PEDIATRIC PREPAREDNESS IN A RURAL HEALTH SYSTEM

A Dissertation
Submitted to the Graduate Faculty
of the
North Dakota State University
of Agriculture and Applied Science

By

Sarah Ann Nielsen

In Partial Fulfillment of the Requirements
for the Degree of
DOCTOR OF NURSING PRACTICE

Major Program:
Nursing

February 2024

Fargo, North Dakota

North Dakota State University
Graduate School

Title

PEDIATRIC PREPAREDNESS IN A RURAL HEALTH SYSTEM

By

Sarah Ann Nielsen

The Supervisory Committee certifies that this ***disquisition*** complies with North Dakota State University's regulations and meets the accepted standards for the degree of

DOCTOR OF NURSING PRACTICE

SUPERVISORY COMMITTEE:

Dean Gross, Ph.D. FNP
Chair

Mykell Barnacle, DNP, FNP-BC

Abigail Brunsvold, DNP, APRN, CPNP-AC/PC

Heather R. Fuller, Ph.D.

Approved:

February 28, 2024
Date

Carla Gross PhD, MSN
Department Chair

ABSTRACT

Pediatric emergencies present significant challenges and emotional strain in healthcare settings. In critical access hospitals, the provision of safe, effective, and high-quality emergency response for pediatric cases is especially demanding. Many rural hospitals have infrequent exposure to pediatric emergency care, which can contribute to a lack of confidence when caring for this population. Diminished confidence in pediatric skills and procedures has been linked with a reduction in overall patient safety. Research on pediatric emergency preparedness in rural settings outlines the need for further multi-faceted education to achieve increased provider comfort and preparedness.

The practice improvement project aimed to understand health provider comfort related to pediatric trauma preparedness at a critical access hospital in rural southwest North Dakota. A pediatric education-based seminar was developed in response to the facility healthcare providers' educational needs and was implemented to further evaluate the impact that simulation, didactic education, and hands-on skills have on perceived comfort and knowledge. Evaluation of the concluded practice improvement project showed valuable insights into the state of pediatric preparedness in rural healthcare. A pre-seminar needs assessment and post-survey were administered. Post-survey results reflected an increase in knowledge related to caring for pediatric patients after the seminar. The positive influence of education reflected an increase in comfort levels among participants. Many participants felt that their future practice would be changed due to the seminar education. Findings supported a need among healthcare providers for regular education and training. Overall, the analysis and results of the project supported the need for future pediatric preparedness training and the positive impact that education can have on

healthcare providers. These findings support the project's potential to influence the future direction and emphasis of rural health education.

ACKNOWLEDGMENTS

There are many people that I would like to acknowledge in the achievement of this moment. To my husband, Alex, for encouraging me to go back to school and achieve my goal of becoming a nurse practitioner. Thank you for supporting me through this process and constantly reminding me that I could achieve this degree. To all my family, both extended, in-law, and immediate. Thank you for taking me in, giving me encouraging words, and talking me through my highs and lows. I am appreciative to have each of you. To my friends and fellow DNP classmates, I could not have achieved this without all of you by my side. I will cherish the moments with each classmate forever. I am so thankful to have made lasting networking and friendships through this program.

To all my nurse mentors and preceptors throughout my educational journey, I appreciate your knowledge, patience, and willingness to teach more than you know. I have learned so much from every one of you and I can't wait to put the knowledge and values into practice. I would not be where I am today without you.

A special thank you to my chair, Dean Gross, along with Mykell Barnacle, Abigail Brunsvold, Heather Fuller, and all the NDSU Graduate Nursing Faculty. Your constant guidance and help throughout the last three years are what has made me successful in this program. I am thankful every day that I got my degree from NDSU because of the amazing faculty. I cannot thank you all enough for the time and commitment that you have put into my education and future.

DEDICATION

To my husband, Alex, and my family, especially my parents, Paul and Deb. Their unwavering support has helped me achieve this goal. They have helped guide me through the triumphs and challenges in life and I would not be where I am without them.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

U.S. .....United States

CAH .....Critical Access Hospitals

CMS .....Center for Medicare and Medicaid Services

PALS.....Pediatric Advanced Life Support

BLS .....Basic Life Support

CALS .....Comprehensive Advanced Life Support

ATLS.....Advanced Trauma Life Support

HALO .....High Acuity Low Occurrence

SDOH.....Social Determinates of Health

MUA/Ps .....Medically Underserved Areas/Populations

HPSA .....Health Professional Shortage Areas

DOI .....Diffusion of Innovation Theory

DON.....Director of Nursing

ADON.....Assistant Director of Nursing

PIP.....Practice Improvement Project

IRB.....Institutional Review Board

AED .....Automated External Defibrillator

CPR.....Cardiopulmonary Resuscitation

PA .....Physician Assistant

NP .....Nurse Practitioner

CHAPTER 1: INTRODUCTION

Background and Significance

Pediatric trauma emergencies create highly stressful and emotional situations in both rural and urban healthcare systems. In rural, critical access hospitals, increased challenges occur in providing safe, effective, and high-quality emergency response pediatric skills. Rural facilities often see fewer pediatric patients during their emergency practice and commonly have limited resources (Katznelson et al., 2018). The low exposure to pediatric emergency care can cause providers to have a lack of perceived confidence, which may lead to provider discomfort when caring for these patients. A lack of confidence in pediatric skills and procedures can decrease overall patient safety (Goldman et al., 2018). Studies of critical access hospital emergency preparedness suggest that positive health outcomes can be increased through further readiness in pediatric emergencies (Ames et al., 2019). Interventions such as education and simulations can help develop further healthcare provider comfort.

