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The Impact of Mobile Integrated Healthcare on 911 Use and Patient Activation

Jocelin Olin
Seattle University

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Jocelin Olin, BSN, RN

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Approved by: Diane Fuller Switzer Date June 6, 2023
DNP Faculty Mentor: Diane Fuller-Switzer, DNP, ARNP, FNP/ENP-C ENP-BC CEN CCRN FAEN FAANP

Approved by: Benjamin J Miller Date 06 June 2023
DNP Project Reader: Benjamin Miller, PhD, ARNP, FNP-C, ACNPC, ENP-C, FAANP

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Abstract

Background: Emergency Medical Services (EMS) and Emergency Departments (EDs) are experiencing an increase in low-acuity and high frequency patients. Treating non-emergent patients with emergency resources drives up healthcare costs, leads to delays in care for all patients, and increases strain on emergency resources. To address the increase in low-acuity and high-frequency patients within the 911 system and emergency departments, mobile integrated healthcare (MIH) has emerged as an EMS-based intervention to connect patients with community resources and reduce non-emergent transports and ED visits. This program evaluation examines the impact of nurse-social worker teams in a fire-based MIH program by measuring 911 and ED use and patient activation before and after MIH interventions.

Methods: Participants were enrolled in the program evaluation by the MIH field teams. Participants were either new or existing MIH patients and enrollment occurred over a 2-month period. Participants completed the patient activation questionnaire (PAM-13) at the time of enrollment and again between 8 and 12 weeks later. The number of 911 calls, transports, and ED visits for each participant was extracted from Julota and EPIC for a period of 12 weeks prior to and after the date of enrollment. The pre and post data and PAM-13 scores were compared using Wilcoxon Signed Ranks Test of Significance. The mean pre and post PAM-13 scores were also compared to evaluate the difference.

Results: 19 participants were enrolled in the study. One participant died during the follow-up period. Of the remaining 18 participants, 4 completed the second PAM-13 questionnaire. There was a statistically significant reduction in 911 calls ($p=0.015$), transports ($p=0.021$), and ED visits ($p=0.006$) following MIH intervention ($n=19$). The change in PAM-13 scores ($n=4$) was not significant ($p=0.655$). The difference in the means of the pre and post PAM-13 questionnaires was an increase of 1.75.

Conclusions: MIH intervention reduced 911 calls, transports, and ED visits in this program evaluation. The effect on patient activation as measured by the PAM-13 questionnaire was not

significant. Given the statistical significance in reducing use of emergency services for this small sample, a longer evaluation with more participants is needed to determine if fire-based MIH using a nurse and social worker is effective in reducing emergency resource use.

Table of Contents

The Impact of Mobile Integrated healthcare on 911 Use and Patient Activation

Emergency Medical Services (EMS) and Emergency Departments (EDs) are facing increasing volumes of patients with low acuity non-emergent complaints (Iovan et al., 2020). Many of these patients use EMS and the ED at a high rate relative to the general population (Iovan et al., 2020; Sanko et al., 2019). Patients who over-use EMS and EDs often have multiple comorbidities and struggle with social challenges such as poverty, homelessness, addiction, and psychiatric diagnoses (Agarwal et al., 2019; Pinet-Peralta, 2021) that cannot be effectively managed with episodic care (Sanko & Eckstein, 2021). The increased patient load can lead to delays in care for those with time-sensitive emergencies (Pinet-Peralta, 2021; Sanko et al, 2019) and negatively affect the quality of patient care for all patients needing emergency services (Green & Ruel, 2020; Pinet-Peralta et al., 2021). It also increases costs (Castillo et al., 2016; Green and Ruel, 2020; Pinet-Peralta et al., 2021; Sanko et al. 2019), and contributes to high stress levels and burnout among first responders and ED staff (Cannuscio et al., 2016; Green & Ruel, 2020).

National Prevalence

In 2018 there were 16 million 911 calls for EMS service in the United States that resulted in transports to an ED (National Association of State EMS Officials [NASEMSO], 2020, p. 82). Of patients seeking care in EDs, conservative estimates are that around 30% of these patients have low-acuity non-emergent complaints (Durand et al., 2011; Gregg et al., 2019; Nejtek et al., 2017). Treating non-urgent patients in the ED costs approximately 38 billion dollars annually (Green & Ruel, 2020; Gregg et al., 2019) and ED care represents approximately 10% of national healthcare costs (Solberg et al., 2016).

Hospitals are not the only place treating non-emergent patients with emergency resources. Of the patients transported to the ED by EMS, not all of them require prehospital care and transport. Conservative estimates are that approximately 30% of EMS transports are patients with low-acuity complaints that could have been safely transported by alternate means

to the ED or treated elsewhere (Castillo et al., 2016; Pinet-Peralta et al., 2021; Sanko et al., 2019). Additionally, as low as 2.5% of 911 calls are for time-sensitive emergencies (Sanko & Eckstein, 2021). As 911 call volumes rise, most of the increase in calls for EMS has been from patients with low-acuity complaints (Longabeer et al., 2016; Sanko et al., 2019). This inappropriate use of EMS extends response times and strains regional EMS and ED capacity (Cannuscio et al., 2016; Longabeer et al., 2016; Sanko et al., 2019).

Local Prevalence

These national trends are reflected locally in the data for King County, Washington, and within the Puget Sound Regional Fire Authority (PSRFA) jurisdiction. In the past 5 years in King County, total 911 EMS calls increased by 5% while the number of emergent calls, those calls requiring an advanced life support response, decreased by 10% (Public Health and King County, 2022). Population growth aligns with the increases in total 911 EMS calls during the five-year period. However, the trend towards a decrease in emergent calls while the population has increased suggests that most of the increase is due to low-acuity calls (Public Health and King County, 2022). During that same time, total 911 EMS calls increased by 25% within PSRFA's jurisdiction which is five times greater than the county wide increase in 911 EMS calls (Puget Sound Regional Fire Authority [PSRFA], 2022). In 2016, 1.18% of the population within the PSRFA jurisdiction accounted for 40% of the 911 calls (Fire Department Community Assistance, Referrals, and Education Services, n. d.). These trends align with the national data and show an increase in the number of low-acuity 911 calls while emergent calls remain relatively stable or decrease despite population increases.

Background and Significance

High-Frequency Patients

High-frequency patients, whose use of emergency resources is greater than the general population, represent just 10% or less of ED patients but generate up to 28% to 34% of ED visits, depending on the definition of a high-frequency patient used (Iovan et al., 2020; Solberg

et al., 2016). While 16% of ED patients arrive by EMS (Gregg et al, 2019), high-frequency patients arrive by ambulance between 59.3% and 68% of the time (Agarwal et al., 2019; Solberg et al., 2016) and represent 32% of transports (Solberg et al., 2016). This shows a significant overlap in low-acuity and high-frequency patients who access EMS and those seeking care in EDs (Solberg et al., 2016). The increase in volume of low-acuity calls and frequent transport by EMS of high-frequency patients (Agarwal et al., 2019; Sanko et al, 2019; Solberg et al., 2016) means both settings are experiencing an increase in low-acuity complaints and over-use.

Mobile Integrated Healthcare

Providing care to high-frequency patients requires an integrated approach addressing both social and medical needs and connecting patients to local resources (Thurman et al., 2021). Within traditional treat and transport models of EMS there is no transitional care available, treatment on scene is limited to stabilizing interventions, and the only approved transport destination for prehospital patients is an ED (Longabeer, et al., 2016; Sanko et al, 2019). To address gaps in care within communities, the concept of mobile integrated healthcare (MIH) and community paramedicine (CP) has emerged to provide patient-centered care in the pre-hospital environment using an integrative approach and building on existing EMS infrastructure (Choi et al, 2016; Gregg et al., 2019; National Association of Emergency Medical Technicians, 2016; Thurman et al., 2021; Zavadsky et al., 2015).

Mobile integrated healthcare is an emerging concept and data regarding best practices is still being generated (Choi et al, 2016; Gregg et al., 2019; Pang et al., 2019; Thurman et al., 2021). The primary goal of MIH is reducing preventable or inappropriate 911 calls and ED use and most programs report a decrease in both (Castillo et al., 2016; Longabeer et al., 2016; Longabeer et al., 2017; Myers et al., 2021; Nejtek et al., 2017; Sanko et al., 2019; Sanko & Eckstein, 2021; Xie et al., 2021). However, MIH seeks to provide patient-centered care and improve outcomes beyond reduction of 911 calls and ED use. Of the studies reviewed for this

project, only two evaluated patient outcomes in connection with MIH services, one assessing quality of life and the other assessing patient activation (Castillo et al, 2016; Nejtek at al, 2017). Both studies found an improvement following MIH intervention, one in a population of high-frequency patients in California and the other in a Medicare population in Florida. With only two studies examining outcomes beyond 911 calls and ED use, whether these findings apply to high-frequency patients and low-acuity patients remains unknown.

