This doctoral scholarly paper, directed and approved by the candidate's committee, has been accepted by the College of Graduate and Professional Studies of Abilene Christian University in partial fulfillment of the requirements for the degree

Doctor of Nursing Practice

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Abilene Christian University

School of Educational Leadership

Integration of Nurse Practitioners into the EMS

A scholarly paper submitted in partial satisfaction

of the requirements for the degree of

Doctor of Nursing Practice

by

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Dedication

This DNP project is dedicated to the brave and caring fire and emergency professionals and their humble and tireless action to public service. I dedicate my work to you thankfully knowing that St. Florian smiles upon us.

Acknowledgments

I would like to graciously acknowledge my faith in God and in all my teachers, mentors, and, most importantly my wonderful family, for their belief in me and my abilities. I thank and graciously acknowledge the Abilene Christian University faculty and the magnificent cadre of colleagues who underpin my ambitions, specifically the El Paso Fire Department, A. Duque, and Dr. Ken Berumen. There are several personal mentors, friends, and colleagues who have been tremendously supportive to me in this endeavor. I appreciate you all and extend to everyone warm wishes and God's blessings.

Abstract

With the passage of the Affordable Care Act, more individuals have obtained health coverage, which has inundated the emergency medical service (EMS) systems, proliferating the number of non-urgent and non-emergent transports. The ability of nurse practitioners (NPs) to provide quality, evidence-based, safe, patient-centered care promotes innovative models of care delivery within the EMS system. The purpose of this manuscript was to explore the role of NP inclusion within the EMS system and the NPs' impact as it relates to patient transports. The population explored included those individuals who accessed the El Paso Fire Department 911 EMS system. The data gleaned from the population assessed were reviewed, and the application of Levine's theoretical model provided the framework for the pilot study facilitating the integration of NPs into the EMS system. Further evaluation of the impact NP inclusion has within the EMS system related to transports was evaluated against traditional 911 EMS system response and ongoing evidence-based practice, and standardization of models of care within the EMS system is ongoing.

Keywords: *ED overcrowding, reducing frequent patient ED admissions, community paramedicine, mobile integrated health, nurse practitioners in fire & EMS, 911 non-urgent EMS transports*

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Chapter 1: Introduction

The passage of the Patient Protection and Affordable Care Act, abbreviated and known as the Affordable Care Act (ACA), has expanded health coverage to U.S. citizens, resulting in an overabundance of non-urgent and non-emergency transports. The influx in the number of individuals receiving health care coverage under the ACA has given rise to many individuals, families, and communities utilizing the services of their 911 emergency medical service (EMS) systems. The EMS system has been inundated with large volumes of non-emergent and non-urgent transports to hospital emergency departments (EDs). The number of non-urgent and non-emergent transports to the ED reduces the safety and quality of overall patient care and diminishes the efficacious appropriation of essential health care resources. The inclusion of nurse practitioners (NPs) into the EMS system can reduce the number of non-urgent and non-emergency transports and improve resource utilization within the EMS system.

Background

The challenge of health care legislation requires the ability of key stakeholders, influential organizations, political parties, and the public to remain focused on an agenda and health care policy that allows quality, cost-effective, accessible health care delivery using advanced practice nurses. Integration of NPs into the EMS system to evaluate and treat on scene reduces the burden on hospital EDs and urgent care centers, while reducing overall health care cost, improving resource utilization, and providing point-of-service care. Fire department EMS systems are well positioned to deliver emergency medical services; however, the use of fire apparatus to transport dual-role firefighters to the scene of a medical emergency is not very cost effective in terms of maintenance and fuel costs (Fitch, Knight, & Griffiths, 2015). Nurse practitioners provide cost-effective, quality primary care; are efficacious in the management of

chronic diseases; and are significant to care coordination. Opportunities to decrease expenses related to the large number of low-acuity calls, while maintaining the ability to respond quickly to life-threatening emergencies, are essential responsibilities of the EMS system (Escott, 2017).

Problem Overview

Emergency departments and urgent care centers continue to be overburdened with non-urgent, non-emergency, and preventable transports. The EMS system is a major contributor to this costly and burdensome problem (National Highway Traffic Safety Administration, 2013). The EMS system has failed to progress and adapt in its service delivery model. Most EMS systems throughout the nation remain solely focused on responding quickly to serious accidents and critical emergencies, even though patients increasingly call 911for less severe or chronic health problems (Fitch et al., 2015). Integration of NPs into the EMS system to assess, treat, and release decreases the burden of non-emergent, non-urgent transports and reduces preventable transports to EDs and urgent care centers. The integration of NPs within the EMS can increase access to quality care and improve resource utilization. Nurse practitioners and, more specifically, Doctor of Nursing Practice (DNP) prepared clinicians, are essential in the facilitation and implementation of evidence-based medicine and are critical providers in the sustainability of a culture that is supportive of quality, safe, and evidence-based practice. The tangible benefits of NPs are ongoing, and their merit to the health care system is efficacious, with robust health care outcomes that are repeatable, meaningful, and positive.

It is essential to define, explore, and understand the implications and process around the expanding role of advanced practice nurses within the EMS system. The dynamics currently underway with community paramedicine, along with the expanded call for EMS systems to improve service delivery and become more involved in health care in its entirety, demands a

strong nursing presence and nursing leadership. With the changes in full practice authority and compact licensure changes and the increase of advanced practice nurses within the workforce, it is imperative to understand and define nursing impact, influence, and overall contribution as key drivers of health care delivery for the continued improvement of health outcomes.

Project Purpose

Decreasing the number of non-urgent and non-emergency transports by the EMS system is essential to decreasing the costly, timely, and inefficient use of EMS systems and the ED. The purpose of the pilot study was to explore the evidence-based practice of NP inclusion within the EMS system to determine if this addition to EMS response teams decreases the number of non-urgent and non-emergency transports. A pilot study is an initial exploration of the feasibility of an innovative practice or intervention in clinical research (Leon, Davis, & Kraemer, 2011).

Problem Statement

The EMS system's current delivery model cannot continue to burden hospital EDs and urgent care centers with costly non-emergent and preventable transports. In an era of health care reform and fiscal prudence, the current EMS delivery model cannot continue (Fitch & Knight, 2015). The EMS system transport of frequent patients and non-urgent and non-emergency patients is an unnecessary burdening cost. In 2012, patients who visited the ED five or more times comprised 3.25% of ED patients, but accounted for 17% of ED visits and 13.7% of hospital costs (Solberg et al., 2016). Without changes to the current EMS system response teams, such as the addition of NPs, unnecessary 911 ambulance transports within the EMS systems will continue to contribute to this unnecessary cost.

PICOT Question

Advancing nursing clinical research and advanced nursing practice requires the ability of DNP-prepared nurses to translate scholarly clinical practice projects into applied evidence-based clinical practice using the clinical question asked in the PICOT format. The population (P), intervention/issue (I), comparison (C), outcome (O), and time (T) format yields the most relevant and evidence-based results when cultivating inquiry on evidence-based projects (Melnyk & Fineout-Oveholt, 2015). A well formulated PICOT helps to define the key operational words to provide the clinical researcher the most relevant best evidence to critically appraise and translate into best clinical practice outcomes. Asking clinically relevant questions is essential to the development of new knowledge and bridges the gaps related to deficits in clinical research application and the continued advancement of quality improvement science (Chism, 2016).

The PICOT question is: Does the inclusion of a nurse practitioner within an EMS system decrease the number of patient transports to emergency departments over two months?

P – EMS system

I – NPs within the EMS system

C – EMS system

O – decrease patient transports

T – two months

Significance of Problem

With the passage of the ACA, more individuals have found insurance coverage and are utilizing the EMS system more frequently. From 1999 to 2009, there was an 83% increase in frequent ED patient visits, and expansion of insurance coverage under the ACA is further increasing the use of ED and EMS ambulance service (Solberg et al., 2016). Advanced practice

RNs continue to be crucial providers of care and are essential to redesigning the health care delivery system and improving the health outcomes of individuals, families, and communities. Interdisciplinary professionals must work together in a collaborative team spirit to build a culture within the health care organization to improve care and patient outcomes (Melnyk & Fineout-Oveholt, 2015). Prior to the ACA legislation, the EDs nationwide had traditionally been the safety net and primary source of medical treatment and evaluation, and EMS systems contributed excessively to this ongoing, inefficient care with limited access and poor utilization of resources. Inclusion of NPs into the EMS system can facilitate evidence-base practice that improves the decision-making process of 911 EMS system stakeholders.

