PATIENT ACTIVATION THROUGH COMMUNITY PARAMEDICINE – INITIAL ASSESSMENT AND FUTURE DIRECTIONS

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Dedication

To the men and women of Buckeye Fire Department in gratitude for their vigilant service to the community and desire to always do more.

Acknowledgment

This work would not have been possible without the support of the community paramedics at Buckeye Fire Department, Fire Chief Bob Costello, research coordinator Brandyn Stewart, JD and my mentor Todd Clever, MD.

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Abstract

Community paramedicine is an evolving concept that promises to expand the role of emergency medical services to support patients outside of the conventional emergency activation. Community paramedics engage in a variety of activities such as post hospital discharge follow up, medication reconciliation and monitoring of health parameters such as blood glucose, body weight and blood pressure. These activities generally occur during home visits by the community paramedics. As programs are developed, it is important to have a mechanism by which to measure their impact. The patient activation measure holds promise as a tool to make this assessment. Patient activation is a holistic concept that describes a patient's ownership of his or her health and healthcare. The patient activation measure is a means to assess a patient's level of activation in both a quantitative and qualitative way. Is it possible that participation in a community paramedicine program could increase patient activation, which in turn could act as a measure of the success of the community paramedicine intervention? This study analyzed the results of a patient activation measure used in association with a community paramedicine program conducted by Buckeye Fire Department in Buckeye, Arizona between April 2016 and August 2018. It was expected that patient activation would increase among patients participating in the community paramedicine program. The hypothesis was ultimately not born out in this study however an analysis provides several insights into the relationship between community paramedicine and patient activation and holds promise to better define a future study.

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Introduction

Community paramedicine and the closely related concept of mobile integrated healthcare, referred to jointly as MIH-CP, has generated much interest for prehospital emergency medical service providers and represents a significant diversification of their traditional role. Results of surveys conducted by the National Association of Emergency Medical Technicians, published in 2015 and again in 2018, describe this evolving phenomenon[1,2]. Simply stated, the goal of these programs is to expand the role of emergency medical services to address a variety of healthcare needs within the community outside of the standard emergency activation. This expanded role does not embody an expanded scope of practice but rather leverages competencies already fundamental to the traditional practice of these providers[3]. Interested parties include both public and private entities ranging from municipal fire departments to private ambulance services and hospitals. Community paramedicine programs, being an extension of existing emergency services, leverage the mobility and distribution of these resources to meet the patients wherever they are, with home visitation being the norm. During home visits, community paramedics provide a range of services including support for chronic disease management, post hospital discharge follow up and healthcare system navigation. Additionally, primary prevention activities such as home safety inspections are a common feature[4-8]. The inherent distribution of community paramedicine resources is particularly important in rural and underserved regions where other healthcare resources are limited but there is generally some representation from emergency services. Despite the level of interest and the speed with which these programs have been deployed, little has been done to measuring the effectiveness of these programs. One measure might focus on reduction in hospital readmission rates and certainly many stakeholders are interested in this outcome however it has proven difficult to assess[7]. Community paramedics are engaging patients holistically and attending to a wide range of health-related needs. Is there a way to assess the effectiveness of community paramedicine that accounts for this complexity and could act as a surrogate measure to address questions such as one regarding readmission rate?

The patient activation measure (PAM), an instrument developed and revised by Hibbard et al, holds promise to make this assessment. Patient activation describes a patient's capacity in terms of knowledge, skill and confidence to manage his or her medical condition(s)[9]. High levels of patient activation, as assessed utilizing the PAM, lead to a reduction in the patient's need for additional health services including hospital admission[10,11]. Patients with higher activation have also been noted to better manage chronic health conditions[12-17], have better acute care outcomes[18,19] and require fewer health care resources.[20] Finally, it has been shown that health care providers can influence PAM scores and increase patient activation.[21-26]

This prospective study sought to measure the success of a community paramedicine program by asking if visitation by community paramedics increased patient activation. Additional secondary questions relating to baseline PAM scores for patients voluntarily entering the program, length of active enrollment versus changes in PAM score and needs assessed in patients visited by community paramedics were explored.

