>
<td>Q8: I believe that most FEUs are well aware of their high use of emergency care services</td>
<td>3 (19%)</td>
<td>2 (2%)</td>
<td>11 (69%)</td>
</tr>
<tr>
<td></td>
<td>Q12: I believe that I have negative reactions towards the appearance of people who frequently use emergency services</td>
<td>13 (81%)</td>
<td>1 (6%)</td>
<td>2 (13%)</td>
</tr>
<tr>
<td></td>
<td>Q14: I believe that it is difficult for me to feel empathy for a patient who frequently use emergency services</td>
<td>10 (63%)</td>
<td>2 (13%)</td>
<td>4 (25%)</td>
</tr>
<tr>
<td>Perception of CP Interventions</td>
<td>Q7: I believe that it is necessary to educate FEUs on when to use emergency care</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>16 (100%)</td>
</tr>
<tr>
<td></td>
<td>Q9: I believe that most FEUs could reduce their use of emergency care if they were motivated to do so</td>
<td>0 (0%)</td>
<td>1 (6%)</td>
<td>15 (94%)</td>
</tr>
</tbody>
</table>

Table cont’d
<table>
<thead>
<tr>
<th>Constructs</th>
<th>Question Item</th>
<th>Disagree n (%)</th>
<th>Neutral n (%)</th>
<th>Agree n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perception of CP Interventions</td>
<td>Question: I believe that it is acceptable to use “scare tactics” to obtain compliance of the frequent ED user</td>
<td>13 (81%)</td>
<td>1 (6%)</td>
<td>2 (13%)</td>
</tr>
<tr>
<td>Paramedics’ Self-confidence</td>
<td>Question: I believe that I can correctly assess the needs of patients who frequent EDs</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>16 (100%)</td>
</tr>
<tr>
<td></td>
<td>Question: I believe that I am usually successful in helping FEUs get access to alternative primary care services.</td>
<td>0 (0%)</td>
<td>1 (6%)</td>
<td>15 (94%)</td>
</tr>
<tr>
<td>Perceived Efficacy of CP Program</td>
<td>Question: I believe small reduction in ED use can produce important health benefits for FEUs</td>
<td>1 (6%)</td>
<td>1 (6%)</td>
<td>14 (88%)</td>
</tr>
<tr>
<td></td>
<td>Question: I believe that most FEUs will not refrain from their high use of emergency care services.</td>
<td>6 (38%)</td>
<td>7 (44%)</td>
<td>3 (19%)</td>
</tr>
<tr>
<td></td>
<td>Question: I believe that for most FEUs, long-term compliance is impossible.</td>
<td>11 (69%)</td>
<td>2 (13%)</td>
<td>3 (19%)</td>
</tr>
</tbody>
</table>

**Perceptions of frequent ED users.** *Theme 1: Characteristics of frequent utilizers.* The first significant focus of paramedics during the interviews was on FEUs and the reasons behind ED overuse. In both the interviews and surveys, paramedics indicated that patients who utilize EMS frequently were usually genuinely sick (Table 2.5). When asked to rate the importance of certain factors contributing to frequent ED use, 93.75% (n=15) of paramedics ranked the statement, “Having significant physical and/or mental health burden,” as a moderately, very, or extremely important factor (Figure 2.1). In contrast, only 37.5% (n=6) of paramedics agreed in the survey that “frequent ED use is associated with serious medical conditions” (Table 2.4).
Table 2.5. Paramedics’ perception of frequent ED users (FEUs)

<table>
<thead>
<tr>
<th>Subtheme</th>
<th>Quote</th>
</tr>
</thead>
<tbody>
<tr>
<td>Significant physical illness</td>
<td>“Most of them are chronically ill and end up in the emergency room experiencing a true emergency.” – CP014</td>
</tr>
<tr>
<td>Mental illness</td>
<td>“The majority, if not all the patients we have, have a psych component going on.” – CP010</td>
</tr>
<tr>
<td>Addiction</td>
<td>“because of the substance abuse they either can’t or won’t or don’t care to pursue taking care of themselves” – CP007</td>
</tr>
<tr>
<td>“Not bad people”</td>
<td>“they’re not bad people” – CP004</td>
</tr>
<tr>
<td>Willful ED abusers</td>
<td>“I think some know that they’re abusing it and don’t care. They just do it anyway” – CP006</td>
</tr>
<tr>
<td>Immature</td>
<td>“… they don’t think like normal adults” – CP011</td>
</tr>
</tbody>
</table>

Figure 2.1. Paramedics' perceived importance of factors contributing to frequent ED use

Of all 16 paramedics, 13 had generally positive attitudes about FEUs. They described FEUs as being a product of their circumstances and in need of assistance to get started in the right direction. When asked if frequent ED use was an abuse of the EMS system, they were reluctant to blame CP patients or group them all in the category of abusers.
Theme 2: Underlying causes of frequent use. Paramedics shared the perception of the reasons for overutilization of EDs in both survey (Figure 2.1) and interviews, from which the recurrent themes are broken into two subthemes: Individual and System (Table 2.6).

| Table 2.6. Underlying causes of frequent ED use |
| --- | --- | --- |
| Theme | Subtheme | Descriptive Quote |
| Underlying causes of frequent ED use: Individual | Patient’s lack of health education | “They just think they go to the ER, they get fixed, they might get admitted to the hospital, and then that's it. They don't understand that their health care is an ongoing thing and they need to be active participants in it.” – CP011 |
| | Low socioeconomic status | “Unfortunately, a fair amount of people don’t understand what is and is not a life threat.” – CP014 |
| | Lack of family or social support | “These people can’t afford, you know, cars, public transportation, taxis, Ubers, or nothing like that; so, they use an ambulance because they don’t have to pay right away, and they may or may not pay their bill afterwards.” – CP004 |
| | ED convenience | “Access to home health patient advocacy actually is one of the biggest things that we do.” – CP014 |
| Underlying causes of frequent ED use: System | Difficulty navigating the healthcare system | “I can go to the hospital, I can get seen. I’m going to get seen, they’re not just going to give me an appointment and I have to wait a week.” – CP002 |
| | Healthcare desert | “You’ve seen it with us trying to make appointments for some of these patients, of the circles that we have to go through and the hoops we have to jump through to get somebody a primary care appointment, or God forbid, you need a specialist” – CP012 |

Perceptions of CP program. Another significant focus of the interviews was on the CIHP itself. Paramedics discussed the program’s purpose and future, shared their frustrations and what gave them confidence in the program.
**Theme 1: General impressions.** Paramedic responses varied slightly when discussing the purpose of the CP: some stated that the aim of the program is to reduce frequent EMS and ED utilization, while others focused on how the program helps patients improve their health and quality of life. Paramedics also believed the CP can help fill the void in the current healthcare system created by the communication barrier between doctors and their patients or the lack of the connection between nonemergency and emergency healthcare.

With regards to the future of the CP program, paramedics expressed a qualified optimism. Only 18.75% (n=3) of paramedics believed that long-term patient compliance is impossible for most FEUs, demonstrating that the majority of paramedics have faith in the mission of the CP program. Most paramedics (87.5%, n=14) believed that a small reduction in EMS use will have health benefits for the patient (Q4, Table 2.4), however, they believed that adjustments to the program structure must be made for it to be successful in reducing frequent use of emergency services (Table 2.8). Paramedics believed that the program was the beginning of a shift in how the healthcare system as a whole handles patients. One expressed the belief that the program should expand through “a nationwide change” (CP011). Every paramedic (100%, n=16) discussed how the program was personally fulfilling to be a part of, and most viewed the program as a bigger challenge than working on an ambulance. Other paramedics enjoyed developing a bond with their patients and watching them learn to take control of their health. As the interviews progressed and themes emerged, the author began asking paramedics if they would prefer to work as a community paramedic full time. Five paramedics said yes, two said they would prefer to work on the ambulance and one did not commit to either option. Those that preferred their traditional ambulance service cited frustration with noncompliant patients and the emotionally draining nature of the CP program.
**Theme 2: Commendations for CP program.** As shown previously with the survey questions, paramedics were highly confident in their ability to help CP patients (Q6 & 11, Table 2.4), and each paramedic believed that they were helping at least one patient. Paramedics attributed the success of the program to many aspects or services of the CP program, the most prominent of which were patient interaction, education, and advocacy. The relationships paramedics built with their patients that allowed them to understand the patients’ unique circumstances were seen as the cornerstone of the program. Paramedics viewed this patient interaction as an advantage that doctors did not have: ““[Doctors] don’t see how they live, who’s around them, how their community, how their family affects them. Maybe they can’t understand why they can’t afford to pay for their medicine”” – CP004.

The ability to establish a trusting bond between paramedics and patients was a common theme of success with the program, as paramedics became personally invested in the wellbeing of their patients. Only 25% (n=4) of paramedics found it difficult to feel empathy for their patients, while the majority reported that the program enabled them to learn more about the patients and have open discourse with them. Paramedics also explained that many PCPs were too removed from their patients’ circumstances to treat them effectively, citing physicians’ ignorance of the living arrangements, transportation restrictions, or other circumstances that were obstacles in the patient’s pursuit of healthcare. They also cited incidents of physicians using more advanced vocabulary than the patient could understand when discussing their health.

**Theme 3: Frustration with CP program.** Every paramedic expressed some level of frustration during their interview either as issues with noncompliant patients, or the result of problems with the structure of the CP program itself (Table 2.7).
### Table 2.7. Paramedics’ frustrations with patients and CP program

<table>
<thead>
<tr>
<th>Subtheme</th>
<th>Quote</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noncompliant patients</td>
<td>“You either want the help or you don’t… they’re just going to call, no matter what” – CP005</td>
</tr>
<tr>
<td></td>
<td>“A lot of [patients] we can’t find half the time. Either they are not home or they won’t answer their phone…They are actively avoiding me” – CP009</td>
</tr>
<tr>
<td>Lack of patient ownership</td>
<td>“They are just not going to take that next step and take responsibility for themselves. They’re so system dependent that they want somebody to do it for them” – CP007</td>
</tr>
<tr>
<td>Paramedic Rotation</td>
<td>“The first week that I come in, I’m basically getting to know who the patients are, you know, what they’re about, what they need. By the time I gain their trust and by the time I’m able to really start doing stuff, it’s time for me to go [back to my regular ambulance rotation]” – CP016</td>
</tr>
<tr>
<td>Lack of communication</td>
<td>“…we’ve had some of these patients unknowingly graduated from the system and [we] were not told” – CP008</td>
</tr>
<tr>
<td></td>
<td>“I mean we say that, you know, we haven’t talked to XYZ in a week, so maybe we should check in with them. But there’s not like a set [standard procedure]” – CP006</td>
</tr>
</tbody>
</table>

**Theme 4: Suggestions for improving CP program.** Paramedics identified several suggestions to improving the CP program. The most cited was having a patient screening process and an individualized patient care plan (Table 2.8). Also, they suggested they personally screen patients before they are admitted into the program, instead of leaving this task to the program’s administration. Paramedics commented on their training: “*Basically, the class is more of an administrative class. The training comes from the everyday [patient interaction]*” (CP002). Despite the wide disparity in the amount of training received (Q1; Table 2.4), most (93.75%, n=15) paramedics agreed that they were “usually successful in helping FEUs get access to alternative primary care services” (Q11, Table 2.4), and all the paramedics (100%, n=16) believed they “can correctly assess the needs of patients who frequent EDs” (Q6, Table 2.4). For the responses to both of the above statements, there was not a strong Pearson’s coefficient of correlation with the paramedics’ perception of the adequacy of training received ($r=0.3714$, $n=16$).
This indicated that even paramedics who considered their training to be inadequate still believed they were able to serve their patients well.

<table>
<thead>
<tr>
<th>Subtheme</th>
<th>Quote</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual care plan</td>
<td>“There should be a care plan written on the initial visit... let's get the patient to sign off on it... I can open reports and say we're on step four of a ten step plan with this patient” – CP011</td>
</tr>
<tr>
<td>Patient re-evaluation</td>
<td>“…they (patients) should be re-evaluated as to whether the program is benefitting them... Some of them do still have obstacles in their healthcare that we can assist them with and some of them haven’t utilized any of the resources that we have tried to give them.” – CP014</td>
</tr>
<tr>
<td>Limit program to specific disease(s)</td>
<td>“Medical problems that we know we’ve had success in the past with, like Type I diabetes, CHF, COPD … I think we can actually make a really great impact on those. Mental health does not work out well for us.” – CP009</td>
</tr>
<tr>
<td>Standardized, practical training</td>
<td>“I was amazed by how much social work we really did. And that’s probably something that we should have [learned] that we didn’t,” (CP015)</td>
</tr>
</tbody>
</table>

2.4 Discussion

This study investigated the opinion of EMS paramedics who are currently involved in a CP program that links medically underserved FEUs to alternative primary care services. This study contributes to the understanding of paramedics’ perceptions of patients in the CP program and reasons for frequent ED use, their perception of the CP program, and how these views are reflected in published literature. Paramedics in this study mostly defined FEUs in sympathetic tones: e.g., not bad people, chronically-ill, mentally-impaired (Table 2.5). They acknowledged that a majority of patients have health issues requiring care, but only about a third (37.5%, n=6) agreed that frequent utilization is associated with serious medical conditions. This has been reported by Sieck et al.26 who found that a lack of understanding about emergencies and patients’
low health literacy make ED use seem appropriate to patients, while in reality the condition is not an emergency. They also reported that the convenience of the ED and logistical factors are typical reasons for non-urgent frequent ED use, which agrees with the current findings of lack of transportation and perceived immediacy of care being major factors in ED overuse. Although few paramedics (13% - 25%) were insensitive towards frequent users, a larger portion (69%) believed that FEUs are well aware of their high ED use (Q8, Table 2.4). Findings from Coung and colleagues revealed that 44% of frequent users had none of the common risk factors associated with high ED use (lack of PCP and health insurance, substance abuse, mental illness, etc.), which may explain the lack of sensitivity demonstrated by some of the paramedics towards frequent ED use. However, no existing published studies were found to corroborate or discount paramedics’ belief that FEUs are well aware of their high ED use.

**Paramedics’ opinion of underlying causes of FEU.** All the paramedics interviewed agreed that frequent ED use is a public health issue (Q3, Table 2.4) and that having significant physical and/or mental health burdens and having low socioeconomic status (93.75% and 87.5% respectively) contribute at least moderately to frequent utilization of healthcare resources (Figure 2.1). Frequent use is associated with greater comorbidity, lack of personal transportation and low household income. However, contrary to paramedics’ responses, other studies found that most FEUs had health insurance and a PCP, and individuals without a usual source of care were actually less likely to be FEUs. Also, FEUs are not without social/family support. Blank et al. reported that 93% of heavy ED users have their own homes, 94% have relatives or friends and 73% have a religious affiliation. This contradicts the paramedics’ perception that lack of social support was a contributing cause to ED overuse.
Paramedics also reported that the deficiencies in the current healthcare system can be credited as part of the underlying causes of frequent ED use. Specifically, they highlighted the US healthcare system fails patients owing to doctor’s ignorance of the low health literacy of [CP] patients, and not being inquisitive/caring enough to learn about the patients’ health literacy or living conditions. This assertion is supported by a recent study\textsuperscript{27} that found that more than half (56\%) of patients did not understand the discharge instructions, and approximately 40\% did not understand which symptoms would indicate a need to seek immediate medical help. Low health literacy costs the US health care system more than $106 billion annually\textsuperscript{34,35}, and patients with limited literacy are very ashamed of it, often ending up back in a physician's office with more serious conditions or, worse, in the ED.\textsuperscript{36}

**General impressions and commendations of the CP program.** Effective patient-centered care requires allowing patients to discuss their own ideas (preferences, readiness to change and psychosocial variables) in an unhurried manner and with a practitioner who is willing to make the conscious effort and time to listen.\textsuperscript{37} Paramedics agreed, citing that the program allows patients to discuss their health concerns with a health professional who comes to them at a place and time that is most convenient for the patient. Also, personal interactions and emotional support are strong components of the CP program. By meeting a patient in his/her home, a relationship is established and greater trust is built, allowing the paramedics to more fully understand and address the patient’s social needs.\textsuperscript{38}

**Frustrations with the CP program.** Paramedics cited lack of effective communication and program administration as part of their frustrations with the CP program, usually relating it to recommendations for program improvement. A recent policy statement released by ACEP (American College of Emergency Physicians)\textsuperscript{39} provides components essential for successful CP
programs. These include strong supervision by the CP program administrators, solid clinical oversight by the medical director, and an ongoing system of assessment that evaluates the effectiveness of meeting patient/program’s identified objectives. Another angst shared by paramedics is the short 30-day rotation, which is not enough time to fully acclimate with the cohort of patients in the program and deliver quality care. This is consistent with another study which highlights that short intervention duration is a barrier to continuity of care. In addition, paramedics suggested the need for individual care plans documented for patients, and this correlates with previous research showing that programs with deficiencies in care plans tend to produce patients who are non-compliant. As well, paramedics appear to be frustrated by non-compliant behaviors by some patients. This is probably because education/motivation alone is not enough as CP intervention for chronic disease management, and accountability should be paired as an important element of the framework for CP success. Difficulty in navigating the healthcare system was a major frustration expressed by the paramedics. Any successful ED intervention program requires integration into existing health care systems, including bi-directional sharing of patient health information to ensure that patients’ needs are addressed and prevent redundancy of services.