The rising cost of health insurance and premiums has caused much angst among consumers and politicians and has left the health care industry seeking solutions and compromise. The nursing profession has foundations in health promotion, risk reduction, and population health, and therefore, the discipline of nursing is well positioned to impact the health outcomes of people in multiple settings (Chism, 2016). Nurse practitioner integration within the 911 EMS system can facilitate a review of the relevancy for ambulance transport and offer an innovative and meaningful, safe alternative delivery of care system. Reimbursement rates for ambulance transport of Medicare and Medicaid patients (who account for approximately 60% of patients transported by EMS agencies) have consistently failed to match the cost of service (Fitch et al., 2015). Development and implementation of more cost-effective care delivery systems is essential to continuous quality improvement, and NPs, specifically those prepared at the DNP terminal degree, are critical to improvement of the health care system through their integration within the EMS system.

Research Question

Does the inclusion of a nurse practitioner within an EMS system decrease the number of patient transports to emergency departments over two months?

Methodology

A pilot test design experiment was taken both before and after comparing units with an NP versus units without an NP. The pilot study explored the inclusion of NPs to decrease the number of ambulance transports within the EMS population. A pilot study is not a hypothesis testing study; a pilot study represents a small-scale approach to test the methodology and procedures to be evaluated and implemented on a grandeur scale with the continued science of process improvement methodologies (Leon et al., 2011).

Independent variable: No NP response unit versus NP response unit.

Dependent variable: Transport

Operational Definitions

To ensure that the most up-to-date and relevant evidence-based practices are critically appraised for the pilot study, keywords that cultivate best inquiry to the PICOT question are essential. The search for best evidence begins with the elements of the PICOT question, and keywords help guide and formulate the literature review for appraisal of the best evidence (Melnyk & Fineout-Oveholt, 2015). The dynamics of the health care industry require continuous evaluation and critical appraisal of best practice and evidence-based interventions that facilitate improved health outcomes of individuals, families, and communities.

Community paramedicine. To address the growing number of chronic conditions within their state, Massachusetts Department of Public Health utilizes NPs and specialty trained and equipped paramedics to provide advanced community paramedicine (Iezzoni, Dorner, &

Ajayi, 2016). Community paramedicine remains dynamic and is achieved through individualized needs assessment for the community and population served. The EMS providers who make up the community paramedicine workforce are diverse in roles, training, and education (Iezzoni et al., 2016).

Emergency department overcrowding. Emergency department overcrowding is a frequent and costly problem. The decompression of ED overcrowding can be complex and multifactorial. The reduction of non-urgent and non-emergent 911 transports can help alleviate ED overcrowding. The 911 EMS system ambulance transports are a major contributor to ED overcrowding (National Highway Traffic Safety Administration, 2013).

Emergency medical services. Patients who frequently use the ED, use the EMS system. Very little peer-reviewed studies have looked at EMS cost and hospital care cost to estimate the total emergency care cost for this patient population (Solberg et al., 2016). EMS transports and increased demands for community and population health requires EMS systems to develop innovative models of care. Today, the EMS system continues to evolve to meet the challenges and demands of the communities they serve.

Frequent patients. Solberg et al. (2016) described frequent patients as a cause of ED overcrowding and increased ED health care costs, which results in the reduction of optimization of ED resources. Many times, those individuals who are high utilizers of the 911 EMS system are also those who present to the ED for all their health care needs. Solberg et al. described frequent patients as those individuals who visited the ED five or more times during their 2012 study.

Mobile integrated health. Mobile integrated health, while not standardized nationally, can benefit communities and populations with services provided by paramedics, NPs, and other

integrated health professionals that include pharmacists and physician assistants. Recognizing that mobile integrated health and advanced EMS systems can offer services other than an immediate transport to the ED is essential to EMS systems' viability and sustainability (Fitch & Knight, 2015).

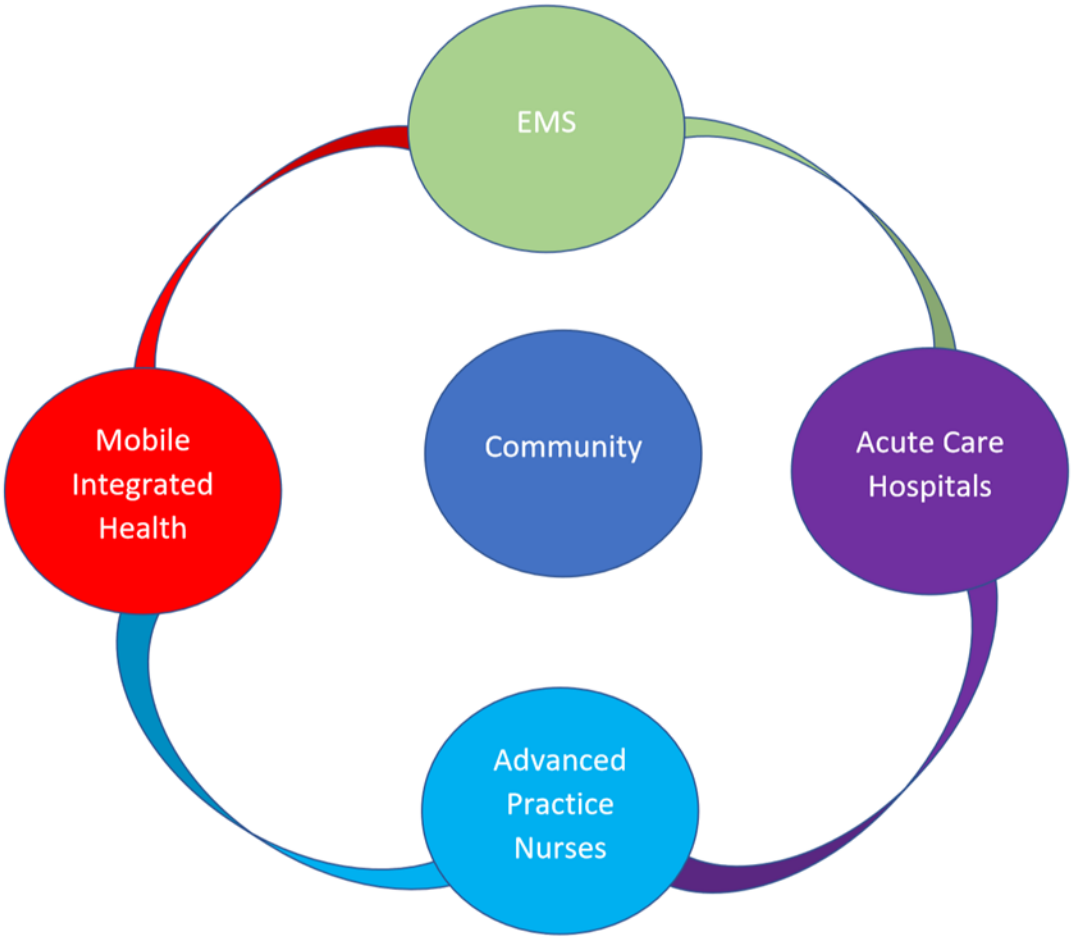
911 transports. Partnering with hospitals and Medicaid care coordination, along with teams of NPs, physicians, and paramedics, can reduce 911 calls and 911 transports (National Association of Emergency Medical Technicians [NAEMT], 2015). Collaborative efforts across the nation with hospitals, fire departments, NPs, and other health care professionals to develop a team-based approach to preventable hospital readmissions, as well as 911 transports, have been successful in many parts of the United States. Seeking strategies to reduce cost among frequent patient presentations to the ED, preventing avoidable hospital readmissions, and reducing 911 transports requires bringing payer sources, hospitals, and the EMS system together to better address their community's needs (NAEMT, 2015).

Theoretical Framework

An important foundation for advanced practice nursing is to improve quality of care and reduce hospitalizations through the synthesis of theoretical, scientific, and contemporary knowledge to guide care through Levine's conservation model (Abumaria, Hastings-Tolsma, & Sakraida, 2015). Nurse practitioners implemented into the EMS system can significantly impact the health care systems with the application of Levine's theory of conservation (*See Figure 1*). Advanced practice nurses prepared at the DNP terminal degree are well equipped to facilitate change through the application of theoretical frameworks (Chism, 2016). As drivers of change, the DNP-prepared professional is well equipped to implement systemic process improvements for improved outcomes.

Levine's conservation model describes how adaptation leads to wholeness and offers a valuable theoretical lens as clinicians provide care specifically to those of advanced age and with multiple chronic conditions (Abumaria et al., 2015). The discipline of nursing and its fundamental framework is based on caring and wholeness of the individual that is holistic in nature. Levine's theoretical model can be applied broadly to varying populations, individuals, communities, and health policies (Abumaria et al., 2015).

Figure 1



Nursing praxis reinforces and supports the advanced practice preparation, training, and education of the DNP-prepared clinician. The eight essentials of the DNP curriculum underpin the necessary framework for DNP competencies, and Levine's conservation model provides guidance to the role development of NPs into the EMS system. Application of Levine's theoretical model allows for targeted interventions that promote adaptation, wholeness, and conservation of energy that improves health outcomes (Abumaria et al., 2015). According to Chism (2016),

> The application of theory into practice may extend along several lines, such as using relevant theories to address patient-centered clinical problems, conceptualized quality improvement initiatives, or address organizational problems related to the uptake and diffusion of well-tested, innovative approaches to clinical problems (p. 118).