Methods

The City of Buckeye Fire Department in Buckeye, Arizona has been conducting a community paramedicine program since 2015. The program is geographically defined by the fire department service area. Patients from this area gain access to the program as a voluntary referral upon discharge from a nearby hospital. Discharge coordinators at the hospital identify qualifying patients and facilitate the referral. Patients are therefore entering the program post hospital discharge for health conditions both acute and chronic. Upon referral to the program, patients are contacted by Buckeye Fire Department to arrange an initial community paramedic visit. During the initial visit, the community paramedics complete an intake interview including health history and current health concerns. A physical assessment including vital signs is completed and other direct health concerns are addressed such as medication reconciliation or review of discharge instructions. Considerable time is allowed for conversation with the patient about his or her current health status and potential areas for improvement which might be amenable to intervention by the community paramedics. The community paramedics will also assess the patient's living space for hazardous conditions such as those which may lead to a fall and seek remedies to those conditions. Following the initial visit, patients are contacted to schedule additional visits during which continued evaluation and interventions will be completed based upon the initial needs assessment. Weekly visits are recommended but this is a dynamic element and being a voluntary initiative, follow up and exit from the program is entirely at the discretion of the patient.

In 2016 the community paramedic program at Buckeye Fire obtained access to a ten-question patient activation measure survey provided by Insignia Health. The survey was delivered in several forms to participating patients including paper surveys at the time of the home visit or following the visit via telephone or online as facilitated by the fire department's research coordinator. An example of the PAM survey offered in promotional materials by Insignia Health is shown in Figure 1.

The progression of questions one through ten in the PAM survey represent a Guttman scale which can be converted via Rasch analysis to a total numeric score, the PAM score, with higher numbers representing higher levels of patient activation. Numeric scores also localize the patient within four categorical stages of activation, PAM levels. In the original work by Hibbard et al it was concluded that "activation appears to involve four stages: 1) believing the patient role is important, 2) having the confidence and knowledge necessary to take action, 3) actually taking action to maintain and improve one's health, and 4) staying the course even under stress."[7] These categorical stages or levels of patient activation better communicate in plain language where along the continuum a patient is located and also reinforce the idea that patient activation is developmental in nature and patients can graduate to higher levels of activation.

PAM surveys were completed for patients enrolled in the community paramedicine program at Buckeye Fire Department from April 2016 through August 2018. The research group did not participate directly in any aspect of the community paramedicine intervention or collection of PAM survey data. In support of this project, Buckeye Fire Department was able to provide de-identified summary data to the research group for analysis and therefore IRB approval was not required as per the Human Subjects Protection Program at the University of Arizona.