To evaluate studies on MIH, it is important to understand the difference between MIH and CP and how the terms are used. MIH utilizes non-EMS personnel, sometimes in combination with a first responder, to provide the services and usually does not include paramedics. In contrast, CP programs primarily use paramedics for the services provided in the prehospital environment but may include physicians, nurses, social workers and other healthcare personnel in the assessment and management of patients (Thurman et al., 2021). Although MIH and CP are different conceptually, there is significant overlap in services provided and the terms are often used interchangeably (Choi et al., 2016; Thurman et al., 2021). Understanding this difference is important in evaluating the different programs as they are often lumped under the umbrella of MIH.

Theoretical Framework

Mobile Integrated Healthcare is best understood under the quadruple aim framework. The quadruple aim builds on the triple aim of providing patient-centered care, improving population health, and reducing cost (Bodenheimer & Sinsky, 2014; Sikka et al, 2015). The triple aim addresses outcomes related to the patient experience of care, the impact of care at a population level, and the cost of care. These are relevant outcomes for all stakeholders and valued by the public in general. However, the increasing emphasis on value-based care, supported by the triple aim framework, has increased pressure on providers. High rates of provider burnout are reported nationwide, with stresses related to streamlining operations, reducing costs, and adopting electronic health record technology identified as a major cause

(Bodenheimer & Sinsky, 2014; Rathert et al., 2018). The addition of a fourth aim supports providers by including improvement in the work experience and practice environment (Bodenheimer & Sinsky, 2014; Sikka et al, 2015). Thus, the quadruple aim seeks to provide patient-centered care, improve population health, reduce costs, and improve provider experience.

As an intervention, MIH provides patient-centered care within the community environment. MIH programs are tailored to local needs based on community assessments and work to improve population health. With its potential to reduce costly EMS and ED overuse, it offers a cost-effective intervention to reduce ED crowding and strain on EMS systems, and connect patients with appropriate non-emergency healthcare resources. Reducing stress on EMS personnel and the ED related to high volumes, frequent patients, and low-acuity complaints improves the work experience for EMS and ED personnel. Thus, by providing patient-centered care in the mobile environment, MIH improves individual patient outcomes, supports population health, provides care in a cost-effective way, and reduces stress on EMS and ED providers.

Purpose

The purpose of this project is to evaluate the impact of mobile integrated healthcare provided by nurse and social worker teams on patient outcomes. The project will be done with the Fire Department Community Assistance, Referrals, and Education Services (FD CARES) which provides MIH for the Puget Sound Regional Fire Authority in King County, Washington, as part of its core operational services. To measure outcomes, emergency service use will be evaluated before and after enrollment in the evaluation and the Patient Activation Measures (PAM-13) questionnaire will be administered at the beginning of case management and again 8-12 weeks later. The PAM-13 is a validated and reliable questionnaire that measures a patient's knowledge, belief, and ability to manage their own health and care needs (Hibbard et al., 2004).

This program evaluation examines whether mobile integrated healthcare as delivered by FD CARES reduces EMS and ED overuse and improves patient activation.

Literature Review

To understand the current data and literature related to MIH and CP programs and their outcomes, a literature search was conducted using Google Scholar, PubMed and CINAHL. To capture the extant literature, the search terms “mobile integrated healthcare”, MIH, “community paramedicine”, CP, “advanced practice provider”, APP, nurse, “nurse practitioner”, “advanced practice registered nurse”, APRN, “low-acuity”, “high-frequency”, “heavy utilizers”, and “super-utilizer” were used. Article abstracts were reviewed and those reporting original research on program analysis, observational analysis of target populations, and systematic reviews were selected for full review. Additional articles were identified by reviewing reference sections of the reviewed articles. All articles included in the literature review were written within the past 10 years. Each article addresses MIH or CP care and includes at least one outcome measure related to the quadruple aim of healthcare. Because of unique factors related to the United States (US) health system structure and reimbursement, studies selected focused on US based programs and interventions. One Canadian study was included as it provided an in-depth cost analysis of an MIH program.

Focusing on original research and articles analyzing specific programs provides insight into what types of MIH and CP interventions are effective and allows analysis of specific components such as cost-effectiveness, efficacy, patient outcomes, patient satisfaction, and provider satisfaction. Included in this review are 10 articles discussing specific programs which address high risk patients, high-frequency patients, patients with low-acuity complaints, or some combination of these populations and allows for a more detailed analysis of proactive and reactive MIH components. The quality of data is often reduced by short evaluation periods, small sample size, lack of a control group, or use of pre-post analysis which increase the risk of bias and regression to the mean.

Proactive Programs

Proactive MIH and CP programs provide care to patients identified as high-risk (Castillo et al. 2016: Gingold et al., 2021; Pinet-Peralta et al., 2021) or patients identified as high-frequency from either pre-hospital or ED records (Myers et al., 2021; Nejtek et al., 2017; Pinet-Peralta et al., 2021; Sanko et al., 2019; Xie et al., 2021). These programs can be further broken down by whether the intervention has a defined time frame (Gingold et al., 2021, Pinet-Peralta et al., 2021) or the intervention is provided without a fixed end point (Castillo et al., 2016; Myers et al., 2021; Nejtek et al., 2017; Sanko et al., 2019; Xie et al., 2021).

For time-bound interventions, Gingold et al. (2021) evaluated the effect on 30-day readmissions of an MIH team centered on a community paramedic which provided in-home transitional care following hospital admission. This study found no difference between the intervention and control group, but it did find high patient satisfaction ratings. The intervention group generated higher costs than the controls due to costs associated with the MIH care. Similarly, Pinet-Peralta et al. (2021) studied the effect of an MIH intervention lasting four months for high-risk patients and evaluated EMS activation as the primary outcome. This study showed a reduction in EMS use during the intervention period but EMS activation from enrolled patients exceeded baseline levels two months after the intervention ended. Both studies failed to demonstrate long-term sustainable impacts following a time-bound intervention.

Interventions which provided follow-up care and transitional care without a defined time frame reported more positive outcomes. A large quasi-experimental study by Castillo et al. (2016) reported a decrease in costs and ED utilization with increased patient engagement and high levels of patient satisfaction following an MIH intervention in Medicare advantage seniors identified as high-risk. The intervention offered transitional care, disease management, and access to 24/7 unscheduled care using a team of healthcare providers and including site visits. A small pre-post analysis by Nejtek at al. (2017) also reported a decrease in EMS and ED use along with a decrease in hospital admissions and an increase in quality of life for high-frequency

patients (≥4 ED visits/year). This intervention used a community paramedic to provide on scene care in consultation with a physician and clinical program manager and provided weekly visits which included services such as vital sign monitoring, blood draws, medication management, home safety checks and wellness check-ups. Finally, a small pre-post observational study by Myers et al. (2021) found a decrease in ED, inpatient and primary care use for high-risk and high-frequency patients referred to the CP program by physicians. It also found a high level of satisfaction from the referring physicians with the service provided. The decrease in visits to primary care was offset by an increase in visits by the CP team which suggests that to effectively manage these complex patients requires ongoing high levels of engagement. These studies suggest that proactive MIH and CP interventions without a fixed end point and targeting specific populations may be an effective way to reduce acute care utilization, improve patient outcomes, and increase patient satisfaction.

Reactive Programs

Evaluation of reactive MIH interventions focuses on low-acuity callers and involves evaluation and management of patients prior to arrival at an ED for primary care complaints. Two of the reactive intervention studies examined the effectiveness of a prehospital telehealth physician consultation for low-acuity patients with the goal of referring them to primary care centers when appropriate (Longabeer et al., 2016; Longabeer et al., 2017). These studies were quasi-experimental, had a sample size of over 5,000, and used a control group. The first study (Longabeer et al., 2016) found that telehealth consultation reduced EMS transport by 56%. Additionally, there was no difference in patient satisfaction and no reported mortality of the treated patients indicating that patients were satisfied with the care and that the intervention had no adverse outcomes. The second study (Longabeer et al., 2017) evaluated the cost benefit, inclusive of the cost of operating the program, and estimated that providing the telehealth intervention to 2% of the total 911 call volume resulted in savings of almost 1 million dollars annually.