The United States (U.S.) rural population compromised 46 million residents in 2020 and accounts for up to 14 percent of the population (Dobis et al., 2021). Of the rural population, about 13.4 million, or about 29 percent, are children under the age of 18 (United States Census Bureau, 2016). Residents of rural communities face increased challenges in comparison to urban areas, including issues related to social determinants of health, physical, and environmental exposures. Overall, the residents of rural America are at an increased threat of injury, which presents these residents with an increased challenge to maintain the health of their children.

Critical access hospitals are the only site for primary and emergency care in the rural United States. Critical access hospitals commonly see fewer than five pediatric patients a day (Auerbach et al., 2021). The low volume of pediatric patients places critical access hospitals at

risk of struggling to provide a high standard care in comparison to larger health systems (Katznelson et al., 2018). The lower quantity of emergency room patients, especially pediatric trauma patients, places an increased risk of poor outcomes for the patient population. Since critical access hospitals are the first point of access for emergency care, provider proficiency and comfort with pediatric care is needed (Pilkey et al., 2019). Pediatric trauma patients are a population that rural critical access providers see very infrequently, but when the situation does present, they need to be competent in the care they are providing.

Education is the key to successful emergency outcomes in a critical access hospital with pediatric patients as it can help improve the comfort level of providers. The utilization of simulations with realistic pediatric scenarios can increase exposure to these situations. Simulations create a safe environment to rehearse infrequently used, but lifesaving skills (Katznelson et al., 2018). The term high acuity low occurrence (HALO) can be used to describe the procedures and skills required. HALO education has repeatedly shown an improvement in team performance, understanding of skills and knowledge, and familiarity with the resources (Bierer, et al., 2021). The implementation of pediatric education can be challenging but has been associated with improvements in overall pediatric preparedness (Auerbach et at., 2021).

Problem Statement

Pediatric trauma preparedness in all healthcare systems can be a challenging task to achieve. The process of pediatric preparedness can most often be achieved through ensuring that the facility is up to date on competencies, policies, equipment, and other resources. The attainment of these steps is needed to provide high-quality care for children. Pediatric specialty providers are often utilized to achieve a high level of healthcare for the pediatric patient; however, a large portion of the U.S. lives in rural locations where specialty availability is

minimal. Rural providers are already at a healthcare disadvantage due to numerous barriers, including a lack of continuing education and exposure to traditional pediatric patients. The need for improving levels of confidence and knowledge is at the forefront for practitioners in rural communities. The problem statement addressed by this project is: among healthcare providers in rural hospitals, does providing pediatric response education increase their perceived confidence of providing pediatric care?

Purpose

The purpose of this project was to determine if pediatric trauma care education in a rural hospital influences overall provider perceptions of confidence in delivering care to pediatric patients. Further education for providers is proven to be an integral step in the process of achieving a higher perceived confidence. Therefore, an education-based program that provides information regarding pediatric trauma emergency care practices was proposed for rural providers. The education was developed based on the identified facility healthcare providers' needs and the healthcare providers' perceived confidence in providing pediatric care. The participants' perceived level of confidence will be assessed after the training. Increased comfort and confidence following hands-on training are supported in the literature and will be identified in this project.

Objectives

Objective One

Evaluate the perceived level of preparedness among rural healthcare providers in performing pediatric emergency skills at a rural healthcare facility.

Objective Two

Develop and implement a pediatric emergency care-based training seminar based on the perceived needs of rural healthcare providers in a critical access hospital.

Objective Three

Following the seminar, the healthcare provider's perceived level of preparedness at pediatric emergency skills will increase.

CHAPTER 2: THEORETICAL FRAMEWORK AND LITERATURE REVIEW

North Dakota has a current population of about 760,394 people with 50.2% or 381,625 of those individuals living in nonmetro areas (Rural Health Information Hub, 2023). The number of individuals living in rural areas in comparison to urban areas shows that a rural healthcare focus is needed in North Dakota. Initiatives through the Center for Rural Health (2020) and other organizations have created a basis for healthcare development in the state's rural areas, but more assistance should be provided. Pediatric health in rural communities is one topic that could benefit from a deeper focus. Chapter two will address the need for continued education, knowledge improvement, and evaluation of pediatric preparedness in rural North Dakota healthcare. The chapter will include descriptions of definitions related to the topic, theoretical framework to guide the study, and a review of literature on rural healthcare and its relation to pediatric preparedness.

List of Definitions

Pediatric. Refers to "the branch of medicine that deals with children and their disease" (Oxford Advanced Learner's Dictionaries, n.d.-c). Pediatrics can be determined as a specialty that encompasses children's mental, psychosocial, developmental, and physical health (Hardin et al., 2017). Infancy to adolescence falls within pediatric care. Adolescence is defined as age 11 to age 21 (Hardin et al., 2017). However, the ages of 0 to 17 will be used to outline the pediatric range in this study. Operationally, education on the care for pediatric patients, or patients less than 18, will be utilized in the following project.

Rural. Means to be "connected with or like the countryside" (Oxford Learner's Dictionaries, n.d.-d). Rural can be a difficult term to define as it can be an abstract concept that has an altered meaning in different locations. However, the Census Bureau defines rural as any

geographic area that does not fall under the classification of urban (United States Census Bureau, 2023-a). An urban area is determined by having a population of 50,000 or more and an urban cluster has a population of at least 2,500, but less than 50,000 (United States Census Bureau, 2023-a).