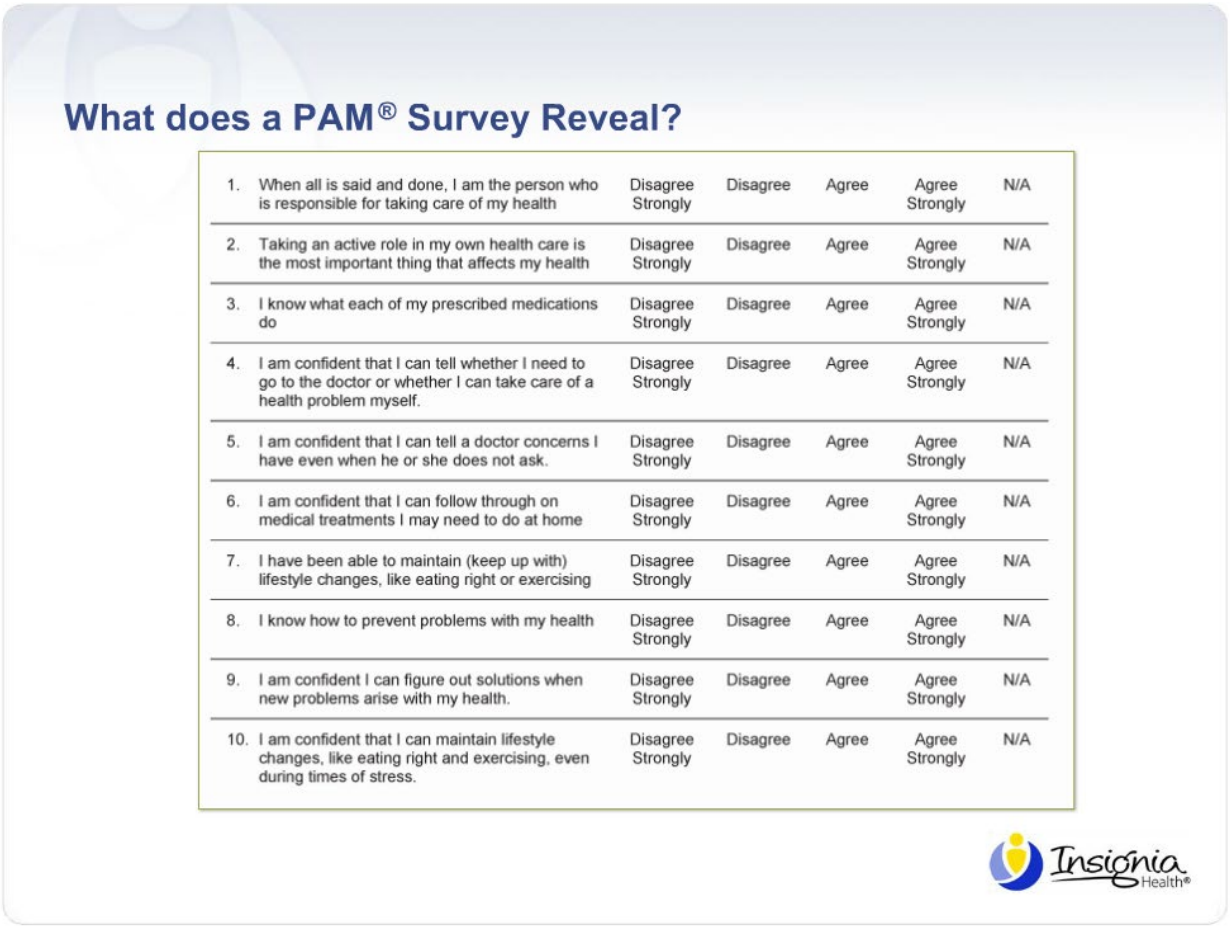

Figure 1: PAM survey provided in promotional materials by Insignia Health.

Results

Between April 2016 and August 2018, 70 patients completed one or more PAM surveys while participating in the program. Example data are shown in Table 1 for patient number 209 who was active in the program for 14 days and completed two PAM surveys in that time. This patient demonstrated an increase in activation with a change in PAM score from 52.9 to 75.5 and a change in PAM level from 2 to 4.

The PAM score provides the most granular assessment of change in patient activation. Figure 2 depicts the range of PAM scores for all 70 patients with 51 of those patients completing one survey, 11 patients completed two surveys, 3 patients completed three surveys, 3 patients completed four surveys and 2 patients completed five surveys. Assessing for a correlation between PAM score and visitation by community paramedics with a linear mixed model, there is no statistically significant correlation ($p=0.75$). When the single survey, single contact patients are removed from the data set, given the intention to track changes in patient activation longitudinally, there remains no statistically significant correlation as shown in Figure 3. It is noteworthy however that at the fourth visit, the mean PAM score is seven points higher than baseline.

PAM level	PAM score	Patient ID	Gender	Language	Survey	SurveyDate
2	52.9	209	Female	English	Paper	04/26/2016
4	75.5	209	Female	English	Phone	05/10/2016

Table 1: Example data for patient 209.

