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RESEARCH REPORT

ADVANCED INTERVENTIONS DURING PREHOSPITAL TRANSPORT OF PATIENTS WITH CHEST PAIN AND SUSPECTED ACUTE CORONARY SYNDROME

Mitchell R. Cleghorn, MD, MPH [1], Francis R. Mencl, MD, MS, FACEP, FAAEM[1], Daniel J. Johnson, DO[1*]

*Corresponding Author: djohnson18@pennstatehealth.psu.edu

Author Affiliations: 1. Department of Emergency Medicine, Penn State Health Milton S. Hershey Medical Center, Hershey, PA, USA

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ABSTRACT

Objective: This study aims to describe the frequency and type of advanced (ALS) interventions performed by emergency medical services (EMS) providers while caring for undifferentiated chest pain patients.
Methods: This pilot study is a retrospective review of advanced interventions performed on consecutive adult patients transported by EMS with a provider impression of non-traumatic chest pain and treated under the suspected acute coronary syndrome statewide protocol from July 2013 through January 2022. The EMS system studied is a hospital-based agency serving a large suburban to rural population in central Pennsylvania. Advanced interventions were defined a priori and included STEMI activation.
Results: During the study period, 2,456 EMS transports out of 97,877 met study inclusion criteria. A total of 121 advanced interventions were performed on 101 (4.1%) of these patients, the majority 79 (3.2%) of which were prehospital notifications of STEMI activations. Intravenous medications were administered 25 times to 22 (0.9%) patients and advanced procedures were performed 17 times on 7 (0.3%) patients. Several patients received more than one intervention or medication. Patients between 60 and 65 years of age accounted for the highest number of activations (283, 11.5%) and received the largest number of interventions (28, 9.9%). Only eight patients were below the age of 45, and all were STEMI activations only.
Conclusion: We found that less than 5% of included patients transported by EMS required advanced interventions, most of which were STEMI activations not requiring any additional interventions. Further investigation is required to determine if certain characteristics or risk factors predict the need for out-of-hospital advanced interventions and ALS transport.

INTRODUCTION

Chest pain is one of the most frequent symptoms experienced by patients seeking emergency care (Mokel, 2013). It is estimated that over 6.5 million patients presented to emergency departments throughout the United States for evaluation of chest pain

in 2017 alone (Rui, 2017). Many of them arrive by emergency medical services (EMS). Studies show that as many as 10% to 15% of EMS calls are for individuals experiencing chest pain (Clawson, 2008; Wilbring 2021). Potential causes of chest pain range from relatively benign disorders, such as muscle strain or gastritis, to imminently life-threatening conditions, including pulmonary embolism, aortic dissection, and myocardial infarction.

While serious medical conditions may cause chest pain, the majority of the patients transported by EMS with chest pain are ultimately diagnosed with self-limiting, non-cardiac causes for their symptoms (Alotaibi, 2021). A study by Saddichha and Saxena (2009) found that less than 10% of patients presenting with chest pain were found to have ischemic cardiac events. This estimate increases to 15% when any potentially life-threatening condition is considered (Rawshani, 2014). Regardless of final ED diagnosis and disposition, what is important and unknown is how many actually require or receive advanced life support (ALS) intervention due to their complaint.

Because of the potential seriousness of the complaint, most chest pain patients are traditionally transported by ALS units staffed with paramedics or physicians in countries that deploy doctors on ambulances. This is a practice that may be unnecessary for many of these patients.

While studies have attempted to correlate prehospital factors of undifferentiated chest pain patients with traditional outcomes, such as major adverse cardiac events at 30 days or the need for coronary intervention, little is known about the care they receive in the out-of-hospital phase (Stopyra, 2018). This study aims to describe the frequency of advanced interventions performed by EMS providers while caring for undifferentiated patients with chest pain/suspected acute coronary syndrome. We hypothesize that few patients will require advanced interventions during transportation to the hospital. This knowledge could be used to develop more resource-appropriate transportation decisions based on the predicted immediate needs of the patient, irrespective of final disposition from the emergency department.

METHODS

Study Design

This pilot study is a retrospective review of consecutive adult patients transported by EMS with a provider impression of chest pain and treated using the suspected acute coronary syndrome statewide protocol. This study was deemed exempt from full IRB review by the Human Subjects Protection Office of Penn State University (Study #00015252).

Study Setting and Population

The EMS system studied is a hospital-based agency that serves a large suburban to rural population in central Pennsylvania. The Commonwealth of Pennsylvania utilizes a system of statewide protocols for basic and advanced life support. These protocols are

universally applied with few exceptions for optional or pilot protocol adaptation. The electronic medical record allows for documentation of the particular treatment protocol being followed for each individual case or intervention. Furthermore, a field for provider impression is required, and a selection is made from a dropdown menu.

Study Protocol

The reporting function of the electronic medical record (emsCharts, ZOLL Medical, Chelmsford, MA) was queried for patients transported from 7/1/2013 to 1/5/2022 who met inclusion criteria. Inclusion criteria included adults 18 or older with an EMS provider impression of non-traumatic chest pain or discomfort and treatment under the Suspected Acute Coronary Syndrome Statewide Protocol. Exclusion criteria included individuals less than 18 and those with unknown ages. Investigators reviewed records for advanced interventions for individuals included in the study. Advanced interventions were pre-defined as defibrillation or cardioversion, transcutaneous pacing, IV medications for the treatment of arrhythmia, bradycardia, hypotension or shock, or identification of an ST-elevation myocardial infarction (STEMI). In the Commonwealth of Pennsylvania and many other states, the administration of aspirin is included in the basic life support protocols. Acquiring a 12-lead electrocardiogram and transmitting it is also part of the BLS protocols. Administration of nitroglycerine and opioids was not included in the definition of advanced interventions as they have not been shown to improve outcomes in patients with ACS (Savino, 2015). The authors do acknowledge that pain management is a consideration in such cases and could be a benefit of advanced care in resource-rich settings.

Data Analysis

Interventions were reported as a percentage of included patients. Continuous variables were reported using the median and interquartile range. Simple descriptive statistics were performed (Excel 2013, Microsoft Corporation, Redmond, WA).

RESULTS

There were 97,877 total EMS activations from the study period. 2,456 (2.5%) of these activations met the study inclusion criteria. The median age was 64 [IQR 51-76] and ranged from 18 to 100. Almost half (48.6%) of the participants were female.

121 advanced interventions were performed on 101 (4.1%) patients. The median age of those who received advanced interventions was 65 [IQR 58-

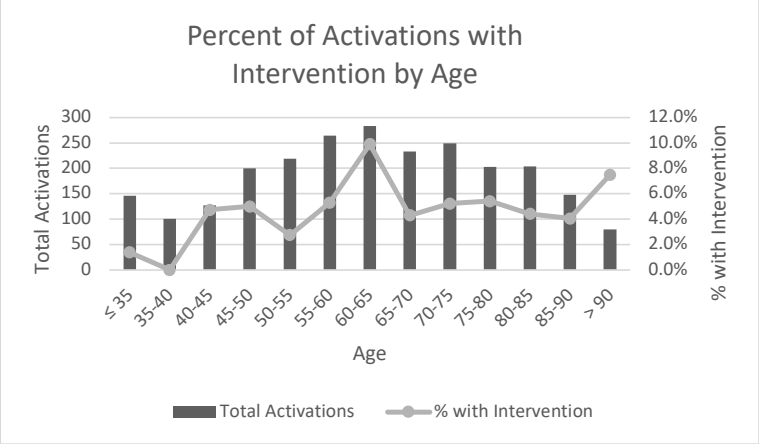

Figure 1 - Percentage of calls with advanced interventions by age. Represents the total number of activations and percent of activations with advanced intervention for each corresponding age group.

76]. All but eight interventions were performed on patients over 45, and these were all STEMI activations that did not require additional advanced care. Patients between 60 and 65 accounted for the highest number of activations (283, 11.5%) and received the largest number of interventions (28, 9.9%). Twenty-three percent of all interventions performed were in this age range (*Figures 1, 2*). Overall, intravenous medications were administered 25 times to 22 (0.9%) separate patients during the study period. These medications included adenosine, amiodarone, atropine, diltiazem, epinephrine and normal saline. Prehospital alerts for STEMI were activated for 79 (3.2%) patients and several interventions occurred in these patients. Advanced procedures, which included cardiopulmonary resuscitation (CPR), defibrillation or electrical cardioversion and transcutaneous pacing, were performed 17 times on 7 (0.3%) patients. Advanced interventions performed by EMS providers during this study period are summarized in *Table 1*.

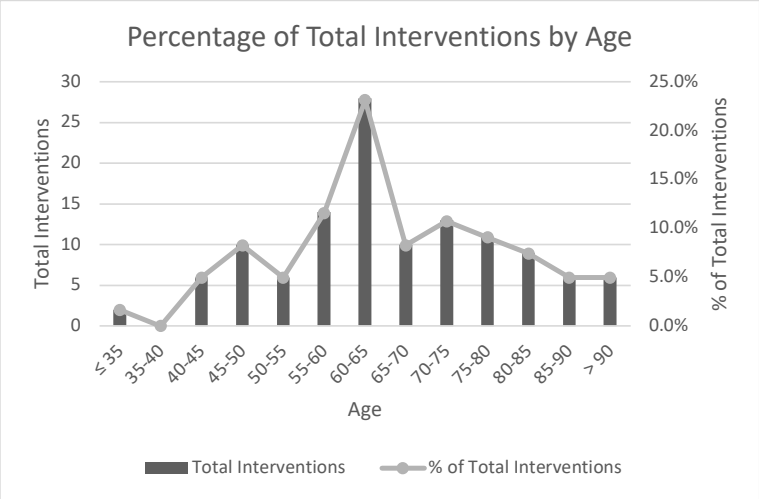

Figure 2 - Percentage of total interventions by age. Represents the total number of interventions and the percentage of total interventions for each corresponding age group.