Emergency. An emergency is "a sudden serious and dangerous event or situation which needs immediate action to deal with it" (Oxford Advanced Learners Dictionary, n.d.-b). Important issues in which to seek emergency assistance are when experiencing breathing difficulties of any type, chest pain or pressure, severe infections, acute abdominal pain, heavy bleeding, high/sustained fevers, loss of consciousness, motor vehicle accidents, fractures, sudden severe headaches, and severe dehydration (Mayo Clinic Staff, 2022). Understanding the meaning and general diagnosis of emergency medicine is crucial in the development of this project.

Comfort. Comfort is "the state of being physically relaxed and free from pain; the state of having a pleasant life, with everything that you need" (Oxford Advanced Learner's Dictionary, n.d.-a). Comfort can be achieved through many steps but can be an extremely subjective feeling. Individuals will obtain a feeling of comfort through many ways. The goal of this project intervention is to create a sense of confidence in providers when caring for pediatric patients. Knowing the definition of comfort is important to fully understand the goal.

Healthcare Provider. A medical or healthcare provider is described as "a person who is trained and licensed to give health care" (CMS, n.d.b) The individuals who fall under the category of a health care provider can range from doctors, nurses, nurse practitioners, physician's assistants, and many other areas in healthcare. The term health care provider will be utilized in this project to reference relevant individuals working in the healthcare system.

Theoretical Framework

The Diffusion of Innovation (DOI) theory by E.M. Rogers was chosen for this study. The theory was developed in 1962 and described as one of the oldest social science theories (LaMorte, 2022). E.M. Rogers was a rural sociologist that worked to explain regressive behaviors of farmers in his rural community (Dearing, 2009). The results he gained from studies reflected differences in the rate of individuals adopting innovations. Rogers created this theory to describe the process of how an idea or product gain momentum over time through a specific population or social system (LaMorte, 2022). The momentum eventually develops into performing something different than previously, or adoption. Based off this information, Rogers created five categories of individuals. The categories are innovators, early adopters, early majority, late majority, and laggards (Dearing, 2009). The categories are significant because they help depict the values in the innovation movement, which helps to understand the uptake of an improvement. Factors that influence adoption of an innovation were evaluated before implementation of this project by assessing some of the main factors and barriers of the theory. The project considered relative advantage, compatibility, complexity, and observability of the project at the site. This theory provided a supportive basis for understanding further education in all stages.

An understanding of the different learning adoption characteristics was taken into consideration when creating the pediatric education training session. The DOI theory also helped to assist in the progression and adoption of pediatric skills and retention moving forward; however, it does not address the cessation or prevention of other behaviors. The information provided in the session included improvements in knowledge, skills, and updated evidence-based practices on the care of pediatric patients. Rural healthcare providers at the participating facility

were assessed through a previous simulation to determine their level of comfort in caring for a pediatric patient. Knowing the level of comfort before implementation of a second simulation helped to understand the potential adoption of the practices following the session. The categories of the DOI theory and how they pertain to the project are outlined below.

Innovators

An innovator is an individual who is eager to try innovation first (LaMorte, 2022). The innovator comprises about 2.5% of the population. These individuals are interested in new ideas, want to be the first to adopt them, and require very little to adopt the practice. Innovators will be ready to learn and integrate the new pediatric education into their daily practice.

Early Adopters

The early adopter stage includes 13.5% of the population and are usually the opinion leaders of an organization (LaMorte, 2022). These individuals are interested in embracing change, are comfortable with adopting new ideas, and will lead others to implement and adopt the practice. The early adopters encourage the importance of mentorships, further education, and the need to be constantly changing with updates. Early adopters will be integral in the continued practice of pediatric education and simulation for this project. Stakeholders at the site, including the Director of Nursing and Assistant Director of Nursing are prime examples of early adopters. The stakeholders will advocate for the education opportunity and work to ensure continuation of the improvement project topics.

Early Majority

Early majority adopters are commonly more apprehensive about change and are rarely leaders; however, they will be ahead of the average person in adopting new ideas. The early majority is about 34% of the population. Early majority individuals are often later in adoption

due to their need to see evidence that the change is working (LaMorte, 2022). A strategy to enhance the probability of this category adopting the practice is to provide success stories and evidence that the change works. Success in pediatric practice changes are always attained through evidence-based support. The care changes have shown efficacy in practice and are supported in the education session, which helps to address the apprehensions of the early majority individuals.

Late Majority

The late majority adopters are generally skeptical of change. The 34% of people that make up late majority individuals will adopt an innovation only after it has been tested and supported by the majority (LaMorte, 2022). Information and evidence supporting the changes in pediatric practice are provided to appeal to this category of the population. Evidence-based practice support will also be needed to encourage adoption from this category. These individuals may need to observe the change from the innovators, early adopters, and early majority before accepting the movement.

Laggards

Laggards are 16% of the population and are the most difficult category of people to convince in a change of practice. These individuals are attached to tradition or "how things have always been done," and are very conservative. The laggards will need statistics, appeals, and assistance from others to eventually adopt a practice (LaMorte, 2022). Support from other participants, further statistics and evidence, and hand on visual practice are utilized to help laggards adopt the knowledge.