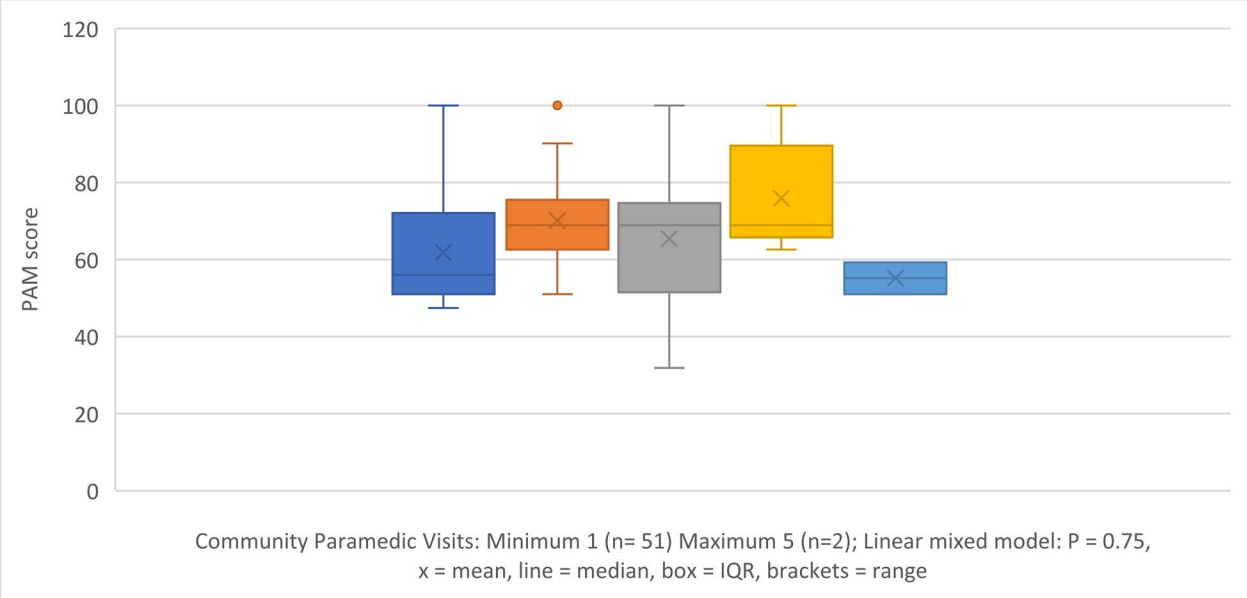

Figure 2: Distribution of PAM scores for all patients by visit number 1 – 5 shows no correlation.

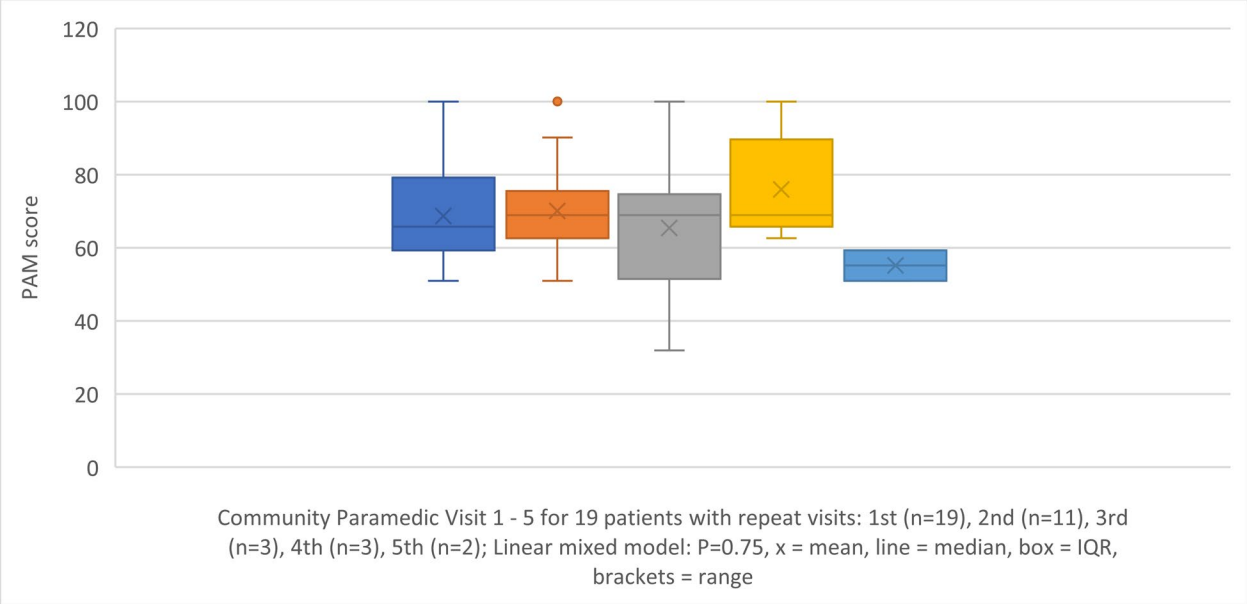

Figure 3: Distribution of PAM scores among patients with repeat visits shows no correlation.