Intervention	n	%
Any advanced intervention	101	4.1
Intravenous medication (total)	25	1.0
Adenosine	1	0.04
*Amiodarone**	8	0.3
Atropine	1	0.04
Diltiazem	2	0.08
Epinephrine	1	0.04
*Normal saline (for hypotension)***	12	0.5
STEMI activation	79	3.2
Advanced procedures	17	0.7
*CPR**	5	0.2
*Defibrillation or electrical cardioversion**	12	0.5
Transcutaneous pacing	0	0

*One STEMI patient received defibrillation, CPR, and amiodarone
**Two STEMI patients received normal saline for hypotension

Table 1 - Summary of advanced interventions performed (n = 2456 EMS activations)

DISCUSSION

This study demonstrates that few EMS transports for chest pain with suspected acute coronary syndrome require or receive advanced interventions from prehospital providers. This is consistent with previous investigations demonstrating that most cases of chest pain are due to non-life-threatening causes. A study by Pedersen et al. (2019) found a high rate of over-triage for ambulance-transported chest pain patients, with only 2.1% of the study population ultimately diagnosed with an acute myocardial infarction during the index hospital admission. Given that advanced interventions are rarely required, further consideration should be given to how prehospital providers transport patients with chest pain.

There is currently a limited body of literature that has attempted to identify patients at increased risk for major adverse cardiac events in the prehospital setting. Several studies have examined the relationship between data collected in the prehospital setting and conventional hospital-based outcomes such as mortality or 30-day major adverse cardiac events (Wilbring, 2016; Frisch 2018). Frisch et al. (2018) did find that advanced age, among other historical factors, was associated with abnormal cardiac catheterization, the performance of coronary artery bypass grafting, and death in the hospital. Indeed, in our study, the median age for requiring advanced intervention was 65 years. A total of 8 interventions were performed on patients under age 45. Interestingly, this is also the lower limit of risk stratification for age in the HEART pathway (Backus, 2010). It should be noted that all of the advanced interventions in this younger group were prehospital activation of STEMI, and none required advanced procedures or medications. Interventions were most commonly performed on patients between 60 and 65. A total of 9.9% of activations in this age range required interventions, and 23.1% of all interventions were performed on these patients. Further investigation should build on these findings to determine if certain patient characteristics or risk factors are associated with more frequent need for advanced interventions by prehospital providers.

There is no doubt that some chest pain patients will require advanced care, and it may be that it actually does make a difference in overall mortality outcomes, as suggested by the Ontario Prehospital Advanced Life Support (OPALS) Study Group in a recent paper (Stiell, 2022). Nonetheless, their findings also support our hypothesis. It was a minority of their chest pain patients received any advanced intervention. Only 7.4% of patients received some IV medication, most commonly morphine (4.2%) and intravenous fluid bolus (3.5%); 0.7% received adenosine, 0.3% atropine, and 0.25% lidocaine. Only 1 patient (0.02%) received dopamine. One study by Holmberg et al. (2018) found that increased chest pain severity did correlate with rates of hypotension and bradyarrhythmia requiring prehospital intervention. Overall, this study reported a complication rate of 2.9 to 3.1%, requiring prehospital intervention in patients suffering from chest pain of suspected cardiac origin.

Nonetheless, because of perceived increased seriousness, EMS calls for patients with chest pain are typically given a high triage level, and ALS resources, when available, are dispatched immediately. Such a response comes at an increased overall cost, greater equipment and supply need, and personnel expense compared to basic life support (BLS) resources (Bissell, 1998). This is particularly concerning when the data regarding ALS versus BLS care for patients with cardiovascular complaints are considered. Furthermore, evidence-based interventions for acute coronary syndrome and cardiac arrest, such as aspirin administration, high-quality CPR, and early defibrillation, are within the BLS scope of practice. A review by Isenberg and Bissell (2005) showed no difference in patient outcomes for myocardial infarction or cardiac arrest when ALS provided care compared to BLS providers. A separate study showed that patients receiving BLS care for out-of-hospital cardiac arrest actually had higher survival rates to hospital discharge and at 90 days as well as better neurologic functioning compared to those who received ALS (Sanghavi, 2015). Given the increased resources required and limited, if any, benefits, ALS transportation for every patient with chest pain does not appear to be a cost-effective approach when providing prehospital care.

The purpose of this study is not to diminish the utility of high dispatch priority or initial ALS response in patients requesting EMS resources for chest pain. As mentioned above and suggested by the OPALS study group, advanced interventions may indeed contribute to improved patient outcomes. Certainly, the ability to identify STEMI and activate appropriate hospital resources is beneficial to patients. The American Heart Association advocates for early identification of STEMI and transportation by EMS to decrease the time to treatment and improve the morbidity and mortality of patients suffering from STEMI (Antman, 2004). This was the most frequent advanced intervention observed in our study. Unlike the OPALS study, we did not examine outcomes in patients receiving advanced interventions and, therefore cannot comment on the impact of the interventions performed. While their work is critical to understanding the impact of ALS care, we aim to complement this research and provide commentary on the frequency of these interventions. A scenario may exist in which, after ALS assessment, including a screening 12-lead electrocardiogram, a subset of patients can safely be transported to the hospital via BLS. Advanced resource allocation would remain unchanged; however, their utilization may be dedicated to transporting patients more likely to require advanced intervention during transport. Further research will be needed to ensure that resources are utilized such that the maximal number of patients can be provided care that has been proven to improve their outcomes.

LIMITATIONS

As this study was performed within a single EMS system, the generalizability of our results may be limited. For example, systems with longer transport times may be more likely to provide advanced interventions during transport. Our data were collected through retrospective chart review and therefore we were unable to assess for incomplete or inaccurate data. A total of 2.5% of patients met our inclusion criteria, less than the previously reported frequency of EMS activations for chest pain. Requiring documentation of specific treatment protocols and provider impressions likely contributed to underrepresenting the true number of patients presenting with non-traumatic chest pain. As we examined interventions performed, it is possible there were missed opportunities to intervene, and our results may underestimate the actual need for ALS intervention. In some systems, particularly internationally, further advanced interventions such as administering antiplatelet agents may be of value and not mentioned here —finally, not all patients with cardiac issues present with chest pain. However, the outcome of interest was not the accuracy of diagnosis but rather what happens to the patient that presents to EMS with chest pain and suspected acute coronary syndrome.

CONCLUSION

Chest pain is a common symptom experienced by individuals seeking medical care. While providers must consider and screen for potentially life-threatening conditions when caring for these patients, most of these are likely due to relatively benign causes and do not require any immediate ALS care on scene or in the ambulance during transport. Our study suggests that it is a minority of chest pain patients receive an ALS intervention during transport to the hospital. A better understanding of this might

allow a more pragmatic use of ALS resources for these transports. This could be a benefit, especially in areas where paramedic or physician-level care is in short supply. Further investigation is required to determine if certain patient characteristics, such as the description of symptoms, presence of cardiovascular risk factors, or EKG abnormalities, may predict the need for out-of-hospital advanced interventions and, consequently, ALS transport.

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SPECIAL REPORT

INCLUSION OF CONFINED SPACE RESCUE IN EMS PHYSICIAN FELLOWSHIP PROGRAMS

Michael McCartin, MD, NRP[1*], Lindsay Jaeger, MD[2], Bernard Heilicser, DO[3], Joseph Weber, MD[4] and Katie Tataris, MD, MPH[5]

Author Affiliations: 1. UChicago Medicine, Chicago, USA; 2. The University of Chicago Comer Children's Hospital, Chicago, USA; 3. UChicago Medicine Ingalls Memorial, Harvey, USA; 4. Cook County Hospitals, Chicago, USA; 5. UChicago Medicine, Chicago, USA.

**Corresponding Author:* michael.mccartin@bsd.uchicago.edu

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ABSTRACT

Introduction: In July 2021, the Accreditation Council for Graduate Medical Education (ACGME) updated the Program Requirements for Graduate Medical Education in Emergency Medical Services to include participation in special operations trainings as a required key index procedure during an EMS fellowship. These requirements now include documentation of "participation in confined space, technical rescue, or collapse/trench training". EMS fellowships may have limited opportunities for fellows to actively participate in these complex events.
Background: Federal or State Urban Search and Rescue (USAR) teams present a unique opportunity to meet this training requirement. USAR teams perform search and rescue operations in collapsed structures and provide emergency medical care for entrapped survivors, task force personnel, and search canines. The physician is integrated into the Incident Command Structure of the USAR teams under the Medical Branch as the "Medical Team Manager". This provides a defined team role in training and promotes physician level knowledge and skills in rescue operations.
Methods: The University of Chicago EMS Fellowship partnered with Illinois Task Force-1 USAR team to meet the new training requirements and participate as a Medical Team Manager on the team.
Results: During the 12-month fellowship period, the EMS fellow participated in monthly USAR training that included both single day and multi-day exercises. The exercises included scenarios with complex hazardous materials, confined space rescue, high angle rescue, collapsed structure and trench rescue. With a dedicated physician role on the USAR team, the EMS fellow integrates into the response structure as a Medical Team Manager and can learn how to deliver high quality patient care in an austere environment. USAR training fulfilled several of the new ACGME key index procedure for an EMS fellow in the special operations environment including participation in hazardous materials response training, participation in confined space, technical rescue, or collapse/trench training, and participation in vehicle rescue/extrication training.
Conclusions: EMS fellowship programs can collaborate with Urban Search and Rescue teams to provide training opportunities in confined space rescue to meet ACGME requirements for key index procedures and integrate qualified EMS physicians into USAR responses. Collaboration between EMS fellowship programs and USAR teams can be mutually beneficial.