Levine's theory of conservation includes assessment, trophicognosis, hypothesis, intervention, and evaluation to provide the framework for the integration and application of DNP advanced practice providers into the EMS system. Levine's theory of conservation focuses on structural integrity of the person, the person's environmental structure, and the bio-physical and psychological adaptation.

Much of health care today is consumed by the elderly at all health care levels. Older adults represent the most medically challenging, with multifactorial complexities (Abumaria et al., 2015). Conservation includes nursing intervention and patient adaptation and participation to achieve and maintain a safe balance. An important aspect of Levine's conservation model is the role of the advanced practice registered nurse (APRN) as the leader for the coordination of care among the patient, family, and other health care providers (Abumaria et al., 2015). This framework facilitates the NP's role within the EMS system and allows synthesis and evaluations

of health outcomes and facilitates, as well as fosters, a therapeutic milieu that is conducive to evidence-based practice.

Summary

Chapter 1 illustrated the need for the use of integrative models of care with the inclusion of NPs to improve resource utilization in the EMS system, with specific implications of interventions aimed at reducing the number of non-urgent and non-emergent ambulance transports. The exploration of NP integration into the EMS system to improve health outcomes considers an innovative way to use APRNs to improve access to care for individuals, communities, and populations through qualified competent health care providers. The use of Levine's conservation model explores the framework of nursing theory to facilitate holistic, patient-centered care that improves the health outcomes of the individual, families, and populations. The exploration of NPs into the EMS system also stimulates discussion on the burdensome cost of non-urgent and non-emergency ambulance transports to the EDs and its effect on upstream and downstream stakeholders and how to reign in the global impact of cost on the global health care system. Chapter 2 will provide insight from the literature review regarding the impact NP inclusion within the EMS system has had up to this point

Chapter 2: Literature Review

Introduction

The rapid and dynamic pace at which health care is evolving requires the 911 EMS agencies to play a significant role in the improvement of their communities' health outcomes and in the reduction of overall health care costs (Fitch & Knight, 2015). The relevance of this article review is the strength demonstrative of NP inclusion within the 911 EMS system to improve the health outcomes of individuals, families, and communities. Integration of NPs into the EMS system to evaluate and treat on scene saves time and reduces overall health care costs. The weaknesses demonstrative of this article review is the lack of clearly defined NP roles within in the EMS system and the fact that community paramedicine is a relatively new concept, specifically as it relates to NP inclusion within the EMS system. Defining community paramedicine, along with improved resource utilization through NP inclusion within the 911 EMS system, is critical to collaborative care.

Burgett (2014) implemented a pilot study program within the Mesa Fire and Medical Department (MFMD) in 2006 after economic downturns and budget cuts. The MFMD realized 75% of its responses were medical in nature and were forced to face the missed opportunities to address some 911 calls with the appropriate resources. Non-urgent and non-emergent 911 calls require allocation of large numbers of resources, are costly, and often because of the 911 EMS system organization services, are delivered in a one-size-fits-all manner. Matching the response to the level of urgency, along with targeted personnel, saves money and resources and improves patient and population outcomes (Burgett, 2014). The strength of this article review was the clear and demonstrative impact NPs had in reducing the number of non-urgent and non-emergent transport. The article's pilot study was demonstrative of the impact of designating an emergency

response vehicle staffed with an NP to provide urgent care on wheels that reduced overall ambulance transports. The burden on hospital EDs and urgent care centers was also reduced, while improving resource utilization and providing point-of-service care. More than 33% of 911 calls nationwide can be classified as non-urgent or not immediately life threatening (Burgett, 2014). The weakness of the study was associated with long-term funding and partnering with hospital entities, as well as the salary requirement for NP staffing and MFMD collaboration. Significant changes in the delivery of health care and the political and bureaucratic environment calls upon health care providers and stakeholders alike to develop creative and innovative ways of delivering quality health care, increasing access, and decreasing overall costs. The EMS systems can no longer see themselves as independent from the rest of the health care system (Fitch & Knight, 2015). The EMS system is the nib of the patient's health care journey, and through the EMS system, the patient's journey is chronicled; however, the EMS system can do more with the inclusion of NPs into the EMS system to write a more detailed and individualized care plan for each patient. Non-urgent, non-emergent calls to the 911 EMS system unnecessarily tax fire and emergency services response units (Burgett, 2014). The burden of the cyclic nature of EMS transports of non-urgent and non-emergent conditions to EDs has a ubiquitous, crippling financial affect that does little to improve quality of and access to care.

Solberg et al. (2016) used a qualitative data collection of transport data from Medicare reimbursement schedules to estimate the cost of EMS transports and compared them between frequent patients and non-frequent patients who visited the ED. Frequent patients often present to the ED via ambulance transport, and they are frequently individuals who have multiple chronic conditions and chronic disease. Solberg et al. found that frequent patient hospital costs were $29.1 million, and those frequent patients arrived more often via ambulance, accounting for

32% total transports at an estimated cost of $2.5 to $3.2 million, bringing the total cost of emergency care to $31.6 to $32.3 million, approximately $25,000 per patient. The strength of the article illustrated the high cost associated with frequent patient presentation to the ED that is attributed to the chronicity of disease process and its impact on population health. Clinical significance, as well as the statistical significance, can be replicated and is an important interpretation for clinicians to observe (Melnyk & Fineout-Oveholt, 2015). The ability of NPs to interpret and apply statistical and clinical significance to an evidence-based project is developed and honed through the achievement of the DNP terminal degree.

Advanced practice providers, such as NPs and those NPs specifically prepared at the DNP terminal degree, are highly capable individuals who possess knowledge, skill, and leadership traits to exert a high level of trust and competence through patient-centered care within the EMS system. Nurse practitioners working collaboratively to accomplish a shared goal of improved patient outcomes and improved resource utilization decreases overall health care cost (Burgett, 2014). Notable weaknesses of the article are related to the inability to determine if those individuals identified as frequent patients to the ED were identified by frequent use of 911 ambulance EMS systems, by personally owned vehicle, or by some other means of presentation to the ED. When individuals, communities, and populations have access to qualified health care providers, such as NPs, primary care needs can be addressed, and individualized specialty care can occur with a focus on health, wellness, and prevention emphasized so that it is patient-centered. The ACA has expanded coverage to the uninsured and extended the coverage to those who are underinsured. The cumulative effect of the ACA legislation has led to an increase in U.S. citizens utilizing the 911 EMS system for other than life-threatening emergency conditions. Individuals, families, and communities rely on timely and effective response of 911 EMS

systems for emergent, acute, and critical care conditions. The influx of non-urgent, non-emergent 911 EMS system transports is burdensome, costly, and does not improve patient outcomes. The net effect of this reduces the overall effectiveness of fire and EMS resources and contributes to the overall rising cost of health care.

Literature Review

The literature review focused on relevant models of care that included the use of APRNs integrated or collaboratively engaged in interdisciplinary teams within the fire and EMS systems. Related articles and literature were also reviewed that demonstrated the use of APRNs in post-discharge care aimed at reducing preventable high-risk hospital 30-day readmissions that facilitate decompression of ED patient overflow.

An integrative review of the literature was performed seeking empirical and non-empirical evidence in practice delivery models related to the EMS system and the impact they have on ED overcrowding. I conducted a search of the Cumulative Index to Nursing and Allied Health Literature (CINAHL), EBSCOhost, and PubMed using a combination of keywords and phrases, such as *non-urgent EMS transports, community paramedicine, reducing non-emergent transports, ED overcrowding, nurse practitioners in EMS, nurses in prehospital care, ED unscheduled visits,* and *frequent patients to the ED.* These search combinations were extensive and yielded varying results. In the PubMed database, the use of the combination keywords *ED overcrowding* yielded 11 specific articles of related focus. The same keywords had varying results within the other databases, requiring a lengthier exclusion. After selection of the most appropriate articles, a qualitative and grounded theory approach was used in synthesis of the literature review.