Sanko et al., (2019) examined a pilot MIH intervention with an advanced practice registered nurse (APRN) on an EMS unit that responded to low-acuity calls. The unit also provided proactive care to individuals identified as high-frequency with the goals of creating community connections and reducing 911 use. The addition of the APRN allowed for treatment and discharge on scene within the APRN scope of practice. The preliminary analysis of the intervention found 50% of patients seen by the APRN were either treated and released on scene or referred to an alternative non-ED destination and patients reported high levels of satisfaction with the service (Sanko et al. 2019). This program was scaled up during the COVID-19 pandemic and retrospective analysis showed that patient satisfaction with MIH care was higher than with traditional EMS care and that treatment on scene or transport to an alternative destination cost approximately one fourth of traditional EMS care (Sanko & Eckstein, 2021).

Finally, Xie et al. (2021) conducted a comprehensive cost analysis of a CP program which provided reactive intervention on scene to low-acuity callers and proactive follow up between calls. This intervention resulted in a decrease of approximately 50% in ED transports for patients with the intervention versus matched controls. It found that MIH intervention cost less than traditional EMS inclusive of operational and staffing costs, reduced use of EMS resources, and increased EMS unit availability. All four of these studies demonstrated a significant decrease in EMS and ED use for patient's evaluated by MIH or telehealth.

Synthesis

There are two broad categories for MIH and CP interventions, proactive and reactive, focusing on three distinct target populations: high-frequency patients, high-risk patients, and low-acuity patients. Proactive interventions focused on patients identified as high-risk or high-frequency, provided transitional and follow-up care within the patient's residence, and included connection with primary care and community resources. The configuration of the field intervention team varied, with CP programs using EMS personnel with advanced training and MIH programs using healthcare teams including social workers, nurses, and providers who

frequently paired with a first responder (Castillo, et al., 2016; Choi et al., 2016; Gingold et al., 2021; Nejtek et al., 2017; Myers et al., 2021; Pang et al., 2019; Pinet-Peralta et al., 2021; Sanko et al., 2019; Xie et al., 2021). Reactive interventions aim to reduce inappropriate EMS and ED use for low-acuity complaints. The primary outcome for all the programs reviewed was reduced EMS and ED use. Programs with a prehospital component also reduced the number of personnel and time spent on the call and reported high levels of patient satisfaction (Longabeer et al., 2016; Sanko et al., 2019; Xie et al., 2021). Several of these programs also provided follow-up care and community resource connection between calls and reduced EMS use by high-frequency patients (Sanko et al., 2019; Xie et al., 2021).

Comparing transitional care and follow-up care, ongoing follow-up was the only intervention demonstrating a sustained reduction in EMS and ED use. Transitional care provided in a defined time frame did not provide statistically significant benefit (Gingold et al., 2021) or did not produce a reduction in EMS and ED use sustained beyond the intervention period (Pinet-Peralta et al., 2021). In contrast, proactive follow-up care without defined time frames, did produce consistent reductions in EMS and ED usage and reduced cost (Castillo et al., 2016; Myers et al., 2021; Nejtek et al., 2017). In both types of proactive intervention, patient satisfaction was generally high (Castillo et al. 2016; Gingold et al., 2021; Sanko et al., 2019; Xie et al., 2021). The correlation of ongoing care to a decrease in EMS and ED use and reduced cost suggests that patients receiving these interventions are complex and require sustained engagement.

Outcome measures beyond a reduction of EMS and ED use and cost analysis were varied and secondary measures were often not included in the final data analysis. Of the studies reviewed, one studied the outcome of quality of life (Nejtek et al., 2017) and one patient activation (Castillo, et al., 2016). Further study may show additional benefits beyond the quantitative outcomes of reduced EMS and ED use and reduced cost for MIH and CP interventions.

Gaps in the literature

Mobile integrated healthcare is an emerging concept without established best practices (Choi et al, 2016; Gregg et al., 2019; Pang et al., 2019; Thurman et al., 2021). While most studies show a decrease in EMS and ED use following MIH interventions, data regarding patient outcomes beyond a decrease in 911 and ED reliance is lacking. Although patient satisfaction is generally high (Castillo et al. 2016; Gingold et al., 2021; Longabeer et al., 2016; Sanko et al., 2019; Xie et al., 2021) and Nejtek et al. (2107) found an improvement in quality-of-life following intervention, measures which can quantify patient outcomes are difficult to find. Castillo et al. (2016) evaluated patient outcomes in connection with MIH by studying patient activation in a Medicare population in Florida. This research showed a positive improvement with patient activation that was associated with a decrease in 911 and ED use and an overall decrease in healthcare costs. As increased patient activation is shown to be correlated with improved patient outcomes (Greene et al., 2015; Hibbard et al., 2004), this suggests that MIH intervention improves outcomes. However, this study was in a Medicare population and whether these findings apply to high-frequency patients and low-acuity patients more broadly remains unknown.

Methods

Design

This was a quasi-experimental program evaluation examining the impact of fire-based mobile integrated healthcare on 911 call frequency and patient activation. The purpose of the evaluation was to measure use of 911 services and patient activation for participants enrolled in MIH case management to see if the intervention was correlated with a change in emergency services use and patient activation.

Ethical considerations

This program evaluation involved patients who have multiple comorbidities and were often from marginalized groups (Agarwal et al., 2019; Pinet-Peralta, 2021). During the design and implementation of the project, attention to the impact of bias on both who was selected for enrollment and to ensure that patients felt safe and supported always was essential. Any patient within the service area identified as needing support outside of emergent 911 services was eligible to receive MIH care. Participation did not impact the care a patient received, and patients could choose to remove themself from the study at any time. This project was submitted to Seattle University's Institutional Review Board with the determination that it was "not human participant research (NHPR)" (Appendix A).

Setting

This fire-based EMS program serves eight urban communities in western Washington with field-based teams composed of a nurse and social worker. They provide proactive and reactive services and respond to non-emergent 911 medical aid calls and referrals. The MIH teams help navigate patients to appropriate care, connect patients to community resources, and provide temporary case management and follow-up for those needing additional support. The researchers examined the impact of case management provided as part of the proactive services.

Participants

Patients receiving case-management from December 15th of 2022 through February 15th of 2023 were invited to participate in the project. Participation was voluntary, participants were 18 years or older, and either a new or continuing recipient of case-management by MIH. The field teams identified eligible patients and invited them to participate. Informed consent was obtained by handing out an information sheet (Appendix B) and having patients choose an "I consent" option on the survey before continuing. Those who consented to participate completed

the patient activation measurement questionnaire (PAM-13). All participants needed to have basic English language proficiency as the questionnaire was provided in English only.

Intervention

Case management was provided as part of the MIH program by the field team members. The care was provided in accordance with their organizational policies and procedures as usual. No changes to the interventions provided by the teams were made.

Data Collection Procedures

Data

For participants enrolled in the evaluation, their medical record number was recorded along with their survey. Using the medical record number, additional data was extracted from Julota and EPIC. Julota is the electronic health record (EHR) database used by the MIH team and regional first responders. EPIC is the EHR database used by many regional emergency departments. This data included the de-identified demographic information of age and sex, the number of 911 calls, the number of transports, and the number of ED visits in a 12-week period preceding the initial PAM-13 questionnaire and a 12-week period after the initial questionnaire was given. The demographic data was used to increase understanding of the participant population. The number of 911 calls, transports, and ED visits before and after the initial PAM-13 questionnaire is initiated was used to analyze changes in frequency as ongoing MIH case management is provided.

PAM-13

For patients participating in the evaluation, the PAM-13 questionnaire was administered twice. Once at initial enrollment in the study and again 8 to 12 weeks later. The time frame for the follow-up questionnaire was 8-12 week to accommodate potential difficulties in locating patients and the variable nature of daily calls for the MIH teams administering the questionnaire. The PAM-13 questionnaire was accessed using a QR code on MIH mobile devices and administered using Qualtrics.

Timeline

Participant enrollment began on December 15th, 2022, and ended on February 15th, 2023. All follow-up questionnaires and data extraction were completed between February 8th and May 5th, 2023.

Instrument

PAM-13

The patient activation measure (PAM-13) questionnaire measures a patient's knowledge, belief, and ability to manage their own health and care needs. It consists of 13 questions and is a shortened version of the original PAM questionnaire which was 22 questions and is validated and reliable with a Cronbach's alpha of 0.91 (Hibbard et al., 2004). The questions are scored based on a 4-point Likert scale using the scoring algorithm provided by Insignia Health and provide quantitative data. Higher scores on the PAM-13 are correlated with improved health outcomes and reduced overall healthcare costs (Greene et al., 2015). This tool was selected as it allows inference related to patient outcomes and cost, both of which are difficult to quantify and measure directly. A research license to use the questionnaire and score it was obtained prior to initiating the study (Insignia Health, 2021).