INTRODUCTION

In July 2021, the Accreditation Council for Graduate Medical Education (ACGME) updated the "ACGME Program Requirements for Graduate Medical Education in Emergency Medical Services" to include participation in special operations trainings as a required key index procedure during EMS Fellowship. Among these new requirements, fellows must document "participation in confined space, technical rescue, or collapse/trench training" (ACGME, 2021). EMS Fellowship Program Directors may need to evaluate partnerships with organizations that can become participating sites and provide an educational experience for the fellow. Within the complex environment of confined space and technical rescue, Urban Search and Rescue (USAR) teams represent a unique opportunity for training EMS fellows. We describe our experience partnering with an Urban Search and Rescue (USAR) team to provide special operations training to physicians in their EMS fellowship and meet new ACGME requirements.

BACKGROUND

USAR Team Description

The National Urban Search & Rescue (US&R) Response System was established under the authority of the Federal Emergency Management Agency (FEMA) in 1989 as a framework for organizing federal, state, and local partner emergency response teams as integrated federal disaster response task forces (FEMA, 2020). According to FEMA "An Urban Search and Rescue (US&R) Task Force is a multi-disciplined organization which conducts search, rescue, and recovery in technical rescue disciplines, including structural collapse, rope rescue, vehicle extrication, machinery extrication, confined space (permit-required, non-cave, non-mine), trench, excavation, water operations, and chemical, biological, radiological, nuclear, and explosives (CBRNE) defensive operations in a US&R environment"(FEMA, 2020). There are currently 28 active US&R teams in the United States (FEMA, 2022) that may be deployed by FEMA as a disaster response task force. In addition to these federal teams, there are numerous state task force teams with a similar structure to the federal teams. USAR task force personnel are equipped and ready to deploy within six hours of notification (FEMA, 2003). USAR task force teams train frequently in different aspects of technical rescue including high angle, confined space, trench, hazardous materials, and swift water.

USAR Team Organization

USAR task force members are assigned to a specific team with a defined component of the USAR mission. There are six teams which include Search, Rescue, Hazardous Materials, Medical, Logistics, and Planning (FEMA, 2003). Physicians serve in the role of Medical Team Manager and supervise the medical team of a USAR task force. The role of the Medical Team Manager includes ensuring all medication and controlled substances are accounted for and secured, ensuring proper medical coverage of the task force is maintained during all mission phases, monitoring the task force for injury and illness, providing medical oversight, performing medical care as appropriate, and coordinating incident stress debriefing as indicated (FEMA, 2003). Medical Team Mangers work with

Medical Specialists, who are typically paramedics, to carry out the medical team responsibilities. Duties of the Medical Specialist include monitoring the health and wellbeing of task force personnel and under the direction of the Medical Team Manager, assisting in the treatment, extrication, and transfer of injured team members and patients to the local emergency department (FEMA, 2003).

USAR Medical Component

Medical care within the Task Force is primarily to care for Task Force members and survivors being extricated or rescued. As defined by FEMA, "the Medical Team Manager is a licensed physician who is Emergency Medicine residency trained and/or Board-certified in Emergency Medicine and actively practicing clinical Emergency Medicine and having experience with prehospital medical care OR be a currently licensed physician with current ACLS, ATLS and PALS certification (or equivalent) whose medical activities include clinical medicine and/or prehospital care" (FEMA, 2020). Emergency Medicine physicians with subspecialty fellowship training in EMS are well qualified to meet the defined responsibilities of a Medical Team Manager. Team members participate in training specific to USAR which includes use of a self-contained breathing apparatus (SCBA), maneuvering through confined spaces, and preparing an injured patient for extrication. The Medical Team must be trained and equipped for potentially prolonged field management of critically ill or injured patients. Unique problems that are encountered in the USAR environment include dust asphyxiation, toxic inhalation, crush injury, open fractures, and field limb amputations (Macintyre et al., 2006).

Scope of Practice

Medical Team Managers and Medical Team Specialists have an expansive scope of out of hospital equipment and medications available. The FEMA medical cache is a comprehensive standardized pallet of equipment to aid the medical team in their mission. It is important that USAR teams be self-sufficient for at least 72 hours, as they will not be able to depend on local infrastructure to support their operations. The cache is designed for extended field care operations and similar to the formulary in an Emergency Department, which includes medications for procedural sedation and rapid sequence intubation, antibiotics, chest tubes, central lines, ventilators, and video laryngoscopes. Some USAR teams have a climate-controlled patient treatment truck with examination beds and overhead lighting for advanced field care.

METHODS

This study was determined to be exempt from IRB review by The University of Chicago Biological Sciences Division (Protocol Number: IRB22-1477).

The University of Chicago EMS Fellowship explored local opportunities for physician involvement in confined space rescue training. The Illinois Task Force-1 USAR team is a State USAR team comprised of first responders from around the state. It has an organization modeled after the previously described FEMA USAR teams. The University of Chicago EMS Fellowship Program contacted task force leadership to discuss opportu-

nities for fellowship involvement on the team to meet their available open positions for Medical Team Managers.

After an interview, both the EMS Fellow and Program Director started the process of onboarding as Medical Team Managers. Part of the onboarding process included licensure verification, current employment verification, completion of a computer based Medical Specialist training and signing a memorandum of understanding (MOU). As available, both team members planned to attend the four-day FEMA approved Medical Specialist Course. This comprehensive course provides Medical Team Managers and Medical Team Specialists with "the knowledge, skills, and abilities necessary to perform medical functions for an Urban Search and Rescue team during a disaster or planned event". It covers medical topics specific to the confined space environment and culminates in field exercises to apply newly learned skills.

Both team members were outfitted with standard USAR equipment to include helmets, boots, duty uniforms, cold weather gear, rain gear, eye protection, respirators, heavy leather gloves, flashlights, sleeping bags and head lamps. New team members were also added to an alerting system, which sends notification regarding trainings and deployments. Once onboarding was completed, the team members were added to the training schedule and alert cycle.

RESULTS

During the 12-month fellowship period, the EMS fellow participated in monthly USAR training that included both single day and multi-day exercises. Each exercise was attended by all USAR function groups and focused collaboratively to stabilize the incident. The exercises included scenarios with complex hazardous materials, confined space rescue, high angle rescue, collapsed structure and trench rescue. The medical team is integrated into the response structure with the goal of providing high quality patient care from initial assessment, through extrication, and prolonged field care. With a dedicated position on the team for physicians as Medical Team Managers, the EMS fellow was able to be "down the hole" performing medical care at the point of patient contact with the Medical Specialists in high fidelity scenarios during each training day. During these scenarios the fellow gained skills including setting up high angle and confined space rescue systems, performing confined space rescue work while wearing HAZMAT gear and a self-contained breathing apparatus, treating patients in the confined space environment, extricating patients from collapsed structures and other confined spaces, performing field amputations, and using ropes to rappel and ascend on scene.

USAR training fulfilled several of the new ACGME key index procedure for an EMS fellow in the special operations environment. These procedures include specifically participation in hazardous materials response training, participation in confined space, technical rescue, or collapse/trench training, and participation in vehicle rescue/extrication training.

DISCUSSION

University of Chicago EMS fellowship met the new ACGME requirements for EMS fellowships by successfully partnering with the Illinois Task Force-1 USAR team. USAR teams represent a unique opportunity for EMS Fellowships to deliver high quality patient care in an austere environment with technical rescue while completing ACGME key index procedures. Establishing a relationship between an EMS Fellowship and a USAR team is mutually beneficial for both the EMS fellow and EMS faculty. EMS faculty may consider joining the USAR team which allows for an expanded scope of out of hospital medicine practice, opportunity to educate the fellow during trainings, and the ability to deploy for real world disasters.

The steps to establish a partnership between an EMS fellowship and a USAR team are geographic considerations, stakeholder meetings, administrative paperwork, distribution of team gear and equipment, scheduling trainings, and attending specialized courses. The first and most important step to evaluating a collaboration between an EMS Fellowship program and an urban search and rescue program is the geographic proximity of the sites. The distance should be within reason for a fellow to travel to the participating site. If the site is proximate, the task force leader of the USAR team can be contacted. A state or federal urban search and rescue teams that has an opening for Medical Team Manager is optimal, however discussion about the mutual benefits may provide a pathway onto a fully staffed team. A meeting between key stakeholders of the EMS Fellowship and USAR team is critical to ensure requirements and needs on both sides are met. Once the partnership is established, the onboarding process for the fellow may consist of a brief interview and commitment to meet team requirements including monthly trainings.

USAR teams benefit from consistent physician involvement. For a mobilized USAR task force to be considered complete, typically a physician is required to deploy with the team. This can pose a challenge, as some teams can expect to be reliably mobilized on an annual basis for seasonal events like hurricanes. Deployments will typically last 10-14 days and both personal and occupational factors can prevent a physician from being able to go every time their team is mobilized. By establishing a relationship with an EMS fellowship, it is possible that a USAR team will find itself with a greater pool of physician resources.

EMS Fellowships also benefit from USAR involvement. USAR teams offer access to and education in the complex world of technical rescue. EMS fellows can directly participate in high quality training events that satisfy the ACGME key index procedure requirements while learning from highly skilled rescue professionals. One of the major advantages to the USAR organizational structure for EMS fellows is the defined role for a physician on the team. Involvement of an EMS fellowship with a USAR team can also lead to scholarly and quality improvement efforts on USAR topics, leading to improved medical care provided by the USAR team and overall advances in the field of confined space medicine.

Our experience is limited to one EMS fellowship program and one state USAR team.

Other programs and locations may have different considerations as they investigate similar opportunities for collaboration to strengthen EMS fellow education.