Methodology

The review of the literature revealed some relevant qualitative and quantitative studies with statistical analysis using Pearson x2, Wilcoxon, pilot study, and retrospective analysis. There were no studies that solely looked at the decrease in cost and time as it relates to the implementation of NPs within the EMS system. Also, limited results reflected advanced practice nurses as the only response in the context of community paramedicine, and mobile integrated health is currently in an influx of change. Qualitative approaches were also key components of this assessment and literature review process. Qualitative methods utilized in this study included structured personal interviews with key participants that included field observation and clinical ride-a-longs. Descriptive statistics, including frequencies and percentages, were also used to characterize the study population (Patterson, Baxley, Probst, Hussey, & Moore, 2006). There was a significant decrease in the amount of non-urgent, non-emergent transports in the literature review where NPs in pilot programs had been implemented within the EMS system. Mesa, Arizona; Los Angeles, California; and Colorado Springs Fire and EMS systems, specifically, demonstrated within their system delivery a decrease in frequent emergency visits and in non-urgent and non-emergency transports. These organization utilized advanced practice nurses, but again, their systems and responses were supported or augmented in some way by emergency medical technicians (EMTs) and paramedic combinations in some aspect or form that included additional EMS providers. Mesa, Arizona, utilizing a pilot study involving an NP transitional response vehicle, reduced emergency room (ER) visits, of which 75% of their responses had been medical in nature (Burgett, 2014). Decreasing ED overcrowding and reducing unnecessary ER visits improves resource utilization and decreases cost. A decrease in hospital readmissions, ED cost, and unnecessary transports can save $597 million annually (National Highway Traffic

Safety Administration, 2013). The contribution of NP inclusion within the EMS system has been evident in MFMD in Mesa, Arizona; Colorado Springs Fire Department in Colorado Springs, Colorado; and the Los Angeles Fire Department in Los Angeles, California. During a post-intervention analysis, an estimated $145,000 in Medicaid claims for transport or ER treatment had been saved within the trial period of an NP response unit (M. Escobedo, personal communication, September 20, 2017). Essentially recognizing that advanced practice nurses can provide quality, cost-effective care, while improving community outcomes, EMS systems can have a major role in health prevention and promotion. An analysis model by the National Highway Traffic Safety Administration and the Department of Health and Human Services pilot-tested strategies and innovation, along with adopted protocols, and determined approximately 15% of all Medicare ED transports could be safely treated outside the ED if other options existed (National Highway Traffic Safety Administration, 2013).

Literature Review Findings

The review of the literature revealed some relevant qualitative and quantitative studies with statistical analysis using Pearson x2, Wilcoxon, pilot study, and retrospective analysis. There were no studies that solely looked at the decrease in cost and time as it relates to the implementation of NPs within the EMS system. Coordination regression utilizing backward elimination selection approach and an alpha value of < 0.05 was used to characterize odds of medically unnecessary transports (Patterson et al., 2006).

There was a significant decrease in the amount of non-urgent, non-emergent transports in the literature review where NPs in pilot programs had been implemented within the EMS system. A chi-square test used to test for differences in the distribution of medical necessity between levels of categorical variables used two-sided chi-square conducted at alpha 0.05 (Patterson et

al., 2006). There is little research or data about the relationship of EMS system factors that compare traditional EMS system response teams' effectiveness and patient outcomes to community paramedicine and mobile integrated health teams utilizing NPs, physician assistants (PAs), pharmacist teams, or other EMS providers (emergency medical physicians).

Transformation of the EMS system to reduce non-urgent, non-emergent transports and reduce ED costs and utilization requires development of data collection systems and the impact on quality care metrics to be measured before and after intervention (National Highway Traffic Safety Administration, 2013). The perceived community health and population health needs rather than empirical data seemed to drive the EMS change in workforce status, which also seemed to overlap community paramedicine, mobile integrated health, and the need for EMS workforce retention. Mesa, Arizona; Los Angeles, California; and Colorado Springs fire and EMS systems specifically demonstrated within their EMS system delivery a decrease in frequent emergency visits and a decrease in non-urgent and non-emergency transports with the inclusion of NPs. The EMS systems can ensure cost-effectiveness and evidence-based delivery of care with quality clinical interventions with the use of physician extenders, such as nurse NPs and PAs (Fitch & Knight, 2015). This would seem to suggest the inclusion of advanced practice providers, such as NPs, had some effect on improved patient outcomes uniquely different than outcomes of traditional EMS encounters; however, whether these outcomes are parity with traditional outcomes that have nursing sensitive outcomes are not clearly defined. In the EMS community, many 911 calls do not result in *emergency care* so much as *unscheduled health care.* Hospitals have an incentive to collaborate with physician extenders, such as NPs, within the EMS system who offer services aimed at reducing hospital readmissions (Fitch & Knight, 2015).

Limitations

No consistent guidelines are currently available for how to implement, retain, recruit, qualify, and train NPs for implementation into the EMS systems. Community paramedicine was also not clearly defined, structured, or organized uniformly with NPs, specifically as many utilized traditional EMT paramedics and other allied health personnel, with some utilizing combination teams of EMT/paramedics and RNs. It is also noted that improvements in clinical research, EMS systems research, and uniform data collection (including workforce data) could result in an improved understanding of the impact of EMS workforce issues that integrate advanced practice providers into their systems and their impact and relations upon patient outcomes. The Institute for Health Care Improvement (IHI, 2017) triple aim goals include improving the health of populations, reducing per capita cost of health care, and improving the quality of care, satisfaction, and patient outcomes. Organizations and communities that attain the triple aim have healthier populations and reduced per capita cost of care for populations (IHI, 2017). Without a gold standard and the significant changes in the infrastructure of health care reimbursement models, coupled with full practice authority limitations and restrictions, need for innovation in the EMS delivery model of care is evident. The literature suggested that 11% to 61% of Medicare beneficiaries who received ED transports might not actually have required ED care, but no studies "described their methods in sufficient detail to support a firm conclusion" (Pezzone et al., 2016, para. 7). Inclusion of DNP-prepared NPs into the EMS system can improve EMS systems' ability to apply quality improvement metrics and statistical and scientific methodology to corroborate or refute these ambiguities. Levine's conservation theoretical framework of holism and adaptation through deliberate nursing intervention to achieve patient and population homeostasis through the use of resources requires identifying and promoting

individual patient needs and how best to identify and facilitate them. Future research should focus on addressing full practice authority for NPs, while exploring the full range of conditions that allow integration into the EMS system to address the complexities of care and conditions where *treat and release* may be appropriate.

Synergistically decreasing ED overcrowding and non-urgent, non-emergent, and frequent patient transports through the inclusion of advanced practice providers, such as NPs, may also be beneficial in decreasing health disparities, while improving access to quality cost-effective care. Bringing hospitals, emergency services, a payer source, and other health care specialist together to address community needs can significantly decrease 911 system super-utilizers and decrease ED overcrowding (NAEMT, 2015). With advanced practice providers, such as NPs, access to quality cost-effective care is extended to communities and populations and reduces health care disparities. Lack of uniformity in methods used to identify medically unnecessary or inappropriate EMS transports has hampered identification of appropriate solutions (Patterson et al., 2006). With the passage of the ACA, more individuals have obtained health coverage, which has inundated the EMS systems, proliferating the number of non-urgent and non-emergent transports. Inclusion of advanced practice providers, such as NPs, into the EMS system can decrease the number of non-urgent and non-emergent 911 EMS system transports and may increase uniformity and standardization of resources through nurse-driven, evidence-based, triage processes.

Summary

Non-urgent and non-emergency transports by the 911 systems to ED are costly and burdensome to hospitals. The integration of NPs into the fire and EMS systems has been shown to be essential in reducing non-urgent and non-emergent transports to the ED. The use of

APRNs within the 911 system has been shown to significantly decompress ED overload and contribute to more efficient allocation of ED resources to those within the ED who have acute, emergent, or critical needs. Nurse practitioners were also found to be critical in decreasing preventable and costly high-risk 30-day hospital readmissions through better coordination of care and post-discharge care and management of chronic illness.

A variance exists in how EMS systems incorporated NPs into community paramedicine programs. Mobile integrated health care development inclusion of NPs and integration of NPs, as well as other EMS providers and other health care professionals, within the fire and EMS service is dynamic and tailored to serve individualized communities and populations. A clearly defined mission and vision established by the EMS organization should guide the development of such innovative models of care. Based on the needs of their community and population, EMS systems can construct innovative models of care delivery that take advantage of team-based health care approaches that improve resource utilization.

Chapter 3 explains the methodology of data collection gathered during the pilot study to determine the impact of NP integration within the EMS system.

Chapter 3: Methodology

Introduction

The methodology section explores the plan of action and processes needed to successfully develop the pilot study, evaluate the pilot design, and analyze the quantitative data collection, as well as the data interpretation of the quantitative data related to the pilot design. Numerical data gleaned from quantitative approaches helps with the ability to understand the numerical qualities and attributes as they relate to the study (Bonnel & Smith, 2018). A pilot study design best explores the feasibility of NP inclusion within the EMS system and allows for quantification of their impact as it relates to 911 EMS system transports. The results of a pilot study can guide the efficacy of the intervention and feasibility of implementation on a grander scale (Leon et al., 2011).