Literature Review

A literature review was performed to identify articles supporting information on pediatric emergency preparedness, skill competency needs, rural health, social determinants of rural health, and outcomes of pediatric patients in the rural setting. Searches were conducted using the Cochrane Database, PubMed, EBSCO, Google, and Cumulative Index to Nursing and Allied Health Literature (CINAHL). Grey literature was also utilized in this literature review to obtain numerical, statistical, and knowledge information from organizational sites. Main keywords used to conduct this literature review included: "pediatric emergency," "emergency preparedness," "rural," "critical access," and "North Dakota." Inclusion criteria for articles included articles in the last five years and those in English. Full text articles were sought, but access for further full text articles was not excluded. After a comprehensive review of literature, it was recognized that a need for further rural pediatric preparedness research was needed. Literature shows that the process and attainment of pediatric preparedness through competencies, equipment, and other resources was not a topic that has been researched extensively in either rural or urban settings. The topic was one that is underrecognized and under-addressed, which supports the need for this project. The following research has been obtained from the limited amount of evidence available and primarily focused on emphasizing the needs and benefits of increased pediatric education in rural hospitals.

Rural Health

Rural residents of the U.S. compromises 46 million residents and 14 percent of the total population (Dobis et al., 2021). Nearly one in five children live in rural areas of the U.S. (Bettenhausen et al., 2021). The rural population has seen a mild change since the 2010 census. Rural area populations slightly declined from 2010 to 2020, while urban areas grew by almost

nine percent (Dobis et al., 2021). However, recent Census Bureau data released in March 2023 reflected a slight increase in the rural population following the COVID-19 pandemic (United States Census Bureau, 2023-b). During the pandemic, many small counties saw higher levels of domestic migration as individuals worked to escape urban areas. These variations in the rural population have also manifested in ethnic demographics as the percentage of ethnic minority residents in rural American has surged by more than 80% (Dobis et al., 2021). A typical rural United States county contains less than 10 percent of the current population of an urban county. Two thirds of the rural population in America live west of the Mississippi River. Half of the rural land is in the south, where 72% of the land area is considered rural. The distribution of age and sex are similar in comparison between rural and nonrural children in the U.S. with 51.4 versus 51.1 male and 48.6 versus 48.9 female, respectively (Bettenhausen et al., 2021). Roughly 19.5% of the pediatric population in the U.S. are considered rural, while 80.5% is nonrural. Of the percentages, the division of age from 0-6 is 29.6 rural versus 30.5 nonrural, age 7-14 is 48.1 rural versus 47.7 nonrural, and age 15-18 is 22.4 rural versus 21.8 nonrural (Bettenhausen et al., 2021). Understanding the distribution of rural America assists in recognizing the healthcare needs within the rural population.

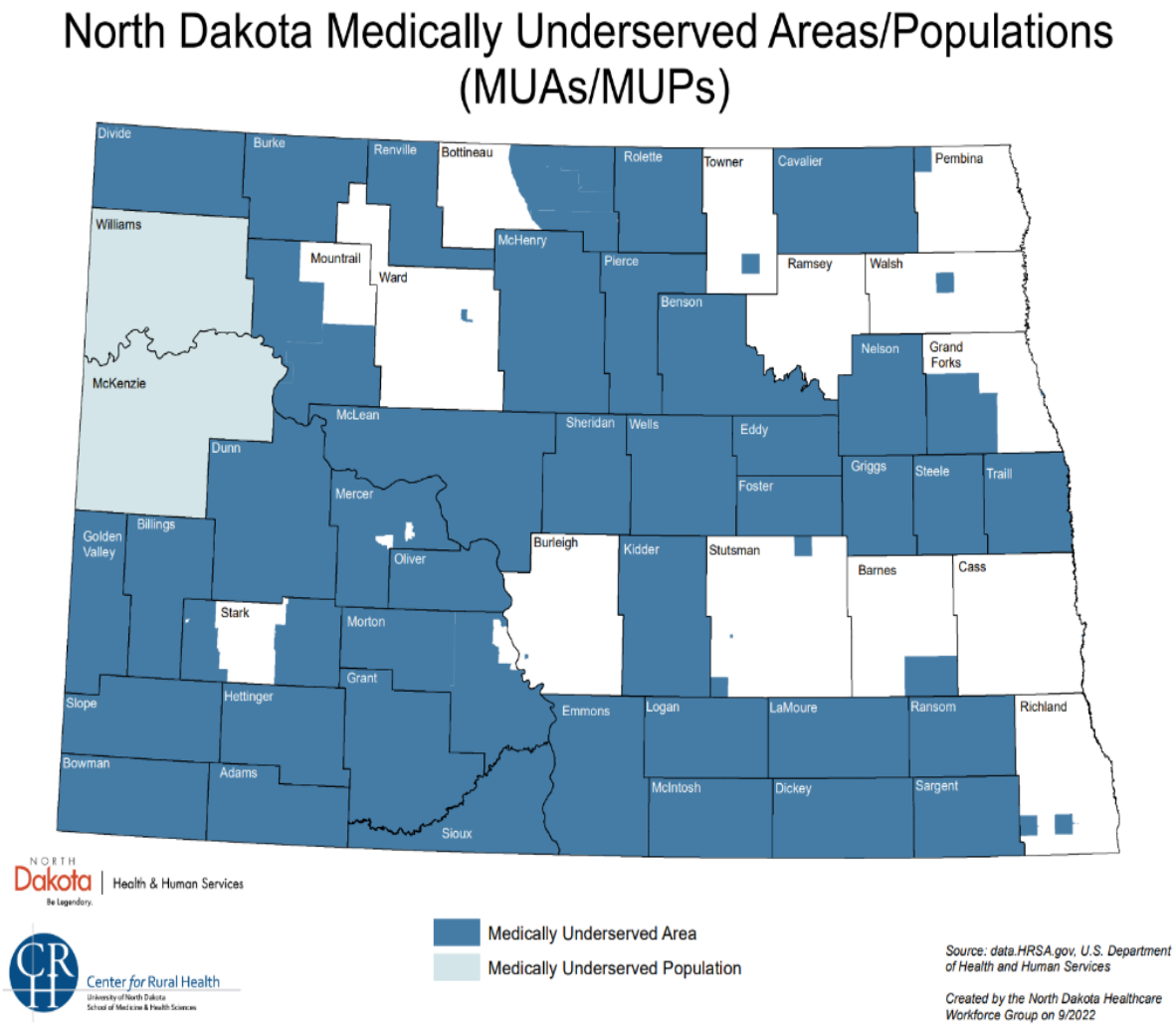
Approximately 27 million children are treated each year in emergency departments throughout the United States, which results to about a quarter of all emergency rooms visits (Pilkey et al., 2018). Over 5.8 million (about 21.5%) of these pediatric patients present in rural emergency departments (Auerbach et al., 2021). Additionally, nearly two-thirds of children cannot readily access an emergency department that can provide highly proficient and guideline compliant pediatric emergency care (Pilkey et al., 2018). Limited pediatric care is an issue because most rural emergency departments see less than five pediatric patients per day and do