CONCLUSION

EMS fellowship programs can collaborate with urban search and rescue teams to provide training opportunities in confined space rescue to meet ACGME requirements for key index procedures. This mutually beneficial relationship provides USAR teams with consistent EMS fellow and faculty physician involvement and EMS fellowships with high quality experience in technical rescue and prehospital medicine. Additional investigation should include defining best practices for collaborations to strengthen EMS fellowship clinical education in the various out of hospital environments.

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REVIEW

GOALS, SERVICES, AND TARGET PATIENT POPULATIONS OF COMMUNITY PARAMEDICINE IN RURAL UNITED STATES: A LITERATURE REVIEW

Chelsea McAuslan[1], BS, John M Roll, PhD[1,2], Mitchell McAuslan, BS,EMT-P, FP-C[3]

Author Affiliations: 1. Medical student, Elson S. Floyd College of Medicine, Washington State University, Spokane, Washington; 2. Associate Vice Dean of Research, Elson S Floyd College of Medicine, Washington State University, Spokane, Washington; 3. EMT-Paramedic, Lifeflight Network

**Corresponding Author*: Chelsea.mcauslan@wsu.edu

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INTRODUCTION

Rural counties account for more than half of the designated health professional shortage areas in the United States. Rural, remote, or frontier areas contain one-fifth of the U.S. population and only 10% of the nation's physicians. In addition to challenges with geographically isolated providers and limited primary care resources, rural populations tend to be sicker and older than urban populations. Medicare beneficiaries have a high hospital readmission rate as one in five are readmitted within 30 days of hospital discharge, while more return to the emergency department (Pearson et al., 2014).

Community paramedicine is a growing healthcare delivery model within emergency medical services (EMS) in which emergency medical professionals, such as paramedics or emergency medical technicians (EMTs), provide nonemergent medical care (Pearson et al., 2014). In a rural context, community paramedics (CPs) work in an expanded role under the direction of a primary care provider, emergency physician, or medical director to increase access to preventative health and primary care services (Huang et al., 2017). CPs may help fill the primary healthcare gap for rural residents by performing patient assessments and procedures that are within their skill set within the comfort of the patients' home (Pearson et al., 2014; Huang et al., 2017).

The goals and services of community paramedic (CP) programs are determined by the specific health needs of the community. CP programs across the country differ in their program organization, target patient population, collaboration with providers and social services, reimbursement strategies, scope of practice, and educational requirements (Huang et al., 2017; Coffman & Kwong, 2019).

The goal of this literature review is to examine the limited number of peer reviewed publications about rural community paramedicine programs in the United States. This paper will provide an overview of the common goals, services, and target populations of rural CP programs and further highlight the reported outcomes of the top three most common goals of rural CP programs: chronic disease management, reduction in emergency department (ED) transports, and reduction in healthcare costs. It will also examine the limited number of reported patient and paramedic perspectives of the evolving CP position and summarize the problems identified in rural community paramedicine.

This paper highlights the lack of research investigating patient outcomes secondary to preventative health and primary care services provided by CPs, which may identify if CPs are an effective means of filling the primary care gap for rural communities.

METHODS

The systematic review process followed PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines and was not formally registered. PubMed and Google Scholar databases were searched in June 2021 using the search terms: "community paramedicine/paramedic" and "rural, remote, frontier" with a date restriction of 2000-2021. Two investigators reviewed all abstracts independently and identified 56 articles relevant to community paramedicine. International literature and research about CP programs in urban locations were excluded because this literature review is focused on CP programs in rural US. The study team extracted publications that reported data through observational ethnographic studies, observational cohort studies, observational case studies, structured interviews, and systematic reviews about existing rural CP programs in the US. Commentaries, opinion articles, incomplete research, and guidelines on CP program development or national calls for CP research were excluded because they are considered lower quality under the Standards for Reporting Qualitative Research (SRQR) criteria (O'Brien et al., 2014). Additional articles were identified by searching bibliographies of articles identified in this process. The exclusion criteria resulted in 12 publications about rural CP programs in the United States.

RESULTS

Search Yield

Figure 1 depicts the selection of articles from the preliminary review to the articles used in this literature review. PubMed and Google Scholar databases and bibliography handsearch identified 56 articles related to community paramedicine. Abstract review identified 21 articles about rural CP programs in the US. Analysis of the full text identified 12 articles that reported data through observational ethnographic studies, observational

cohort studies, observational case studies, structured interviews, and systematic reviews.

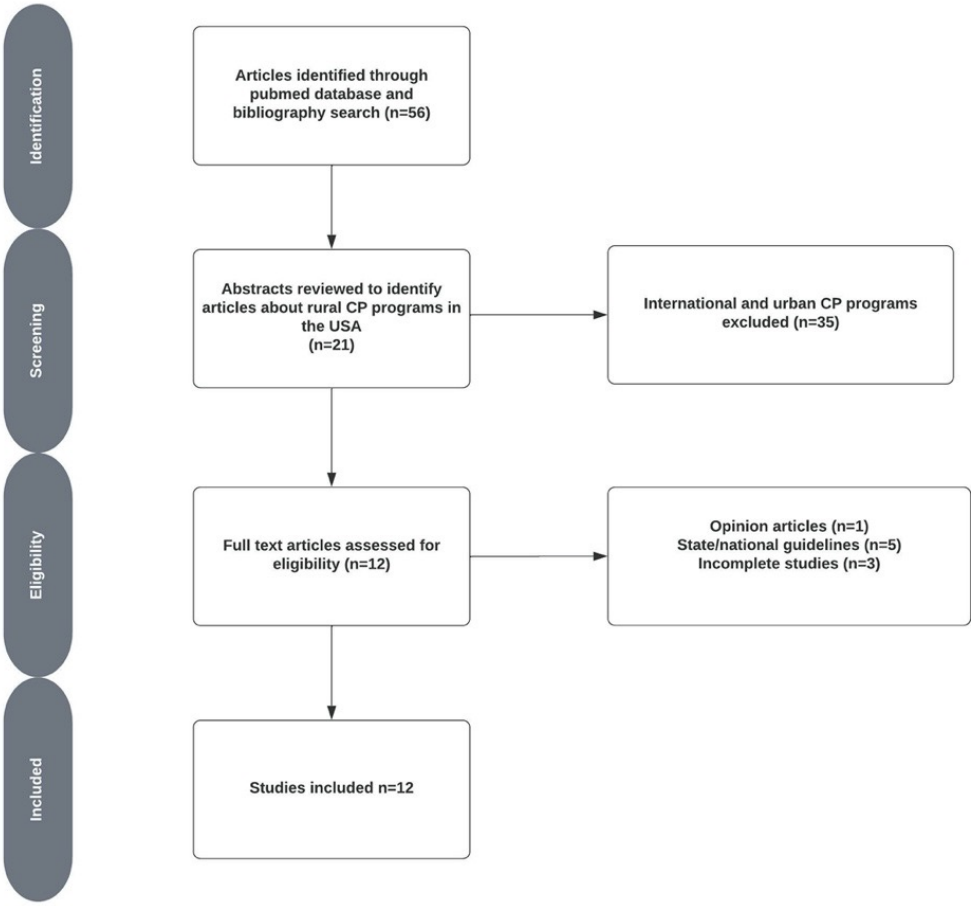

Figure 1- Flowchart of Data Collection

Goals, Target Patient Population, and Services

Goals

Rural serving CP program goals are developed according to the needs of the community and CP services are integrated into the community's resources and existing healthcare system (Huang et al., 2017). The most common program goals are to aid patients in chronic disease management, reduce emergency department visits, reduce hospital admissions/readmissions, and reduce healthcare costs (Patterson et al., 2016). A rural CP program in South Central Pennsylvania reports their program goal is to reduce the number of patients readmitted to the hospital within 30 days after hospital discharge (Huang et al., 2017).

Target Patient Population

Programs report targeting their services toward patients who are chronically ill,

post-hospital discharge, and frequent ambulance users (Patterson et al., 2016). A rural CP program in Texas provided a list of the most common diagnoses of the patients who receive their coordinated CP care: hypertension, injured in accident, dementia, constant falls, diabetes, respiratory problems, anxiety, chronic pain, seizure disorder, depression, and osteoarthritis (Pennel et al., 2018). Another program reported their target service group to be patients with chronic disease and high risk for readmission such as patients with CHF, COPD, chronic kidney disease, or asthma (Huang et al., 2017).

Services

Community paramedics can provide services included in a care plan designed by a patient's primary care provider, or services within their scope of practice defined by protocols that have been approved by a program's medical director (Table 1). Practice authority varies by state (Coffman & Kwong, 2019).

	Services Provided by Rural CP Programs	Specific Examples Reported by Rural CP Programs
Preventative Health Services	• Vaccine administration • Patient education (ex. wound care education, diabetes education, medication education) • Home safety evaluation • Assessment of the patients' perception of their health	Installation of a bathroom chair and education on an in-home lift device for a patient with frontal lobe dysplasia and constant falls.
Resource Navigation	• Social services • Healthcare providers: Primary care facilities, hospitals • Community resources: Meals on Wheels, nutrition assistance programs, housing and utilities assistance programs, and transportation assistance	A program connected 60% of patients to a community resource and all patients eligible for affordability programs or a health care plan were enrolled, which expanded their access to healthcare providers. Referrals to the following resources: a hospital benefit counselor for a Medicaid application, PCP for the establishment of primary care, dental clinic, diabetes program, pharmacy program, neurology specialist, and transportation resources for patients to travel to appointments. CPs reached out to local faith-based organizations to help their patients, utilizing the 'shared obligation' values of a small community
Behavioral Health	• Depression screening	A service of 30-45 minutes of sitting and talking with a patient who experienced anxiety and respiratory problems, which resulted in reduced anxiety about her condition and no 911 call since program enrollment.
Medical Reconciliation	• Review of patients' current medications including dosage, daily schedule, adherence • Identification of other medications prescribed by another provider • Assistance with medication sorting system	A primary care provider changed a patient's medication dosage after communicating with the patients CP.
Physical assessment	• Evaluation of patients' activity level • Blood glucose tests • Weight measurement • Blood pressure • monitoring 12-lead electrocardiogram	• Oxygen saturation checks • ING monitoring • Blood draw • Ultrasound

Table 1 - Services Provided (Coffman & Kwong, 2019; Bennett et al., 2018; Huang et al., 2017; Myers et al., 2020; O'Meara et al., 2018; Patterson et al., 2016; Pennel et al., 2016)

Goal 1: Chronic Disease Management

CP provision of preventative and primary care services has improved health outcomes for patients with diabetes, hypertension, CHF, and COPD. Literature also reports CPs successfully referring patients to local resources which may improve health outcomes. However, programs may have failed to improve health outcomes among underserved and minority populations.