Purpose of the Study

Pilot study design allows for the active evaluation of the impact of NP integration into the 911 EMS system. The pilot study is an evidence-based methodology for evaluating change projects that can help facilitate quality assurance and quality improvement programs. The plan-do-study-act (PDSA) is a science-based quality improvement methodology that structures a pilot design study. The PDSA cycle provides for measurable, quantifiable outcomes that can be identified from the intervention that is applied or implemented (Roussel, Thomas, & Harris, 2016). The use of the pilot study design allows for a baseline evaluation that can be quantified on a small scale before implementation or application on a grander scale.

Research Question

Does the inclusion of a nurse practitioner in an EMS system decrease the number of patient transports to EDs over two months?

Project Design

Piloting a practice change is essential in an evidence-based DNP project and for identifying issues before instituting a house-wide rollout (Melnyk & Fineout-Oveholt, 2015). The pilot study was discussed and approved by my capstone chair, and review and approval to initiate the pilot study occurred through the ACU institutional review board (IRB). The guiding ethical principles of the IRB are embodied in all research involving humans; respect for persons, justice, and beneficence are the ethical foundation of all research involving human participants (Keele, 2011). The pilot test design aims to demonstrate the effects of an NP on the number of transport occurrences within the EMS population.

Instrument Measurement Tool

This pilot study utilized nominal scale measurements to identify and quantify the data gleaned from the pilot study and was developed by the project implementer. The implementation of a new intervention requires the measurement of the impact. Measurement, whether developed in research or in practice, must be able to accurately collect the data (Melnyk & Fineout-Oveholt, 2015). Data collection from medical transports involved in the EMS system pilot study used a nominal scale form. The scale consisted of the following: 0 represented a patient's refusal to be transported, 1 represented a patient was transported, and 2 represented no patient transport occurred. Validity of the data collection instrument is critical to synthesis of evidence-based nursing practice gleaned from the pilot study and underpinned by validity and reliability (Keele, 2011).

To maintain confidentiality and anonymity, no identifying information was collected from patients who were transported for health care. The goal and intent of the project was to measure the use of NPs for deciding transport of patients; therefore, there was no reason for the

collection of patient information. Staff members, along with key upstream and downstream stakeholders, were educated about the project through group sessions, and a copy of the parameters for the pilot study was given to each participant. The parameters were also laminated and posted in visible areas of the 911 emergency response unit patient compartment.

Implementation of a pilot program requires planning and effective management strategies, including modification of the implementation process, the practice protocol, and the effectiveness of evidence-based protocols (Melnyk & Fineout-Oveholt, 2015). A comparison of post pilot results will be directly compared to results and outcomes revealed and demonstrated from the pilot program. Piloting a design study helps to identify the reliability of the data collected, aids in identification of any potential problems, and helps with data organization for future analysis (Bonnel & Smith, 2018).

Independent variable: No NP response unit versus NP response unit.

Dependent variable: Transport.

The dependent variable is what is measured as the result of the independent variable/ intervention; the independent variable is the intervention or treatment that affects or alters the variable (Keele, 2011).

Research Plan

A critical appraisal of the results gleaned from the pilot design study and interpretation of the phenomenon, as it relates to the inclusion of NPs into the EMS system, is essential to the validity of the pilot study. Feasibility is demonstrated by enough information for researchers to determine whether there is enough time and expertise to spearhead the pilot study and are the resources available to conduct a meaningful study (Melnyk & Fineout-Oveholt, 2015). Researchers and practitioners involved in quantitative research projects must be able to articulate

the understanding of the phenomenon to consumers of research so that the consumer or reader is able to credibly relate to the reported research pilot design results. Research should be carefully documented to provide evidence of how conclusions were reached, and whether under similar conditions, a similar researcher can experience homogenous results describes validity (Keele, 2011).

Practice Setting

The practice setting for the pilot study is the EMS system in the northeast side of El Paso, Texas, designated as Battalion 5, which is serviced by the El Paso Fire Department. Both units comprising the NP and the traditional El Paso Fire Department response were housed out of Fire Station 21. The units were dispatched to 911 EMS incidents via 911 call-in, by El Paso Fire Department unit request, or by the specific established pilot protocols developed by the medical director's staff and interdisciplinary teams.

Protection of Participants

Participants' rights in this study were protected through the El Paso Fire Department's Health Insurance Portability and Accountability Act and Compliance Division. Institutional Review Board approval was gained from ACU and The Hospitals of Providence (THOP), a Tenet corporation. The purpose of the pilot design study was disclosed to upstream and downstream stakeholders. All Tenet hospitals' and the El Paso Fire Department's privacy and confidentiality practices and procedures in place prior to pilot design study remained unchanged and enforceable without deviation from standard practices throughout the pilot design study.

Participants acknowledged consent and participation through their activation and initiation of the El Paso Fire Department's 911 EMS system. No deviation from established El Paso Fire Department medical direction policies, procedures, and protocols occurred, except as

those modified and delegated and within the scope of practice per Texas law requirement of a prescriptive authority agreement in place, along with a collaborative agreement between the medical physician and the APRNs.

Data Collection

Data collection is a central component of clinical projects and addressing the quality of the data to be collected is essential (Bonnel & Smith, 2018). Data were gleaned from call triage and review of current and previous 911 EMS system responses that were appropriate for the study. The deciding factor was focused specifically on stable and unstable characteristics utilizing current dispatch queues, but with questions elicited to ascertain stable versus unstable from the caller or as deemed by the emergency dispatch call-taker. Being systematic and objective in data collection helps to support and strengthen reliability and dependability of the pilot study research and gives credibility to the DNP project (Bonnel & Smith, 2018).

The pilot study occurred during regular 24-hour rotations, with an NP being first assigned to the medical operations captain for acclimation to the El Paso Fire Department's administrative policies and procedures. After this administrative assignment was completed, the NP was assigned to a rescue unit, with the team being comprised of a paramedic and an emergency medical technician. The NPs were assigned specifically to one of the busiest stations in the El Paso City Fire Department and were dispatched via radio, from first responding units, from medical operation captains, or directly from fire dispatch. The traditional El Paso Fire Department staffing of a rescue unit, with a team that was comprised of a paramedic and an emergency medical technician basic, was also housed and dispatched out of the same station and territory for comparison.

Data Collection Form

Nominal scale data representing: 0 – patient refusal, 1 – transport, and 2 – no transport was charted and measured for both the NP response unit and the traditional EMS response unit (see form below).

NP response unit month totals:

0 ____

1 ____

2 ____

Traditional response unit month totals:

0 ____

1 ____

2 ____

Timeline

The pilot study integration of NPs into the El Paso Fire Department's 911 EMS system was accomplished over two months. Within the 2-month timeframe, data collection, review, and development of medical protocols and quality assurance (QA) was continuously reviewed. Case study analysis gleaned from the pilot program was discussed and interpreted, and implementation of recommendations was incorporated into clinical practice and applied to transport decision making. Throughout the 2-month timeframe dissemination of transport, decision making was provided to the medical director and staff for end of the month QA review (see Appendix B).

Summary

Chapter 3 provided the details and methodology, including design of the pilot study, along with the quantitative approach that was used for this clinical DNP project. The methodology, including protocols, policies, and procedures, ensure the protection of human participant's and safeguards their continued autonomy, as well as the facilitation of the reliability and dependability of the pilot study needed to advance further research and dialogue. Chapter 4 will analyze the findings from the pilot study design.

Chapter 4: Pilot Study Findings

Introduction

The pilot study utilized a quantitative approach to describe and explore the integration of NPs into the EMS to determine if they decreased the number of patient transports over two months. The EMS medical director, the El Paso Fire Department Public Health and Infectious Disease RN, and the El Paso Fire Department medical deputy chief and the medical director's medical staff, along with selected line operation paramedics, which also included an administrative paramedic medical captain of the fire department's medical research division and dually licensed personnel holding both RN and paramedic licensure, were assembled. Key stakeholders also included personnel from the fire department EMS system dispatch and communications center and the City of El Paso coding and medical billing division.

Project Overview

The El Paso Fire Department's current medical procedures and guidelines were reviewed by the medical director's staff and with input from the dual licensure RN/paramedics, and NP protocols were specifically developed and revised to provide for NP interventions. These protocols were also developed with input from two NPs; both NPs had experience with employment and working within the El Paso Fire Department. The participating NPs are also board-certified emergency nurses and remain licensed as paramedics and actively practice in APRN roles with prescriptive authority and have collaborative agreements in place. One of the two NPs remains actively and gainfully employed within the El Paso Fire Department and serves as a preceptor and mentor for new firefighters and paramedics within the El Paso Fire Department.

Once the protocols had been sufficiently revised and reviewed by the medical director and fire chief, training and information sessions were conducted to brief those stations and crews affected. Training and information sessions were also conducted with THOP EDs, which included briefings and information sessions with the charge RN, triage nurse, registration personnel, case managers, and social workers. The medical captain, along with an RN/paramedic teamed up with a member of dispatch to facilitate knowledge sharing and to implement shared experiences and expertise of nursing triage to be blended with established medical dispatch protocols to enhance prehospital assessments and interventions.