Data Analysis

To analyze the data, SPSS software and excel was used. Patient demographic data was reported using the descriptive statistics of percentage, median, and range in table form to provide an understanding of who received the intervention. Paired pre and post 911 call, transport, ED use data, PAM-13 scores and PAM-13 level were evaluated using Wilcoxon Signed Ranks Test before with significance set at a p-value of 0.05. The PAM-13 scores were calculated using the scoring template provided by Insignia Health. The pre and post questionnaire scores were evaluated by comparing the mean first and second PAM-13 survey scores for participants who completed both surveys. For all participants, regardless of whether they completed the post PAM-13 questionnaire, the total number of pre and post 911 calls,

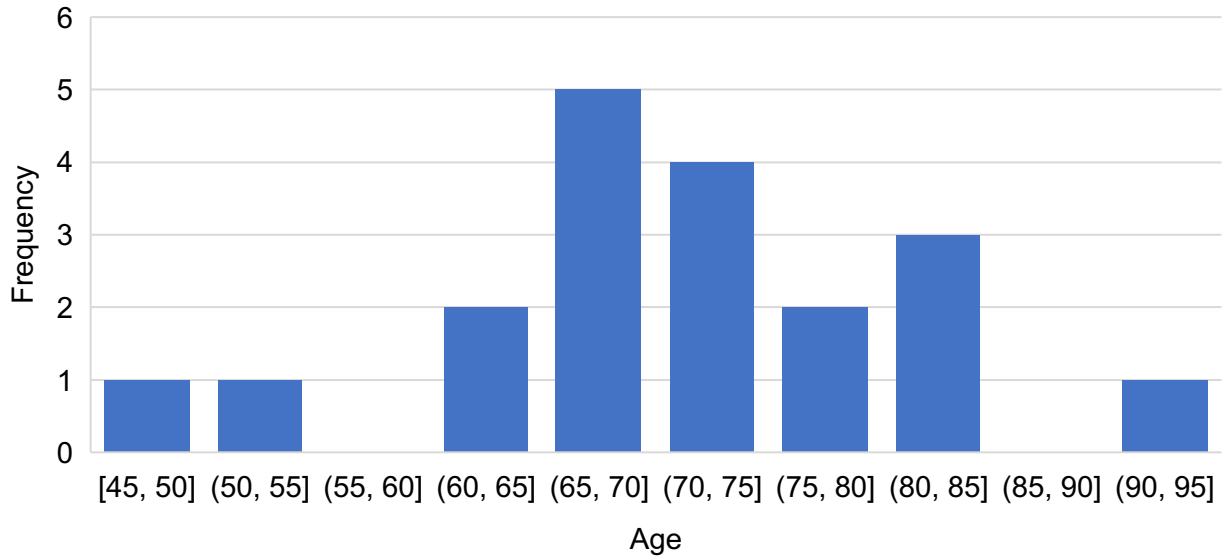
transports and ED visits was compared graphically. For participants who did complete both PAM-13 surveys, their composite pre and post 911 call, transport, and ED data was evaluated graphically and compared to the graph for all the participants.

Results

From December 15th, 2022, to February 15th, 2023, a total of 19 participants were enrolled in the study. Of those participants, one died during the follow up period. Of the remaining 18 participants, four completed the second PAM-13 survey within the eight to twelve week follow up period, one started the survey but did not finish it, and one did not consent to participate in the second survey (Appendix C). The gender distribution was 57.9% male and 42.1% female and the median age was 71.2 years with a range from 45 years to 92 years. The distribution of age was normal (Figure 1) and there was no statistically significant difference in participant age (X^2 (1, n=19) = [.47], p=1.00) or sex (X^2 (14, n=19) = [2.32], p=0.491).

Figure 1

Frequency of Participant Age



Note: This graph contains the data for all participants, n=19.

Examining the five pre and post metrics, there was a statistically significant difference ($p < .05$) in three of the five. Statistical significance was present in pre and post enrollment 911 calls ($p=0.015$), transports ($p=0.021$), and ED visits ($p=0.006$) (Table 1). The use of emergency services is displayed graphically in Figure 2 which compares the total number of 911 calls, transports, and ED visits for all participants in the pre and post period. During the pre and post periods, total 911 calls decreased from 31 to 15, total transports decreased from 14 to four, and ED visits decreased from 19 to five (Figure 2). Changes in the PAM-13 scores for the four participants who completed both surveys did not reach statistical significance ($p=0.655$) and there was no difference in the PAM-13 level between the pre and post surveys ($p=1.000$) (Table 1).

Table 1

Wilcoxon Signed Ranks Test of Significance

	Post 911 – Pre 911	Post Trans – Pre Trans	Post ED – Pre ED	Post PAM-13 Score – Pre PAM-13 Score	Post PAM-13 Level - Pre PAM-13 Level
Z	-2.434[b]	-2.308[b]	-2.724[b]	-.447[c]	.000[d]
Asymp. Sig. (2-tailed)	.015*	.021*	.006*	.655*	1.000*

*P< .05

b. Based on positive ranks.

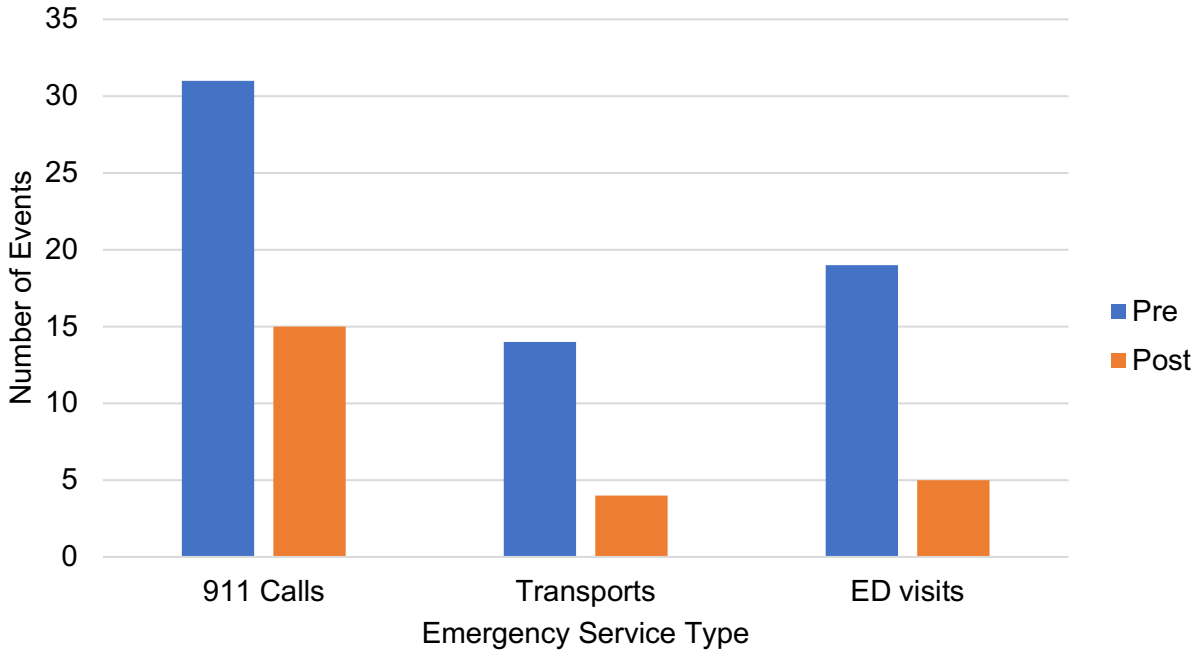
c. Based on negative ranks.

d. The sum of negative ranks equals the sum of positive ranks.

Note: For this analysis, n=19 for the paired pre and post data for 911 calls, transport, and ED visits. For the PAM-13 pre and post score and level, n=4.