**Suggestions for CP program improvement.** Paramedics suggested more stringent patient screening that aligns the needs of patients with program competencies and goals. Specifically, paramedics suggested restricting CP from mental health patients because they require substantially more time and effort, and these patients are usually non-compliant. Other studies have shown that mental illness and substance use are associated with higher ED use (e.g. Moulin et al.). Knowlton et al. found that 65.8% of FEUs had indications of behavioral health problems, representing 6.6 times higher odds than non-frequent users. These restrictions may
shut out patients who need this program the most, but paramedics may lack vital skills necessary to deal with psychiatric complaints. CP training curriculum should incorporate effective negotiation and persuasion skills as part of training modules, as this can boost service provider confidence when managing people with psychiatric conditions.\textsuperscript{44}

Standardized training is the second major area for improvement. Wide variation in training appears to be fairly common in CP programs\textsuperscript{45}, and inadequate training is one of the key challenges to delivering CP services.\textsuperscript{46} Paramedics need more education to improve their recognition of and attitudes towards FEUs.\textsuperscript{1} Pertinent to The Chronic Care Model\textsuperscript{47}, training programs for paramedics should focus on creating awareness of the importance of perceived control over health and to their ability to enhance it. Programs should also facilitate the adoption of participative communication skills\textsuperscript{48}, such as motivational interviewing.\textsuperscript{49}

There are a number of formalized CP curricula (e.g. Hennepin Technical College\textsuperscript{50}). Also, the Community Healthcare and Emergency Cooperative (CHEC) has a standardized, internationally consistent curriculum\textsuperscript{51} that any institution with connections to rural and remote communities can obtain and customize to specific CP training programs. Adopting a nationally consistent curriculum will ensure that CP paramedics are equipped with the same set of skills to deliver reliable and uniform patient care, which may strengthen the credibility and increased acceptance of the program by potential partners and investors.

**Limitations.** This study has several limitations. Paramedics were from a single suburban, public EMS service, so findings may not be generalizable. Interviews and surveys were limited to only paramedics who have recently completed a CP rotation and not the entire EMS labor force.
Therefore, there is potential for selection bias, with participant views differing significantly from those of other EMS professionals and other non-CP participating EMS paramedics.

2.5 Conclusion and implications

EMS providers play a critical role in the care of pre-hospital patients and are in an ideal position to deliver community-based individualized care to FEUs. Paramedics believe in the CP model and want to advocate for these underserved patients, but they also acknowledge that some willfully abuse the EMS system, while explaining that overutilization for others could be the result of personal circumstances or the healthcare system. Similar to the findings in this study, paramedics are generally positive about the efficacy of the CP program and McCann et al. recommended that paramedics need more undergraduate and in-service education about the care of patients. By empowering EMS paramedics though specific training, comprehensive protocols for patient screening, and periodic goal assessments, it is possible to have a significant impact on ED overuse and improved care for this population.

This study also showed that improved program management is required, as there was a wide disapproval for the current 30-days/twice a year rotation. This structure is influenced by lack of CP-dedicated funding from policymakers, a problem that could be alleviated with empirical data of CP effectiveness. EMS services and policymakers can use these findings to implement a thriving CP program and also incentivize CP career pathways, taking into account the paramedics’ perceptions and suggestions that could better support this innovative community care model.
2.6 References


Chapter 3. Intensive Management of Frequent ED Users in a CP Program Yields Positive Patient Experiences and Cost Savings while Reducing EMS Utilization

3.1 Introduction

Frequent utilization of emergency departments (ED) for non-urgent reasons among the Medicaid population and people with multiple chronic conditions (MCC)\textsuperscript{1,2} is a growing problem of high healthcare waste in the US\textsuperscript{3}, resulting in more than 10 times the healthcare costs for non-frequent users.\textsuperscript{4} Community paramedicine (CP) is an emerging healthcare intervention that has been garnering attention in recent literature as a solution to curb non-emergent frequent ED use.

Paramedicine represents a unique intersection of health care, public health, and public safety and allows paramedics and emergency medical technicians (EMTs) to operate in expanded roles by assisting with primary healthcare, preventive services and public health for underserved populations in the community. It has been deployed in a variety of settings\textsuperscript{5}, including illness management\textsuperscript{6}, senior housing\textsuperscript{7,8}, flood disaster\textsuperscript{9}, rural communities\textsuperscript{10,11}, and recently in an ED-to-home transition intervention\textsuperscript{12}. There is a push to study the effectiveness of these programs in achieving the IHI (Institute for Healthcare Improvement) Triple Aim.\textsuperscript{13,14}

In general, there is a dearth of scholarly literature evaluating CP programs\textsuperscript{5,15,16} related to program implementation, patient care and experience, and economic impact.\textsuperscript{17,18} To the knowledge of the author, no study has reported the frequency and modality of CP interventions to patients in the program, nor described the process of enrollee intake and assessments. While studies on CP have explored providers’ perspective of the program\textsuperscript{19,20}, or used national health surveys, paramedic service database and/or highly structured interviews to assess program effectiveness\textsuperscript{7,8,21,22}, there is a paucity of quantitative data about patients’ perspectives and experiences.\textsuperscript{23} Mobile Integrated Healthcare (MIH)-CP proposals and white papers written in
emergency medicine cite the need for patient experience as one of the highly-desired outcome measures for establishing CP sustainability\textsuperscript{13,24}, but the few studies on CP rarely reports this measure, and most report a single score on patient satisfaction.\textsuperscript{10}

Research is required to understand whether CP enhances patients’ experiences while maintaining or reducing costs.\textsuperscript{15} Measuring patient experience of care has become a priority for national payment and public reporting programs.\textsuperscript{25} Specifically, CP sites have requested guidance in developing patient experience surveys with CP-relevant items.\textsuperscript{13} In the US, the Consumer Assessment of Healthcare Providers and Systems (CAHPS) surveys are the standard for collecting information about patient experience of care, but very few studies have adopted CAHPS instruments to measure effectiveness of innovations implemented in health care settings.\textsuperscript{26} Few peer-reviewed studies have added EMS cost to the cost of hospital care, to estimate the total cost of emergency care for frequent ED users.\textsuperscript{1}

The aim of this study is to provide an understanding of patients’ self-reported experiences of care with the CP program, and to test whether these experiences change over the time patients are enrolled in CP. There are no easily accessible peer-reviewed studies that sufficiently document the day-to-day types of activities or interventions in the CP program. To address this gap, this study reports the adherence to intake protocol, frequency and nature of the paramedic-patient interactions in the CP program, and participant characteristics. Finally, cost effectiveness analysis compares CP program costs and cost avoidance. These findings help to enhance the evidence base of the structure of an EMS-led CP program, and achieve two of the Triple Aim objectives: patient-centeredness and cost versus benefits of CP programs (Figure 3.1).
3.2 Methods

**Study Setting & Design.** This study is observational and prospective in design, and occurred in East Baton Rouge Parish, Louisiana (2017 population 446,228\textsuperscript{27}). The ratio of residents to primary care providers (PCP) is high at 1500:1, in contrast to the 2016 national average of 1326:1.\textsuperscript{28} This has left a gap in healthcare access, particularly for more-vulnerable individuals with MCC and few resources. The CP program has targeted these individuals to provide healthcare and decrease these individuals’ use of emergency medical services. Services provided vary depending on the individual’s needs and often include: persistent patient follow-up (e.g. home visits and “hello” calls), home safety/ fall risk assessments, hospitalization visits/ post-discharge follow-up, medication administration, etc. The program is further described here\textsuperscript{29} and is operated by the local public EMS agency, comprising of a cohort of paramedics who are specially trained in community health, a supervisor, a social worker and a physician medical
director. Community paramedics receive an additional 20 hours of instruction in critical care and home-based primary care through didactic training and clinical rotations. Two paramedics from the CP-certified cohort work on the CP program in one-month rotations. One of the two paramedics work each day from 7am-7pm on a rotating basis. Paramedics are encouraged to collaborate with the patient’s PCP and social service workers to leverage all available community resources based on the individual’s need.

There is a potential pool of about 2000 high-utilizers in the EMS coverage area who could benefit from this program, and patients are identified using one of three methods: referral by paramedics based on a patient’s frequent 911 calls within a short time frame, referral by nurse navigators in the ED, or through a review of the 911 call log by the EMSagency. Patients are instructed to call a direct phone number, available from 7am-7pm, rather than 911. Patients who still call 911 are identified by EMS dispatchers, who in addition to sending an ambulance, notify the community paramedic on call. The paramedic visits patients in a specially-marked EMS vehicle (not an ambulance), and all visits are conducted in the patient’s home, at the patient’s PCP office, or at the hospital/ED (if a patient was hospitalized). After each visit, the paramedic documents the visit using the EMS electronic reporting software. Patients are reassessed as needed over the course of the program and are “graduated (or dismissed if non-compliant)” when the CP provider team collectively decides that a patient is in stable health condition, able to self-manage his/her health care, and no longer needs the program’s services.

**Selection of Participants.** 57 participants who had ≥4 ED visits during the previous 12 months were included in the study. This selection is consistent with previous literature, including the recent CMS (the Centers for Medicare & Medicaid Services) classification30. Other inclusion criteria were: ≥18 years of age, ability to give informed consent, ability to respond to written and
oral questions in English, and willingness to participate/receive the CP interventions. Patients who were too intoxicated, acutely confused, or lacked mental capacity to give informed consent were excluded. Recruitment of study participants took place when the author, together with a paramedic visited patients at home. The author explained all experiment protocol verbally in addition to providing written documentation for informed consent, then answered any patient questions. Participation was completely voluntary, and patients were required to sign a consent form (Appendix 4) that specified that there was no compensation for participation in the study, nor were there any adverse consequences for withdrawing from the study. In addition, no personally identifiable information about the patients were collected nor recorded. The study protocols were approved by the Institutional Review Board of the Louisiana State University (IRB# 3978; Appendix 1).

**CG-CAHPS-derived Survey Instrument.** A modified version of the CG-CAHPS Adult Survey 3.0 was developed for this study (Appendix 5) because the design of the core items and the composite measures are best aligned to the structure of the CP model of care, the survey fits the target population of individuals 18 years and older, and the response burden to the patient is relatively small compared to other CAHPS. One of the recommended users/entities for this survey include “community-based collaboratives”\(^{31}\), which fits a description for this CP program. The Agency for Healthcare Research and Quality (AHRQ) explicitly allows the phrase “this provider” to be changed to fit the provider label specific to the entity being or organization being assessed\(^ {32}\). For this study, the words “hospital” and “provider” were changed to “your home” and “community paramedic” or simply “paramedic”, respectively.

This study utilized three composite measures: Access, Provider communication and Care coordination, and two global items: Program rating and a supplemental item on whether
participants would recommend the program (*Program recommendation*). One composite measure (*Helpful, Courteous, and Respectful Office Staff*) and one item from the care coordination composite (*Did this provider order a blood test, x-ray, or other test for you?*) were excluded as these are not relevant to the CP program. Removing one item should not negatively impact the Care Coordination composite score, since each item in the CAHPS’ composites is generally equally weighted. While the researchers understand that CAHPS surveys are designed to evaluate and compare health plans and healthcare providers, AHRQ advised that it is acceptable to compare across time, as it is customary to “do some trending for Health Plan populations” [OA, personal communication, 11/15/2017].

**Data Collection Procedures**

**Patient Experience.** The CG-CAHPS-derived survey was administered once the participant was active in the program, first at 3-months (*T*₁) and at 6-months (*T*₂). One of the researchers [OA] visited the patient at home and read the questions verbatim to the participant. Each item’s score was averaged between all respondents, and the items scores corresponding to each scale was then averaged.

**CP Program Enrollee Intake.** Based on interviews with the program administrators regarding program goals for patient intake protocol and assessments, an audit examined intake paperwork and other patient documents against the protocol to determine how well paramedics followed the program’s prescribed goals for patient enrollment. Table 3.1 shows the list of enrollee intake assessments and program’s set goals against actual results.
Table 3.1. CP enrollee intake summary

<table>
<thead>
<tr>
<th></th>
<th>Goal</th>
<th>Actual n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medication Reconciliation</td>
<td>100% of patients enrolled have their medication reconciled</td>
<td>3 (5.3%)</td>
</tr>
<tr>
<td>Initial EKG</td>
<td>100% of patients enrolled receive baseline EKG measurement</td>
<td>17 (29.8%)</td>
</tr>
<tr>
<td>Health Questionnaire</td>
<td>100% of patients enrolled are physically assessed</td>
<td>39 (71.9%)</td>
</tr>
<tr>
<td>Nutrition Assessment</td>
<td>100% of patients enrolled</td>
<td>42 (73.7%)</td>
</tr>
<tr>
<td>Social Support Checklist</td>
<td>100% of patients are screened for social support</td>
<td>43 (75.4%)</td>
</tr>
<tr>
<td>Home Safety Assessment</td>
<td>100% of patients screened for fall risks</td>
<td>45 (78.9%)</td>
</tr>
<tr>
<td>Vaccination History</td>
<td>100% of patients are screened for up-to-date vaccine record</td>
<td>29 (50.9%)</td>
</tr>
<tr>
<td>Katz Index of Independence in Activities of Daily Living (ADL)</td>
<td>100% of appropriate patients (age 55+) receive ADL assessment: n=38</td>
<td>30 (78.9%)</td>
</tr>
<tr>
<td></td>
<td>Score: 0-2 (Patient very dependent)</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>3-4 (Moderately dependent)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>5-6 (Independent)</td>
<td>22</td>
</tr>
<tr>
<td>Lawton’s Instrumental Activities of Daily Living (IADL)</td>
<td>100% of appropriate patients (age 55+) receive ADL assessment: n=38</td>
<td>28 (73.7%)</td>
</tr>
<tr>
<td></td>
<td>Score: 0-2 (Severe functional impairment)</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>3-5 (Moderate impairment)</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>6-8 (High Functioning)</td>
<td>11</td>
</tr>
</tbody>
</table>

EMS Records Regarding CP Patient Encounters and 911 Calls. EBRP EMS uses its existing electronic reporting software as the primary means to document CP and patient interactions. Specific measures obtained from this record included: date of encounter, patient identifier number, type of chronic condition(s), types of CP intervention provided (Table 3.2), if the encounter was scheduled or unscheduled, and if the encounter was successful or not (i.e. the purpose of initiating contact by either party was achieved). The data also included if the patient called 911 or the CP phone, if the 911 call resulted in transport to an ED, the urgency of the need for ED transport (1=non-urgent, 2=urgent, 3=life threatening), and the frequency of same-day and next-day paramedic follow-ups.
Table 3.2. Definition of interventions

<table>
<thead>
<tr>
<th>Intervention Type</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Follow up</td>
<td>Initiated by CP due to a recent event/incident that s/he would like to check on (could lead to providing other interventions, e.g. patient education, vital check, medication assistance).</td>
</tr>
<tr>
<td>2 Well check</td>
<td>“Hello call” or home visit initiated by CP, not due to any recent or specific incident; often because there has not been any contact with patient in the last 5 days or more.</td>
</tr>
<tr>
<td>3 Patient reassurance</td>
<td>The only intervention initiated by patients; arising from patient having medical question/concerns, or experiencing health problems.</td>
</tr>
<tr>
<td>4 911 response</td>
<td>CP responds to 911 call by patient or calls 911 on behalf of patient while providing care until ambulance arrives.</td>
</tr>
<tr>
<td>5 Patient advocacy</td>
<td>CP facilitates communication between patient and outside source or discusses possible care plans for patient with outside source (e.g. hospital, ED, PCP, fire department, police); also involves research.</td>
</tr>
<tr>
<td>6 Vitals check</td>
<td>CP visits to check patient’s vitals.</td>
</tr>
<tr>
<td>7 Appointment scheduling</td>
<td>Initiated by CP to remind or coach patient to schedule medical appointments.</td>
</tr>
<tr>
<td>8 Living assistance</td>
<td>CP assesses living condition of patient or helps to improve the living situation of patient.</td>
</tr>
<tr>
<td>9 Health coaching/Patient education</td>
<td>CP educates or advises patient about their health or navigating the health system.</td>
</tr>
<tr>
<td>10 Medication assistance</td>
<td>Initiated by CP because patient has difficulty assessing or reconciling medications.</td>
</tr>
<tr>
<td>11 Transportation scheduling</td>
<td>CP reminds or coaches patient about transportation options to medical appointments.</td>
</tr>
</tbody>
</table>

Data Analysis

Outcome Measures. The key outcomes of interest included (1) adherence to program enrollee protocols, (2) CG-CAHPS-derived patient experience score, (3) mean 911 calls, EMS transports, and non-transports, with associated costs, (4) descriptions of CP interventions: type and mode of
delivery (Table 3.2), and (5) associations between frequency and type of intervention with participant demographic variables.