Purpose of Project

The purpose of the pilot project was to determine the impact of NP inclusion within the EMS system response teams. Assessment of NP inclusion within the EMS response teams' centers around the NPs impact on the reduction of the overall 911 ambulance transports to the ED. The NP integration into EMS system response teams may have profound implication and application in developing interdisciplinary teams within the EMS organization that are better equipped to meet the needs of their communities and the populations they serve.

Interdisciplinary Collaboration

The facilitation of a collaborative team-based approach was centered on the science of quality process improvement. Team-based interaction fostered discussion and collaboration on the development and implementation of policies and procedures defining the pilot study. Shared evidence-based approaches from various EMS providers was central to the decision-making process and for problem solving. Interdisciplinary collaboration guided the selection and review of case studies from the pilot study.

IRB Approval

With the guidance and oversight provided by my ACU capstone chair and revisions requested by the ACU's Office of Research and Sponsored Programs (ORSP) submission for approval to implement the DNP capstone pilot project, integration of NPs into the EMS system, was finalized and forwarded to the ORSP. On May 3, 2018, the DNP capstone pilot project (IRB 18-024; Integration of Nurse Practitioners into the EMS System) was approved. A copy of IRB 18-024 was submitted to the ACU capstone chair, the El Paso Fire Department's medical director, and the El Paso Fire Department's compliance officer.

Participant Characteristics

Various participants activated or accessed the El Paso Fire Department 911 EMS system for this pilot study. Most of those participants in the pilot study accessing or activating the 911 EMS system were greater than 70 years of age. Approximately 75% of the individuals who accessed the El Paso Fire Department EMS system were also over the age of 70, with the remaining 25% of all participants being 70 years of age or below. Approximately 28% of those total participants in the pilot study design were uninsured or underinsured, with the remaining 72% having medical insurance coverage through Medicare and Medicaid programs and/or private insurance or TriCare Health Military coverage.

Parameters of Pilot Study

1. The NP response unit may transport ambulatory, stable (pulse less than 110 bpm) patients with a mental health complaint only to an outpatient mental health facility.
2. On scene treatment of stable patients with minor complaints. Low-acuity complaints: sutures, back pain, medication refill, UTI, etc.

3. Medical clearance of stable patients with minor and low-acuity complaints who are in El Paso police custody.
4. Social work follow-up and NP follow up on identified frequent 911 callers.
5. NP will not handle abdominal pain, OB/GYN, or patients less than one year of age. The NP unit will not be dispatched to these 911 calls and, if encountered, will request 911 traditional response. The NP may stabilize and intervene up to full scope of practice but will not transport or accompany the traditional 911 response unit.
6. The goal is to keep NP response unit available to respond to lower acuity calls.

Data Collection

Nominal scale data representing 0 – patient refusal, 1 – transport, and 2 – no transport was charted and measured for both the NP response unit and the traditional EMS response unit.

Table 1

EMS NP Unit versus Traditional Unit Responses

Unit	Total	Patient Refusal (0)	Transport (1)	No Transport (2)
NP Unit	311	91	167	53
Traditional Unit	258	24	181	53

The NP unit ran more non-urgent and non-emergent 911 calls than the traditional unit which resulted in 29.26 percent of patient refusals which translated into 53.70 percent fewer transports overall (Table 1 & 2). The traditional unit ran fewer total 911 calls and still transported 70 percent of the time with only 9.3 percent of total 911 calls resulting in a patient refusal.

Table 2

	Sum of NP Unit	**Sum of Traditional Unit**	**Sum of NP Unit2**	**Sum of Traditional Unit2**

Pt Refusal	167	181	53.70%	70.16%
Transport	91	24	29.26%	9.30%
Grand Total	**311**	**258**	**100.00%**	**100.00%**

A Chi Square analysis was used to statistically analyze the findings related to the NP unit and the Traditional unit. A Chi Square presented as (X^2 (1) = 16.0782, p =.000, with the p value being this small the null was rejected as the two outcomes were indeed statistically different See (Appendix C). The NP unit reduced overall ambulance transports when compared to the Traditional unit.

Summary

The pilot study design: The inclusion of NPs into the El Paso Fire Department EMS system reduced the number of transports to hospital EDs and was supported by a Chi Square analysis. The NP unit obtained more patient refusals for transport when compared to the traditional El Paso Fire Department 911 EMS system response unit. The pilot study answered the research question, but more questions were developed from the results of the pilot study. The effective utilization of APRNs in EMS systems improved resource utilization of El Paso Fire Department EMS system response units and resulted in decompression of ED overload of non-urgent and non-emergent transports. Unnecessary transports to EDs and improved 911 EMS system responders and equipment had a synergistic effect on the community and upstream and downstream stakeholders. Having the appropriate EMS response unit available for high-acuity 911 calls improves response times and patient outcomes with true emergencies. Furthermore, the pilot study demonstrated that NPs can have a legitimate role in the EMS system and can significantly impact 911 EMS system outcomes that facilitate improved resource utilization.

Chapter 5 addresses the implications of APRN integration in 911 EMS systems and addresses key future questions, as well as implications of clinical practice and patient, family, and community outcomes. Chapter 5 also examines the limitations of the pilot study design and explores additional research questions to be explored and expanded upon, as well as provide for future leaders and researchers a direction in role development, competencies, and inclusion into future APRN education and curriculum development.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

The purpose of the pilot study was to determine if the integration of NPs into the 911 EMS system reduced patient transports. The pilot study design revealed that the inclusion of NPs into the EMS system does, in fact, decrease the number of transports. On the surface, the research question was addressed, but more questions began to develop and were considered almost immediately as the pilot study began. Chapter 5 explores the implications of NP integration into the 911 EMS system and discusses the limitations of the pilot study. Recommendations for ongoing future research will also be discussed, as well as how best to standardize the practice, training, and integration of NPs into the 911 EMS system.

Discussion of Findings

Integration of NPs into the EMS system promotes nursing science and facilitates nurse-driven protocols that enhance the EMS system's response team's ability to offer a patient-centered approach. Nursing science expands the discipline of nursing and the use of nursing theory in the application of new clinical approaches that help to improve patient outcomes (Chism, 2016). This is reflective of DNP Essential I for curriculum standards of DNP preparation.

Dynamics in health care policy and health care law requires an assessment of an organization's ability to improve its service delivery to consumers of health and lead the organization through change and is imperative to the increasing demand for cost-effective health care improvement. Doctoral-prepared nurses are equipped to assess and identify improvement processes of an organization, and the DNP professional is a leader in developing and managing

the ethical, safe, and quality care approach for communities and vulnerable populations (Chism, 2016). This is reflective of DNP Essential II for curriculum standards of DNP preparation.

Critical appraisal of the literature regarding similar EMS use of NP inclusion in 911 response pilot projects and the translation of the recommendations apropos advantages and disadvantages is imperative for continuous quality improvement. The DNP-prepared NPs are experts in working with collaborative teams to further clinical scholarship that advances nursing practice to populations in diverse arenas through the translation and dissemination of research and quality improvement science (Chism, 2016). This is reflective of DNP Essential III for curriculum standards of DNP preparation.

Nurse practitioner integration into the 911 EMS system challenges the NP to acquire knowledge of health information technology related to the EMS system and then requisition this knowledge to enhance the accuracy and communication sharing of the health consumer's information to improve the health outcomes of the community and populations they serve. This is reflective of DNP Essential IV for curriculum standards of DNP preparation.

Experiences shared from NP integration within the EMS system empowers the NP to opine on issues of health policy that have EMS implications, thus further empowering a team-based collaborative approach that can garner interdisciplinary support for full practice authority nationally for APRNs. Doctor of Nurse Practitioner leadership is needed at the local, state, federal, and international level to ensure a robust platform exists for nurses to opine on health care financing and health care policy and to advocate for ethical, equitable, and social justice policies (Chism, 2016). This is reflective of DNP Essential V for curriculum standards of DNP preparation.

Nurse practitioners working collaboratively with EMS providers to improve the health of communities and populations, while promoting health and wellness initiatives that focus on prevention, stabilization, and management of chronic care conditions in heterogeneous environments, is reflective of DNP Essential VI and VII for curriculum standards of DNP preparation.

The integration of NPs into the 911 EMS system allows for the extension of nursing influence in the development of therapeutic relationships within the EMS organization, as well as the sharing and exchange of new knowledge and skills between EMS professionals and the NP. Specialty practice and specialization in a specialty practice area is within the role and scope of the DNP. Advanced nursing practice that encompasses critical thinking, advanced clinical decision making, and the implementation and evaluation of evidenced-based care to improve patient outcomes is what distinguishes the DNP professional (Chism, 2016). This is reflective of DNP Essential VIII for curriculum standards of DNP preparation.