Figure 2

Comparison of Total Participant 911 calls, Transports, and ED Visits for a 12-week Period Before and After Initial Enrollment

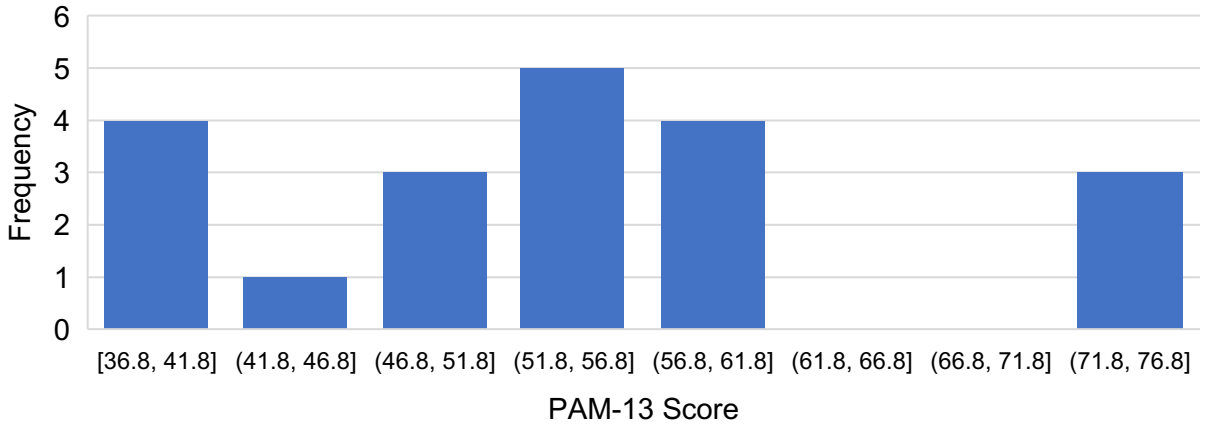


Note: This graph contains the data for all participants, n=19.

The pre-PAM-13 score frequencies are shown in Figure 3 and the PAM-13 level frequencies are shown in Figure 4. Notably, there are 3 outlier scores above 70 while the rest of the scores are 58 or less (Appendix C; Appendix D). As lower scores are associated with less engagement, the graphical view of the PAM-13 scores demonstrated an overall trend towards lower engagement (Figure 3). Looking at the PAM-13 by level, there were six participants in level one, two participants in level two, eight participants in level three, and three participants in level four (Figure 4).

Figure 3

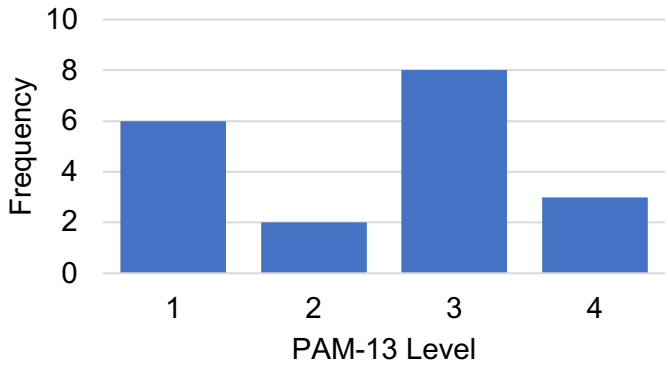
Frequency of PAM-13 Score on the Pre-Questionnaire



Note: This graph contains data for all participants, n=19

Figure 4

Frequency of PAM-13 levels on the Pre-Questionnaire

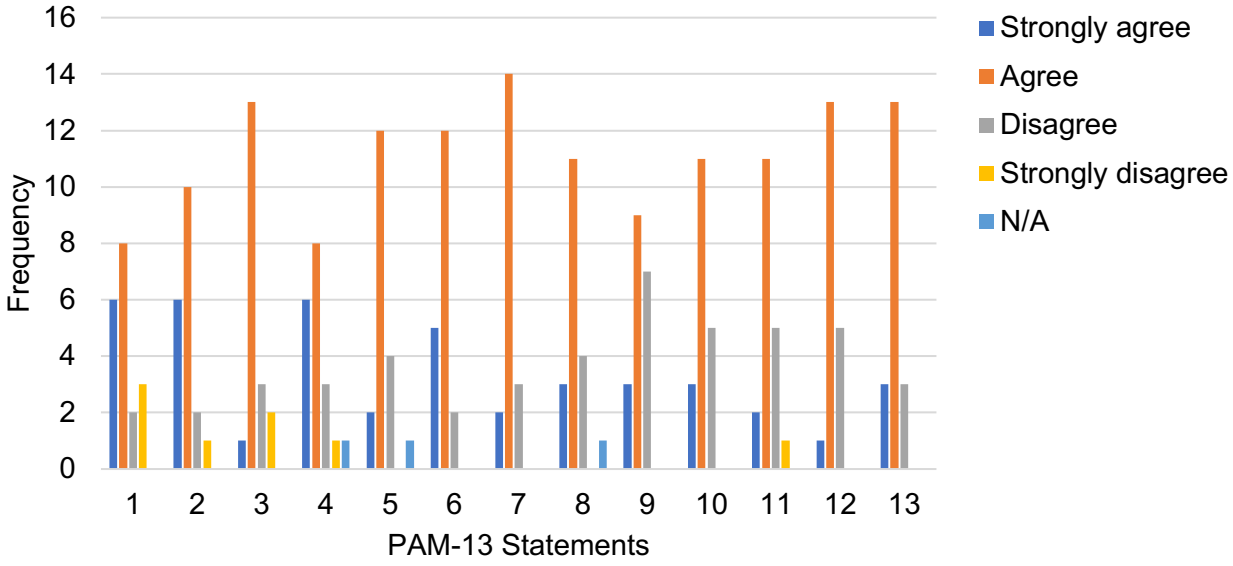


Note: This graph contains data for all participants, n=19

The frequencies of responses for each of the 13 statements in the PAM-13 in the prequestionnaire is displayed graphically in Figure 5. The statements on the PAM-13 questionnaire can be viewed in Appendix E. The most common response for all statements on the questionnaire was “agree”. Statements one, two, four, and six had five or more participants

Figure 5

Frequency of Response by Question for Initial PAM-13 Questionnaires



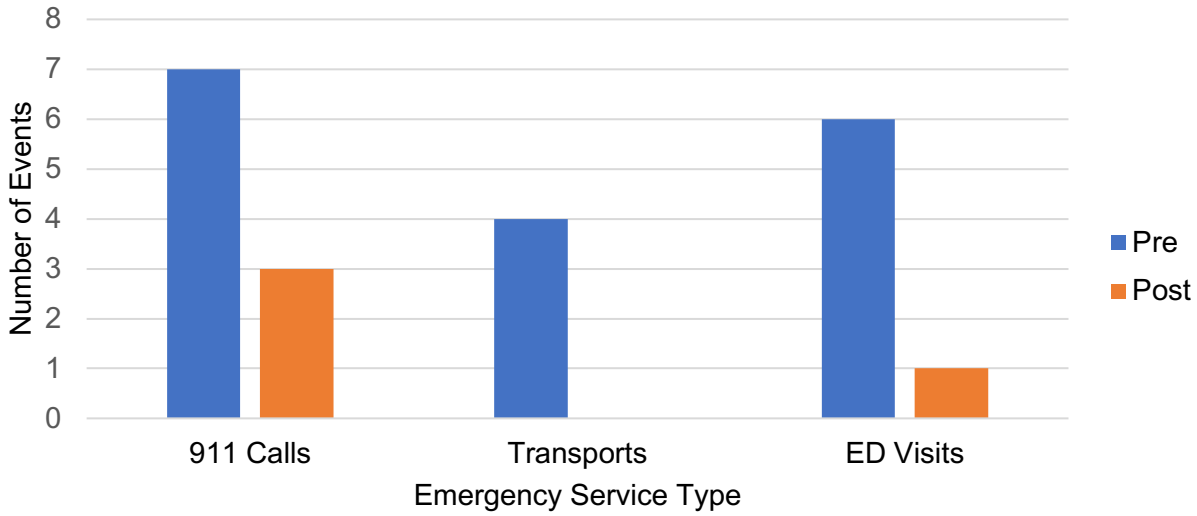
Note: This graph contains data for all participants, n=19

who strongly agreed. Conversely, five or more participants selected “disagree” or “strongly disagree” for statements one, three, nine, ten, eleven and twelve.

For the four participants who did complete the pre and post PAM-13 questionnaires, the mean pre-PAM-13 score 46.675 and the mean post Pam-13 score was 48.425. The difference in the mean PAM-13 scores was 1.75 points, with the mean post score higher than the mean pre score. For these four participants there were a total of seven 911 calls, 4 transports and 6 ED visits in the pre-enrollment period and three 911 calls, no transports, and 1 ED visits in the post-enrollment window (Figure 6). The changes in emergency service use pre and post enrollment for the 4 participants who completed both pre and post PAM-13 questionnaires (Figure 6) follow the same pattern as changes observed for the entire group (Figure 2).

Figure 6

Comparison of 911 calls, transports, and ED visits for participants completing both the Initial and Second PAM-13 Survey



Note: This graph displays data for the participants who completed both pre and post PAM-13, n=4.

Discussion

The demographics of the study participants suggest that increased age is associated with need for MIH services. The median age of the participants was 71.2 years, and the youngest participant was 45 years old. This indicates that age increases the likelihood of needing MIH services, likely due to an increasing number of comorbidities which is also associated with increased age. There is no significant difference in gender ($p=0.491$) suggesting that gender is not an independent risk factor for needing MIH services. As the data only included age and sex, further inferences about patient demographics cannot be made.