Assessing the baseline level of activation among the entire group participating in the community paramedicine intervention finds an average baseline PAM score of 61.9 (SD 13.5). Separating the group into single and repeater groups, the average baseline PAM score among single survey participants is 59.3 (SD 12.9) while the average among repeat participants is 68.7 (SD 12.9). A Wilcoxon rank sum test suggests a similar distribution between these two groups and supports the assertion that the baseline level of activation among the repeater group is higher (p=0.002). These results are shown graphically in Figure 4**.**

Being a voluntary initiative, the length of enrollment in the program was widely variable. Single visit patients accounted for the majority of patients who enrolled in the program and represent a single day of active enrollment. Among repeaters, overall active enrollment remained variable with the longest enrollment being 126 days. A Kruskal Wallis test supports the assertion that longer periods of active enrollment correlate with a greater number of visits as shown in figure 5 (p=0.002).

In addition to the PAM surveys, the fire department tracked a variety of demographic features of the participating patients. Figure 6 shows an example of summary data from January through August 2018 including demographics and highlights the variety of needs assessed by the community paramedics and other notable features within the study group.

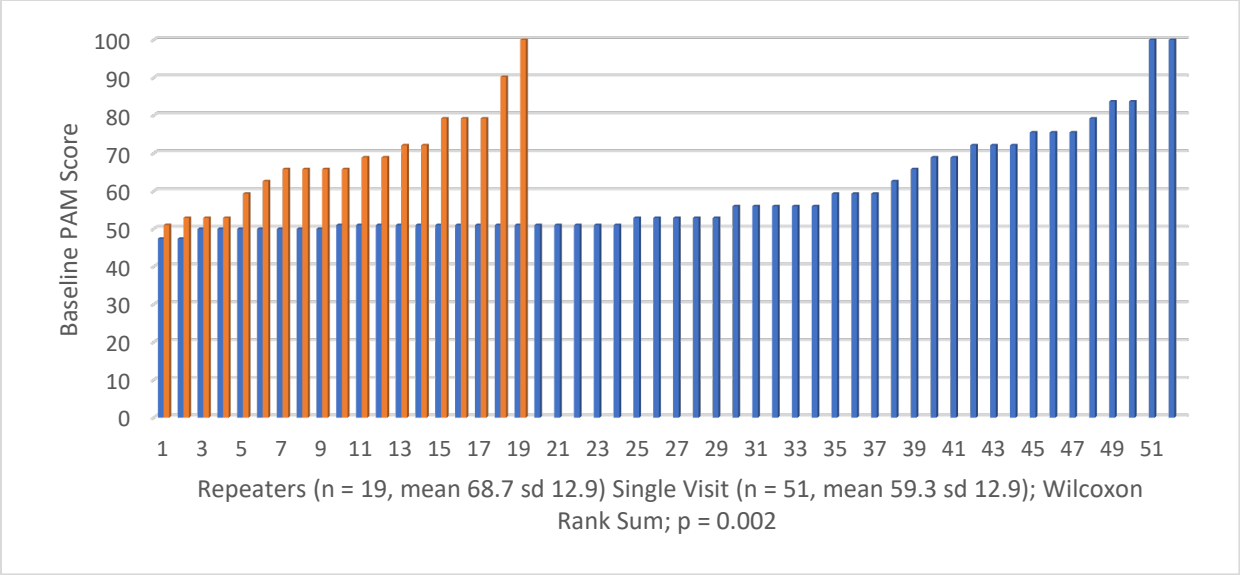

Figure 4: Baseline PAM score is higher for repeat participants.