Abbeville County's CP program reported that 85% of their patients with diabetes experienced a decrease in fasting blood glucose level compared to their baseline and 70% of the patients with hypertension had a decrease in blood pressure. Though the program lacked the resources to track metrics of COPD participants, the COPD patients recorded significantly fewer ED admissions for shortness of breath during the project period (Bennett et al., 2018). A program in South Central Pennsylvania reports a 12% reduction in readmission rates for CHF patients and a 10% reduction for COPD patients (Huang et al., 2017). Two programs reported 67% of patients claimed to have the same or better health status as at their first CP visit, 59% of patients had the same or fewer physical limitations as at their first CP visit, and 7% had an improvement in quality of life indicated by an increase on a standardized quality of life instrument. The timeframe from the first visit to data collection was not reported (Patterson et al., 2016).

One way CPs impact patient outcomes is through referring patients to community resources. A program in Texas reported a primary care provider changed a patient's medication dosage after communicating with the patient's CP. A CP referral to a hospital benefits counselor resulted in the patient receiving Medicaid and utilizing Medicaid transportation to obtain medications. A referral for a diabetic patient who stretched his insulin use due to cost resulted in the patient receiving financial assistance for diabetes medication and lancets (Pennel et al., 2016).

The MEDICVAX Project in Pennsylvania demonstrated the feasibility of paramedics providing influenza vaccination to citizens in public buildings. Of the 2,075 adults immunized, 1,014 (49%) of patients did not receive an influenza vaccine the year prior and 705 (35%) reported they probably would not have been vaccinated elsewhere (Mosesso et al., 2003).

Underserved Patient Populations

Most vaccine recipients in the MEDICVAX project were white and younger than 60 years old. The author suggests distributing vaccinations at senior citizen centers to increase vaccinations among at-risk elderly individuals and implementation of culturally sensitive recruitment to target the attention of underserved and minority groups (Mosesso et al., 2003).

The Texas program reported a Spanish speaking only patient (no Spanish speaker on the care team) was dropped from the program after being labeled "non-compliant" (Pennel et al., 2016). CP programs may need to address language barriers in their services. Out of 31 rural serving CP programs, only 6.5% of programs report referring patients to mental health care facilities and 0% refer patients to addiction treatment centers (Patterson et al., 2016). However, rural regions may lack addiction centers to refer patients to.

Goal 2: Reduction in ED Transports

Rural community paramedicine programs achieved a common goal of reducing patients' transportation to emergency departments. A reduction in unnecessary ambulance transports may be especially beneficial to rural communities where EMS agencies have limited numbers of ambulances and personnel, and transport patients longer distances to reach emergency departments (Gregg et al., 2019).

A CP program reported educational efforts and connections with other services allowed the patients participating in their program to use healthcare more appropriately, resulting in a 48.5% decrease in 911 calls made related to patients' primary conditions. Furthermore, there was 100% decrease in 911 calls for nonemergent issues and ambulances experienced a decrease in return to service times thus increasing their availability for patients in need of emergent care (Bennett et al., 2017).

Emergency department visits among patients who saw a CP decreased by 58.7% while those in a control group increased by 4%. Additionally inpatient admissions among patients who saw a CP decreased by 68.8% while the control group increased by 187.5%. Out of the CP program participants with a hospitalization, there was a 41% reduction in 30-day readmissions compared to 35.9% increase in the comparison group. Specifically, COPD patients enrolled in the CP programs saw a 75% decrease in readmissions (Bennett et al., 2017).

In rural Wisconsin county, patients identified as "high utilizers" by a referring physician experienced a statistically significant decline in utilization of primary care and ED visits during participation in an in-home CP program. However, the reduction of primary care and ED visits was replaced and exceeded by the number of CP visits (Myers et al., 2020).

Outcomes data from MedStar Mobile Health program in Texas reports 146 patients avoided 1,893 transports to the emergency department and the CHF readmission rate for patients who saw CPs was 6.7% lower than the national median (Choi et al., 2016).

Between December 2012 and June 2014, Washoe County, Nevada's CP program estimated 1,795 ED visits, 354 ambulance transports, and 28 hospital readmissions avoided by the delivery of CP services (Choi et al., 2016).

Goal 3: Cost Reduction

Through reduction in ED transports and hospital readmissions, CP programs in rural communities have reported cost savings for the healthcare payer and patient. Furthermore, a reduction in 30-day hospital readmission rates may help rural hospitals avoid financial penalties from Medicare and Medicaid Services (Myers et al., 2020).

A rural county in Colorado reported a healthcare cost savings of $412,000 in 3 years due to the implementation of a CP program (Pennel et al., 2016). Washoe County, Nevada's CP program reported $7.9 million in charge avoidance and $2.8 million in Medicare

payments avoided within 2.5 years because of the ED visits, ambulance transports and hospital readmissions avoided by patients supported by the CP program. The MedStar Mobile Health program in Texas reported Medicare charge avoidance of $21,627 and payment avoidance of $5,536 per patient due to the avoidance of ED transportations (Choi et al., 2016).

On the other hand, a case study reports a decrease in primary care and ED visits resulted in an increase in utilization of healthcare resources when the number of CP home visits is taken into consideration. The cost of a CP visit compared to ED visit and ambulance transport must be considered. CP visits may result in an overall financial savings to the patient by reducing the time a patient has to travel and time away from work. A decrease in ED use also implies smaller charges to the patient and a reduction in unreimbursed expenses to the health system (Myers et al., 2020).

Patient and Paramedic Attitudes

Patients report positive perception of CP services with an emphasis on valuing the trust-based relationship developed through multiple in-home visits. Though paramedics report a positive perception of the CP position, some struggle with peers not understanding the new CP role and being viewed as a threat by other healthcare professionals.

Patient Satisfaction

Community paramedics are described as having a more personal and trust-based relationship with their patients by conducting multiple visits in the comfort of the patients' home. CPs receive positive satisfaction scores from patients and patients report feeling "a lot safer" and "not afraid" of being home by themselves knowing that community paramedics are available to help them, especially if they are unsure if their health issue are serious enough to call an ambulance (Bennett et al., 2018; Pennel et al., 2016). CP's reduce stress on patients' family members by checking in on how the family is handling the patients' health condition and offering support. A family member reported feeling more comfortable with her decision to go on vacation because a CP she trusted was available to support the family member's mother, if needed (Pennel et al., 2016).

Paramedics are in an advantageous position to increase the rate of preventative health methods, such as immunizations, within their community because they often live in the community they serve and are therefore known and trusted by the residents (Moseso et al., 2003). Patient interviews provided evidence of the importance of meeting in-person at a patient's home - It was reported that phone calls were less effective means of communicating with the patient because patients did not trust the unknown caller (Pennel et al., 2016).

Paramedic Satisfaction

Paramedics are motivated to provide CP care out of a genuine interest of positively impacting their community and are also attracted to the innovative role of delivering preventative care to their patients (Martin & O'Meara, 2019).

A survey of EMS professionals servicing Missouri, Arkansas, Kansas, and Oklahoma indicates the majority believe they understand CP programs and perceive their communities want CP-level care. Fewer, however still the majority, reported they were willing to obtain additional education to provide CP care to their community. However, there is a concern about splitting dual responsibilities between emergency response and CP care during a shift, suggesting the preference for staff members to be committed directly to CP duties. There are no statistically significant differences in willingness to participate in a CP program between EMS provider level, age, level of education, type of shift, community served, or rank (Steeps et al., 2017).

Community paramedics report that skepticism from other paramedics and role boundary tensions with nurses have resulted in challenges to accept the CP role. Overall, CPs reported contentment with their positions and experience job satisfaction by making small differences in patients' lives, despite often being misunderstood by their peers (Martin & O'Meara, 2019).

Problems Identified

The major problems identified are acquiring sustainable funding to develop CP programs and reimburse CP services, lack of consistency between CP scope of practice and educational requirements across states, role tensions with other healthcare professions, and lack of research about the safety of CP programs for patients.

Funding

A major concern for the sustainability of CP programs is funding the implementation of programs and reimbursement of CP services. Programs in the past, such as a program in California, have terminated operations once funding concluded (Pennel et al., 2016; O'Meara et al., 2018). Funding for many programs thus far have been achieved by federal and state grants as well as by ambulance services themselves (Choi et al., 2016). Several states have legislation declaring that EMS services are only reimbursed if a patient is transported to the emergency department (Bennet et al., 2018). Therefore, changes in state legislation and Medicare/Medicaid reimbursement models are required to sustain operations on a larger scale (Choi et al., 2016).

One-third of states have enacted community paramedicine into legislation and there is a large variation in Medicaid and commercial insurance reimbursement between states. For example, only Medicaid reimburses CP services in three state, only commercial health plans reimburse CP services in twelve states, and both Medicaid and commercial health plans reimburses CP services in four states (Coffman & Kwong, 2019).