In evaluating the impact of MIH services, the Wilcoxon Signed Ranks Test showed that intervention by MIH teams in this evaluation is effective in meeting the primary goal of reducing 911 calls ($p=0.015$), transports ($p=0.021$), and ED visits ($p=0.006$) and meets the requirements for statistical significance with $p < .05$ (Table 4). As the participant group was small, n=19, the fact that the data show a statistically significant difference suggests a strong negative

association between the interventions provided by the MIH teams and the outcomes of 911 calls, transports, and ED visit frequency. This data is consistent with other studies which find that MIH services are effective in reducing 911 strain (Castillo et al., 2016; Myers et al., 2021; Nejtek et al., 2017; Sanko et al., 2019; Xie et al., 2021). A larger analysis over a longer period is needed to demonstrate reproducibility of the results from this evaluation and confirm the negative association between MIH services and 911 calls, transports, and ED visits.

In considering the use data, it is important to note that the study was expanded to include existing MIH patients in addition to new patients one month into the enrollment period (Appendix F). The inclusion of existing patients means that not all pre data precede the initiation of MIH services. The patients are not identified in the data as new or existing as that information was not collected. The inclusion of existing patients may have influenced the pre and post data as they are less likely to have one or more calls in the preceding 12 weeks compared to newly referred patients. Thus, a study that only included new patients might find a larger effect size. However, since patients often access 911 during an acute health event or following a change in health, a study which only includes new patients is susceptible to regression to the mean which may exaggerate the impact of MIH intervention. Existing patients are less likely to have experienced a change in health or acute healthcare related event to precipitate their contact with MIH compared to new patients. The inclusion of existing patients in this evaluation may reduce the effect of regression to the mean in over-estimating the magnitude of the effect of MIH services.

In identifying ED visits outside of the 911 system, the data for this study was incomplete. We were only able to query EPIC for ED visits outside of the 911 system and this only covered two of the five regional EDs. As such, it is likely that there were additional ED visits outside of 911 services that were not captured in the data. Further analysis of ED use including a query of the other regional EDs is warranted to fully evaluate ED use in relationship to 911 calls and transports for these patients. As ED care represents 10% of national healthcare spending

(Solberg et al., 2016), diverting non-emergency visits from the ED to alternative destinations or helping the patient remain at home may be an effective cost savings measure that also reduces strain on emergency resources.

Given the small number of participants who completed both the pre and post PAM-13 questionnaires, the PAM-13 scores and PAM-13 levels did not change (p=.655, p=1.000). Of the 19 participants, 16 had scores ranging between 36.8 and 58.1 (Appendix C; Figure 4). There were six in level one, two in level two, eight in level three, and three in level four (Figure 5). Patients in level one are passive and disengaged from their healthcare while those in level two have some knowledge but still struggle and feel that health is mostly out of their control. These two lower levels are associated with poorer health and increased costs. Those in level three are beginning to become engaged in their health, understand the key concepts, and are building self-management skills but still need support improving these behaviors and skills (Insignia Health, 2023). There were three outliers who had scores above 70 which places them at level four (Figure 4; Figure 5). This is the highest level of engagement and is associated with maintaining health behaviors, improved health, and reduced costs (Greene et al, 2015; Insignia Health, 2023). Overall, MIH patients had lower levels of patient activation which may place them at higher risk of falling into the cycle of repeated 911 calls and emergency service use.

To improve patient activation levels, understanding what the areas of deficit are and using that to guide intervention and support can improve activation and thereby reduce health costs and improve outcomes (Greene et al, 2015; Insignia Health, 2023). Looking at responses to specific questions provides insight on where participants need the most support. Statements with more “disagree” or “strongly disagree” responses need additional teaching and support to improve participant’s knowledge, skills, or beliefs to support optimal health outcomes. The areas of greatest need in this evaluation are improving knowledge about available treatments and how to prevent problems with health. Additional areas where support is needed include building a sense of agency in determining health outcomes, building confidence in preventing or reducing

health complications, building the knowledge and skills to recognize new changes in health, and supporting skills and behaviors to maintain lifestyle changes to support health (Appendix C; Figure 5). If we assume the participants are representative of patients who receive ongoing MIH services, then incorporating interventions and supports in these identified areas of deficit may improve health outcomes and reduce healthcare associated costs (Greene et al, 2015; Insignia Health, 2023).

When looking at the pre and post PAM-13 score means (Table 5), there is an increase of 1.75 points. If we assume that these four participants are representative of the remaining participants, we can infer an overall increase in score. This inference is supported by the overall similarity of pre and post data for 911 calls, transports, and ED use between all 19 participants (Figure 2) and the subgroup of four who completed the post PAM-13 questionnaires (Figure 6). This would be consistent with the findings from Castillo et al. (2016) and suggests that MIH intervention may be associated with increased patient activation. As improvements in PAM-13 scores are correlated with improved outcomes and decreased healthcare costs (Greene et al., 2015), the increase in mean scores may represent an improvement in patient outcomes. The decreases in 911 calls, transports, and ED visits (Figure 6) further support potential decreases in healthcare costs. To test these assumptions, a larger study is needed and should compare PAM-13 scores with independently calculated cost estimates.

Barriers

The MIH teams identified several barriers to enrolling patients and following up. These barriers included difficulty in locating patients, incorrect contact information in Julota and/or EPIC, unreturned phone calls, patients who were not home during planned visits, patients who declined visits when contacted, and patients who declined enrollment in the study. Additional challenges for the MIH teams during the 5-month study period included the recent increase in response area, changes in staffing configuration, new response protocols, and the study enrollment period coinciding with December religious holidays and New Year’s celebrations.

These barriers resulted in lower enrollment than originally anticipated and may have affected the sensitivity of the study for significance.

Limitations

This project evaluation had several limitations. First, due to the constraints of the academic calendar and progression of coursework, there was a short enrollment window of 2 months and the follow up period was 8-12 weeks from the initial enrollment. This limited the number of participants and may not have provided adequate time for the impact of MIH intervention to be reflected in PAM-13 scores. Additionally, the PAM-13 was only provided and administered in English which excluded from participation non-English speaking patients. Although training in the process was completed prior to the start of enrollment, initial enrollment was slow and picked up through the enrollment window. The criteria for enrollment were also expanded to include existing patients to boost enrollment on January 13th, 2023 (Appendix F). This meant some participants who were included were existing patients and not new to MIH services. As these participants are not new to MIH services, changes in their use data and PAM-13 scores may not capture changes that might have occurred in the 12 weeks before and after their initial contact with MIH services. As information on whether a patient was new or existing was not tracked, it is impossible to know how this influenced the data.

The small number of participants, n=19, and the lack of a control group also limits the sensitivity of analysis in detecting change and increased the risk of regression to the mean bias in the data. While the pre and post 911 call, transport and ED use data was statistically significant, the true effect may be smaller than calculated due to the possibility of regression to the mean and a return to baseline use after a change in health or acute healthcare event. The lack of a control group also increased the risk of over-estimating the magnitude of the change due to the MIH interventions.

The small number of participants, n=4, who completed both the pre and post PAM-13 surveys was too small for statistical analysis. Inferences based on this small sample may not

hold true over a larger sample size and may not be representative of the patient population. Due to the small sample size, the value of the PAM-13 for assessing patient engagement following MIH services could not be determined. Additional studies with a larger sample size and which include a cost analysis are needed to determine if the PAM-13 is an effective measure for patient outcomes and healthcare costs.

Another limitation was that ED data were only available for regional EDs which utilize EPIC as their EHR software. This makes it likely that we have incomplete data on ED use. Thus, it is possible that the data underestimates ED use. Since a review of the two EDs using EPIC did find ED visits outside of 911 activation and these visits decreased in frequency following MIH intervention, it is likely ED use trends would continue to reflect the evaluation data. As previous studies have found that high-frequency patients tend to arrive in the ED by ambulance (Agarwal et al., 2019; Solberg et al., 2016), it is unlikely that ED use would be significantly greater or change the outcomes of the analysis. This should be confirmed with a more thorough survey of regional EDs to evaluate ED visit frequency for MIH patients.