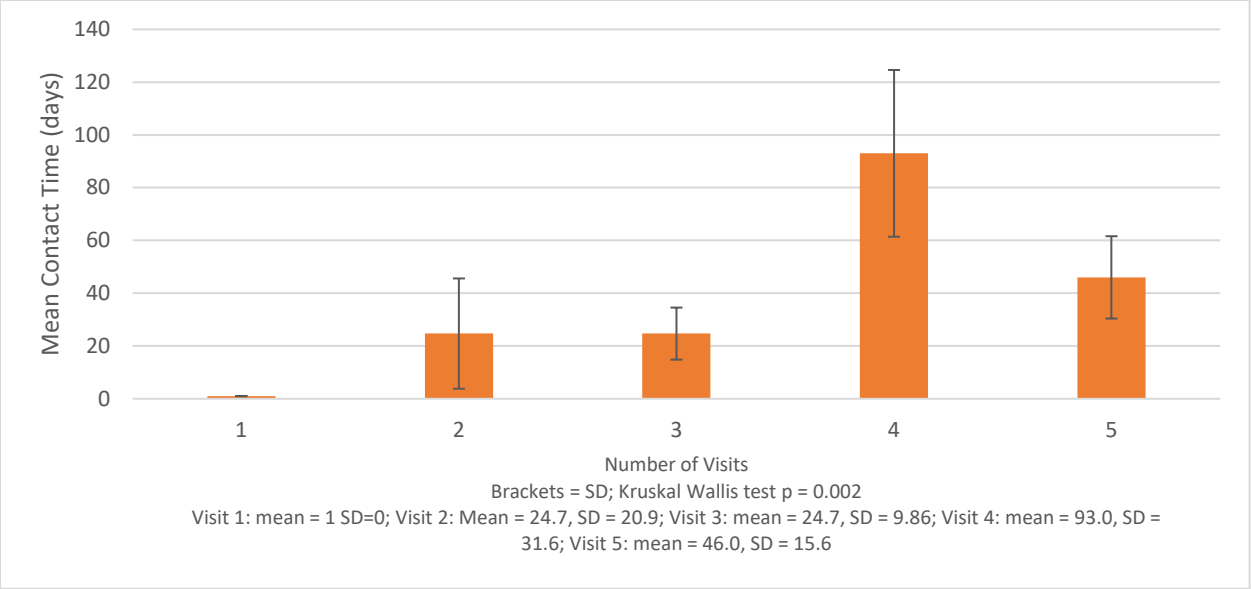

Figure 5: Length of active enrollment correlates with visit number given voluntary follow-up.

BUCKEYE FIRE-MEDICAL-RESCUE DEPARTMENT
COMMUNITY PARAMEDICINE PROGRAM

TOTAL PATIENTS REFERRED	455
Total Patients Accepted Program	219
Total Active Patients	39
Total Patients Declined Program	236
% Male Decline Program	57.5%
% Female Decline Program	47.7%
Average Age of Patient	63.4
Youngest Patient Age	18
Oldest Patient Age	98
Percentage Female	57.6%
Percentage Male	42.4%
Percentage 85326	80.0%
Percentage 85396	20.0%
Total All Cause 30 Day Readmissions	15
Total Target Dx 30 Day Readmissions	3
30 Day All Cause Readmission Rate	6.8%
30 Day Target Dx Readmission Rate	3.9%
Total All Cause Readmissions > 30 Days	35
Patient Insurance Coverage	
Private Insurance	40.2%
Medicare	38.5%
AHCCCS Plans	13.6%
VA	7.7%
Patient Needs	
Follow Up or Schedule Dr. Appt.	79.8%
Monitor Blood Pressure	35.8%
Medication Refill or Compliance	25.7%
Home Safety Modifications	23.9%
Monitor Weight	20.2%
Monitor Blood Sugar	19.3%
Smoke Detector	15.6%
Adhere to Dietary Guidelines	12.8%
Wound Care	11.9%
Connect w/ Proper Resources	11.0%
Social Needs Required	9.2%
Manage Fluid Intake	1.8%
Arrange Transportation	1.8%
Medical Records	0.9%

Target Diagnoses = AMI, CHF, COPD, Pneumonia, Jt. Replacement

Figure 6: Community paramedicine program demographics and needs assessment January - August 2018.

Discussion

The goal of this study was to determine a correlation between community paramedicine participation and patient activation as assessed by the patient activation measure. Of the 70 patients who voluntarily enrolled in the program, only 19 of those participated longitudinally with repeat visits by the community paramedics. Given the limited data, there is no statistically significant correlation between patient activation and participation in the community paramedicine intervention. However, definitive conclusions are not warranted given the underpowered nature of the data set. A power calculation assuming all first visit PAM scores for both single and repeater participants to be representative of a normally distributed population reveals a necessary sample size among repeaters of at least 31 which is significantly greater than the 19 repeat participants obtained in this study. The proposed origin of the limited and inconsistent participation lies in this being a voluntary initiative which allowed patients to enter and exit the program entirely at their own discretion.