Implications and Interpretation for Practice

Nurse practitioners integrated within the EMS system can provide cost-effective, quality patient-centered care. Integration of NPs within the EMS system is efficacious in the management of chronic diseases and is significant to care coordination. Nurse practitioners are capable of handling acute, critical, and emergency cases and are essential in increasing access to care, while decreasing the overall cost of health care. As communities across the nation continue to age and the shortage of primary care providers proliferates the EMS system, the EMS system will ultimately be confronted with the challenges of those in need of chronic and primary care that may or may not warrant an emergency transport or presentation to an emergent department or urgent care center. Many calls could be classified as non-life-threatening, and the EMS

system could tailor a response to the uniqueness of the circumstances (Burgett, 2014). Emergency nurses, paramedics, fire and EMS services, physicians, and other crucial stakeholders should raise important questions on whether dialing 911, as it is currently structured, is as efficacious as dispatching an NP to a community request. Integration of NPs within the EMS system facilitates a 911 EMS system's ability to provide patient-centered point of care that enhances the 911 EMS system resources. Matching the response level to the urgency along with targeted personnel has been shown to save money and improve resources outcomes (Burgett, 2014).

Important issues regarding training, care coordination, evidence-based practice, and outcomes need to be further researched and integrated care models standardized and designed. Many times, patients and high frequency users of the EMS system simply need education or lack transportation, sometimes they simply cannot get to an appointment for traditional primary care needs, and the 911 EMS system is perceived as the way to gain access. The 911 EMS system is the easy way when transportation is lacking to pharmacies and/or doctors' offices, and the EMS system cannot turn them away (NAEMT, 2015).

The inclusion of advanced practice providers, such as the DNP NP, into the EMS system provides a highly skilled, qualified, clinical expert capable of identifying, assessing, and intervening on social determinants of health and implementation of evidence-based practice. Evidence-based practice is the evidence that is applied during clinical practice encounters and communicated during the patient-provider encounter and supports our understanding of the effectiveness of strategies to integrate evidence-based health interventions and change practice patterns within a specific setting to improve health outcomes for our patients (Melnyk & Fineout-Oveholt, 2015). Performing and sustaining change is a long-term, dynamic, and

iterative process that requires scientific underpinnings, along with deliberate nursing intervention and executive nursing leadership.

Limitations of the Pilot Study

Limitations and questions that the pilot study revealed or cultivated included what types of treatments performed by the NP successfully resulted in no transport. The pilot study also did not reveal if the patient refused transport but still presented to the ED by their personally owned vehicle. There were limited data on what the 911 caller's chief complaint was or whether their initial need or reason for activation of the 911 EMS system was ever addressed. The pilot study was limited in defining the 911 EMS callers' outcomes and whether or not NP interventions specifically improved patient outcomes over traditional 911 EMS system responders. Specific NP interventions, such as referral to appropriate provider, suturing, motivational interviewing, goal-directed therapy, facility or specialist referral, and/or consultation, as well as NP prescriptive authority interventions, such as durable medical equipment or prescriptive medications, were not addressed.

Discussion

To affect positive outcomes, foster evidence-based care, and improve the health of communities and vulnerable populations, access and availability to high-quality health care is essential. Health care policy and health care legislation remains dynamic as the number of older Americans continues to increase. The additional burdensome effects of multiple disease and chronic conditions, along with an aging population, taxes the EMS system. The advanced age of the American population, along with chronic debility and multiple chronic disease states, establishes the high risk and vulnerability of communities utilizing the 911 EMS system (Larsen, 2016).

Efficacy of treatment, conscientious application of resources, and cost containment are imperative to reigning in the overall cost of health care. Chronic illness and chronic conditions are not curative and have episodic phases that range from stable to unstable; whereas, an individual with an acute disease may recover, and the acute disease and pathology typically resolves in a relatively short time (Larsen, 2016). This is an important distinction for NPs to educate individuals, families, and communities about.

Empowerment and education of the public for when it is appropriate to access the 911 EMS system begins with one's ability to distinguish acute from chronic and the relevancy of acute and emergent intervention. Emergency departments and urgent care centers have consistently found their facilities overburdened and overcrowded with non-emergent and non-urgent patients, and the increasing influx of frequent patient visits and unscheduled visits have caused tremendous financial strain, decreased the quality of care, and exacerbated the inefficient use of resources.

Health care spending in the United States increased by 3.7% to $2.8 trillion or $8,915 per person in 2012, and personal health care spending accounted for 85% of the overall national health care spending, increasing 3.9% in 2012 (Larsen, 2016). Advanced practice nurses have been exemplary in most all facets of health care domains, but their impact within the EMS system has been limited. Advanced practice nurses are capable, competent, and can improve health outcomes within the EMS system's community served; facilitate evidence-based care; and promote wellness within the population, while providing compassionate patient-centered point of care.

The EMS system serves as America's frontline to all hazardous situations and are first responders to just about every emergency thinkable, from natural disasters, man-made disasters,

and biological outbreaks, to mass shootings. The EMS system is the crux of the health care system. Many communities and populations served are dependent on the services of their EMS system; however, EMS systems have remained relatively unchanged. Community paramedicine programs are developed to specifically target and address critical problems in local delivery systems, such as insufficient primary and chronic care resources, overburdened EDs, and costly, fragmented emergency and urgent care networks (Iezzoni et al., 2016). With the dynamics of legislative health care policies, governing bodies and executive boards calling for reduction in funding, and the overwhelming changes related to the increase in life span of geriatric patients, extended therapies of those who have chronic illnesses, such as HIV, diabetes, and chronic obstructive pulmonary disease, it is imperative that the EMS system maturation is conducive to these complex and volatile demands.

Recommendations for Future Research

Inclusion of NPs into the EMS system requires further development of established roles to foster a team-based approach to innovative models of care delivery. Integration of health care teams from diverse disciplines allows for an exchange of information and social capital through informal and formal structures that develop as needed (Roussel et al., 2016).

Development and facilitation of team-based models of care helps to deliver quality, value-based care that is inclusive to all. Integration of NPs into the 911 EMS system provides robust opportunities for the DNP-prepared nurse, specifically the APRN, to opine on role development and organization of relationships and to lead transdisciplinary teams in preparing next generation NPs to provide care within the EMS system. To develop and mentor a qualified practitioner requires a dynamic blend of classroom and clinical education; clinical practice as an NP requires engagement in the literature to determine best practice, as well as community

service (Van Leuven, 2014). Curricula focused on the management of health and illness, along with prevention, prepare NPs to meet the needs of the communities and populations in which they serve. Nurse practitioner faculty must be able to present evidence-based knowledge on health care conditions as it relates to academia and clinical practice and translate that knowledge into meaningful patient-centered outcomes (Van Leuven, 2014). Preparation of the next generation of NPs will require nursing leaders, nurse educators, and APRNs to explore integration of EMS systems' clinical and prehospital experience into advanced practice nursing education and development. Developing competency-based NP education requires qualified mentors and preceptors who are experienced and readily engaged within the EMS system. To effectively develop and structure NP roles into the EMS system, with the goal of standardization, requires the APRN to practice to their full educational capacity and training.

Advanced practice RNs should be able to practice to the full extent of their education and training (Institute of Medicine, 2010). Nurse practitioners are essential to the promotion of individuals, families, and communities. Professional nursing is distinct from other health professions in that health promotion and disease prevention is foundational to nursing practice (Thomas, Hart, & Burman, 2014). The DNP-prepared APRNs can facilitate and promote wellness and prevention to rural populations and communities more readily through their incorporation into the EMS system. An APRN has advanced practice skills, can manage acute and chronic illness, and is competent to play significant roles within the EMS system. Advanced practice RNs need to continue to advocate for roles within in the EMS system and help to develop and foster interdisciplinary teams focused on reducing health care outcomes through the prevention of avoidable hospital 30-day readmissions and the needless transport to EDs for non-urgent and non-emergency ambulance transports. Nurse practitioners are well poised to provide

solutions to improve care and access to communities and populations that reduce the overall cost of health care and improve resource utilization through enhanced care delivery systems (Gutchell, Idzik, & Lazear, 2014). Nurse practitioner-delivered interventions that optimize the effectiveness and efficiency of health promotion and disease prevention through the application of behavior change theories and patient education about lifestyle recommendations and evidence-based techniques improves goal-setting, self-efficacy, and overall patient outcome (Thomas et al., 2014). To optimize NP utilization within the EMS system requires legislative action, as well as federal- and state-level health care policy, to provide for APRNs to practice to the extent of their education and training.