Sustainability Plan

Based on the findings of this MIH program evaluation, the addition of MIH services to a fire-based EMS system appears to be an effective way to connect patients with community resources and reduce strain on local emergency resources. As an operational core service, the FD CARES team is included in the budget for Puget Sound Regional Fire Authority and will continue to provide MIH services beyond this study period. To support ongoing evaluations of the effectiveness of MIH programs, a retrospective analysis over a larger period should be completed to confirm reproducibility of the findings on a bigger scale and increase the statistical power of the findings. This study should include a cost estimate to evaluate whether this MIH intervention model reduces healthcare costs inclusive of the cost of operating the program itself. Including data from 6-12 months before the recent changes in operations and staffing were made and 6-12 months after the changes is recommended. This would provide data regarding

the impact of MIH services on emergency system use and evaluate whether the changes in staffing and operations had an impact on these metrics. The findings of this study should be shared to support the growing body of knowledge regarding the effects of MIH and offer a comparison of different staffing models. These findings can contribute to the growing knowledge base regarding MIH effectiveness and operational models to facilitate the implementation of MIH in other EMS systems.

Implications for Advanced Practice Nursing

The services and care provided by MIH teams are consistent with the nursing model of patient-centered holistic care. As such, there are many possible roles advanced practice nurses could fill as MIH programs are adopted across the country and move towards becoming a standard of care within 911 systems. These roles include protocol development, program design, being a provider remotely or on scene, policy work at the county and state level, and advocacy for widespread adoption of MIH services to help address gaps in care. In supporting the goals of the quadruple aim of population health, patient centered care, reduced healthcare costs, and an improved work experience and environment the advanced practice nurse practitioner can apply their training and skills to support MIH programs.

Conclusion

This program evaluation for the Puget Sound Regional Fire Authority FD CARES fire-department based MIH service with nurse and social worker teams found a significant decrease in 911 calls, transports, and ED visits after initiating MIH services. We were not able to determine whether the MIH interventions impacted patient activation. Although there was a small increase in the mean of the pre and post PAM-13 scores, additional evaluations with a larger participant group are needed to determine if this increase persists and reaches the level of significance. The reduced use of emergency services following MIH intervention present in this program evaluation are consistent with other studies on MIH interventions which also found decreases following MIH intervention (Castillo et al., 2016; Myers et al., 2021; Nejtek et al.,

2017; Pinet-Peralta et al., 2021; Sanko et al., 2019; Xie et al., 2021). This program evaluation suggests that fire-based MIH programs with nurse and social worker teams may be an effective tool for reducing strain on emergency resources.

These findings support MIH interventions under the quadruple aim framework as effective in improving the work experience, improving population health, reducing cost, and improving outcomes (Bodenheimer & Sinsky, 2014; Sikka et al, 2015). By reducing strain on emergency resources, MIH can improve the work experience and practice environment for first responders and ED personnel. It also delivers patient-centered care by conducting individual needs-based assessments and connecting patients with community resources. By helping patients access the resources they need and reducing preventable 911 calls, transports, and ED visits, MIH supports population health and improved health outcomes. As the strain on healthcare and emergency resources continues to increase, incorporating effective MIH programs into all 911 systems could be an effective way to improve population health and patient experiences, reduce strain on emergency personnel, and reduce healthcare costs.

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Appendix A

SEATTLEU
INSTITUTIONAL REVIEW BOARD

Admin 201 | 206-296-2585
irb@seattleu.edu

December 19, 2022

Jocelin Olin
College of Nursing
Seattle University

Dear Jocelin,

As I indicated in my December 15 email, your application for the project **Impact of Mobile Integrated Healthcare on Patient Activation** meets criteria for a "Not Human Participant Determination" because you indicated that activities will involve

- A multi-phase survey to evaluate the impact of mobile integrated healthcare case management as delivered by the Fire Department Community Assistance, Referrals, and Education Services (FDCARES) and whether patient activation improve after corresponding case management.

Given the nature of these activities, this project does not meet the federal regulatory definition of human participant research, and your project does not need further IRB review. (This determination does **not** indicate IRB "approval." *Do not include statements for publication or otherwise that the SU IRB has "reviewed and approved" this study*; rather, say the SU IRB has identified the study as "Not Human Participant Research (NHPR).")

If your project alters in nature or scope, please contact the IRB right away. If you have any questions, I'm happy to assist.

Best wishes,

Andrea McDowell, PhD
IRB Administrator

cc: Dr. Diane Switzer, Faculty Mentor

Appendix B

CONSENT TO PARTICIPATE IN RESEARCH

TITLE: Impact of Mobile Integrated Healthcare on Patient Activation

INVESTIGATOR: Jocelin Olin, Seattle University College of Nursing, 206-293-6445

ADVISOR: (if applicable) Diane Fuller Switzer, Seattle University College of Nursing, Associate Professor and Assistant AGACNP Program Director, 206-296-5611

PURPOSE: You are being asked to participate in a research project that seeks to investigate **whether case management through mobile integrated healthcare improves patient health outcomes by measuring patient activation**. You will be asked to complete **a 13 question questionnaire at the beginning of case management and again 2 to 3 months later**.

SOURCE OF SUPPORT: This study is being performed as partial fulfillment of the requirements for the doctoral degree Doctor of Nursing Practice as a Family Nurse Practitioner at Seattle University.

RISKS: There are no known risks associated with this study. However, some participants may experience mild distress when asked questions about their healthcare knowledge, beliefs, and self-management abilities. This stress is not expected to be greater than what they encounter in everyday life. The questionnaire will be provided using tablet provided by the care team or on paper and any support in reading or understanding the questions will be provided by team members if needed.

BENEFITS: This study seeks to understand the impact of mobile integrated healthcare on patient outcomes by measuring patient activation. Improved health outcomes benefit the individuals who are receiving care, the health of the communities served, and contribute to the knowledge base for mobile integrated healthcare.

INCENTIVES: You will receive no gifts/incentives for this study. Participation in the project will require no monetary cost to you.

CONFIDENTIALITY: This study will collect data by address and patient medical record number and will include demographic information. No identifiers will be used in the published information. All research materials and consent forms will be stored **on a secure cloud platform provided by Seattle University and Qualtrics and only the principal researcher and their faculty advisor will have access to them.** Human subjects research regulations require that data be kept for a minimum of three (3) years. When the research study ends, any identifying information will be removed from the data, or it will be destroyed. All of the information you provide will be kept confidential.

RIGHT TO WITHDRAW: Your participation in this study is *voluntary*. You may withdraw your consent to participate at any time without penalty. Your withdrawal will not influence any other services to which you may be otherwise entitled.

SUMMARY OF RESULTS: A summary of the results of this research will be supplied to you, at no cost, upon request by Jocelin Olin at 206-293-6445 or jolin@seattleu.edu at the completion of the research project in June 2023.

VOLUNTARY CONSENT: I have read the above statements and understand what is being asked of me. I also understand that my participation is voluntary and that I am free to withdraw my consent at any time, for any reason, without penalty. On these terms, I certify that I am willing to participate in this research project.

I understand that should I have any concerns about my participation in this study, I may call Jocelin Olin, who is asking me to participate, at 206-293-6445. If I have any concerns that my rights are being violated, I may contact Dr. Michael Spinetta, Chair of the Seattle University Institutional Review Board at (206) 296-2585.

Appendix C

Complete Pre & Post Data Set for All Participants (n=19)

Age	Sex	911 calls-Pre	Transports-Pre	ED visits-Pre	Pre PAM-13 Score	Pre PAM-13 Level	911 calls-Post	Transports-Post	ED visits-Post	Post PAM-13 Score	Post PAM-13 Level
77	male	0	0	0	51	2	0	0	0	51	2
67	female	2	1	2	55.6	3	2	0	0	51	2
72	male	1	0	1	39.4	1	0	0	1	51	2
74	male	4	3	3	40.7	1	1	0	0	40.7	1
68	male	3	3	3	39.4	1	4	3	3		
73	female	0	0	0	36.8	1	0	0	0		
72	female	3	2	2	58.1	3	0	0	0		
65	male	0	0	0	51	2	0	0	0		
66	male	0	0	0	75	4	0	0	0		
92	female	1	0	0	55.6	3	0	0	0		
55	female	4	0	0	72.5	4	2	0	0		
77	female	3	1	1	55.6	3	2	0	0		
84	male	4	1	1	47	1	0	0	0		
83	male	2	1	1	72.5	4	3	0	0		
69	male	1	1	1	58.1	3	0	0	0		
67	male	1	0	2	58.1	3	1	1	1		
82	female	1	0	0	55.6	3	0	0	0		
45	male	1	1	2	58.1	3	0	0	0		
65	Female	0	0	0	45.3	1	0	0	0		

Note: One participant died during the follow up period, one started the post survey but did not finish it, and one did not consent to complete the second survey

Appendix D

Complete Data for PAM-13 Responses (Part 1)