To determine if patient experience changes as patients are enrolled longer in the CP program, patient experience ratings at 6 months, \( T_2 \), were compared to baseline ratings, \( T_1 \) (that is, 3 months following CP enrollment). Due to attrition yielding unequal sample sizes at \( T_1 \) and \( T_2 \), comparison was conducted using unequal sample \( t \)-test (\( \alpha = 0.05 \)). From pilot studies, the average length of time a patient stays in the CP program graduation/discharge is 6-9 months, although this varies according to specific needs. This study reports patient experience about the following composites: Access, Provider Communication, Care Coordination, and two global items: Program Rating and Program Recommendation\(^31\).

**Time Frame.** Between 2017 and 2018, the CP program enrolled 57 participants, with varying levels of health needs and program exposure. Program impact on participants’ healthcare utilization was measured in 3 ways: (1) a retroactive 12-month chart review of EMS records was performed to identify EMS and ED utilization prior to program enrollment; (2) utilization during enrollment period; and (3) up-to 12-months chart reviews of EMS and ED utilization post-enrollment to compare changes. The CG-CAHPS-derived survey was administered between January and December 2018 to only the continuing patients from 2017, and patients that were enrolled in 2018 (if they have been in the program for \( \geq 3 \)-months). Paramedic encounters with patients (visits and calls) were tracked throughout the entire study period.

The number of 911 calls and the percentage of those calls that resulted in ED transports and the urgency of the transports were used to assess program impact on EMS utilization and the CP program’s effectiveness in educating patients to recognize and distinguish true medical
emergencies. Records on paramedic-patient encounters were categorized as scheduled/unscheduled, phone/in-person, home/hospital/other, intervention type, and party who initiated the encounter (patient/paramedic-initiated) to describe the level of paramedic involvement with patients, and the coordination of those encounters.

To determine the effectiveness of the program in reducing EMS utilization, paired student $t$ tests were performed to assess differences in pre-enrollment and up to 12-months post-program 911 calls, ED visits, and non-ED transports. Categorical scoring was conducted for the CG-CAHPS responses for the three composite measures and two global ratings, and differences between 3- and 6-months ratings were determined using 2-sample $t$-tests. Associations between the type of intervention, frequency of interventions and urgency of ED transports, against demographic variables and type of chief complaint were assessed using Wilcoxon signed-rank tests. These associations were tested to assess whether patient’s gender, ethnicity, age group and chief complaint influences the type of intervention and how often the interventions were received. Nonparametric tests were used due to a small sample size yielding data that were not normally distributed. Significance level is set at 0.05 and analyses were performed using JMP Pro software (SAS, version 14.2.0, 2018).

**Cost Effectiveness.** Cost effectiveness was estimated using program costs and cost avoidance. Program costs were obtained from the EBRP EMS records and included staff payroll, program receipts, and fringe benefits. Cost avoidance was estimated by examining utilization pre- and post-enrollment. Costs included ambulance transports, ED visits, and inpatient hospital days. Ambulance transport costs were obtained from the EBRP EMS cost reports using the average Medicare reimbursement rate.$^{33}$ Medicare reimbursement rate was used because it is generally considered to be closest to the cost of care.$^{34}$ ED visit and inpatient hospital costs were estimated
using data from the Louisiana Hospital Inform database\textsuperscript{35} and Healthcare Bluebook\textsuperscript{TM}\textsuperscript{36} for EBRP, LA. Cost avoidance was then calculated as these average costs multiplied by reduction in ambulance transports, ED visits and inpatient days.

3.3 Results

**Sample Characteristics.** The participants (n=57) were 66.6% female, 80.7% African-Americans, aged 59.8 years (SD = 17.6), and most had high school level education or less (91.2%) (Table 3.3). 22 participants had heart-related diseases including hypertension, 12 had diabetes and/or chronic kidney-related conditions, 5 had drug/alcohol abuse, 5 had psychotic disorders, 3 had COPD or asthma, 10 had other disease (3 chronic pain, 2 sickle cell, 2 morbid obesity, 1 HIV/AIDS, 1 seizure, 1 gastro-intestinal problem), and 53 had some combination of the above. About half of the program enrollees participated longer than 180 days to help them achieve the goal of self-management of meet their chronic conditions.

**CP Program Enrollee Intake.** Results showed varied levels of adherence to intake protocols, with the lowest being medication reconciliation (only 5.3% of enrollees completed). The highest recorded accounts of conformance to program goals were administration of the Katz Index of Independence in Activities of Daily Living (ADL) instrument, and performance of home safety assessments (78.9% completion for both), followed by the Lawton’s Instrumental Activities of Daily Living (IADL) (73.7% completion) (Table 3.1).
<table>
<thead>
<tr>
<th>Table 3.3. Participant characteristics (n = 57)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (mean, SD)</td>
</tr>
<tr>
<td>Gender (frequency)</td>
</tr>
<tr>
<td>Men</td>
</tr>
<tr>
<td>Women</td>
</tr>
<tr>
<td>Race/Ethnicity (frequency)</td>
</tr>
<tr>
<td>White/Caucasian</td>
</tr>
<tr>
<td>Black/African American</td>
</tr>
<tr>
<td>Age at enrollment (frequency)</td>
</tr>
<tr>
<td>18-24</td>
</tr>
<tr>
<td>25-34</td>
</tr>
<tr>
<td>35-44</td>
</tr>
<tr>
<td>45-54</td>
</tr>
<tr>
<td>55-64</td>
</tr>
<tr>
<td>65-74</td>
</tr>
<tr>
<td>75 or older</td>
</tr>
<tr>
<td>Employment status (frequency)</td>
</tr>
<tr>
<td>Employed</td>
</tr>
<tr>
<td>Unemployed</td>
</tr>
<tr>
<td>Highest level of education (frequency)</td>
</tr>
<tr>
<td>≤ 8th grade</td>
</tr>
<tr>
<td>Some HS, but did not graduate</td>
</tr>
<tr>
<td>HS graduate or GED</td>
</tr>
<tr>
<td>Some college or 2-year degree</td>
</tr>
<tr>
<td>4-year college graduate</td>
</tr>
<tr>
<td>PCP at enrollment (frequency)</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
</tr>
<tr>
<td>Missing</td>
</tr>
<tr>
<td>Health insurance at enrollment (frequency)</td>
</tr>
<tr>
<td>Medicaid</td>
</tr>
<tr>
<td>Medicare</td>
</tr>
<tr>
<td>Medicare dual eligible</td>
</tr>
<tr>
<td>Private</td>
</tr>
<tr>
<td>Other</td>
</tr>
<tr>
<td>Number of chronic conditions (frequency)</td>
</tr>
<tr>
<td>≤ 2</td>
</tr>
<tr>
<td>3-5</td>
</tr>
<tr>
<td>6+</td>
</tr>
<tr>
<td>Chief medical complaints (frequency)</td>
</tr>
<tr>
<td>Heart Disease</td>
</tr>
<tr>
<td>Psychotic Disorders, Drug/Alcohol Abuse</td>
</tr>
<tr>
<td>Diabetes</td>
</tr>
<tr>
<td>Chronic Kidney Disease</td>
</tr>
<tr>
<td>Chief medical complaints (frequency)</td>
</tr>
<tr>
<td>--------------------------------------------</td>
</tr>
<tr>
<td>COPD/Asthma</td>
</tr>
<tr>
<td>Other</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Eligibility criteria (total (mean per patient))</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>EMS (911) calls, prior 12-months</td>
<td>565 (14.1)</td>
</tr>
<tr>
<td>ED visits, prior 12-months</td>
<td>402 (10.05)</td>
</tr>
<tr>
<td>Non-ED transports, prior 12-months</td>
<td>160 (4)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Length of CP participation (frequency)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 60-days</td>
<td>14</td>
</tr>
<tr>
<td>60 – 180-days</td>
<td>17</td>
</tr>
<tr>
<td>181 – 360-days</td>
<td>16</td>
</tr>
<tr>
<td>&gt; 360-days</td>
<td>10</td>
</tr>
</tbody>
</table>

CG-CAHPS Adult 3.0-derived patient experience. Overall, patient experience was very positive, with at least 97% of participants reporting a “Definitely yes” in program recommendation to friend or relatives, and an initial (T1) top box score (9 or 10 out of 10) of 90% for global program rating. Initial top box score (“Always”) for the Access, Provider communication and Care coordination domains were 98%, 88.2% and 70.5% respectively (Table 4). At T2, participants reported a decrease by 25.8% in the Access composite score, but the difference appeared to shift to the middle proportion score (“Usually”). However, the Provider communication and Care coordination composite scores appeared to improve at T2 by 5.8% and 11.5% respectively (Table 4). However, none of these changes were statistically significant (Access, \( p = 0.6612 \); Provider communication, \( p = 0.1541 \); Care coordination, \( p = 0.6810 \)).

Interventions and Patient Contacts. Most interventions (95%) were unscheduled and occurred on demand relative to CP program and personnel resources. Also, interventions were largely initiated by paramedics (68.44%) rather than patients (31.56%, which includes patient reassurance and 911 calls). Depending on the nature of the intervention, these activities are mostly delivered in the patients’ home (47.17%), by phone (42.08%), and in the hospital
following an ED transport (9.03%) (Figure 3.2 and Table 3.5). As shown in Table 3.5, females and African-Americans received the most interventions: 51.6 interventions per female patient versus 47.1 interventions per patient overall, and 46.8 interventions per African American patient versus 38.4 per Caucasian patient. These groups of patients also recorded the highest proportion of ED transports. These differences were confirmed with post-hoc $X^2$ tests of independence: females: $X^2 (2, n = 57) = 191.13, p < .0001$; African Americans: $X^2 (2, n = 57) = 72.25, p < .0001$, showing that women and African Americans were statistically more likely to receive more interventions than male or Caucasian participants.

To investigate the promptness of follow-up interventions, the researchers determined the proportion of same-day and next-day paramedic encounters with patients subsequent to patients’ 911 or reassurance calls. Paramedics follow-up with patients after they call the CP phone for any health reason 51.1% on the same day, and 6.7% by the next day (Table 3.6). However, if a patient calls 911, paramedics follow-up on the same day 22% of the time and 14.4% by the next day.
Table 3.4. Modified CG-CHAPHS patient experience scores

<table>
<thead>
<tr>
<th>Scales and Items</th>
<th>T₁ (n = 28)</th>
<th>T₂ (n = 17)</th>
<th>Change in Top Box Score (T₂ – T₁)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% Lower Proportion Score (Never, Sometimes)</td>
<td>% Middle Proportion Score (Usually)</td>
<td>% Top Box Score (Always)</td>
<td>% Lower Proportion Score (Never, Sometimes)</td>
</tr>
<tr>
<td>Access</td>
<td>2</td>
<td>-</td>
<td>98</td>
<td>27.3</td>
</tr>
<tr>
<td>Urgent care</td>
<td>6</td>
<td>-</td>
<td>94</td>
<td>45</td>
</tr>
<tr>
<td>Routine care</td>
<td>-</td>
<td>-</td>
<td>100</td>
<td>20</td>
</tr>
<tr>
<td>During office hours</td>
<td>-</td>
<td>-</td>
<td>100</td>
<td>17</td>
</tr>
<tr>
<td>Provider communication</td>
<td>5.8</td>
<td>6.0</td>
<td>88.2</td>
<td>1.5</td>
</tr>
<tr>
<td>Understand</td>
<td>3</td>
<td>7</td>
<td>90</td>
<td>-</td>
</tr>
<tr>
<td>Listen</td>
<td>7</td>
<td>3</td>
<td>90</td>
<td>-</td>
</tr>
<tr>
<td>Respect</td>
<td>3</td>
<td>7</td>
<td>90</td>
<td>-</td>
</tr>
<tr>
<td>Spend enough time</td>
<td>10</td>
<td>7</td>
<td>83</td>
<td>6</td>
</tr>
<tr>
<td>Care coordination</td>
<td>17.5</td>
<td>12.0</td>
<td>70.5</td>
<td>3</td>
</tr>
<tr>
<td>Medical History</td>
<td>6</td>
<td>10</td>
<td>84</td>
<td>6</td>
</tr>
<tr>
<td>Prescription medicines</td>
<td>29</td>
<td>14</td>
<td>57</td>
<td>6</td>
</tr>
<tr>
<td>Global ratings</td>
<td>Bottom Box (0-6)</td>
<td>Middle proportion (7-8)</td>
<td>Top Box Score (9-10)</td>
<td>Bottom Box (0-6)</td>
</tr>
<tr>
<td>Provider rating</td>
<td>3</td>
<td>7</td>
<td>90</td>
<td>6</td>
</tr>
<tr>
<td>Program recommendation¹</td>
<td>-</td>
<td>3</td>
<td>97</td>
<td>-</td>
</tr>
</tbody>
</table>

¹Not part of CG-CAHPS core items
Figure 3.2. Pictorial distribution of type vs. mode of CP interventions
Further, this study investigated whether patients’ gender, race/ethnicity, age group and chief medical complaint were associated with the frequency and types of interventions received, as well as the EMS-recorded urgency of ED transports. As shown in Table 3.7, participants’ gender ($p < .0001$), and age ($p < .0001$) were significantly associated with the intervention type.
received, as with chief medical complaints \( (p < .0001) \), specifically diabetes \( (p = 0.0002) \) and kidney disease \( (p = 0.0003) \).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Intervention type</th>
<th>Frequency of intervention</th>
<th>ED-transport urgency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>&lt; .0001</td>
<td>&lt;.0001</td>
<td>0.7182</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>0.2957</td>
<td>&lt;.0001</td>
<td>0.0080</td>
</tr>
<tr>
<td>Age</td>
<td>&lt; .0001</td>
<td>&lt;.0001</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Number of chronic conditions</td>
<td>&lt;.0001</td>
<td>&lt;.0001</td>
<td>0.1235</td>
</tr>
<tr>
<td>Chief complaint</td>
<td>&lt; .0001</td>
<td>&lt;.0001</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Heart Disease</td>
<td>0.0788</td>
<td>&lt;.0001</td>
<td>0.4591</td>
</tr>
<tr>
<td>Mental Health Conditions</td>
<td>0.7541</td>
<td>&lt;.0001</td>
<td>0.0702</td>
</tr>
<tr>
<td>Diabetes</td>
<td>0.0002</td>
<td>0.0329</td>
<td>0.0003</td>
</tr>
<tr>
<td>Kidney Disease</td>
<td>0.0003</td>
<td>&lt;.0001</td>
<td>0.0003</td>
</tr>
<tr>
<td>Lung Disease</td>
<td>0.9606</td>
<td>&lt;.0001</td>
<td>0.2946</td>
</tr>
</tbody>
</table>