not have the increased training required for adequate pediatric care. Along with this, “children living in rural areas have increased risk of disability and death from injury, trauma, and medical diseases” (Stellflug & Lowe, 2018, p. 21). The health disparities and limited care of rural America creates a focus on the increased needs for healthcare services. Healthcare service needs can be determined through the assistance of rural health studies and assessments. One useful step in determining the healthcare needs of rural America is through evaluation of the medically underserved areas/populations within the state.

Medically underserved areas/populations (MUA/Ps) designate areas of North Dakota that meet criteria for experiencing a shortage of primary healthcare services for a specific population (Center for Rural Health (CRH), 2022b). The population may also be experiencing further economic, cultural, or language barriers to their healthcare. The designation provides knowledge on healthcare needs of specific geographical areas and helps to aid with health maintenance organizations and community health centers. The areas can include a whole county, a group of neighboring counties, a group of urban census tracts, or a group of civil divisions (Health Resources & Services Administration (HRSA), 2022). Examples of MUA/Ps include homelessness, low-income, those eligible for Medicaid, Native Americans, and migrant farm workers. In North Dakota, 37 federal programs use the Health Professional Shortage Areas (HPSA) and MUA/MUP Designation (CRH, 2022b). The North Dakota MUA/Ps map is outlined in Figure 1 and was developed by the Center for Rural Health through funding from the North Dakota Department of Health and Human Services, Primary Care Office. Permission was granted from the Center for Rural Health for use of the figure (Appendix E).

Figure 1

North Dakota Medically Underserved Area/Populations



(Center for Rural Health, 2022b)

Social Determinants of Rural Health

Social determinants of health (SDOHs) are described as the "conditions in which people are born, grow, work, live, and age" and the ways that they influence the outcomes of our daily life (World Health Organization (WHO), n.d.). SDOHs are an important step in understanding the needs of rural health and the disparities that can occur as they affect the incidence of

pediatric emergencies. Residents who reside in smaller and more isolated settings have an increased challenge in accessing not only healthcare, but also groceries, home supplies, community services, transportation, and other economic lifestyle tasks (Dobis et al., 2021). Further, the rural pediatric population has a higher exposure to large machinery, trucks, grain bins, and many other large, potentially dangerous equipment. Children living in these rural areas are shown to have a higher rate of injury, including unintentional injury and attempted suicide, in comparison to urban children (Pilkey et al., 2018). Therefore, SDOH affecting rural pediatric populations will be further discussed below, including geography, environment, medical care, socioeconomic-cultural, and behavior.

Living in a rural location can contribute to numerous health disparities in comparison to urban areas, which directly influences the type and frequency of pediatric health presentations. In the U.S., rural Americans already have a higher risk to die from heart disease, cancer, unintentional injury, chronic lower respiratory disease, and stroke. The development of these chronic conditions begins with childhood lifestyles. Children also face extra challenges with physical injury and mental, behavioral, and developmental disorders (Center for Disease Control and Prevention (CDC), 2017). The risk of unintentional injury deaths is shown to be 50 percent higher in rural areas and is the leading cause of death in those age 1-18 (Bettenhausen et al., 2021). In 2019, suicide was the second leading cause of death in rural adolescents, which had a mortality rate of 60% higher than nonrural peers (Bettenhausen et al., 2021). Furthermore, a firearm is utilized in the act of suicide two and half times more than in non-rural adolescents.

Rural children are often also faced with an increased risk of chronic disease in comparison with their nonrural counterparts. Obesity is one chronic disease that faces a disparity as 35% of rural children are considered overweight or obese versus 29% of urban. Other

common chronic conditions in rural health include asthma, allergies, ADHD (Attention Deficit Hyperactive Disorder), developmental delays, and anxiety (Bettenhausen et al., 2021). Rural children are more likely to engage in higher risk related behaviors at a younger age. Habits can include unhealthy dietary decisions, early initiation and/or unprotected sexual activity, and substance abuse. The increased chance of developing early high-risk habits places children at risk of further chronic conditions later in life.