There is also a concern that a reduction in emergency department transports may financially devastate rural hospitals and contribute to rural hospital closures. This may further reduce rural communities' access to healthcare providers (Gregg et al., 2019).

Role Tensions

Community paramedicine does not fit the traditional EMS definition of responding to medical emergencies. For this reason, this relatively new role has been met with resistance by some physicians, nurses, and paramedics who are unfamiliar with the newer concept of community paramedicine (Gregg et al., 2019). There are reports of concern about role tension because nurses, especially home health nurses, may feel that paramedics are encroaching on their job description (O'Mera et al., 2018).

No Consistency in Scope of Practice or Education Across States

There is a large variation between states in defining the CP scope of practice and educational requirements. There are twelve states that require formal CP recognition beyond paramedic training. The type of recognition varies between receiving a certification, endorsement, or simply approval. On the other hand, three states are currently developing formal CP education guidelines. For example, in Idaho there is no formal training requirement codified in the law other than completion of "additional training." On the other hand, a CP endorsement in Colorado is achieved by the completion of a CP course from an accredited paramedic school or college and passing a nationally offered exam (Coffman & Kwong, 2019).

This variation in reimbursement, scope of practice, and education creates challenges for policy makers to determine which elements to include in CP legislation. Research is needed to assess the consequences of this wide variation between states (Coffman & Kwong, 2019).

Safety

CP remains a relatively new model of care and its long-term outcomes are not well documented in peer-reviewed literature, especially in the rural United States. More evidence is needed to verify that CP care is safe and effective (Patterson et al., 2016; Choi et al., 2016). Furthermore, there are few CP interventions that describe addressing patients' mental or behavioral health (Gregg et al., 2019).

There are additional concerns about broadening the paramedic scope of practice in the US. For example, to include paramedic prescribing rights such as paramedics in the UK. A CP program in Colorado has introduced the use of ultrasound to paramedics (Coffman & Kwong, 2019; O'Mera et al., 2018).

DISCUSSION

The goals, target populations, and services reported in the literature by CP programs reflect the expectation of programs to provide preventative and primary care services to chronically ill patients. However, only five of the twelve publications reviewed provided data about patient outcomes. Patterson et al suggests CP programs lack access to data on patient outcomes once the patient leaves the care of the EMS agency and smaller rural programs may not have a large enough patient population to yield statistically

significant results (Patterson et al., 2016). There appears to be more data reported about reduction in ED transports and cost savings than whether CP services are effectively filling the primary care gap in rural communities. Furthermore, CP education may need to emphasize serving underserved and vulnerable populations early in the development of this evolving healthcare delivery model to ensure health disparities are not perpetuated. This may include overcoming language barriers, ensuring the program is advertised to all cultural groups, and enhancing referrals to behavioral health and addiction professionals.

This literature review highlights that there is limited literature investigating the patient outcomes of CP provision of primary and preventative care services in rural communities in the United States. Furthermore, most of the existing literature describes rural CP programs as positive.

The reported data suggests rural CP programs successfully reduce transports to the ED and may reduce the cost of health care. Future research of the cost-benefit analysis of CP programs requires a detailed analysis of the cost of developing and deploying a rural CP program compared to patient and payer cost savings (Myers et al., 2020).

Patient perception of CP services appears overwhelmingly positive. It would be interesting to investigate the extent to which patients in rural communities prefer CP services over telehealth. Research on the potential synergies that may exist between telehealth and CP is also needed to optimize care. Improving paramedic perspective of the CP position by clearly identifying the job description, separating CP duties from emergency response to avoid overwhelming EMS staff, and eliminating role tension around overlapping responsivities of CP and home health nursing may enhance paramedic interest in obtaining a CP position. This may be especially important because rural regions traditionally struggle with EMS recruitment and staff retention (Freeman et al., 2009).

This overview of challenges echoes that funding for the development of CP programs and reimbursement of services limits the development of sustainable rural CP programs. Furthermore, lack of consistency between states regarding funding, scope of practice, and CP education may make it difficult for other states interested in implementing CP programs to identify what elements to incorporate in their CP legislation. This may impair more rural regions from initiating their own CP programs

LIMITATIONS

Community paramedicine is an evolving concept in the United States and there is limited research investigating patient health outcomes and patient safety after CP intervention. Most studies are observational studies or systematic reviews.

CONCLUSION

Rural serving CP program goals are to aid patients in chronic disease management, reduce emergency department visits, reduce hospital admissions/readmissions, and reduce healthcare costs. Programs report targeting services toward chronically ill patients,

post-hospital discharge patients, and frequent EMS users. CP provision of preventative and primary care services has improved health outcomes for patients with diabetes, hypertension, CHF, and COPD. Rural CP programs report cost savings for the healthcare payer and patient and a reduction in ED transports and hospital readmissions. Patients report positive perception of CP services with an emphasis on valuing the development of a trust-based relationship. The problems identified are acquiring sustainable funding to develop CP programs and reimburse CP services, lack of consistency between CP scope of practice and educational requirements across states, role tensions with other healthcare professions, and lack of research about the safety of CP programs for patients.

This paper highlights the lack of research investigating patient outcomes secondary to preventative health and primary care services provided by CPs, which may identify if CPs are an effective means of helping to fill the primary care gap for rural communities. Furthermore, CP programs may need to devise protocols to overcome language barriers, enhance referrals to addiction services if possible, and advertise services to all cultural groups within the community to ensure they are serving underserved and vulnerable populations early in the development of this evolving healthcare delivery model.

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LITERATURE SURVEILLANCE

PARAMEDICINE LITERATURE SEARCH: MARCH-MAY 2023

SECTION EDITORS: Brenda M. Morrissey, MS, FP-C, FACPE[1*], Shaughn Maxwell, Psy.M., EMT-P[2]
**Corresponding Author:* bmmorrissey@outlook.com

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The Dialogues section will publish 'letters to the editor' with comments and questions regarding previously published articles. Our intent is to foster professional coversations about the papers to include its methods, analyses, results, conclusions, implications, and implementation issues. We will also accept general comments and questions regarding the *Journal*. The selection of submissions with be at the sole discretion of the Journal's editorial team.

IJOP will also have a presence in several social media platforms to faciliate broader reach and participation in these scholarly conversations. The IJOP editorial team will moderate these social media conversations and curate posts to include in the pages of the *Jounal*. The authors of articles will be invited to directly participate in theses discussions. We anticipate that a many of these conversations will take place in the message threads of the *IJOP's* email discussion group, called IJOP Dialogues (https://groups.google.com/u/1/g/ijopdialogues). This venue, and others, will be formally launching in the next few weeks. Separate message threads will be started in this email discussion group for each major article published in *IJOP*.

To help establish and maintain a professional and constructive decorum in these conversations, the message traffic will be moderated. That will allow *IJOP's* social medial editors to screen posts before becoming publicly visible. Everyone participating in these discussions will be asked to include their name, location, and/or professional affiliation. Posts without such identification or having an unconstructive or otherwise unprofessional tone will be rejected or sent back to the submitter for revision and resubmission. We want to provide venues for authors and members of the professional community to feel safe to participate, comment, and ask questions without fear of unbecoming exchanges.

We want to reach and engage more of our colleagues in professional discourse regarding the art and science of paramedicine. We hope that the IJOP Dialogue section will help accomplish that.

RE: Private Health Information Legal Protections in Emergency Medical Services

https://internationaljournalofparamedicine.com/index.php/ijop/article/view/2330

The recommendations and cautions regarding HIPPA and electronic data sharing between healthcare entities cited in this article are pertinent for every EMS agency to acknowledge and

establish the appropriate policies and procedures to maintain legal compliance.

The utilization of electronic technologies is rapidly escalating with telemedicine, body cameras, and artificial intelligence platforms. For EMS and healthcare facilities, acquired, and shared, electronic data is an element of the patient's medical record. As such, it must be maintained, stored, and accessible for decades. Most EMS agencies do not have tightly secured servers compared to hospital systems. This is especially true for rural and volunteer EMS agencies. Are there any policies or best practices established for the ownership, storage, and long-term security for electronic data containing patient information and/or images?

Carol A. Cunningham, MD, FAAEM, FAEMS
State Medical Director, Division of EMS, Ohio Department of Public Safety;
Columbus, OH, USA
(Via email)

This response is not legal advice and is only intended to offer general best practices. The requirements for medical records vary significantly based on state law, and it is crucial for EMS agencies to consult with legal professionals who are licensed to practice law in their jurisdiction to understand and comply with the specific medical record requirements applicable to them. EMS agencies should consider simple ways in which security measures can be implemented to enhance the protection of patient data and thus their EMS service. Consider a situation in which your agency keeps medical information on a tablet that providers use on calls to begin documentation. If a provider accidentally leaves the tablet on scene, simple measures such as decreasing the time needed for a device to time-out and encrypting hard drives can better protect patient data. EMS agencies should restrict access to data for only authorized users. Passwords are also important settings for data protection. Agencies should enforce password policies that require regular expiration, meet specific length and complexity criteria, and prohibit password reuse. A lot of agencies are frequently concerned about 'hacks' of their systems (and rightfully so as healthcare entities are increasingly the focus of ransomware attacks), however, agencies often neglect to protect the agency from itself. Research by the Ponemon Institute, found that 75% of United States' healthcare organizations don't secure medical devices containing sensitive patient information and 94% had leaked data in the previous two years, mainly because of staff negligence. EMS agencies must prioritize the establishment of a strong culture of cybersecurity to ensure the protection of electronic data and patient information. By fostering a culture that values and emphasizes cybersecurity practices, EMS agencies can mitigate the risks of data breaches, unauthorized access, and potential harm to patient privacy and confidentiality. EMS agencies should work closely with legal professionals in their state to ensure that they remain compliant with all federal and state laws and to remain current on best practices for security of patient data which is constantly being updated.