ED: Emergency Department

To further examine patients’ chief complaints and the potential overuse of certain type of interventions, post-hoc analysis using \( X^2 \) tests revealed that morbidly obese patients required significantly more number of patient reassurance interventions and help with transportation scheduling \( (p < .0001; \text{Table 3.8}) \). Similarly, patients whose chief complaint was seizures required more reassurance and medication assistance than would be expected \( (p < .0001) \), and sickle cell patients had more transportation scheduling help and frequent well-check visits \( (p < .0001; \text{Table 3.8}) \). For the frequency of interventions received, there were significant associations observed across all the variables investigated (all \( p \)-values < 0.05; Table 3.7). The urgency of transport to EDs when patients call 911 was not significantly associated with gender \( (p\text{-value} = 0.7182) \), number of chronic conditions \( (p = 0.1235) \), heart disease \( (p = 0.4591) \), or lung disease \( (p\text{-value} = 0.2976) \). All other characteristics were significant (Table 3.7).
<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Chronic Kidney Disease</td>
<td>31</td>
<td>23.95</td>
<td>2.07</td>
<td>132</td>
<td>3.24</td>
<td>1.79</td>
<td>13.33</td>
<td>0.00</td>
<td>15.28</td>
<td>4.18</td>
<td>0.869</td>
<td>0.86</td>
</tr>
<tr>
<td>Chronic Pain</td>
<td>21</td>
<td>16.27</td>
<td>1.37</td>
<td>150</td>
<td>3.42</td>
<td>0.66</td>
<td>2.02</td>
<td>0.05</td>
<td>3.17</td>
<td>0.54</td>
<td>2.56</td>
<td>0.12</td>
</tr>
<tr>
<td>COPD</td>
<td>43</td>
<td>62.48</td>
<td>6.07</td>
<td>130</td>
<td>3.24</td>
<td>0.66</td>
<td>2.02</td>
<td>0.05</td>
<td>3.17</td>
<td>0.54</td>
<td>2.56</td>
<td>0.12</td>
</tr>
<tr>
<td>Diabetes</td>
<td>29</td>
<td>35.61</td>
<td>1.23</td>
<td>140</td>
<td>3.24</td>
<td>0.66</td>
<td>2.02</td>
<td>0.05</td>
<td>3.17</td>
<td>0.54</td>
<td>2.56</td>
<td>0.12</td>
</tr>
<tr>
<td>Drug/Alcohol Abuse</td>
<td>55</td>
<td>59.57</td>
<td>0.35</td>
<td>130</td>
<td>3.24</td>
<td>0.66</td>
<td>2.02</td>
<td>0.05</td>
<td>3.17</td>
<td>0.54</td>
<td>2.56</td>
<td>0.12</td>
</tr>
<tr>
<td>Gastro</td>
<td>12</td>
<td>7.36</td>
<td>2.90</td>
<td>140</td>
<td>3.24</td>
<td>0.66</td>
<td>2.02</td>
<td>0.05</td>
<td>3.17</td>
<td>0.54</td>
<td>2.56</td>
<td>0.12</td>
</tr>
<tr>
<td>Heart Failure</td>
<td>106</td>
<td>110.69</td>
<td>0.19</td>
<td>159</td>
<td>3.24</td>
<td>0.66</td>
<td>2.02</td>
<td>0.05</td>
<td>3.17</td>
<td>0.54</td>
<td>2.56</td>
<td>0.12</td>
</tr>
<tr>
<td>HIV/AIDS</td>
<td>8</td>
<td>5.68</td>
<td>0.94</td>
<td>16</td>
<td>0.66</td>
<td>0.77</td>
<td>0.42</td>
<td>0.00</td>
<td>3.16</td>
<td>0.00</td>
<td>0.20</td>
<td>0.89</td>
</tr>
<tr>
<td>HTN</td>
<td>22</td>
<td>12.12</td>
<td>8.03</td>
<td>16</td>
<td>0.66</td>
<td>0.77</td>
<td>0.42</td>
<td>0.00</td>
<td>3.16</td>
<td>0.00</td>
<td>0.20</td>
<td>0.89</td>
</tr>
</tbody>
</table>

Table 3.8. Chi-square output of chief complaints by type of intervention
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Morbid Obesity</td>
<td>1</td>
<td>3</td>
<td>20</td>
<td>4</td>
<td>4</td>
<td>0</td>
<td>18</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>13.20</td>
<td>1.88</td>
<td>26.34</td>
<td>1.53</td>
<td>3.96</td>
<td>0.99</td>
<td>7.35</td>
<td>15.41</td>
<td>0.47955</td>
<td>2.07807</td>
<td>16.40</td>
<td>86</td>
</tr>
<tr>
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**911 calls, ED transports, and urgency of ED transports.** Using pre- and post-program means to compare EMS utilization, post-program 911 calls decreased significantly from pre-program levels, from 14.1 to 7.8 ($t = 3.502, p = .0012$), as did ED transports, from 10.1 to 5.6 ($t = 3.32, p = .002$), and non-ED transports, from 4 to 2.2 ($t = 2.277, p = .0380$). EMS (911) calls decreased by 45.1%, ED transports decreased by 44.53%, and the proportion of non-ED transports stemming from calls for non-emergent issues (i.e. health issues not requiring transport to an ED facility) decreased by 60.98%. Out of 57 patients, there were 4 participants who increased EMS utilization after completing the program. Urgency of ED transports as collected from EMS records did not change post-program as 86.9% of 911 calls resulting in an ED transport were non-urgent, compared to 89.8% pre-program.

**Cost-Benefit Analysis.** Based on $9,035.47 in annualized start-up costs, $2,678.16 for supplies and $398,179.49 in personnel costs (2 FTE community paramedics, 1 FTE social worker, and 0.25FTE program administrator), the estimated program cost for the year of 2018 was $409,893.12. The estimated cost of an average inpatient day was $2,423.58, and an ED visit was $648.\textsuperscript{35,36} From the EBRP EMS cost report, the average Medicare reimbursement rate\textsuperscript{33} for ambulance transport was $366.28. The author was able to collect 2018 hospital admission data only for 25 of the participants during program participation. As a result of this limitation, the author adopted a conservative reduction in inpatient admission of 50%, similar to Nejtek, et al.\textsuperscript{37}

Given the annualized reduction in ED visits (224), inpatient days (245), and EMS transports (328), a positive marginal benefit to the local healthcare system was estimated to be at least $439,481.5, which represents a ROI of more than 51%. Additional program expenses such as fixed overhead costs and equipment purchase and depreciation, may further influence this estimate. This cost benefit analysis is similar to Bennett and colleagues.\textsuperscript{10}
In addition, the savings may differ than estimated as the study could not access pre- and post-program inpatient data due to legal/ethical reasons given by the hospitals, nor could this study ascertain that all hospital records for all the participants were available. Further, using average costs may underestimate the actual costs of care as each individual’s health and intensity of care needed differs widely.

3.4 Discussion

MIH-CP programs are growing in the US, yet there are almost no peer-viewed, published studies on MIH-CP outcomes. This study describes the program enrollee intake as well as the nature and frequency of interventions within the CP context, and adopts a national, well-validated instrument (CG-CAHPS) to measure patient experience of a CP program. The EBRP EMS CP program demonstrates the strong belief of the paramedics in serving their community and doing what is right for their patients. The CP program involves intensive patient health management, which is delivered through on-demand, frequent and unscheduled paramedic-patient encounters.

Participants were middle-aged, public insured, unemployed, had low educational attainment and MCCs. Most had a designated home hospital, and more than half had a PCP at enrollment (Table 3.1), yet routinely used the local EMS and hospital ED for non-emergent or primary care treatable conditions prior to enrollment. The sample characteristics in this study are similar to Bennett et al and mirrors the characteristics of frequent ED users as reported by Ondler, et al. Following program intake, participants reported positive patient experience scores, with very high provider rating and enthusiastic scores in program recommendation (Table 3.4). Pre/post program analyses also demonstrated reduced EMS utilization (911 calls and transports), and reduced ED visits, which, if sustained could produce meaningful improvements in their quality of life outcomes.
The positive care experiences observed through the modified CG-CAHPS survey may be attributed to psychosocial bonding\textsuperscript{37} that participants received through the in-home care and the on-demand 12-hour availability that offered immediate healthcare access similar to traditional ambulance service. Participants also experienced assured follow-up encounters and wellness checks (more than 50% within the same day) with a trained health professional advocating for them as they navigate the current maze of the healthcare system (Table 3.6). Similar to this finding, a CP pilot program evaluation supported by the Maine EMS\textsuperscript{38} showed that the most popular intervention in the CP program is wellbeing check, which accounts for nearly half (48.3%) of all the interventions during the two year period of the evaluation. These results are similar to studies\textsuperscript{39,40} which report that having a follow-up within either 7-days or 14-days after hospitalization for heart failure or MCC was associated with lower all-cause ED visits and readmissions. Through intensive management and involvement in the patients’ lives, they are encouraged to be proactive in their health behaviors and call the CP phone when in need of healthcare or related concerns, an experience that is not typically experienced in the oft short and hurried outpatient appointments.

There is a lack of consistency in enrollee intake protocols (Table 3.1), which could be attributed to the monthly rotation of paramedics, evolving program administration, and sub-optimal communication practices between paramedics and program directors, which may have encouraged negligence and allowed paramedics to use their self-discretion in completing program enrollment protocols. The challenge caused by frequent paramedic rotation stems from lack of CP dedicated funding. This frequent rotation hampers effective communication between program administrators and the frontline community paramedics, which in turn results in subpar transition of care responsibilities. Inconsistency could impact patient data coordination, quality
documentation of program effectiveness, and delivery of safe, quality care to the CP patients. This may also be a cause of the relatively long enrollment period (>180-days on average) compared to other studies reporting a typical program length of 90-days.  

To become financially sustainable, CP programs need to demonstrate value and also create reimbursement opportunities, however, the most powerful case for convincing payers or healthcare partners to invest in CP programs is to provide proof that the program delivers on the IHI Triple Aim framework. This framework recommends that new health care innovations must simultaneously pursue three dimensions: (1) Improving the patient experience of care; (2) Improving the health of populations; and (3) Reducing the per capita cost of health care. Use of the CAHPS-based instrument offers a viable tool that CP programs can use to help build the business case for potential payers and healthcare partners. This study adds to the evidence base that CP programs can produce positive patient experience of care, as participants remained positive about the program even as they stayed longer.

This study was able to demonstrate another case for convincing healthcare partners to invest in CP programs through the evidence of positive ROI (reducing per capita cost). Annual personnel costs appeared to be very high compared to a similar study ($398,179.49 vs. $73,127.56). Nevertheless, the average healthcare costs were reasonable, using mean Medicare reimbursement fees and Fair Price amounts, and the analysis shows substantial cost savings due to the CP program. Due to the limitation experienced in accessing participants’ ED and hospitalization records and costs, similar CP programs should form partnerships early with local healthcare entities in order to ensure improved and hurdle-free patient data exchange that is critical to program evaluation.
Finally, the sample characteristics shows a large female, African-American representation (66.6% female, 80.7% African-Americans) and non-parametric tests revealed that the type and frequency of interventions are significantly associated with participant’s demographics, specifically being female and African-American. Although the sample size is small and may have influenced the results, EMS agencies enrolling similar sample characteristics could plan to accommodate or provide more frequent follow-up interventions and paramedic-patient contacts to these groups. As Delia, et al\textsuperscript{43} reports, African-Americans and Hispanics, as well as those enrolled in Medicaid or Medicare Advantage were less likely to receive follow-up visits and thus present to the ED or hospital before having a follow-up visit.

**Potential Limitations of Study.** Several limitations faced the evaluation of the CP program in this study. First, there is the possibility that eligible patients who could potentially benefit from this intervention refused to participate or comply with the program requirements. Thus, the program participants may not be comparable to the remaining frequent ED user population. Second, this study took place in a suburban US city, with a CP program serviced by a public EMS agency that rotates community paramedics every month. Patients in other demographic areas may experience different issues related to EMS and ED utilization, especially given the state of medical desert in EBRP, LA.\textsuperscript{44} Also, while most (77.6%) CP programs utilize inter-professional collaboration to deliver care to frequent ED users\textsuperscript{45}, the current program largely involved only EMS paramedics, with some oversight provided by an EMS-employed medical director and a social worker. This is a feature which if available, may yield improved outcomes and experience for patients.

The cost analysis was limited by several factors. Results did not include ED visits and in-patient hospitalizations outside of the parish jurisdiction of the EMS agency in this study, therefore,
participants’ utilization at other hospitals during the intervention period was unknown. Also, the author was unable to access actual utilization costs from individual participant records, due to patient privacy laws and other administrative hurdles. Instead, the investigators used average costs from third party healthcare pricing databases which makes the costs less precise.

Finally, several amendments to the CG-CAHPS survey and administration may have affected the validity of the data. The investigators removed the Office Staff composite and Ordering tests item in the CG-CAHPS survey to reflect the CP program design. These amendments do not necessarily affect the validity of the instrument, as Stucky, et al demonstrated that measures can be shortened and users may select item options that are particularly relevant without loss in reliability. The researchers used recall periods of 3- and 6-months in order to assure better response rates and more accurate participants’ recall, though the CG-CAHPS Survey can be conducted more frequently (including quarterly or even monthly), to allow continuous identification of opportunities for improvement within a healthcare program or plan.

3.5 Conclusion

CP programs mobilize existing resources and collaborate with existing community healthcare services to deliver active patient management in the most appropriate setting. Frequent ED users participating in the CP program report important benefits in patient experience (100% program recommendation at 6-months) and cost savings (51% ROI) – two of the three dimensions of the IHI Triple Aim framework.

Participants were not particularly different from any other low income, suburban community patients who frequent EDs for non-emergent reasons, and they seemed to need consistent and dependable follow-ups, health reassurance/coaching and frequent wellness monitoring. As
evidenced in this study, 95% of CP interventions were unscheduled and occurred on-demand, although there was a wide disparity in paramedics’ adherence to program intake protocol.

To this end, assuring access to high quality and well-coordinated care is essential to improving patient care experience and population health outcomes while reducing wasteful spending, all desirable results that a carefully designed and managed CP program can deliver. This study can guide/encourage pilot sites in adopting CAHPS items to develop their own CP patient experience instrument, which would be useful in demonstrating the efficacy of CP to potential partners or payers. Also, findings could help guide future CP program design, reinforce its capacity to deliver positive patient experience and financial outcomes, and support expanding the EMS role as a community-based, patient-centered care provider.

3.6 References


Chapter 4. Health-Related Quality of Life, Self-Efficacy, and Emergency Service Use in a Pilot CP Intervention for Frequent EMS Users

4.1 Introduction

In the US, medical 911 calls are increasing by about 8% annually and about 50% of 911 responses are for non-urgent situations. Frequent non-emergent use of emergency medical services (EMS) is a growing concern as it is costly, and studies have shown that the emergency department (ED) care received by frequent users is not adequately addressing their needs. In an attempt to control repeated non-emergent EMS use, particularly unreimbursed transports, many cities, states and communities are implementing innovative community health programs to provide appropriate and cost-effective alternatives for patients with non-emergent and chronic issues. This is important because improving health outcomes and the experience of care continues to be a keen focus for healthcare in population health management, even more so in pre-hospital settings.

Pre-hospital care, which includes the EMS, is an important component of healthcare, as an increasing portion of all patients cared for in EDs are treated and transported by EMS. Traditionally, the EMS role has been reactive in nature, but EMS is evolving to focus on delivering preventative and follow-up care in its local communities. This is done by using specially-trained paramedics and fostering partnerships with other local healthcare providers to decrease the need for unnecessary ED and hospital visits and improve patient health. In 2019, the EMS Agenda for the Future created a 2050 vision which highlights that EMS Systems will be a people-centered system, where “people will receive comprehensive quality care in the place that is most convenient and comfortable”. In line with this vision, the EMS agency of XXX implemented the innovative, patient-centered mobile integrated healthcare – community
A paramedicine (MIH-CP) program called CIHP (Community-integrated Health Program; described here\textsuperscript{10}), as a proactive means to reach frequent ED users who access EDs through EMS ambulance. Patients in CIHP are individuals who frequent the EDs more than 4 times within a year, and the CIHP provides outreach and engagement, linkage to necessary outpatient and (non-medical) community services, and health education as ways to improve patients’ health and self-efficacy (SE).

In evaluating health care, health-related quality of life (HRQoL) is an important outcome measure, as it offers a multidimensional concept that includes physical, psychological and social domains of health. One of the generally-accepted instruments used to measure HRQoL is the 12-item medical outcomes study (MOS) short form (SF) health survey version 2.0 (SF-12v2)\textsuperscript{11}, and is widely-validated in published literature\textsuperscript{11–14}. Further, an individual’s confidence in her abilities or perception of SE, to carry out recommended health behaviors (e.g. symptom self-management of chronic illnesses) is indicative of various desired health outcomes\textsuperscript{15–17}. Thus, through on-demand community paramedic home visits, patient education, and care coordination, the goals of the CIHP are that the patients’ perceived SE will increase such that they are capable of self-managing their health, subsequently resulting in improved health status, and reduced ED dependence.

There are a number of MIH-CP programs across the US\textsuperscript{18–27} showing promise in improving patients’ health outcomes, while reducing unnecessary ED use. In fact, the CMS (Center for Medicare and Medicaid Services) has announced a payment model that would allow EMS the flexibility to treat patients in their homes or transport to an appropriate destination other than an ED.\textsuperscript{28} The CMS projects that this model will ultimately “improve quality and lower costs by reducing avoidable transports to the ED and unnecessary hospitalizations following those
Currently, few published studies have evaluated the potential of CP programs on patient’s health outcomes and SE using validated population-based instruments. Expanding the role of paramedics with specialized community health training, to evaluate and treat patients in the home setting, could have significant implications for population health management and patient health outcomes.\textsuperscript{19,29} Thus, this article presents the results of a trial examining whether an EMS-led CP program was effective in improving HRQoL and SE compared to traditional care. This analysis adds to the evidence base of the effectiveness of CP programs by conducting a longitudinal analysis of a CP program in a suburban US community, xxxx parish, XXXX. This evaluation includes a comparison group of similar patients to better determine the effects of the CP program in reducing frequent EMS and ED use. Finally, this study provides a synopsis of the systems approach methodology to evaluating the CP program.

4.2 Methods

This is a pre/post-test with a comparison group study design to test the effectiveness of CP using specially-trained paramedics to improve patients’ self-reported health outcome and SE, versus usual care where patients frequently use EDs as their source of primary care.