The rural communities represent a higher percentage of uninsured and public insured individuals in the U.S. (Bettenhausen et al., 2021). In North Dakota, 6.1% of residents lack health insurance (Rural Health Information Hub, 2023). Approximately, 22.4% of rural children live in poverty compared to 18.4% of nonrural children. Housing is more likely to be substandard in rural communities and more individuals are shown to be food insecure (Bettenhausen et al., 2021). The higher rate of poverty and general lower level of education contributes to the risk for more adverse childhood experiences. North Dakota Rural Health reports that the poverty rate for rural areas is slightly higher at 10.4% in comparison to 10.1% (Rural Health Information Hub, 2023). Children in rural North Dakota have an 8.4% non-high school diploma rate versus 5.4% in urban areas and a higher unemployment rate at 4.3% versus 3.1% (Bettenhausen et al., 2021). The combination of these disparities creates a risk for poor health outcomes in the rural population.

Geographical and environmental characteristics of a rural community also contribute to general disparities. The characteristics of longer travel times and less access to healthcare, lower seatbelt use, machinery contact, and increased exposures to environmental hazards such as heat, dust, noise, pesticides, and other chemicals all can influence the health of children. Healthy People 2030 has developed a goal to address the geographical disparities of the U.S. The Healthy

People 2030 aims to “reduce the proportion of people who can’t get medical access when they need it” (Healthy People, 2020). Healthy People will assist in recognizing the issues related to geographical health disparities and the steps that need to be taken to meet the goal. However, the Healthy People 2030 goal cannot be achieved without addressing the healthcare provider shortage needs in America.

Healthcare Provider Shortage

Healthcare provider shortages have a direct impact on the care that can be provided for individuals in rural communities. As previously reviewed, children in rural communities are constantly being faced with challenges related to geography, demographic changes, and access to resources (Bettenhausen et al., 2021). The lack of providers in combination with social disparities can affect the health outcomes in children who are under-resourced and underserved (Lipman & Lobo, 2017). Nearly half of the pediatric population in the U.S. see family practice providers instead of a general pediatrician and 82% of rural counties do not have local pediatrician access (Bettenhausen et al., 2021). Many rural hospitals are led by general physicians, physician assistants, and nurse practitioners that may not have significant pediatric training (Katznelson et al., 2018). In fact, surveys show that in rural hospitals across the country, about 14% have solely general family advanced practice providers on site in their emergency departments (Katznelson et al., 2018). Nearly half of rural America must travel greater than 30 miles to a Level 1 or Level 2 trauma center. The designation as a Level 1 or Level 2 trauma center identifies hospitals that can provide the highest levels of trauma care to patients that are critically ill or injured, which can increase the survival rate of patients (American Trauma Society, n.d.). On average, rural families must travel 31 to 45 miles for a child’s hospitalization and 24 to 54 miles for a pediatric specialty.

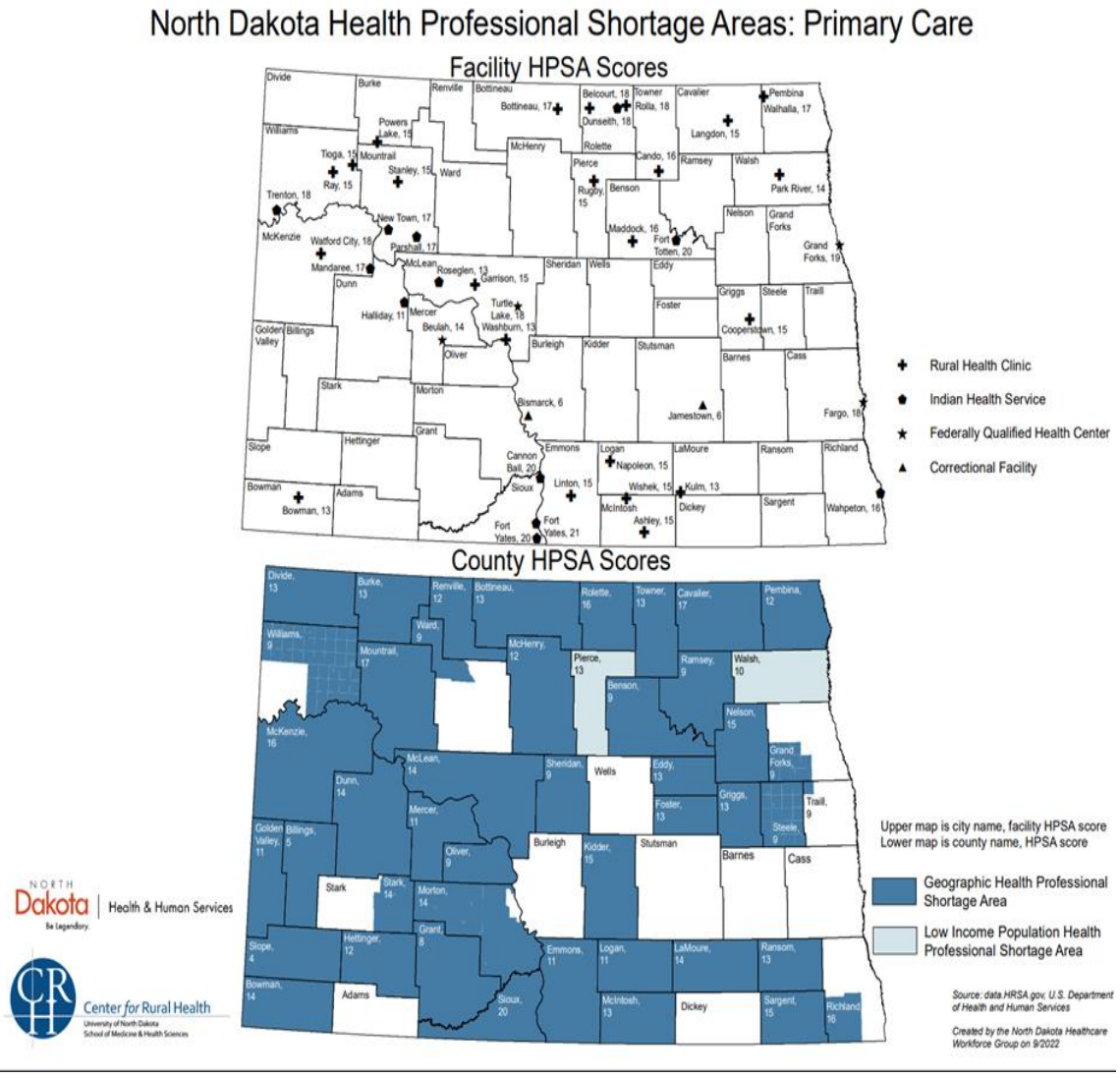
General access to healthcare continues to be a subject under nationwide scrutiny in part due to the shortage of providers. According to the Association of American Medical Colleges (2021), the U.S. could experience a provider shortage across all specialties of about 37,800 to 124,000 physicians by 2034. Primary care alone could experience between 17,800 and 48,000 physician shortages by 2034. The provider shortage has worsened and been highlighted during the stress of the COVID-19 pandemic. Demographics, retirement trends, marginalized minority populations, people living rural, and those without health insurance continue to stress the number of providers in the field (Association of American Medical Colleges, 2021). Many of the younger providers are also choosing to not work full time due to increased burnout potential, which contributes to the shortage of providers. Nurse Practitioners and Physican Assistants can help to aid in the continued shortages.