Patient #	Age	gender	PAM score	PAM level	Q 1	Q 2	Q 3	Q 4	Q 5
1	77	male	51	2	Agree	Agree	Agree	Agree	Agree
2	67	female	55.6	3	Strongly Agree	Strongly Agree	Strongly Agree	Disagree	Agree
3	72	male	39.4	1	Disagree	Disagree	Disagree	Disagree	Disagree
4	74	male	36.8	1	Agree	Agree	Disagree	Strongly Disagree	Disagree
5	68	male	39.4	1	Agree	Disagree	Strongly Disagree	Disagree	Disagree
6	73	female	40.7	1	Agree	Agree	Strongly Disagree	Agree	Disagree
7	72	female	58.1	3	Strongly Agree	Agree	Agree	Agree	Agree
8	65	male	51	2	Agree	Agree	Agree	Agree	Agree
9	66	male	75	4	Disagree	Strongly Agree	Disagree	Strongly Agree	Strongly Agree
10	92	female	55.6	3	Strongly Disagree	Strongly Agree	Agree	Strongly Agree	Agree
11	55	female	72.5	4	Strongly Disagree	Strongly Agree	Agree	Strongly Agree	N/A
12	77	female	55.6	3	Strongly Agree	Strongly Agree	Agree	Strongly Agree	Agree
13	84	male	47	1	Strongly Disagree	Strongly Disagree	Agree	Agree	Agree
14	83	male	72.5	4	Agree	Agree	Agree	Strongly Agree	Strongly Agree
15	69	male	58.1	3	Agree	Agree	Agree	Strongly Agree	Agree
16	67	male	58.1	3	Strongly Agree	Agree	Agree	Agree	Agree
17	82	female	55.6	3	Strongly Agree	Strongly Agree	Agree	Agree	Agree
18	45	male	58.1	3	Strongly Agree	Agree	Agree	Agree	Agree
19	65	female	45.3	1	Agree	Agree	Agree	N/A	Agree
1	77	male	40.7	1	Agree	Agree	N/A	Agree	Agree
2	67	female	51	2	Agree	Agree	Agree	Disagree	Agree
3	72	male	51	2	Agree	Agree	Agree	Disagree	Agree
4	74	male	51	2	Agree	Agree	Disagree	Strongly Agree	Agree

Complete Data for PAM-13 Responses (Part 2)

Patient #	Q 6	Q 7	Q 8	Q 9	Q 10	Q 11	Q 12	Q 13	Survey Type
1	Agree	Agree	Agree	Agree	Agree	Agree	Agree	Agree	Pre
2	Agree	Agree	Agree	Disagree	Disagree	Agree	Agree	Agree	Pre
3	Disagree	Disagree	Strongly Agree	Strongly Agree	Disagree	Disagree	Disagree	Disagree	Pre
4	Agree	Disagree	Disagree	Disagree	Disagree	Disagree	Disagree	Disagree	Pre
5	Disagree	Agree	Agree	Disagree	Agree	Disagree	Disagree	Agree	Pre
6	Strongly Agree	Disagree	Agree	Disagree	Disagree	Disagree	Disagree	Disagree	Pre
7	Agree	Agree	Agree	Agree	Agree	Agree	Agree	Agree	Pre
8	Agree	Agree	Agree	Agree	Agree	Agree	Agree	Agree	Pre
9	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Agree	Strongly Agree	Pre
10	Agree	Agree	Agree	Agree	Agree	Agree	Agree	Agree	Pre
11	Strongly Agree	Strongly Agree	N/A	Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Pre
12	Strongly Agree	Agree	Disagree	Disagree	Agree	Strongly Disagree	Agree	Agree	Pre
13	Agree	Agree	Agree	Agree	Agree	Agree	Agree	Agree	Pre
14	Strongly Agree	Agree	Strongly Agree	Strongly Agree	Strongly Agree	Agree	Agree	Strongly Agree	Pre
15	Agree	Agree	Agree	Agree	Agree	Agree	Agree	Agree	Pre
16	Agree	Agree	Agree	Agree	Agree	Agree	Agree	Agree	Pre
17	Agree	Agree	Disagree	Disagree	Agree	Agree	Agree	Agree	Pre
18	Agree	Agree	Agree	Agree	Agree	Agree	Agree	Agree	Pre
19	Agree	Agree	Disagree	Disagree	Disagree	Disagree	Disagree	Agree	Pre
1	Agree	Disagree	Disagree	Disagree	Disagree	Disagree	Disagree	Disagree	Post
2	Agree	Agree	Agree	Agree	Disagree	Agree	Agree	Agree	Post
3	Agree	Agree	Agree	Agree	Disagree	Agree	Agree	Agree	Post
4	Agree	Agree	Disagree	Agree	Agree	Disagree	Agree	Agree	Post

Appendix E

Name	
ID	
Date	

Below are statements people sometimes make when they talk about their health. Please indicate how much you agree or disagree with each statement as it applies to you personally.

Circle the answer that is most true for you today. If the statement does not apply, select N/A.

1.	When all is said and done, I am the person who is responsible for taking care of my health.	Strongly Disagree	Disagree	Agree	Strongly Agree	N/A
2.	Taking an active role in my own health care is the most important thing that affects my health.	Strongly Disagree	Disagree	Agree	Strongly Agree	N/A
3.	I am confident I can help prevent or reduce problems associated with my health.	Strongly Disagree	Disagree	Agree	Strongly Agree	N/A
4.	I know what each of my prescribed medications do.	Strongly Disagree	Disagree	Agree	Strongly Agree	N/A
5.	I am confident that I can tell whether I need to go to the doctor or whether I can take care of a health problem myself.	Strongly Disagree	Disagree	Agree	Strongly Agree	N/A
6.	I am confident that I can tell a doctor concerns I have even when he or she does not ask.	Strongly Disagree	Disagree	Agree	Strongly Agree	N/A
7.	I am confident that I can follow through on medical treatments I may need to do at home.	Strongly Disagree	Disagree	Agree	Strongly Agree	N/A
8.	I understand my health problems and what causes them.	Strongly Disagree	Disagree	Agree	Strongly Agree	N/A
9.	I know what treatments are available for my health problems.	Strongly Disagree	Disagree	Agree	Strongly Agree	N/A
10.	I have been able to maintain (keep up with) lifestyle changes, like eating right or exercising.	Strongly Disagree	Disagree	Agree	Strongly Agree	N/A
11.	I know how to prevent problems with my health.	Strongly Disagree	Disagree	Agree	Strongly Agree	N/A
12.	I am confident I can figure out solutions when new problems arise with my health.	Strongly Disagree	Disagree	Agree	Strongly Agree	N/A
13.	I am confident that I can maintain lifestyle changes, like eating right and exercising, even during times of stress.	Strongly Disagree	Disagree	Agree	Strongly Agree	N/A

Appendix F

Email communication excepts with Seattle University's IRB regarding changes to enrollment criteria and a change to the project title.

Sent by Jocelin Olin, BSN, RN, on January 13th, 2023:
"There are not as many new patients as anticipated. I would like to adjust the eligibility criteria to include all patients enrolled in case management instead of limiting it to new patients."

Response from Andrea McDowell, PhD, SU Institutional Review Board, on January 13th, 2023:
"Thank you for your conscientiousness in checking in. Expanding your recruitment to include all case management does not elevate risk to participants or represent a significant alteration in your project. I can save this correspondence to your file as verification of IRB consultation and permission."

Sent By Jocelin Olin on May 22nd, 2023:
"I am reviewing the title for my DNP Project and wondering if I can change it to better reflect the entirety of the data gathered and reviewed and the findings of the study? The title on the IRB application is "The Impact of Mobile Integrated Healthcare on Patient Activation". My proposed new title is "The impact of Mobile Integrated Healthcare on 911 Use and Patient Activation".

Response from Andrea McDowell, PhD, SU Institutional Review Board on May 22, 2023:
"Thank you for your conscientiousness. Making a title change is just fine, and I'll update our records to reflect this."

Appendix G

Excerpts from email communication with Cpt. Madlem, PSRFA, granting permission to identify Puget Sound Fire and the FD CARES team in the written report and presentation.

Sent by Jocelin Olin, BSN, RN, on May 16th, 2023:

"In the writing of the DNP project paper, I would like to know whether you would like Puget Sound Fire and the FD CARES team to be specifically identified? There is some compelling regional data which supports the need for the CARES team interventions. It would be impossible to use that data without specifically identifying the region and agency involved in the study. If you are uncertain about it, please let me know and we can set up a time to discuss it."

Response from Captain Matthew Madlem, EMS/FD CARES officer, Puget Sound Regional Fire Authority on May 22nd, 2023:

"Please include Puget Sound Fire as the agency that has deployed the FD CARES program as an operational core service to the community."