**Study Setting.** This study was conducted in EBRP (East Baton Rouge Parish) (population 446,268).\textsuperscript{30} The EBRP EMS, which hosts and operates the CIHP averages about 100-125 medical calls per day\textsuperscript{31} and transports approximately 62\% of patients.\textsuperscript{32} The CP program and interventions have been described previously\textsuperscript{10}, and the program is comprised of a medical supervisor, community paramedics, a program coordinator, and a licensed social worker. Community paramedics receive an additional 20-hours of instruction in critical care and home-based primary care through didactic training and clinical rotations, and work in the CP program for a month after which they rotate back into their regular ambulance shifts. Paramedics visit
with patients in their homes in a specially-marked EMS vehicle (not an ambulance) to provide necessary interventions to the patients. The CP care team meets periodically to review participant reports and share ideas regarding challenging patients or difficulties encountered with care coordination. Participants remain enrolled in the program until they meet one or more of the following conditions: achieving significant individual milestones, e.g. admission into a skilled nursing facility, maintaining sobriety, obtaining housing, etc., improvement in perceived SE, and/or satisfactory demonstration of self-management of health.

**Participant Selection**

**Intervention Group.** Patients in the CP program were required to reside in EBRP, LA, be informed of the program’s purpose, have the mental capacity to follow medical advice, and given an opportunity to accept or refuse participation. If patients accept, they must commit in writing to follow program instructions, to call the paramedics with problems, and to keep scheduled appointments. In return, the paramedics commit to returning or answering phone calls promptly, to providing the patient with information pertaining to patient’s tests, treatments and plans of care, and to relaying information to the patient’s designated family and/or referring doctor.

Patients were given a 10-digit access number that is available 12 hours a day (7am-7pm) to request CP visit, and are urged to call that number when they feel the need to call 911. Participants who neglect this instruction and still call 911 are identified by EMS dispatchers, who in addition to sending an ambulance, notify the community paramedic on call to provide on-demand CIHP services.

To be eligible for enrolment in this study, participants must: (1) be 18 years of age or older, (2) have been transported to the ED at least 4 times within a 12-month period during 2017–2018, and sought treatment for a non-emergent or primary care treatable condition, and (3) be able to
give informed consent and respond to written and oral questions in English (Appendix 4). The Louisiana State University Institutional Review Board approved all phases of this study (IRB# 3978; Appendix 1), and investigators followed the paramedics and patients during the period of January to December, 2018.

**Control Group.** To better assess whether the program impacted frequent EMS calls and ambulance transports, a group of similar, but not enrolled, participants were identified as a comparison group. A matching algorithm was utilized to identify at least 2 comparison individuals for each intervention participant based on: comorbidities provided in the EBRP EMS EHR discharge data, gender, age group (5-year increments), and ethnicity. Despite the algorithm, the comparison group did differ in some ways from the intervention group (e.g. female when an exact comparable male could not be matched, older or younger by more than 5 years where an exact comparable age match could not be found, or rare health conditions). To reduce the possibility of bias, a trained student worker who was unfamiliar with neither the intervention group nor the comparison pool was tasked with identifying the matching individuals from the EBRP EMS database. The final study sample was comprised of 57 intervention participants and 111 comparison individuals (Figure 4.1). In comparison to the intervention participants, the control group’s average age was 60 years (vs 59.4), 65% were females (vs 63%), 75% were African-American (vs 81%), 38.7% had cardiac-related problems (vs 37%), 19.8% had diabetes-related problems and dialysis problems (vs 26%), 10% had alcohol or mental health-related problems (vs 17.5%), and 30.6% had other health diagnoses (asthma/chronic obstructive pulmonary disease (COPD), chronic pain, morbid obesity; vs <20%).
**Instruments.** The Optum™ Short Form SF-12 is one of the most widely used instruments for assessing self-reported HRQoL\(^3^3\), and was used here to measure quality of life as patients participated in the CIHP. SF-12v2 has been used to assess community programs\(^3^4\), and its
reliability has been documented among various populations. For example, studies have reported good reliability in the Medicaid population having combined physical and behavioral conditions, homeless populations, and diabetic patients. This study used the standard 4-week recall form (Appendix 7) and interview-administered items to participants every 3 months (for a total of 12 months) starting from program enrollment (T₀=baseline). Scoring for the SF-12v2 was performed using Optum’s PRO CoRE™ Scoring Software, under license agreement QM042954 (Appendix 6).

This study used the norm-based method for group-level data where scores are calibrated so that the PCS (physical component summary) and MCS (mental component summary) scores of the SF-12v2 each have national averages of 50 ± 10. Of primary interest are the general health (GH) and mental health (MH) scores, and the two component summary scores (PCS and MCS) since these scores are computed using the responses to all 12 items in the SF-12v2 Health Survey, thus providing adequate reliability for interpretation at the individual level.

This study also measured participants’ SE, to determine whether there is a relationship between general health status (GH) and self-perception of control over personal health. SE was assessed using a one-question survey with a 5-point Likert scale similar to a previous study.

Data Collection. Baseline and longitudinal SF-12v2 data were collected at intake and every 3 months during CP participation. Data collection was staggered to accommodate patients who were already enrolled before the study commenced, and patients who “graduated” before the next quarter or phase of survey administration. For example, patients who had been enrolled in the program (before study commenced) for up to 3 months were accessed for the surveys for T₁, more than 6 months were accessed at T₃, and patients who graduated before 9-months were not
accessed at T3. Also, patients who had successfully “graduated”, were dismissed from program
for non-compliance, died or moved out of the parish before the study commenced were not
surveyed but EMS usage data (911 calls and transports) were obtained and included for analysis.
Pre- and post-program EMS calls, ED transports and non-transport were aggregated for the
period 12-months just prior to program enrollment and up to 9-months after program completion.
Following the administration of each HRQoL and SE surveys to a patient, the attending
paramedic was asked to evaluate each participant’s general health (GH) status and SE, and rate
each of these two using the same scale as the participants. To maintain objectivity and accuracy,
paramedics were not given advance notice of the essence of the evaluation, and the evaluations
were conducted at or near the end of the attending paramedics’ monthly shift.

**Main Outcome Measures.** Of primary interest are mean scores for the following HRQoL
outcomes at several time points: general health status (GH), mental health status (MH), PCS and
MCS scores, and SE. Secondary outcomes include number of EMS calls and ambulance
transports and non-transport for control and intervention groups at pre and post-enrolment
periods in the CIHP program. Demographic variables of age, gender, ethnicity, and highest level
of education were collected at the time of consent followed by baseline administration of the SF-
12v2 survey.

**Statistical Analysis.** Sample size was calculated based on the PCS score as the primary outcome
measure. Using an online sample size calculator, a minimum between-subject sample size of 34
(17 in each group) was calculated with 0.05 (one-sided) alpha to ensure 80% power, and 0.88
effect size. A large effect size was expected based on previous use of the survey in a similar
study which observed an effect size of 0.88.11 The EBRP EMS personnel involved in the CP
program had presaged the researchers of the multiple obstacles they have experienced in locating
CIHP patients and frequent ED user population in general. To this end, attrition was estimated at 50% in line with the accounts of the investigators in these studies.\textsuperscript{40,41} Nevertheless, at the time of analysis, actual sample size ranged from 20 at baseline ($T_0$), 27 at $T_1$, 17 at $T_2$ and 16 at $T_3$ (and 4 at $T_4$; not included in analysis). Data are presented as means and standard deviations for continuous variables and numbers, with frequencies and percentages for categorical variables. Data was checked for any violation of assumptions in the use of parametric tests: tests of normality failed (all $p$-values < .0001), however the requirement of homogeneity of variances was met ($p$-values $\geq .3636$). HRQoL results for the intervention group were compared between baseline ($T_0$) and 9-month ($T_3$) periods using individual samples $t$-tests. Similarities between both groups’ age, gender, ethnicity and number of chronic conditions were ascertained using $t$-tests for continuous variables and chi-square tests for categorical variables. For each participant group, post-intervention results for EMS use (911 calls, ambulance transports and non-transports) were compared with pre-intervention use using paired $t$-tests. 2-way ANOVA tests were conducted to further examine main effects and interaction effects of time periods (12-mo pre- vs. 12-most post-intervention) and participant groups (control vs. intervention) on EMS usage. Comparison between participants’ subjective health rating and the paramedic’s objective health assessment was analyzed using Pearson chi-square tests. The null hypothesis was that participants’ GH and SE self-ratings would match the objective professional evaluation of the paramedics. Statistical significance level was set at $p < .05$, and data were analyzed using the JMP Pro statistical software (SAS, version 14.2.0, 2018).

4.3 Results

The study included 168 individuals, from which 57 patients received CP interventions, and 32 completed at least one round of the SF-12v2 and SE questionnaires. Demographic information
on participants is summarized in Table 4.1. There were no significant difference observed between the intervention and control groups with respect to: age (p = 0.93), gender (p = 0.87), ethnicity (p = 0.44) and number of chronic conditions (p = 0.48) (Table 4.1). The reasons for frequent EMS use were cardiac conditions (37%), diabetes-related problems and dialysis problems (26%), alcohol or mental health-related problems (17.5%), and others (asthma/chronic obstructive pulmonary disease (COPD), chronic pain, morbid obesity; <20%). The number of EMS calls per patient in the 12-months prior to intervention ranged from 4 to 51 with an average of 14.06 (SD = 9.18), and transports per patient ranged from 4 to 33, with an average of 10.61 (SD = 7.39) (Table 6).

Twenty-five of the 57 patients enrolled in the program from 2017 to 2018 were not administered the HRQoL and SE questionnaires, thus only their EMS and ED usage for pre- and post-enrolment were included in the analysis. Reasons the 25 participants were excluded from the health assessments were the following: enrollment discontinued prior to study (20), unable to contact (4), and refused to complete questionnaire (1). The reasons for the varied number of participants in each of the four phases of the longitudinal HRQoL data collection are summarized in Table 4.2.
### Table 4.1. Sample characteristics (n=168)

<table>
<thead>
<tr>
<th></th>
<th>Intervention (n=57)</th>
<th>Control (n=111)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (mean/SD)</td>
<td>59.4/17.5</td>
<td>60.0/17.3</td>
<td>0.93</td>
</tr>
<tr>
<td></td>
<td>n (%)</td>
<td>n (%)</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td>0.87</td>
</tr>
<tr>
<td>Female</td>
<td>36 (63)</td>
<td>72 (65)</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>21 (37)</td>
<td>39 (35)</td>
<td></td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
<td>0.44</td>
</tr>
<tr>
<td>Caucasian</td>
<td>11 (19)</td>
<td>28 (25)</td>
<td></td>
</tr>
<tr>
<td>African American</td>
<td>46 (81)</td>
<td>83 (75)</td>
<td></td>
</tr>
<tr>
<td>Highest level of education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High school or less</td>
<td>52 (91)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some college or 2-year degree</td>
<td>3 (5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4-year college graduate</td>
<td>2 (4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employment status</td>
<td></td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>Employed</td>
<td>3 (5)</td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>Unemployed</td>
<td>54 (95)</td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>Health insurance</td>
<td></td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>Public</td>
<td>52 (91)</td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>Private</td>
<td>4 (7)</td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>None</td>
<td>1 (2)</td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>Chronic conditions</td>
<td></td>
<td></td>
<td>0.48</td>
</tr>
<tr>
<td>1</td>
<td>1 (2)</td>
<td>32 (29)</td>
<td></td>
</tr>
<tr>
<td>2 - 3</td>
<td>27 (47)</td>
<td>34 (31)</td>
<td></td>
</tr>
<tr>
<td>&gt;3</td>
<td>29 (51)</td>
<td>45 (40)</td>
<td></td>
</tr>
<tr>
<td>Length of CP participation</td>
<td></td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>&lt; 60-days</td>
<td>14 (25)</td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>60 – 180-days</td>
<td>17 (30)</td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>181 – 360-days</td>
<td>16 (28)</td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>&gt; 360-days</td>
<td>10 (17)</td>
<td></td>
<td>N/A</td>
</tr>
</tbody>
</table>

Change in the SF-12v2 results for the “health rating in general” (GH) score was 2.89 ± 3.2 between baseline and T1 and -2.34 ± 3.4 between T1 and T2 (Table 4.3). However, these changes did not differ significantly (p = .37 and .49, respectively). Between baseline and T3, changes in the physical component score (PCS) were not significantly different (diff = 1.33, p = .62, 95% CI = -3.93 – 6.59). Also, changes in the mental component scale (MCS) did not significantly differ between baseline and T3 (diff = -3.15, p = .38; 95% CI, −3.96 – 10.26).
Table 4.2. Reasons for different sample sizes for HRQoL assessments

<table>
<thead>
<tr>
<th>Reasons</th>
<th>n</th>
<th>%a</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graduated or discharged from CP program prior to study</td>
<td>20</td>
<td>35</td>
</tr>
<tr>
<td>Enrolled prior to study</td>
<td>14</td>
<td>25</td>
</tr>
<tr>
<td>Up to 3-months prior</td>
<td>7</td>
<td>12</td>
</tr>
<tr>
<td>3 - 6-months prior</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>&gt; 6-months prior</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Enrolled during study</td>
<td>24</td>
<td>42</td>
</tr>
<tr>
<td>Lost to follow-up or missing</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Moved to long-term care facility</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Unable to contact</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Died before (next phase of) assessment</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Not interested in participating or continuing</td>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>

aPercentages are out of the 57 patients enrolled in program from 2017-18.

Figure 4.2 shows the PCS and MCS scores from baseline to T3. Overall, based on the norm scoring where 50 is the population average with higher scores indicating a better health status, participants’ mental summary scores were higher than physical summary scores. However, both summary scores and the eight domain scores for the participants in this study were well below the US population average [38], and generally evolved between a floor value of 33.0 and highest value of 47.9 (Figure 4.2).

Figure 4.2. SF-12v2 PCS and MCS scores at T0, T1, T2 and T3 (50 = US average; higher scores indicate better health status)
Overall, the median SE score as reported by participants was 3.0 across the time periods. Mean SE scores at baseline was 2.9, which rose slightly at T1 and T2, then dropped again at T3, showing no significant improvement as patients were enrolled longer in the CP program (Figure 4.3). GH scores however were relatively high at baseline (3.95) (higher scores indicate better health) but slightly dropped to 3.76 at T3 (Figure 4.3).

![Figure 4.3. Distribution of participants’ SE and GH scores across time points (scores are out of 5, with higher scores indicating better health status)](image)

As shown in Table 4.4, participants matched the paramedics’ evaluation of patient’s SE 33.8% of the time (n=27). Comparing responses over the time periods T0 to T3, overall, participants tended to rate their SE lower than paramedics (37.5% of the time, n=30), and higher 28.8% of the time (n=23), but the differences between both groups’ evaluations did not differ across time points, $X^2(12, N = 80) = 10.25, p > .05$. On the other hand, participants generally assessed their overall health (GH) higher than the paramedics’ evaluation (44.3% of the time, n=35), and matched the paramedics’ assessment 36.25% of the time (n=29) (Table 4.5), but contrary to SE, the ratings differed significantly across time period, $X^2(16, N = 80) = 47.60, p < .0001$.
Table 4.3. SF-12v2 norm-based outcomes and between-group differences

<table>
<thead>
<tr>
<th></th>
<th>Baseline (T₀)</th>
<th>3 months (T₁)</th>
<th>6 months (T₂)</th>
<th>9 months (T₃)</th>
<th>Group Differenceᵃ (95% CI)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limitations in physical activities (PF)</td>
<td>36.6 ± 11.2</td>
<td>34.3 ± 10.3</td>
<td>34.4 ± 9.5</td>
<td>35.3 ± 8.6</td>
<td>-1.3 (-7.91 – 5.32)</td>
<td>.65</td>
</tr>
<tr>
<td>Accomplished less due to physical health (RP)</td>
<td>37.4 ± 9.6</td>
<td>35.8 ± 8.5</td>
<td>36.6 ± 4.8</td>
<td>39 ± 8.3</td>
<td>1.68 (-3.71 – 7.07)</td>
<td>.27</td>
</tr>
<tr>
<td>Pain interference with work inside or outside home (BP)</td>
<td>39.2 ± 12.2</td>
<td>33 ± 11.6</td>
<td>35.7 ± 8.7</td>
<td>40.2 ± 12.1</td>
<td>0.98 (-6.50 – 8.46)</td>
<td>.40</td>
</tr>
<tr>
<td>Health rating in general (GH)</td>
<td>38 ± 11.4</td>
<td>40.9 ± 11.5</td>
<td>38.6 ± 9.7</td>
<td>36.3 ± 10.2</td>
<td>-1.71 (-8.86 – 5.42)</td>
<td>.68</td>
</tr>
<tr>
<td>Having a lot of energy (VT)</td>
<td>46.6 ± 10.5</td>
<td>44 ± 11.4</td>
<td>45.4 ± 11.3</td>
<td>45 ± 9.2</td>
<td>-1.59 (-8.64 – 5.46)</td>
<td>.67</td>
</tr>
<tr>
<td>Interference of physical health or emotional problems with social activities (SF)</td>
<td>37.3 ± 11.8</td>
<td>37.1 ± 12.4</td>
<td>34.1 ± 8.6</td>
<td>39.1 ± 10.4</td>
<td>1.78 (-5.56 – 9.12)</td>
<td>.32</td>
</tr>
<tr>
<td>Accomplished less due to emotional health (RE)</td>
<td>37.8 ± 11.7</td>
<td>34.1 ± 12.7</td>
<td>35.5 ± 11.1</td>
<td>34.3 ± 9.5</td>
<td>-3.56 (-11.13 – 4.01)</td>
<td>.82</td>
</tr>
<tr>
<td>Feel calm and peaceful; downhearted and blue (MH)</td>
<td>47.9 ± 10.7</td>
<td>42.1 ± 9.5</td>
<td>43.1 ± 8.8</td>
<td>44.3 ± 11.3</td>
<td>0.94 (-5.40 – 7.29)</td>
<td>.38</td>
</tr>
<tr>
<td>Physical Component Summary (PCS)</td>
<td>36.3 ± 9.7</td>
<td>35.4 ± 7.7</td>
<td>35.6 ± 7.1</td>
<td>37.6 ± 7.1</td>
<td>1.33 (-3.93 – 6.59)</td>
<td>.62</td>
</tr>
<tr>
<td>Mental Component Summary (MCS)</td>
<td>45.4 ± 10.9</td>
<td>41.6 ± 11.7</td>
<td>41.8 ± 10.6</td>
<td>42.2 ± 9.3</td>
<td>-1.315 (-3.96 – 10.26)</td>
<td>.38</td>
</tr>
</tbody>
</table>