Some helpful resources include:

- NEMSIS Technical Assistance Center EMS Data Collection Laws and or Rule
- Emergency Medical Services (EMS) Data Integration to Optimize Patient Care: An Overview Of The Search, Alert, File, Reconcile (SAFR) Model Of Health Information Exchange

- PCR Data QuickGuide: FAQs on Owning, Amending, Retaining and Sharing Patient Care Report Data

Ryan S. Houser, MHA, MPH, MS, EMPS, NREMT
Rutgers Law School - Newark Campus, Newark, NJ, USA
(Via email)

General Comment on the *Journal*

Having closely read the first two editions of the *International Journal of Paramedicine (IJOP)*, I find myself eagerly awaiting the next instalment. As I have long been a proponent of the need for true scientific research in the field of prehospital care, it is reassuring to see that headway is being made. I am sure others of similar experience and involvement in the evolution of Emergency Medical Services (EMS) would agree that a journal of this nature has the potential to further advance the state of our profession and ultimately the quality of our care with the latter being our fundamental goal.

It has been my experience that the vast majority of in-the-field Emergency Medical Technicians (EMTs) and paramedics are ill-prepared to read and appreciate the potential impact of published evidence-based research. It is simply something to which they are rarely exposed or taught. This is said not to diminish the importance of this new journal or the perspicacity of our folks "in the trenches" but to remind us, as the teachers, researchers, leaders, and innovators of prehospital care, that the knowledge gleaned from the peer reviewed research presented by this publication is our responsibility to pass on to the people doing the day-to-day work of EMS.

As the long slow process of advancing our providers of prehospital care from that of technician to technologist continues, the relevance and importance of the IJOP will provide crucial resources. To do our best we must have on-going research that guides our goal to assure "best practices" and ensure the quality of care.

C. Duncan Hitchcock, Paramedic/Firefighter/RN (retired)
Rescue Chief (retired), Pasco County Fire Rescue; Pasco County, Florida, USA
(Via *IJOP* submission platform)

International Journal of Paramedicine

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GUIDELINES FOR AUTHORS

The *International Journal of Paramedicine* (*IJOP*) is a forum for scholarly contributions and state-of-the-art research relevant to patient care and the growth and advancement of paramedicine, including the areas of paramedic leadership, management, education, operations, culture, professional and clinical practice. The *IJOP* encourages exploration of paramedicine from diverse theoretical and practical views from all disciplines, including business and economics; the natural, basic, and applied sciences; and the humanities, social sciences, and arts. Priority will be given to submissions that use sound theoretical or conceptual frameworks, strong methodological design, and relevance to the international paramedic community. All methodologies such as quantitative, qualitative, mixed methods, and knowledge syntheses will be considered.

NEMSMA is a longtime collaborator with National Association of EMS Physicians in support of *Prehospital Emergency Care*. In continuation of that relationship, IJOP and PEC have established a collaborative relationship that will the facilitate the exchange of submissions in certain circumstances based in part on which journal may be the best fit for a particular manuscript.

GENERAL GUIDELINES AND NOTES

- The *IJOP* only publishes material in English. Please use Academic English.
- The *IJOP* accepts submissions in the following categories:
  - Case Studies (≤2,000 words)
  - Concepts (≤3,000 words)
  - Correspondence / Commentary (≤1,000 words)
  - Education (≤3,000 words)
  - Empirical Investigations / Original Research (≤4,500 words)
  - Methodology (≤2,000 words)
  - Quality Improvement Project Reports (≈3,000 words)
  - Reviews / Synthesis (≤4,000 words)
  - Special Reports (≤2,000 words)
  - Toolbox (≤1,500 words)

The word limits noted above are guidelines for the various submission types. Authors are encouraged to adhere to these guidelines and to be concise in their submissions.

- Merriam-Webster's Collegiate Dictionary (11th ed.) should be consulted for spelling.
- Contributions that explore non-clinical topics such as leadership, operations, education, professional practice, and the culture of paramedicine are strongly encouraged.
- Based on the international scope of the *IJOP*, contributions should provide a degree of generalizability and transferability to global settings and should have relevance to the *IJOP's* broad readership.
- *IJOP* discourages multiple publications derived from a single study.

- All original research submissions must have received approval from an Institutional Research Board (IRB) or Research Ethics Board (REB).
- Once a submission has been assessed for suitability by the editorial team, it will undergo a double-blind peer-review by independent, anonymized reviewers.

As part of the submission process, authors will be required to confirm that their submission complies with all of the items below. Submissions may be returned that do not adhere to these guidelines:

- The submission cannot be previously published or in the submission process of another publication (or an explanation has been provided a cover letter to the Editor).
- The Author and Funding File and the Main Submission File are both in Microsoft Word document file format.
- An ICMJE Form for Disclosure of Potential Conflicts of Interest is submitted for each author.
- All illustrations, figures, and tables should be placed within the text at the appropriate points AND submitted as separate files in a high resolution format.
- Supplemental media files (e.g., spreadsheets, slides, audio or video files) may be included for reader access. The file should be hosted by the authors unless other arrangements have been made with the Editors.
- Where available, URLs for each reference has been provided.
- The text is double-spaced in a 12-point font.
- Page numbers and line numbering is used for both the 'Author and Funding File' and the 'Main Submission File'
- The text adheres to the stylistic and bibliographic requirements outlined.
- Authors are strongly encouraged to follow any EQUATOR (Enhancing the QUAlity and Transparency Of health Research) Guidelines that apply to their type of research. These include, but are not limited to:
  - Randomized trials
    - CONSORT and its extensions
      - https://www.equator-network.org/reporting-guidelines/consort/
  - Observational studies
    - STROBE and its extensions
      - https://www.equator-network.org/reporting-guidelines/strobe/
  - Systematic reviews
  - PRISMA and its extensions
    - https://www.equator-network.org/reporting-guidelines/prisma/
  - Study protocols
    - SPIRIT and the PRISMA-P extension
      - https://www.equator-network.org/reporting-guidelines/spirit-2013-statement-defining-standard-protocol-items-for-clinical-trials/
  - Diagnostic/prognostic studies
    - STARD and the TRIPOD extension
      - https://www.equator-network.org/reporting-guidelines/stard/
  - Case reports
    - CARE and its extensions

        - https://www.equator-network.org/reporting-guidelines/care/
    - Clinical practice guidelines
        - AGREE and the RIGHT extension
            - https://www.equator-network.org/reporting-guidelines/care/
    - Qualitative research
        - SRQR and the COREQ extension
            - https://www.equator-network.org/reporting-guidelines/srqr/
    - Animal pre-clinical studies
        - ARRIVE
            - https://www.equator-network.org/reporting-guidelines/improving-bioscience-research-reporting-the-arrive-guidelines-for-reporting-animal-research/
    - Quality improvement studies
        - SQUIRE and its extensions
            - https://www.equator-network.org/reporting-guidelines/squire/
    - Economic evaluations
        - CHEERS
            - https://www.equator-network.org/reporting-guidelines/cheers/

Note that there is a section in EQUATOR with guidelines specific to emergency medicine that may also be applicable to studies in paramedicine.

SUBMISSION FILES

The following describes the 'standard' submission files that should be uploaded via the *Journal* submission website for each manuscript. Please refer to the specific submission guidelines for each submission category for more specific instructions that may apply.

Author and Funding Information File

Author page

- All authors of a manuscript should provide their full name with up to four post-nominals and up to two organizational affiliations and titles – exactly as they should appear in the publication.
- Where available, include ORCiDs (http://orcid.org) numbers and social media handles (e.g., Facebook, Twitter, LinkedIn) for each author.
- If an author changes their affiliation during the peer-review process, the new affiliation information can be given to the Editorial Team and will be handled as any other manuscript revision. Please note that no changes to affiliation can be made after the pre-publication galleys of the manuscript have been accepted for final publication.
- One author must be identified as the corresponding author and their email address must be provided so it can be included the frontmatter of the article.
- If the work presented in the manuscript was presented at conference or published in abstract form, identify the name of the event, location, format, and date of presentation.
- Acknowledgements, where applicable, can be provided. Brevity is strongly en-

couraged.
- Please ensure that everyone who meets the International Committee of Medical Journal Editors (ICMJE) requirements for authorship is included as an author (http://www.icmje.org/recommendations/browse/roles-and-responsibilities/defining-the-role-of-authors-and-contributors.html).

Funding Page

- This page should provide the details for any funding that supported the submitted work, to include all details required by your funding and grant-awarding bodies. The following template sentences are suggested:
  - For single agency grants: This work was supported by the [Funding Agency] under Grant [number xxxx].
  - For multiple agency grants: This work was supported by the [Funding Agency #1] under Grant [number xxxx]; [Funding Agency #2] under Grant [number xxxx]; and [Funding Agency #3] under Grant [number xxxx].
  - If a funding source was not involved, please confirm with a statement such as, "External funding was not used to support this work."

Main Submission File

- To provide a high level of objectivity in the peer-review process *IJOP* uses a double blind process. The identities of the authors and their institutions are not revealed to the reviewers and the identifies of the reviewers are not revealed to the authors.
- Due to the double blind review process, information about the authors and their institutions should not appear anywhere in the main submission file. This should include removal of identifying information in the 'properties' of the Microsoft Word (.doc or .docx) files that are submitted.
- Unless stated otherwise in the directions for a specific manuscript category, all submissions should include the following elements in the following order as a single document file, called the Main Document File, with separation of pages where requested.

Title page

- Provide the suggested title for the published article. Please note that the title used for publication is subject to editorial team approval.