Regarding the secondary questions, the average baseline patient activation score for all participating patients was 61.9. A relatively high level of activation is not a surprising finding given that patients were willing to volunteer for the program. However, when the group is divided into the repeater and single visit cohorts, there is a notable difference in average baseline PAM score of 68.7 and 59.3 respectively. The repeater cohort is more highly activated which again is not an unexpected finding, but the difference offers a clue to a possible threshold at which a particular patient may graduate from a single visit to repeater status, perhaps a target for greater intervention in a future study.

Length of enrollment in the community paramedicine initiative has implications for understanding the "dose" of community paramedicine received and in seeking to understand the dose response relationship that, given a correlation, may exist between the community paramedicine intervention and patient activation. Despite the variability in terms of length of enrollment, longer enrollment resulted in more visits and it is notable that on average, at visit number 4 among repeat patients, the PAM score was 7 points higher than baseline. To achieve

4 visits took roughly 30 to 90 days. Drawing conclusions from these findings is difficult given the limitations of the study, but they do offer insight into potential perameters for a repeat study.

The demographic features of the participants collected in 2018 offer a number of insights of interest here but perhaps more importantly as perameters in the design of a future, perhaps more prescriptive program. Of the patients offered the intervention, only 48% accepted. This could be an important consideration in designing an adequately powered future study. By sex, of those accepting the intervention, 57.6% were female and 42.4% were male. This distribution may persist in a repeat voluntary intervention but a more evenly distributed group should be sought in a repeat study. The average age of participants was 63 years and the primary insurance status of participating patients was private insurance. As noted earlier and consistent with the demographic data, readmission rates, especially in the context of CMS designated target diagnosis', are a very important part of the conversation occuring around community paramedicine but lie outside the scope of this investigation. Regarding needs assessed by the community paramedics, the top six needs include: doctor appointment follow up scheduling, blood pressure monitoring, medication refill and reconciliation, home safety, body weight monitoring and blood sugar monitoring. More broadly, these needs fall into categories of healthcare navigation, health maintenance and primary prevention through home safety. All of this reinforces the idea that community paramedics are leveraging competancies already inherent to their scope of practice to support patients holistically and in the community.

Future Directions

The primary limitation of this study was the underpowered data set likely due to the variability inherent in a voluntary intervention. Despite this challenge, there remains exciting clues to the positive relationship between community paramedicine and patient activation. A future study could address this issue in one of two ways. The first way would be to remain an entirely voluntary intervention but allow enough time to ensure a sufficiently large study population was enrolled. A second approach would involve a redesign of the intervention to make it more prescriptive. Entry into the intervention could remain voluntary but perhaps limited to patients with a baseline PAM score less than 60, as these patients may demonstrate greater movement along the continuum of activation with a prescriptive intervention. The length of enrollment and interval or density of visits could be standardized. There is evidence here that a course of community paramedicine with a minimum of four visits in a period of ninety days could produce meaningful results and is not an unreasonable set of program parameters. Add to this some of the demographic features of the volunteer population which might inform the selection of a repeat study group. For example, targeting patients age 60 to 65 who have private insurance.

Conclusions

Community paramedicine holds great promise to diversify the role of emergency medical services in support of a variety of patients in the community setting. As programs are developed, it is important to seek mechanisms by which to measure the success of these initiatives. The patient activation measure is a holistic tool that has already proven useful in describing how patients relate to their health and healthcare and therefore seems a unique method to measure the effectiveness of community paramedicine. This prospective study sought to correlate patient activation to participation in a community paramedicine initiative. While this objective was ultimately unsuccessful, the study did provide insight into several features of this relationship. Patients who voluntarily enroll in the CP program are already highly activated, longer enrollment results in a greater number of visits and the needs assessed cover a range of issues well within the scope of practice of community paramedics and which may provide a focus for a future, perhaps more prescriptive investigation.

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