ᵃBaseline (T₀) mean – T₃ mean

Abbreviations: PF: Physical Functioning, RP: Role Physical, BP: Bodily Pain, GH: General Health, VT: Vitality, SF: Social Functioning, RE: Role Emotional, MH: Mental Health
In contrast to the comparison cohort, program participants began using EMS and ED care more appropriately, either through the programmatic interventions from the CP program, or access to other services and long-term care facilities (Table 4.6). 911 (EMS) calls decreased by 40.4%, a significant decrease (p = .0010) compared with the 9.2% increase observed in the control group. Similarly, EMS transports (which leads to ED visits) among CP participants decreased by 42.7% (p = <.0001), substantially different from the 3.7% increase in the comparison group. The proportion of EMS calls for non-emergent issues (i.e. routine health issues not requiring transport to an ED) also decreased in the intervention group by 33.6%, a significant difference (p = 0.0007) when compared to the 51.1% increase observed in the control group.
Table 4.6. Between-group differences in EMS usage

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Intervention (n = 57)</th>
<th>Control (n = 111)</th>
<th>P-value</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>12-mo before CP</td>
<td>12-mo after CP</td>
<td>Relative</td>
<td>Annual Mean ± SD</td>
</tr>
<tr>
<td></td>
<td>Annual Mean ± SD</td>
<td></td>
<td>% change</td>
<td></td>
</tr>
<tr>
<td>EMS (911) calls</td>
<td>14.06 ± 9.18</td>
<td>8.38 ± 14.4</td>
<td>-40.4%</td>
<td>.0010</td>
</tr>
<tr>
<td>Ambulance transports</td>
<td>10.61 ± 7.39</td>
<td>6.08 ± 11.05</td>
<td>-42.7%</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Non-transports</td>
<td>3.45 ± 5.96</td>
<td>2.29 ± 5.69</td>
<td>-33.6%</td>
<td>.0007</td>
</tr>
</tbody>
</table>

Table 4.7. ANOVA summary table for EMS usage

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>F</th>
<th>Prob &gt; F</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMS (911) calls</td>
<td>Group</td>
<td>1</td>
<td>70.03</td>
<td>0.923</td>
<td>0.3373</td>
</tr>
<tr>
<td></td>
<td>Time</td>
<td>1</td>
<td>245.88</td>
<td>3.242</td>
<td>0.0728</td>
</tr>
<tr>
<td></td>
<td>Group*Time</td>
<td>1</td>
<td>474.93</td>
<td>6.263</td>
<td>0.0129*</td>
</tr>
<tr>
<td>Ambulance transports</td>
<td>Group</td>
<td>1</td>
<td>3.53</td>
<td>0.07</td>
<td>0.7971</td>
</tr>
<tr>
<td></td>
<td>Time</td>
<td>1</td>
<td>198.41</td>
<td>3.73</td>
<td>0.0545*</td>
</tr>
<tr>
<td></td>
<td>Group*Time</td>
<td>1</td>
<td>264.02</td>
<td>4.96</td>
<td>0.0267*</td>
</tr>
<tr>
<td>Non-transports</td>
<td>Group</td>
<td>1</td>
<td>104.99</td>
<td>8.41</td>
<td>0.0040*</td>
</tr>
<tr>
<td></td>
<td>Time</td>
<td>1</td>
<td>2.54</td>
<td>0.20</td>
<td>0.6520</td>
</tr>
<tr>
<td></td>
<td>Group*Time</td>
<td>1</td>
<td>30.74</td>
<td>2.46</td>
<td>0.1176</td>
</tr>
</tbody>
</table>

Group = Participant group (Control vs. Intervention); Time = 12-mo (Pre-intervention and Post-intervention); SS = Sum of squares.
*statistically significant (α=0.05)
Post-hoc analysis to test the main effects and interaction effects between time periods (pre- and post-intervention) and participant group (intervention or control) on EMS usage revealed several insights. There was an interaction between time period and participant group (p = 0.013) (Figure 4.4), but there was no main effect of time period (p = 0.073) or receiving intervention (p = 0.337) on 911 calls (Table 4.7). Participants who received intervention had higher 911 calls pre-intervention and significantly reduced their calls following intervention, compared to the control group who experienced a slight increase in 911 calls with time. Regarding the frequency of ambulance transports, there was an interaction between time period and participant group (p = 0.027) (Figure 4.5). There was no significant effect on whether participants received intervention (p = 0.797), but the effect of time period approached significance (p = 0.055) (Table 4.7).

Participants who received intervention had higher ambulance transports pre-intervention and significantly reduced their need for emergency transports following intervention, compared to the control group who experienced an increase in 911 calls and subsequent EMS transports with time. Receiving interventions significantly reduced the number of 911 calls when conditions were non-emergent (p = 0.004; Table 4.7). There was no interaction between time period and participant group for non-urgent 911 calls (i.e. non-transports) (p = 0.1176; Figure 4.6), and the effect of time was not significant (p = 0.652; Table 4.7).
Figure 4.4. Effects of time period and participant group on 911 calls

Figure 4.5. Effects of time period and participant group on ambulance transports
4.4 Discussion

This study assessed the impact on HRQoL, SE and EMS use of a MIH-CP intervention targeting frequent users of the EMS and ED, in a sub-urban EBRP in LA. Frequent ED users in the intervention group are defined as having at least 4 EMS transports/ED visits in the 12 months prior to enrollment. Despite significant differences in 911 calls and EMS transports between patients in the intervention and the control group, this study did not show any significant improvement in health outcomes associated with the intervention, either for the SF-12v2 physical and mental component summary scores (PCS & MCS, respectively), or the SE assessments. Despite these non-significant results, this study adds to the literature on MIH-CP programs by investigating their impact on several types of measures evaluated from both health outcomes perspectives and emergency service usage.
Results show that an intensive CP approach for frequent EMS users in the intervention group reduced EMS calls by 40.4% and ED transports by 42.7%. While improvements over time in the patients’ health outcomes and SE scores did not improve significantly, such decline in EMS calls and transports may, nevertheless, be clinically significant. Further, the reductions offer potential for significant financial implications which has been studied extensively in literature\textsuperscript{42,43}, as well as substantial relief to the strained 911 system\textsuperscript{44}. These results suggest that MIH-CP program participation may be associated with reduced EMS dependency and ED utilization, both potential precursors to fewer inpatient hospital admissions for the frequent ED user population.

To the author’s knowledge, this is the first study that employs the use of the SF-12v2 instrument to measure patients’ HRQoL in an EMS-led MIH-CP intervention. Findings did not show any significant improvement over the 9-months period of health assessments, and this could be as a result of the low baseline health scores, determined to be well-below the US population average\textsuperscript{38}. Frequent ED users have been widely reported in literature as having severe health burdens\textsuperscript{45,46}, and although some of the SF-12v2 domains showed improvements between the time periods, participants’ very low baseline scores did not witness significant improvement from CP participation. Similar to this research, a longitudinal study which adopted SF-36 – the parent survey to SF-12v2 used in this study – also reported lower than average scores on several domains\textsuperscript{47}.

Nonetheless, it is unsurprising that participants did not report improved health outcomes, since published literature suggests strong relationships between SE and better health status\textsuperscript{15,17}, and health self-management is an attribute of behaviors such as: “intentionally changing”, “information seeking”, and “shift to independence”\textsuperscript{48}. Paramedics have reported as part of their frustrations with the CIHP program that participants do not exhibit a sense of ownership in their
healthcare, despite their coaching efforts.\textsuperscript{49} This experience is recounted in a similar study\textsuperscript{41}, where the authors wrote that “most frequent users of EMS were either unavailable or unconcerned in the intervention”. Plus, the lack of individualized, patient-influenced care plans\textsuperscript{49,50} may have contributed in varying degrees to the unimproved health outcomes. Working with the general frequent ED user population may be too broad and may explain the seemingly futile results in health outcomes. Thus, as part of suggested improvements to the CIHP, some paramedics suggested that more stringent screening protocols be developed so that enrolled patients are carefully selected\textsuperscript{49}, such that the program may see much more significant improvement in the patient outcomes. This outlook was also shared by Weiss et al.\textsuperscript{41}

Additionally, although HRQoL and SE did not show significant improvement, the CP interventions did positively influence EMS calls and ED transports. To this end, the author would posit that the on-demand and intensive wellness monitoring, home-based health coaching and consistent follow-up visits that the paramedics provided throughout the enrollment period, were program characteristics that yielded a very positive patient experience rating.\textsuperscript{50}

The results in this study may not be comparable to the few empirical MIH-CP studies available in published literature, as some mobile health programs utilize a multidisciplinary team of healthcare professionals\textsuperscript{19} rather than rely on EMTs or community paramedics to deliver the program. This may be important as a recent study\textsuperscript{51} reported that multi-professional follow-up care models are needed for recurrent ED users, in order to improve their needs, quality of life and emergency services. Also, other mobile health programs have a dedicated CP staff\textsuperscript{24}, compared to the CIHP in this study, which rotates community paramedics every month. Nonetheless, participants in this study are similar to the frequent ED user population as described in published literature: most had health insurance\textsuperscript{52} at the beginning of the intervention, multiple
comorbidities, and low socio-economic status. Also, the author found similar post-program reductions of EMS calls as these studies, and reductions in ED transports are similar to these articles, and greater than the 19% decrease reported by Florida's MIH program.

Subsequently, the CIHP team may have empowered participants to be conscious of their excessive EMS usage and ED frequency, leading to the significant reductions compared to the control group. The results in this study are also similar to Chenoweth and colleague’s study, which did not see an improvement in SE following coaching intervention, and another study, which reported lower SE among individuals with greater illness burden.

Furthermore, the patient population of interest in this study have been reported to exhibit significant barriers to being accessible by intervention providers. Similar to these studies, the author encountered multiple obstacles in locating patients and this resulted in inconsistent longitudinal data collection for this study. Of the 57 patients who received interventions, 20 were accessed for the HRQoL survey administration at baseline, 27 at T1, 16 at T2 and 17 at T3. Although not ideal, this study fully utilized the minimal resources available and compares favorably with studies involving similar patient populations. Also, due to the projected small sample size, extensive efforts were made to prevent missing values or incomplete surveys. Likewise, all eligible and accessible enrolled patients were approached for study participation and only one declined to engage in the study, representing a 98% response rate, in contrast to the study by Weiss and colleagues which was unable to enroll 88% of identified participants in their intervention. The improved participation and consent rate evidenced in this study could be due to the CIHP teams’ dedicated experience with this vulnerable population. Other factors that may have contributed to higher response rates include: meeting patients wherever they were at the moment (home, hospital), verbal administration of survey instrument with the researcher.
recording responses, and a warm and patient researcher (OA) whom the patients identified with (being Black), and who struck up friendly conversations with the patients before launching into research. Since paramedics were required to exit the room prior to survey administration to reduce the risk of response bias, on several instances, patients sometimes shared details regarding their health or familial issues with the researcher rather than with the paramedic on duty.

While this study provides valuable information on the effectiveness of the CIHP in improving health outcomes and increasing the SE of frequent users of EMS, further research is necessary. Such research, strategically involving larger-scale MIH-CP projects, with intervention and control groups and more sustained data collection efforts are needed to confirm or dispute this initial analysis. Options for participant compensation and intention-to-treat (ITT) motivation may be employed to assist in rigorous and sustained data collection. In addition, future research should focus on patient characteristics that could predict increased or decreased EMS and ED utilization after CP intervention.

**Limitations.** The evaluation of the CP program faced several limitations. First, there was not a true comparison group, therefore a group similar to the program participants was selected. However, although there were no significant differences observed in age, gender, ethnicity and number of chronic conditions between groups, there is the small possibility of differences existing in other factors such as educational background, income/employment status, health literacy etc. that could have influenced the outcomes reported. Also, this study could potentially benefit from a longer HRQoL assessment period. However, there appears to be no standard length for HRQoL follow-up assessments in published literature; for example, this systematic review recorded longitudinal studies of HRQoL with periods from 3-months to 3-years, and a
previous longitudinal study utilizing the SF-36 instrument did not report improved scores even after 24-months.47

As in every novel healthcare model such as MIH-CP, the goal should be to start small pilot programs and then build upon the success and lessons learned from the pilot programs. Hence, it is important to ensure that the program under investigation is ready for evaluation58, because premature evaluation may lead to false results, which could lead to immense discouragement from further development/expansion, or worse, amplified funding and resource consumption for a project that lacked potential for success. This may be true for this study as the CP program under investigation has been undergoing several administrative changes and impending financial restructuring, which may have impacted the quality of program delivery and subsequent outcome results.

In addition, the HRQoL instrument adopted may have introduced self-report bias, in that more than half of the original SF-36 survey items (from which the SF-12v2 was developed) have been reported to require more than 5 years of formal schooling59. In contrast, more than 70% of the participants in this study have less than a high school degree, which may have introduced some difficulty in items being comprehensible. The study59 further concluded that current HRQoL measures may be inappropriate for general population surveys, especially in populations with lower socio-economic status, a characteristic that describes the sample population in this study. Also, this study utilized data from the prior year's EMS use as a baseline and did not adjust for seasonal trends, nor did the author account for the possibility that participants' EMS calls and transports may have regressed toward the mean without CP participation.
4.5 Conclusion

This pilot project decreased EMS calls and ED transports, resulted in highly positive patient experience⁵⁰, and largely positive paramedic provider experience⁴⁹, with minimal initial investment and existing resource allocation. Non-significant impacts on health outcomes may be due to programmatic characteristics, namely: frequent ED user self-activation and the difficulties encountered in consistent data collection, paramedic monthly rotation and influence on program quality and consistency, as well as program administrative issues. Also, lack of partnership with local hospitals and EDs, as well as legal concerns regarding patient information sharing (HIPAA) prevented access to pre- and post-enrollment inpatient hospitalization data. Although the data available showed cost analysis in favor of the CP program, review of the mature CP program, larger intervention experience of the frequent ED user pool, and additional passage of time to allow medical claims processing are warranted.

This study offers a peer-reviewed Triple Aim framework for the descriptive analysis and program effectiveness for an EMS-led MIH-CP program that is designed to reduce avoidable EMS utilization and cost, and secondarily improve patient experience. The findings indicate that implementation of MIH-CP programs is feasible and strongly suggests commendable impacts on the patient experience and cost of care for the frequent utilizer population. To this end, the description and preliminary impact analysis in this study provides a foundational, peer-reviewed appraisal of MIH-CP programs in the US.
4.6 References


14. Busija L, Pausenberger E, Haines TP, Haymes S, Buchbinder R, Osborne RH. Adult measures of general health and health-related quality of life: Medical Outcomes Study Short Form 36-Item (SF-36) and Short Form 12-Item (SF-12) Health Surveys, Nottingham Health Profile (NHP), Sickness Impact Profile (SIP), Medical Outcomes Study Short Form 6D (SF-6D), Health Utilities Index Mark 3 (HUI3), Quality of Well-Being Scale (QWB), and Assessment of Quality of Life (AQoL). *Arthritis Care Res.* 2011;63 Suppl 11:S383-412. doi:10.1002/acr.20541


23. Gerber M. How 4 cities are making community paramedicine work for them. *EMS1*. https://www.ems1.com/community-paramedicine/articles/1949030-How-4-cities-are-


Chapter 5. Conclusion and Recommendations

5.1 Conclusion

Increasing costs, unsatisfied patients and continuous failing health of repeat ED user populations have propelled stakeholders to call for new projects and ideas that will address these problems. This study aimed to conduct an holistic evaluation of the innovative CP program to determine if it delivers on the Triple Aim objectives, while providing meaning in work for the paramedic on the frontlines of delivering care to frequent ED users. This study provided an evidence base on the efficacy of CP programs to deliver exceptional patient experience scores through the compassionate care and sensitivity towards frequent ED users that paramedics provided.