Abstract, Keywords, Disclosures / Conflicts, Presentations, and Acknowledgements Page

- Unless exempted or described differently in the directions for a specific submission category, limit abstracts to 300 words or less.
- Unless exempted or described differently in the directions for a specific submission category, this page will also include between three (3) and six (6) keywords that will be used for title and search engine optimization. Keywords of 'paramedicine' and 'emergency medical services' will be added by default and wil not count towards the keyword count requirements.
- State any disclosures or conflicts for each author. This will be in addition to completion of the ICMJE Disclosure Forms for each author as described below.

Primary Manuscript Body Pages

- The primary body of the manuscript will come next in the main submission file.

The composition of the primary body of the manuscript may vary with the category of the manuscript. Refer to specific manuscript category descriptions for details.

- Tables should be used to summarize large amounts of information rather than writing it out as a narrative. Tables may be created within the word processor or inserted from another program (e.g., Excel). If another program is used to create the table, please include the original source file as a supplementation media file submission. All tables should be inserted into this primary manuscript body file, must be labelled sequentially, and referred to in the text. Table captions must include a the table number and a name for the table at a minimum. Additional descriptive text may be added to the caption as needed to complement the reference to the table in the main body of the paper.
- Figures shall be inserted directly into the text at the appropriate position. These may be lower resolution images to simply show their correct placement. Figures must be labelled sequentially and referred to in the text. Figure captions must be included with the figure number and a name for the figure at a minimum. Additional descriptive text may be added to the caption as needed to complement the reference to the figure in the main body of the paper. In addition to including figures in the text, submit each figure as a supplemental media files in high resolution PDF, .jpeg, .tiff, or .png file formats, with a 300dpi minimum quality.

Reference Pages

- Where applicable, the references for the manuscript come next. Use endnotes rather than footnotes. They should use APA style reference formats in the body of the manuscript and in the endnotes.
- In each endnote, include hyperlink whenever possible to the referenced document. A DOI hyperlink is preferred, which will have a format of https://doi.org/XXXXX. If a DOI is not available, provide a link to the source journal, publisher website or similar source beginning with the words, "Accessed from: …"
- Authors are responsible for the accuracy of all references, links and in text citations.

Appendices Pages

- Where applicable, any appendices to the manuscript are inserted next.

ICMJE Forms for Disclosure for Potential Conflicts of Interest

- One form per author should be submitted.
- The form is available at: https://icmje.org/disclosure-of-interest/

Supplemental Media Files

- If the submission includes any supplemental media files (e.g., spreadsheets, slides, tables, figures, audio or video files), they would be each be uploaded individually.

GUIDELINES FOR CATEGORY-SPECIFIC SUBMISSIONS

Case Reports (≤2,000 words)

- These manuscripts share the experience of unusual clinical presentations, circumstances, or treatment approaches. Case reports should be structured as described in the Consensus-based Clinical Case Reporting Guideline (CARE; https://www.equator-network.org/reporting-guidelines/care/).

Concepts (≤3,000 words)

- These papers present a specific management or clinical concept, idea, or theory – and describes its practical application. If the paper presents a new concept, it may also suggest research, improvement projects, or pilot implementations of its application. Along with other standard submission file elements, the primary manuscript body pages file for Concept papers should contain:
  - Introduction - The introduction should describe the problem, issue, or circumstance that the concept is intended to address. Where applicable, address the current literature that demonstrates a gap and any pertinent background information.
  - Concept Description – Provide a description of the concept and how it can be applied. Where applicable, provide sufficient detail and clarity of any methods or procedures and the setting and population to which the concept applies.
  - Discussion - Authors are encouraged to include a critical review of related research and a fulsome discussion that highlights how the concept contributes to the field of paramedicine. Address any limitations of the concept.

Dialogues (≤1,000 words)

- The Dialogues section will publish comments and questions from readers related to previously published articles. Along with other standard submission file elements, the primary manuscript body pages file for correspondence should include:
  - Subject Paper Information - Provide the title, name of the first author, and the *IJOP* issue for the paper that is the subject of the correspondence.
  - The narrative of the correspondence.

Editorials (≤2,000 words)

- Editorials are a venue for the expression of opinion and perspective on topics relevant to the paramedicine community. They should make clear point(s) in a concise manner with a scholarly approach and tone. They should not be used for the presentation of data, findings, or research that has not been previously published.

Educational Methods and Processes (≤3,000 words)

- These submissions explore a specific educational process, approach, or method. The paper should also discuss any issues to consider in its practical application. Along with other standard submission file elements, the primary manuscript body pages file for Education papers should contain:
  - Introduction - The introduction should describe the problem, issue, or circumstance that the educational process, approach, or method is intended to address. Where applicable, address the current literature that demonstrates a

gap and any pertinent background information.
- Description – Provide a description of the educational process, approach, or method and how it can be applied. Where applicable, provide sufficient detail and clarity of any methods or procedures and the setting and population to which the process, approach or method applies.
- Discussion - Authors are encouraged to include a critical review of related research and a fulsome discussion that highlights how the concept contributes to the field of paramedicine. Address any limitations of the concept.

Empirical Investigations / Original Research (≤4,500 words)

- The submission of manuscripts for empirical investigations / original research may be clinical or non-clinical. Several of the EQUATOR guidelines, described previously, may apply to any given study in this category. Please apply them as appropriate to your particular investigation.
- Authors may provide, or editors may suggest, that some information be provided as a supplemental file so that the main paper remains concise. The supplemental content may include data sets, images, video clips, and in-depth details on methodology. Along with other standard submission file elements, the primary manuscript body pages file for empirical investigations / original research should include elements as called for in the applicable EQUATOR guidelines.
- NEMSMA is a longtime collaborator with National Association of EMS Physicians in support of *Prehospital Emergency Care (PEC)*. In continuation of that relationship, *IJOP* and *PEC* have established a collaborative relationship that exchanges manuscripts in certain circumstances. Empirical investigations on clinical topics may be forwarded to *PEC* for their initial consideration with author consent.

Methodology (≤2,000 words)

- This category of submissions provides deep explorations of methods used or may be used in research studies or improvement projects. These methods should be novel in some way that makes them of significant interest in their own right, separate from the studies in which they are utilized. These papers can also provide a more detailed description of the methods than would otherwise be appropriate in the primary research or improvement project manuscript. The primary paper's methods section may direct readers to a methodology paper in this category for more detailed descriptions of the methods it utilized.
- Along with other standard submission file elements, the primary manuscript body pages file for Methodology papers should contain appropriate elements from the EQUATOR guidelines, as described for empirical investigations.

Quality Improvement Project Reports (≤3,000 words)

- *IJOP* acknowledges the importance of quality improvement activities to optimize EMS system performance and patient outcomes and welcomes manuscripts describing quality improvement projects.
- United States regulations do not require quality improvement activities to have Institutional Review Board (IRB) or Research Ethics Board (REB) approval. The distinction between manuscripts requiring or not requiring IRB/REB approval

may be subtle. Manuscripts not requiring approval will generally be those which do not apply clinical treatments or diagnostic methods that have not been previsouly established in the literature. A manuscript that explores different ways to implement a clinical treatment or diagnostic method may not require approval.

- The *IJOP* shall reject manuscripts that appear to have framed an activity as quality improvement to circumvent research compliance, conduct, or reporting standards.
- Authors may contact the editorial office if they are uncertain whether their work should be submitted as a quality improvement or a research manuscript.
- Quality improvement project reports should adhere to the Standards for Quality Improvement Reporting Excellence (SQUIRE) guidelines (http://www.squire-statement.org). With permission of the Editorial Team, authors may submit manuscripts that use other generally accepted improvement project frameworks (e.g., IHI Model for Improvement; DMAIC).
- In general, quality improvement project reports should describe the process being examined; the process change(s) that were tested; the baseline process performance level; the methods used for conducting process tests and evaluating the results; the results, including the post-intervention performance levels; any confounding variables and balancing measures; and the process change iterations as applicable.
- The manuscript discussions and conclusions should highlight what the external audience can learn from the reported experience, not just the activity's internal success or failure.
- Authors may provide, or editors may suggest, that some information be provided as a supplemental file so that the main paper remains concise. The supplemental content may include data sets, images, video clips, and in-depth details on methodology.

Reviews / Synthesis (≤4,000 words)

- *IJOP* invites the submission of reviews of all types, including those with and those without meta-analytic components. In addition to the guidelines for original research provided elsewhere in these guidelines, any submissions in this category should be consistent with the Prisma 2020 guidelines for reporting systematic reviews https://www.equator-network.org/reporting-guidelines/prisma/.

Toolbox (≤3000 words)

- These submissions will explain a tool or technique and describe its practical use. Where applicable, the articles may include a supplemental file or link that contains the tool and a data file where the reader may try out the tool.
- Along with other standard submission file elements, the primary manuscript body pages file for Toolbox papers should contain:
  - Introduction - The manuscript shall include an introduction that provides an overview of the type(s) of projects that the tool or technique could be used for or the specifics of the project that it was actually used in.
  - Description of the Tool / Technique – As the central focus on the paper, this section shall provide in an in-depth examination of the tool or technique and its mechanics. Describe how the tool or technique should be applied in con-

text of a clinical, operational, or administrative setting.
- Discussion – Discuss the underlying rationale for the tool or technique and why it may be favored over other options.
- Provide a critique of related methods. Also include discussion of any limitations of the tool or technique.
- Exercise – Where applicable, describe how to use the tool or technique in conjunction with a sample data set or scenario.

Special Reports

- This submission category will be used for articles of a scholarly nature that do not fit into one of the other *IJOP* submission categories. Authors are encouraged to use the guidelines described in this document that seem to be most applicable to their Special Report, but consultation with the Editorial Team before manuscript submission is strongly encouraged.