Nationally, the direct benefit of full practice authority for APRNs allows for standardization of regulatory practices. One of the most significant barriers to NP practice is the uncoordinated system of state regulations that restrict NPs from practicing in a manner that is consistent with their education and training (Gutchell et al., 2014). Legislation that supports full practice authority requires federal- and state-level restrictive scope-of-practice laws to be removed. Advanced practice RNs should work in collaboration with physician specialist to deliver team-based, patient-centered care that improves the health of individuals, families, and communities. The number of NPs within the workforce continues to rise, as does the number of those NPs prepared at the DNP terminal degree.

The need for individuals, communities, and populations to have access to care is not only cost effective but also provides a quality choice regarding provider selection. According to McLaughlin & McLaughlin (2015), “Evidence-based medicine rests on continuous personal, professional, and/or organizational learning” (p. 236). Nurse practitioners and, more specifically, DNP providers, are essential in the facilitation and implementation of evidence-

based medicine and are critical providers in the sustainability of a culture supportive of quality, safe, evidence-based practice. Typically, frequent patient presentations to the ED have higher rates of chronic diseases and present to EDs via ambulance; along with ED overcrowding, this increases health care costs (Solberg et al., 2016). The tangible benefits of NPs are ongoing and their merit to the health care system is efficacious, with robust repeatable positive outcomes. Inclusion of NPs into the EMS system is another way for advanced practice nurses to increase access and decrease the overall cost of health care, while facilitating improved care coordination.

Conclusion

Innovations within the health care system have been transformational for the EMS system, and the EMS system can play an integral role in addressing population health (Escott, 2017). The DNP-prepared clinician is well equipped to help optimize resource utilization within the EMS system to improve population health and increase access to qualified health care providers. Nurse practitioners are critical to delivering wellness and prevention teaching, along with interventions to improve the health of individuals, families, and communities. The EMS system has its place within the health care system, but to remain viable and efficient, it must demonstrate long-term value and perform a significant role in improving the health and delivery of care to their communities, while reducing overall health care cost, saving time, and delivering point-of-service care. Improvement in care for sick populations that reduce frequent EMS and ED use has the potential to produce favorable cost benefits to communities and health systems (Solberg et al., 2016).

Integrated health care and community paramedicine with the inclusion of NPs can offer a significant benefit to individual patients, communities, and hospitals. Inclusion of NPs within the EMS system and within community paramedicine programs can reduce the overburdened EDs

and health care systems and decrease 30-day hospital readmission rates (Iezzone et al., 2016). The efficacy and sustainability of such NP-integrated programs within the EMS system requires more in-depth research, as it is not just new but dynamic and unique to the communities and populations served. Further investigation should include examination of primary care availability and occurrence of unnecessary EMS use, existence of race-based disparities, and transports involving conduct disturbance and other behavioral conditions among children, adults, and the growing geriatric population (Patterson et al., 2006). Literature has identified and even supported the use of advanced practice nurses within the EMS system as improving community health outcomes, reducing frequent EMS system and ED use, and providing a favorable cost benefit alternative for point-of-care service. The EMS system is a subspecialty of emergency medicine, and quality improvement in EMS only serves to advance how prehospital and emergency medicine will be conducted in the future (Bucher & Zaidi, n.d.).

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Appendix A: Project Timeline and Task List

Table A 1

Project Timeline

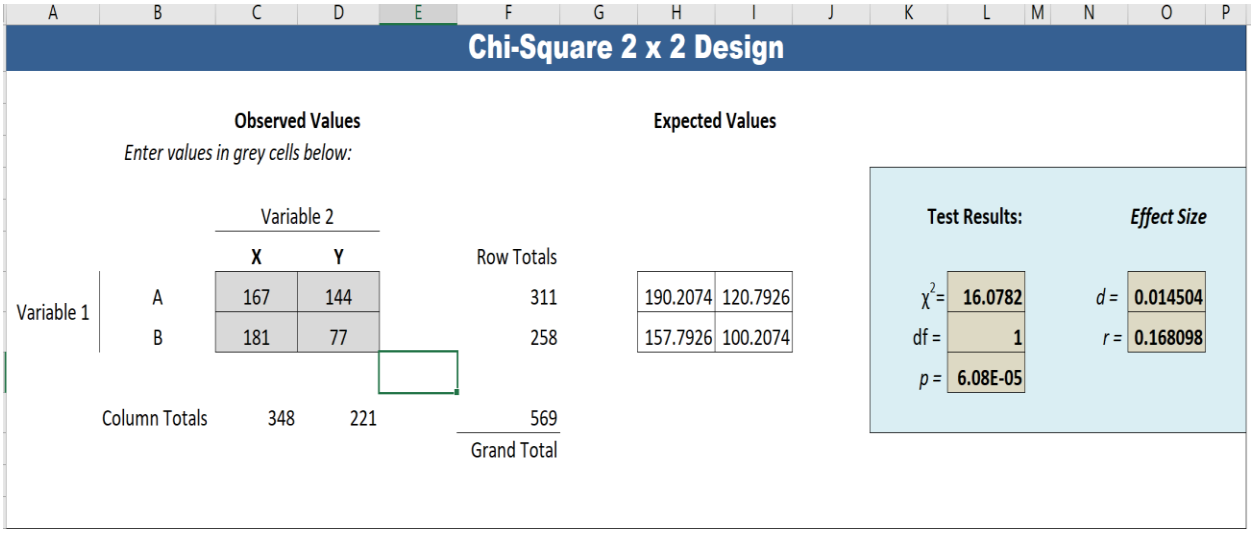
Month	Task
January	Contact key stakeholders to establish project goals and identify a champion.
February – March	Complete affiliation agreement and educate involved participants.
April	Complete Compliance and Ethics training.
May – July	Launch pilot study.
August – September	Evaluate/review data from pilot study.
October – November	Discuss project outcomes, implications on clinical practice and the NP profession.
December	Submit paper for publishing.

Table A 2

Project Tasks with Timeline

Task	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Identify EMS teams.	■	■										
Identify NP participants.			■									
Meet with medical director & staff.			■	■								
Presentation to the EPFD fire chief & asst. chiefs.				■								
Develop pilot design protocols.				■	■							
Dissemination of pilot study protocols.					■							
Launch pilot design.						■	■					
Review data from pilot study.								■	■			
Pilot study implications.									■			
Finalize DNP manuscript.									■	■		
Prepare for publication.										■	■	■

Appendix B



Chi-Square 2 x 2 Design

Observed Values

Enter values in grey cells below:

		Variable 2 X	Variable 2 Y	Row Totals
Variable 1	A	167	144	311
	B	181	77	258
	Column Totals	348	221	569
				Grand Total

Expected Values

190.2074	120.7926
157.7926	100.2074

Test Results:

χ^2 =	16.0782
df =	1
p =	6.08E-05

Effect Size

d =	0.014504
r =	0.168098

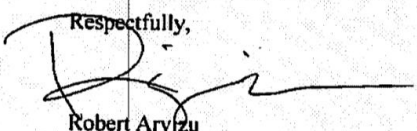
Appendix C

To:	Abilene Christian University, Doctoral of Nursing Practice
Attention:	Dr. Tonya McGee
Reference:	Doctoral Student Taron Peebles
From:	Robert Arvizu, Fire Medical Deputy Chief, El Paso Fire Department
Date:	January 26, 2017

To whom it may concern,

Please accept this letter as verification of Mr. Peebles pursuit and involvement in the development of Mobile Integrated Health Care program for the City of El Paso through the El Paso Fire Department. This program is in line with Mr. Peebles capstone project and will provide useful insight on the development of the program for our community. Mr. Peebles research and outreach will help to identify the direction of the program and provide networking and procedural tools to assist in the development of the program. Please contact me if you have any questions or need more information.

Respectfully,



Robert Arvizu

Fire Medical Deputy Chief, El Paso Fire Department

416 N. Stanton

El Paso, Texas 79901

915-485-5635

Appendix D

Kenneth A. Berumen, M.D, FACEP
Medical Director – El Paso Fire Department
416 N. Stanton
El Paso, TX 79901

October 22, 2017

ACU DNP- Program Director
Abilene Christian University
16633 North Dallas Parkway
Suite 800
Addison, TX 75001

Dear ACU DNP- Program Director:

Lt. Taron Peebles and I have worked for some years together with El Paso Fire Department and in the ICU and ED of our local hospitals. We have been working together lately with EPFD to develop a Mobile integrated health plan to bring change to our local community. This would provide primary care on a mobile unit provided by our Fire Department. He is working on developing several systems regarding organizational change in our Fire Department. He has related that he is working with the IRB and is doing so in an effort to obtain a doctoral degree.

Please let me know if I can be of any help or personal reference with regards to this candidate.

Sincerely,

Kenneth A. Berumen, M.D, FACEP
Medical Director – El Paso Fire Department
Medical Director – ESD #1
Network Director for Emergency Medicine, The Hospitals of Providence
Regional Medical Director – Envision Healthcare, Central Operating Unit
BerumenKA@elpasotexas.gov
915-241-1435