Although limited, the cost analysis also showed significant promise in positive return of investment – 51% in this study – which can be attributed to the significant reductions in EMS utilization (911 calls and transports), ED visits, and hospital admissions. With the high ROI and through the use of the modified CG-CAHPS survey to demonstrate positive patient experience, this study provides two powerful cases for convincing payers or healthcare partners to invest in CP programs. Despite these optimistic results, the author was unable to validate that the CP program in this study can deliver improved health outcomes for patients. Several reasons may be responsible, including the potential short length of the HRQoL assessment (9-months), and possible premature evaluation, given the program was in its infancy stage and experiencing substantial programmatic and administrative hurdles.

5.2 Recommendations

A 2015 policy statement released by The American College of Emergency Physicians (ACEP) details essential elements that must be included in any CP or MIH program. To add to these
elements, this study recommends that new or recently launched CP programs should: (1) identify the specific target population of interest and limiting interventions to this group, (2) utilize interprofessional collaboration, (3) develop partnerships early with local healthcare entities and patients’ PCPs, for ease of patient health information (PHI) and healthcare consumption data exchange (necessary for care coordination and quality data for program evaluation), and (4) investigate and create sustainable financing pathways which would be easier using reliable data from (3) to demonstrate value to potential payers. Appendix 8 details a comprehensive framework for the essential elements of MIH-CP programs (red texts are author’s original contributions).

5.3 Future Work

The results of this project could inform future research opportunities, including:

- Development of health and patient experience instruments specifically tailored to the CP program and/or community care settings.
- Identification of factors that predict when a patient is likely to become a frequent ED user.
- Sequel to the above point, development of system practices that allow PCPs and hospital staff to deliver targeted care to the soon-to-become frequent ED user, before health condition worsens or patient becomes a super-EMS utilizer.
- Assessment of longer-operating CP programs, with full-time CP-dedicated paramedics and staff to determine if the findings in this study are generalizable.
5.4 References


Appendix 1. IRB Approvals

ACTION ON PROTOCOL APPROVAL REQUEST

TO: Laura Ikuma
    Mechanical and Industrial Engineering
FROM: Dennis Landin
      Chair, Institutional Review Board
DATE: November 27, 2017
RE: IRB# 3978
TITLE: Comprehensive Evaluation of Community-Integrated Health Program in Reducing (Non-Urgent) Frequent Emergency Department (ED) Use


Review type: Full ___ Expedited X ___ Review date: 11/21/2017

Risk Factor: Minimal ___X___ Uncertain ______ Greater Than Minimal______

Approved ___X___ Disapproved ______

Approval Date: 11/22/2017 Approval Expiration Date: 11/21/2018

Re-review frequency: (annual unless otherwise stated)

Number of subjects approved: 80

LSU Proposal Number (if applicable):

Protocol Matches Scope of Work in Grant proposal: (if applicable)

By: Dennis Landin, Chairman

PRINCIPAL INVESTIGATOR: PLEASE READ THE FOLLOWING –
Continuing approval is CONDITIONAL on:
1. Adherence to the approved protocol, familiarity with, and adherence to the ethical standards of the Belmont Report, and LSU’s Assurance of Compliance with DHHS regulations for the protection of human subjects.
2. Prior approval of a change in protocol, including revision of the consent documents or an increase in the number of subjects over that approved.
3. Obtaining renewed approval (or submittal of a termination report), prior to the approval expiration date, upon request by the IRB office (irrespective of when the project actually begins); notification of project termination.
4. Retention of documentation of informed consent and study records for at least 3 years after the study ends.
5. Continuing attention to the physical and psychological well-being and informed consent of the individual participants, including notification of new information that might affect consent.
6. A prompt report to the IRB of any adverse event affecting a participant potentially arising from the study.
8. SPECIAL NOTE: When emailing more than one recipient, make sure you use bcc.

*All investigators and support staff have access to copies of the Belmont Report, LSU’s Assurance with DHHS, DHHS (45 CFR 46) and FDA regulations governing use of human subjects, and other relevant documents in print in this office or on our World Wide Web site at http://www.lsu.edu/irb
ACTION ON PROTOCOL APPROVAL REQUEST

TO: Laura Ikuma
   Mechanical and Industrial Engineering

FROM: Dennis Landin
      Chair, Institutional Review Board

DATE: February 1, 2018

RE: IRB # 3978

TITLE: Comprehensive Evaluation of Community-Integrated Health Program in Reducing (Non-Urgent) Frequent Emergency Department (ED) Use

New Protocol/Modification/Continuation: Modification

Brief Modification Description: Add two surveys

Review type: Full ______ Expedited ________ Review date: 2/1/2018

Risk Factor: Minimal _______ Uncertain ________ Greater Than Minimal _______

Approved _______ Disapproved __________

Approval Date: 2/1/2018 Approval Expiration Date: 11/21/2018

Re-review frequency: (annual unless otherwise stated)

Number of subjects approved: 80

LSU Proposal Number (if applicable):

Protocol Matches Scope of Work In Grant proposal: (if applicable)

By: Dennis Landin, Chairman

PRINCIPAL INVESTIGATOR: PLEASE READ THE FOLLOWING - Continuing approval is CONDITIONAL on:

1. Adherence to the approved protocol, familiarity with, and adherence to the ethical standards of the Belmont Report, and LSU's Assurance of Compliance with DHHS regulations for the protection of human subjects. 
2. Prior approval of a change in protocol, including revision of the consent documents or an increase in the number of subjects over that approved.
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*All investigators and support staff have access to copies of the Belmont Report, LSU’s Assurance with DHHS, DHHS 45 CFR 46 and FDA regulations governing use of human subjects, and other relevant documents in print in this office or on our World Wide Web site at http://www.lsu.edu/irb
## Appendix 2. Paramedic Consent Form

<table>
<thead>
<tr>
<th>Consent Form for EMS Community-Integrated Health Program (CIHP) Evaluation Study</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Study Title:</strong> Total Quality Assessment of Community-Integrated Health Program (CIHP) in Reducing Non-Emergent Frequent Emergency Department (ED) Use</td>
</tr>
<tr>
<td><strong>2. Performance Site:</strong> Louisiana State University and Agricultural and Mechanical College</td>
</tr>
<tr>
<td><strong>3. Investigators:</strong> The following investigators are available for questions about this study, M-F, 8:00 a.m. - 4:30 p.m. Dr. Ikuma: 225-578-5364 <a href="mailto:likuma@lsu.edu">likuma@lsu.edu</a> Ms. Adio: 210-574-6898 <a href="mailto:oadio1@lsu.edu">oadio1@lsu.edu</a></td>
</tr>
<tr>
<td><strong>4. Purpose of the Study:</strong> The purpose of this research project is to conduct a total quality evaluation of the community-integrated health program (CIHP) initiated by EBRP EMS, to determine whether it is able to meet the health care needs of frequent users of EDs. The evaluation is from 3 standpoints: (1) does the program improve patient health?; (2) does the program improve patient experience?; (3) does the program reduce burden on EMS and 911 resources?</td>
</tr>
<tr>
<td><strong>5. Subject Inclusion:</strong> Licensed paramedic in good standing, with at least one-year emergency service experience, who works as a community paramedic in the CIHP.</td>
</tr>
<tr>
<td><strong>6. Number of subjects:</strong> Maximum of 20</td>
</tr>
<tr>
<td><strong>7. Study Procedure:</strong> At the end of your monthly rotation, a survey and semi-structured interview would be conducted, where you would be asked to share your perception of frequent ambulance use, as well as your beliefs about the community paramedicine model of healthcare. If you are on rotation, you would also be asked to do a general health and self-efficacy assessments of CIHP patients at certain periods during the study.</td>
</tr>
<tr>
<td><strong>8. Benefits:</strong> The information you provide will help improve the CIHP.</td>
</tr>
<tr>
<td><strong>9. Risks:</strong> None</td>
</tr>
<tr>
<td><strong>10. Right to Refuse:</strong> Your Participation Is Voluntary. You may choose to participate in this interview or not – it is entirely optional. Whether you decide to participate or not, your employment or compensation will not be affected.</td>
</tr>
<tr>
<td><strong>11. Privacy:</strong> Results of the study may be published, but no names or identifying information will be included in the publication. Participant identity will remain confidential unless disclosure is required by law.</td>
</tr>
</tbody>
</table>

12. Signatures: The study has been discussed with me and all my questions have been answered. I may direct additional questions regarding study specifics to the investigators. If I have questions about subjects' rights or other concerns, I can contact Dennis Landin, Institutional Review Board, (225) 578-8692, irb@lsu.edu, www.lsu.edu/irb. I agree to participate in the study described above and acknowledge the investigator’s obligation to provide me with a signed copy of this consent form.

Subject Signature: ___________________________ Date: __________________

Investigator Signature: ___________________________ Date: ________________
Appendix 3. Paramedic Survey

Paramedic ID#: __________________________ Date: __________________________

Paramedic Opinion of Frequent Emergency Department (ED) Users
Part of a Community Paramedicine Program Evaluation Effort

Please complete the following survey based on your experience with patients in the community paramedicine program for your organization. Thank you for your time.

Knowledge

1. As part of your community paramedicine curriculum/training, how many hours of instruction related to working with frequent ED users have you received?

☐ 0-1 hour  ☐ 2-5 hours  ☐ 6-10 hours  ☐ 11-15 hours  ☐ 16-20 hours

2. I have undergone adequate training to be a community paramedic.

☐ Strongly Disagree  ☐ Disagree  ☐ Neutral  ☐ Agree  ☐ Strongly Agree

3. I believe frequent ED use is a public health issue.

☐ Strongly Disagree  ☐ Disagree  ☐ Neutral  ☐ Agree  ☐ Strongly Agree

4. I believe small reduction in ED use can produce important health benefits for frequent ED users.

☐ Strongly Disagree  ☐ Disagree  ☐ Neutral  ☐ Agree  ☐ Strongly Agree

5. I believe frequent ED use is associated with serious medical conditions.

☐ Strongly Disagree  ☐ Disagree  ☐ Neutral  ☐ Agree  ☐ Strongly Agree

6. I believe that I can correctly assess the needs of patients who frequent EDs.

☐ Strongly Disagree  ☐ Disagree  ☐ Neutral  ☐ Agree  ☐ Strongly Agree

Adapted from Foster et al. (2003) and Awan, et. al. (2016)
### Attitude towards healthcare interventions/treatments for frequent ED users

<p>| | | | | | |</p>
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<tbody>
<tr>
<td><strong>7.</strong> I believe that it is necessary to educate frequent ED users on when to use emergency care.</td>
<td>☐ Strongly Disagree  ☐ Disagree  ☐ Neutral  ☐ Agree  ☐ Strongly Agree</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>8.</strong> I believe that most frequent ED users are well aware of their high use of emergency care services.</td>
<td>☐ Strongly Disagree  ☐ Disagree  ☐ Neutral  ☐ Agree  ☐ Strongly Agree</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>9.</strong> I believe that most frequent ED users could reduce their use of emergency care if they were motivated to do so.</td>
<td>☐ Strongly Disagree  ☐ Disagree  ☐ Neutral  ☐ Agree  ☐ Strongly Agree</td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>10.</strong> I believe that most frequent ED users will not refrain from their high use of emergency care services.</td>
<td>☐ Strongly Disagree  ☐ Disagree  ☐ Neutral  ☐ Agree  ☐ Strongly Agree</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>11.</strong> I believe that I am usually successful in helping frequent ED users get access to alternative primary care services.</td>
<td>☐ Strongly Disagree  ☐ Disagree  ☐ Neutral  ☐ Agree  ☐ Strongly Agree</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>12.</strong> I believe that I have negative reactions towards the appearance of people who frequently use emergency services.</td>
<td>☐ Strongly Disagree  ☐ Disagree  ☐ Neutral  ☐ Agree  ☐ Strongly Agree</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>13.</strong> I believe that for most frequent ED users, long-term compliance is impossible.</td>
<td>☐ Strongly Disagree  ☐ Disagree  ☐ Neutral  ☐ Agree  ☐ Strongly Agree</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>14.</strong> I believe that it is difficult for me to feel empathy for a patient who frequently use emergency services.</td>
<td>☐ Strongly Disagree  ☐ Disagree  ☐ Neutral  ☐ Agree  ☐ Strongly Agree</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Adapted from Foster et al. (2003) and Awun, et. al. (2016)*
15. I believe that it is acceptable to use “scare tactics” to obtain compliance of the frequent ED user

- Strongly Disagree - Disagree - Neutral - Agree - Strongly Agree

**Reasons for frequent ED use**

Please rate how important each of the following factors contribute to frequent ED use.

16. **Having significant physical and/or mental health burden(s)**

- Not at all important - Somewhat important - Moderately important - Very important - Extremely important

17. **Lack of family or social support**

- Not at all important - Somewhat important - Moderately important - Very important - Extremely important

18. **Low socio-economic status**

- Not at all important - Somewhat important - Moderately important - Very important - Extremely important

19. **Not having a Primary Care Physician (PCP)**

- Not at all important - Somewhat important - Moderately important - Very important - Extremely important

20. **Lack of willpower or motivation to actively self-manage their health condition(s)**

- Not at all important - Somewhat important - Moderately important - Very important - Extremely important

21. **Lack of health insurance**

- Not at all important - Somewhat important - Moderately important - Very important - Extremely important

22. **Other:** ________________________________

- Not at all important - Somewhat important - Moderately important - Very important - Extremely important

Adapted from Foster et al. (2003) and Awan, et. al. (2016)
## Appendix 4. Participant Consent Form

### Consent Form for EMS Community-Integrated Health program (CIHP) Evaluation Study

<table>
<thead>
<tr>
<th></th>
<th>Study Title:</th>
<th>Total Quality Assessment of Community-Integrated Health Program (CIHP) in Reducing Non-Emergent Frequent Emergency Department (ED) Use</th>
</tr>
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<tbody>
<tr>
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<td>Performance Site:</td>
<td>Louisiana State University and Agricultural and Mechanical College</td>
</tr>
</tbody>
</table>
| 3 | Investigators: | The following investigators are available for questions about this study, M-F, 8:00 a.m. - 4:30p.m.  
Dr. Ikuma: 578-5364 [Ikuma@lsu.edu](mailto:Ikuma@lsu.edu)  
Ms. Adio: 210-574-6898 [iado1@lsu.edu](mailto:iado1@lsu.edu)  
Ms. Sarah Dunn: [sdunn13@lsu.edu](mailto:sdunn13@lsu.edu)  
Ms. Simpson: 939-1663 [RSimpson@brgov.com](mailto:RSimpson@brgov.com) |
| 4 | Purpose of the Study: | The purpose of this research project is to conduct a total quality evaluation of the community-integrated health program (CIHP) initiated by EBRP EMS, to determine whether it is able to meet the health care needs of frequent users of EDs. The evaluation is from 3 standpoints: (1) does the program improve patient health?; (2) does the program improve patient experience?; (3) does the program reduce burden on EMS and 911 resources? |
| 5 | Number of subjects | 60 |
| 6 | Who can participate? | You can participate if you:  
- Are 18 years or older  
- Have 4 or more visits to an ER in the past year  
- Can agree to participate  
- Can answer the questions in English  
- Live in East Baton Rouge Parish, LA  
- Would like to participate in the CIHP  
You cannot participate if you:  
- Are pregnant  
- Are incarcerated  
- Are too intoxicated, acutely confused, or psychotic to agree to participate  
- Are already participating in another ED reduction study |
| 7 | What will you be doing? | 1. Complete 2 surveys (about 20 minutes) today. You can do the surveys aloud (we will ask you questions and record your answers.)  
2. Every 3 months, complete 1-2 more surveys (no more than 15 minutes total), for one year. We will visit you at home at a time convenient to you.  
3. Once you are in the CIHP, we will visit you after a few months to ask for your feedback about the program, especially on what you like and what could be improved. We will visit you at home at a time convenient to you. |
| 8 | Why participate? | Your help in providing information is valuable to us. The surveys will help EMS improve the care you and others receive. The surveys might help get more funding for CIHP, making it available to more people. |
| 9 | What are the drawbacks? | We will be coming into your home when you complete the surveys. We will always be with a paramedic and will only come when you want us to. You might get tired |
of answering the questions, and you can stop at any time.