Due to the continued provider shortage trends, the U.S. has developed a system to identify shortage areas. Under the U.S. Public Health Service Act, Health Professional Shortage Areas (HPSA) were developed to designated geographic areas, population groups, and facilities that demonstrate a need for more primary care services (CRH, 2022b). The designated areas need to prove a shortage of primary, dental, or mental health providers (HRSA, 2022). The HPSA title was originally developed for the National Health Service Corps to create a system for prioritization of resources. The main component of this designation is an assessment of the number of health professionals relative to the population having a high need. Other considerations of HPSA designation include identifying services that are overutilized, excessively distant, or inaccessible to the high need population. Figure 2 outlines the health professional shortage areas in North Dakota Primary Care. The map was developed by the Center for Rural Health through funding from the North Dakota Department of Health and

Human Services, Primary Care Office. Permission was granted from the Center for Rural Health for use of the figure (Appendix E).

Figure 2

Health Professional Shortage Areas Within the State of North Dakota



(Center for Rural Health, 2022b)

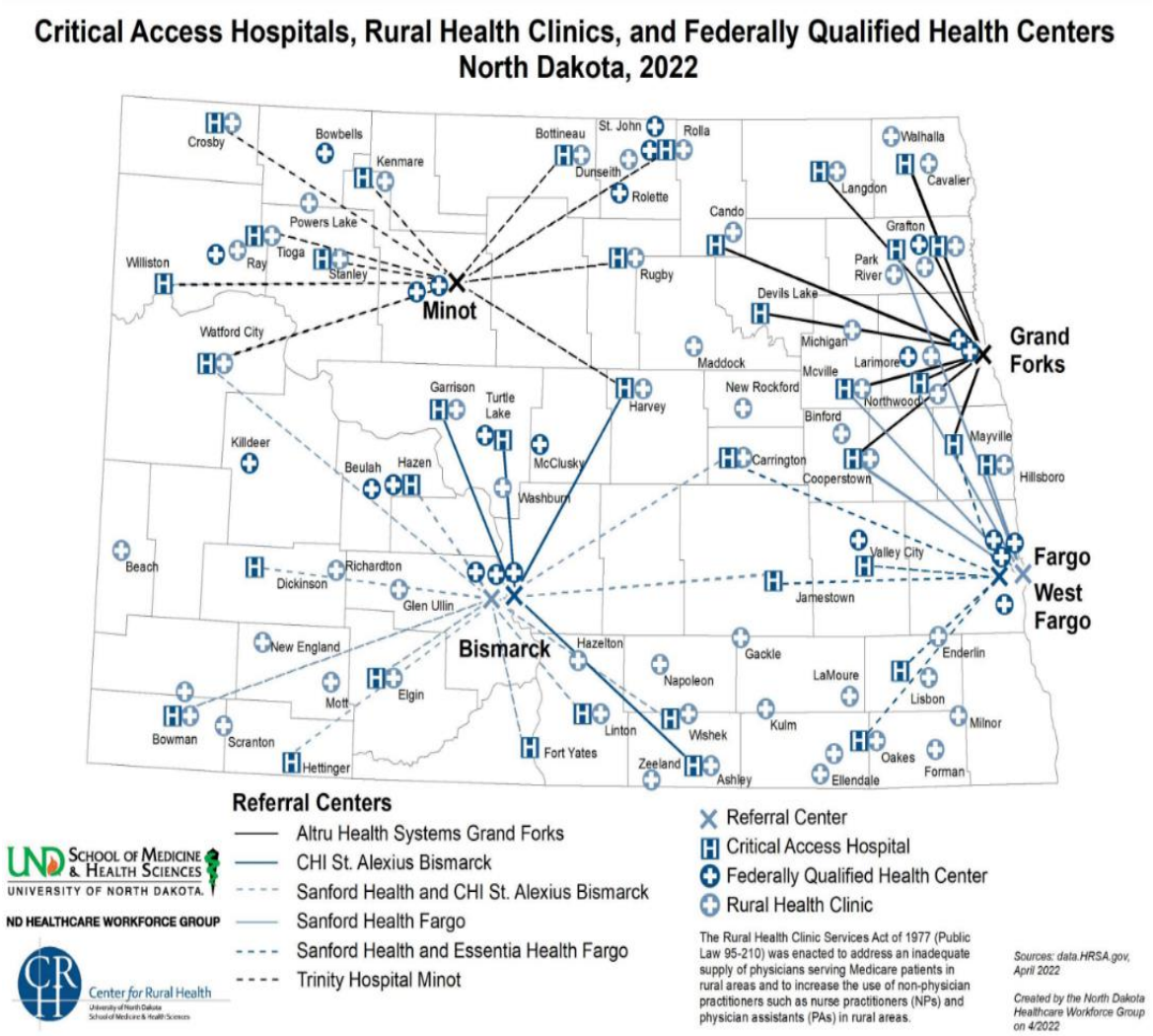
Critical Access Hospitals

In 2022, there were about 1,360 critical access hospitals across the U.S. (Rural Health Information Hub, 2021). North Dakota currently has 47 licensed and certified acute care

hospitals and 37 critical access hospitals across the state (CRH, 2022b). The critical access hospitals must meet a checklist of criteria and be designated by the Center for Medicare and Medicaid Services (CMS). The requirements for a critical access hospital include: be located in a rural area, be more than 35 miles away from nearest hospital, maintain no more than 25 inpatient beds, maintain average length of stay of 96 hours or less, have 24/7 emergency care, be designated by the state, and be a part of an established State Medicare Rural Hospital Flexibility Program (Centers for Medicare and Medicaid Services (CMS), 2021). Figure 3 identifies the critical access hospitals, rural health clinics, and federally qualified health centers in North Dakota. The map was developed by the Center for Rural Health through funding from the North Dakota Department of Health and Human Services, Primary Care Office. Permission was granted from the Center for Rural Health for use of the figure (Appendix E).

Figure 3

Critical Access Hospitals, Rural Health Clinic, and Federally Qualified Health Centers



(Center for Rural Health, 2022b)

Pediatric Education

Numerous rural health disparities and needs have been identified in the prior literature. Understanding these needs is critical for understanding rural pediatric healthcare requirements and the knowledge necessary to care for these individuals. However, pediatric healthcare is a specialty in which many health care providers can lack the necessary depth of education and