10. Right to Refuse

| Your Participation is Voluntary and does not affect your status in CIHP. You may choose to complete this survey(s) or not – it is entirely optional. Whether you decide to participate or not, the health care you receive will not be affected. |

11. Privacy:

| We may publish the results, but your name will not be included to keep your information private. Your identity will remain confidential unless disclosure is required by law. |

12. Signatures: The study has been discussed with me and all my questions have been answered. I may direct additional questions regarding study specifics to the investigators. If I have questions about subjects' rights or other concerns, I can contact Dennis Landin, Institutional Review Board, (225) 578-8692, irb@lsu.edu, www.lsu.edu/irb. I agree to participate in the study described above and acknowledge the investigator's obligation to provide me with a signed copy of this consent form.

Participant Signature: ___________________________ Date: __________________

Investigator Signature: ___________________________ Date: __________________
Appendix 5. Modified CAHPS Survey

Patient Experience Survey

Your Provider

The first questions ask about your Community Paramedics.

1. Our records show that you got care from East Baton Rouge Parish EMS Community Paramedics in the last 3 months.
   Is that right?
   1 □ Yes
   2 □ No → If No, STOP

In the questions that I ask you, I will refer to Community Paramedics as “this provider.” Please think of the Community Paramedics as you answer my questions.

2. Is this the provider you usually see if you need a check-up, want advice about a health problem, or get sick or hurt?
   1 □ Yes
   2 □ No → If No, STOP

3. How long has this provider been seeing you?
   Would you say… [READ LIST]
   1 □ Less than 6 months
   2 □ At least 6 months but less than 1 year
   3 □ At least 1 year but less than 3 years
   4 □ At least 3 years but less than 5 years
   5 □ 5 years or more

Your Care From This Provider in the Last 3 Months

The next questions ask about your own health care. Do not include care you got when you stayed overnight in a hospital. Do not include the times you went for dental care visits.

4. In the last 3 months, how many times did this provider visit you?
   Would you say… [READ LIST]
   □ None → If None, STOP
   □ 1 time
   □ 2
   □ 3
   □ 4
   □ 5 to 9
   □ 10 or more times

5. In the last 3 months, did you contact this provider for an illness, injury, or condition that needed care right away?
   1 □ Yes
   2 □ No → If No, go to #7

6. In the last 3 months, when you contacted this provider for care you needed right away, how often did you get to see the provider as soon as you needed?
   Would you say… [READ LIST]
   1 □ Never
   2 □ Sometimes
   3 □ Usually
   4 □ Always
7. In the last 3 months, did you call for a check-up or routine care with this provider? 

☐ Yes
☐ No → If No, go to #9

8. In the last 3 months, when you called for a check-up or routine care with this provider, how often did you see the provider as soon as you needed? Would you say... [READ LIST]

☐ Never
☐ Sometimes
☐ Usually
☐ Always

9. In the last 3 months, did you contact this provider with a medical question during regular office hours? 

☐ Yes
☐ No → If No, go to #11

10. In the last 3 months, when you contacted this provider during regular office hours, how often did you get an answer to your medical question that same day? Would you say... [READ LIST]

☐ Never
☐ Sometimes
☐ Usually
☐ Always

11. In the last 3 months, how often did this provider explain things in a way that was easy to understand? Would you say... [READ LIST]

☐ Never
☐ Sometimes
☐ Usually
☐ Always

12. In the last 3 months, how often did this provider listen carefully to you? Would you say... [READ LIST]

☐ Never
☐ Sometimes
☐ Usually
☐ Always

13. In the last 3 months, how often did this provider seem to know the important information about your medical history? Would you say... [READ LIST]

☐ Never
☐ Sometimes
☐ Usually
☐ Always
14. In the last 3 months, how often did this provider show **respect** for what you had to say?  
   **Would you say… [READ LIST]**
   1 □ Never  
   2 □ Sometimes  
   3 □ Usually  
   4 □ Always

15. In the last 3 months, how often did this provider **spend enough time** with you?  
   **Would you say… [READ LIST]**
   1 □ Never  
   2 □ Sometimes  
   3 □ Usually  
   4 □ Always

16. Using any number from 0 to 10, where 0 is the worst provider possible and 10 is the best provider possible, what number would you use to **rate this provider**?
   0 □ 0 Worst provider possible  
   1 □ 1  
   2 □ 2  
   3 □ 3  
   4 □ 4  
   5 □ 5  
   6 □ 6  
   7 □ 7  
   8 □ 8  
   9 □ 9  
   10 □ 10 Best provider possible

17. In the last 3 months, did you take any prescription medicine?  
   1 □ Yes  
   2 □ No → **If No, go to #19**

18. In the last 3 months, how often did you and this provider talk about all the **prescription medicines** you were taking?  
   **Would you say… [READ LIST]**
   1 □ Never  
   2 □ Sometimes  
   3 □ Usually  
   4 □ Always

19. Would you **recommend this program** to your friends and family needing similar care?  
   **Would you say… [READ LIST]**
   1 □ Definitely no  
   2 □ Probably no  
   3 □ Probably yes  
   4 □ Definitely yes
Appendix 6. Optum SF-12v2 License Agreement

NON-COMMERCIAL LICENSE AGREEMENT
Office of Grants and Scholarly Research (OGSR)

License Number: QM042954
Licensee Name: Oluwakemi Adio c/o Louisiana State University
Licensee Address: 2563 PFT Hall1, Baton Rouge, LA 70803 US
Approved Purpose: Impact of Community-Integrated Health Program on Health Outcomes of Frequent ED Users
Study Type: Non-commercial academic research and/or thesis – Unfunded Student
Data Collection Method: Tablet, Interview Script, or self-administered
Therapeutic Area: Wellness & Lifestyle
Indication: Health & Wellness

Royalty Fee: None, because this License is granted in support of the non-commercial Approved Purpose

A. Effective Date: This Non-Commercial License Agreement (the “Agreement”) from the Office of Grants and Scholarly Research (OGSR), is made by and between OptumInsight Life Sciences, Inc. (f/k/a QualityMetric Incorporated) (“Optum”), 1301 Atwood Ave, Suite 311N, Johnston, RI 02919 and Licensee. This Agreement is entered into as of the date of last signature below and is effective for the Study Term set forth on Appendix B.

B. Appendices: Capitalized terms used in this Agreement shall have the meanings assigned to them in Appendix A and Appendix B. The appendices attached hereto are incorporated into and made a part of this Agreement for all purposes.

C. Grant of License: Subject to the terms of this Agreement, Optum grants to Licensee a non-exclusive, non-transferable, non-sublicensable worldwide license to use, solely for the Approved Purpose and during the Study Term, the Licensed Surveys, Software, SMS Scoring Solution, and all intellectual property rights related thereto (“Survey Materials”), in the authorized Data Collection Method, Modes of Administration, and Approved Languages indicated on Appendix B; and to administer the Licensed Surveys only up to the total number of Administrations (and to make up to such number of exact reproductions of the Licensed Surveys necessary to support such Administrations) in any combination of the specific Licensed Surveys and Approved Languages, Data Collection Method, and Modes of Administration.

EXECUTED by the duly authorized representatives as set forth below.

OptumInsight Life Sciences, Inc.                     Oluwakemi Adio c/o Louisiana State University

Signature: ________________________________       Signature: ________________________________
Name: Michelle White                               Name: Oluwakemi Adio
Title: Sr. Director                                Title: Doctoral Student
Date: 10/23/2017                                  Date: 10/20/2017
**LICENSE AGREEMENT - DETAILS**

**Licensee:** Louisiana State University  
Oluwakemi Adio  
2563 FFT Hall  
Baton Rouge, LA 70803

**License Number:** QM042954

**Amendment to:** N/A

**Study Term:** 01/01/18 to 12/31/19

**Master License Term:** N/A

**Study Name:** Impact of Community-Integrated H  
Protocol:

**Study Type:** Thesis/Dissertation

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**Approved Languages:**

**United States (English)**

| ISO170   | SF-12 v2 Interview Script, Std                  | Interview Script   | 1        |      |

**Approved Languages:**

**United States (English)**

| ADM012   | Patients Enrolled ("increments of 100")        |                    |          | 40   |
| ADMIN5   | Administrators (40 x 2 admins*)                 |                    |          | 100  |
| SS605    | PRO CoRE Desktop Solution                      |                    | 1        |      |
| SS517    | SF-12 v2: scoring credits                       |                    | 100      |      |
| SS605    | MSE: Missing Score Estimator                    |                    | 100      |      |
| SS606    | DQE: Data Quality Evaluator                    |                    | 100      |      |
| EM066    | SF-12 v2 Quick Start Guide                      |                    | 1        |      |

**Approved Languages:**

**United States (English)**

| EM126    | SF-12 v2 User's Manual 3rd Ed.                  |                    | 1        |      |
OGSR Unfunded Student Program
Quote expires 11/16/17

TOTAL FEES: 0.00 USD
Payment Terms: Due on Receipt
Appendix 7. SF-12v2 and Self-Efficacy Surveys

SF-12v2® HEALTH SURVEY (FOUR-WEEK RECALL)

SCRIPT FOR INTERVIEW ADMINISTRATION

This first question is about your health now.
Please try to answer as accurately as you can.

1. In general, would you say your health is... [READ RESPONSE CHOICES]
   (Circle one number)
   Excellent ............................................................................................................ 1
   Very good ............................................................................................................ 2
   Good .................................................................................................................... 3
   Fair ...................................................................................................................... 4
   or Poor .................................................................................................................. 5

Now I'm going to read a list of activities that you might do during a typical day.
As I read each item, please tell me if your health now limits you a lot, limits you a little, or
does not limit you at all in these activities.

2a. ... moderate activities, such as moving a table, pushing a vacuum cleaner, bowling,
or playing golf. Does your health now limit you a lot, limit you a little, or not limit you
at all? [READ RESPONSE CHOICES ONLY IF NECESSARY]
   [IF RESPONDENT SAYS S/HE DOES NOT DO ACTIVITY, PROBE: Is that because of your health?]
   (Circle one number)
   Yes, limited a lot.................................................................................................... 1
   Yes, limited a little .............................................................................................. 2
   No, not limited at all............................................................................................ 3

2b. ... climbing several flights of stairs. Does your health now limit you a lot, limit you a
little, or not limit you at all? [READ RESPONSE CHOICES ONLY IF NECESSARY]
   [IF RESPONDENT SAYS S/HE DOES NOT DO ACTIVITY, PROBE: Is that because of your health?]
   (Circle one number)
   Yes, limited a lot.................................................................................................... 1
   Yes, limited a little .............................................................................................. 2
   No, not limited at all............................................................................................ 3

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(SF-12v2® Health Survey Standard Interview Script, United States (English))
The following two questions ask you about your physical health and your daily activities.

3a. During the past four weeks, how much of the time have you accomplished less than you would like as a result of your physical health? [READ RESPONSE CHOICES]

(Circle one number)

All of the time ........................................................................................................1
Most of the time .....................................................................................................2
Some of the time ...................................................................................................3
A little of the time .................................................................................................4
or None of the time ..............................................................................................5

3b. During the past four weeks, how much of the time were you limited in the kind of work or other regular daily activities you do as a result of your physical health?
[READ RESPONSE CHOICES]

(Circle one number)

All of the time ........................................................................................................1
Most of the time .....................................................................................................2
Some of the time ...................................................................................................3
A little of the time .................................................................................................4
or None of the time ..............................................................................................5

The following two questions ask about your emotions and your daily activities.

4a. During the past four weeks, how much of the time have you accomplished less than you would like as a result of any emotional problems, such as feeling depressed or anxious? [READ RESPONSE CHOICES]

(Circle one number)

All of the time ........................................................................................................1
Most of the time .....................................................................................................2
Some of the time ...................................................................................................3
A little of the time .................................................................................................4
or None of the time ..............................................................................................5
4b. **During the past four weeks, how much of the time did you do work or other regular daily activities less carefully than usual as a result of any emotional problems, such as feeling depressed or anxious?** [READ RESPONSE CHOICES]  
(Circle one number)

All of the time ...................................................................................................................................... 1  
Most of the time ................................................................................................................................ 2  
Some of the time ................................................................................................................................. 3  
A little of the time ............................................................................................................................... 4  
or None of the time............................................................................................................................ 5

5. **During the past four weeks, how much did pain interfere with your normal work, including both work outside the home and housework? Did it interfere...** [READ RESPONSE CHOICES]  
(Circle one number)

Not at all .................................................................................................................................................. 1  
A little bit ............................................................................................................................................... 2  
Moderately ............................................................................................................................................ 3  
Quite a bit ............................................................................................................................................... 4  
or Extremely .......................................................................................................................................... 5

The next questions are about how you feel and how things have been with you during the past four weeks.

As I read each statement, please give me the one answer that comes closest to the way you have been feeling; is it all of the time, most of the time, some of the time, a little of the time, or none of the time?

6a. **How much of the time during the past four weeks... have you felt calm and peaceful?** [READ RESPONSE CHOICES ONLY IF NECESSARY]  
(Circle one number)

All of the time ...................................................................................................................................... 1  
Most of the time ................................................................................................................................ 2  
Some of the time ................................................................................................................................. 3  
A little of the time ............................................................................................................................... 4  
or None of the time............................................................................................................................ 5
6b. How much of the time during the past four weeks... did you have a lot of energy?  
[READ RESPONSE CHOICES ONLY IF NECESSARY]  
(Circle one number)

All of the time ................................................................. 1
Most of the time ................................................................. 2
Some of the time ................................................................. 3
A little of the time ................................................................. 4
or None of the time ................................................................. 5

6c. How much of the time during the past four weeks... have you felt downhearted and depressed? [READ RESPONSE CHOICES ONLY IF NECESSARY]  
(Circle one number)

All of the time ................................................................. 1
Most of the time ................................................................. 2
Some of the time ................................................................. 3
A little of the time ................................................................. 4
or None of the time ................................................................. 5

7. During the past four weeks, how much of the time has your physical health or emotional problems interfered with your social activities like visiting with friends or relatives? Has it interfered... [READ RESPONSE CHOICES]  
(Circle one number)

All of the time ................................................................. 1
Most of the time ................................................................. 2
Some of the time ................................................................. 3
A little of the time ................................................................. 4
or None of the time ................................................................. 5

In general, how much do you feel you have control over your health?  
Would you say... [READ LIST]

☐ No control at all  
☐ Very little  
☐ Some  
☐ Moderately  
☐ A lot of control  

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(SF-12® Health Survey Standard Interview Script, United States (English))
Appendix 8. Essential Elements of MIH-CP Program

1. Define
   - Conduct community healthcare need assessment
   - Examine your workforce competency
   - Get additional/specialized education if needed
   - Determine and map state/local resources

2. Ideate
   - Identify & narrow down target population/group based on competencies and available resources, e.g., COPD, CHF, mental health
   - Create an inter-professional care team with strong clinical oversight by EMS MD
   - Develop partnerships early (w/ PCPs, ED staff & community health care partners)
   - Research & select a model for chronic disease management, e.g., Chronic Care Model (CCM), Community-based Transition Model (CBTN), etc.

3. Implement
   - Integrate into existing healthcare systems; Establish bi-directional PHI sharing
   - Develop & enforce consistent reporting
   - Utilize culturally-appropriate, CP-invested paramedics
   - Design & enforce care plans
   - Modify/adapt to fit program & patients needs

4. Test
   - Evaluate
   - Select appropriate tools/instruments to measure metrics
   - Share results with potential payers; Create business model highlighting program value

5. Continuous Improvement
   - Ask questions; Listen
   - Create a system of ongoing assessment
   - Observe, identify problems, ensure corrective action, and assess results
   - Improve efficiency; map patients by zip code
   - Observe, identify problems, ensure corrective action, and assess results

Define program success & identify metrics to measure

Essential Elements of MIH-CP Program

Select appropriate tools/instruments to measure metrics

Evaluate

Share results with potential payers; Create business model highlighting program value

Ask questions; Listen

Create a system of ongoing assessment
Oluwakemi Aiyedun, a native of Nigeria, received her bachelor’s degree *summa cum laude* from the University of Ibadan, Nigeria in 2009. Prior to this, she worked as an intern for Ove Arup & Partners and Schlumberger as part of the industrial training requirements of the engineering bachelor’s curriculum. Following her BS degree and a short stint at GTBank, she joined Louisiana State University in August 2012 to pursue a Master of Science degree in Industrial Engineering. Oluwakemi worked with Roy Anderson Corp in Gulfport, MS between 2014 and 2016 as a Project Engineer assisting in the construction and management of multi-million dollar commercial and residential facilities. While in MS, Oluwakemi was nonplussed by the wide disparities that existed in healthcare and health access for minority populations which got her intensely curious on how to apply her engineering background to address this issue. This curiosity eventually led to the pursuit of a Doctorate of Philosophy degree in Engineering Science and her doctoral program began in August 2016. Oluwakemi’s research interests lie in the intersection of public health, innovative healthcare performance measurement and healthcare systems engineering.