comfort in performing. The stem of knowledge begins with pediatric education, which can be inconsistent across the country. Learning experience can drastically vary among institutions, schools, hospitals, and even educators. The amount of pediatric education in undergraduate and graduate nursing and number of individuals entering the pediatric workforce has been on a slow decline (Betz, 2021). Decreased knowledge in pediatric care has also been affected through a decline in experienced educators, difficulty finding good pediatric clinical placement, and a potential for disconnect between didactic content and bedside care (Betz, 2021). A study conducted in five critical access hospitals in North Carolina showed that nearly three quarters of healthcare respondents felt they had an inadequate focus on pediatrics in their continuing education programs (Katznelson et at., 2018). The lack of pediatric education in both undergraduate and postgraduate programs along with infrequent exposure to pediatric care in rural hospitals contributes to the discomfort in care.

Education is the key to pediatric readiness. Pediatric readiness can be obtained through understanding competencies, policies, equipment, and other resources that may be needed to provide high-quality emergency care (Emergency Medical Services for Children Innovation and Improvement Center, n.d.). Many barriers to pediatric readiness in a rural setting have been identified through literature. The most common barriers include a lack of educational resources, lack of policies, lack of familiarity, cost of training, and lack of quality improvement (Pilkey et al., 2018). Other barriers include infrequency of training and clinical events, the emotional toll of caring for a sick child, and knowledge of pediatric specific quality and safety standards (Goldman et al., 2018). These barriers are directly related to a lack of pediatric emergency preparedness within rural facilities, especially critical access hospitals. The process and

importance of achieving pediatric emergency care preparedness will continue to be evaluated below.

Emergency Response Training

The first step to understanding rural pediatric care education is to know what is included in fundamental emergency response training. Pediatric Advanced Life Support (PALS) and Basic Life Support (BLS) are required for rural health emergency department providers and create a basis for emergency response training. The best way to become proficient in emergency response is through experience. However, due to the low volume of pediatric patients and lack of opportunity to practice skills, many rural providers continue to feel uncomfortable with emergency response (Pilkey et al., 2018). A lack of educational resources, lack of policies for pediatric care, unfamiliarity with national guidelines, cost of training personnel, and a lack of quality improvement plans have all been identified as barriers to further competency (Pilkey et al., 2018). Rural emergency training commonly lacks simulation and hands-on training of urban healthcare facilities, including certifications such as PALS and BLS.

BLS is a basic and integral education piece to any individual whether they are involved in healthcare or not. BLS can help provide safe and effective care in a medical emergency. The support can be utilized in cardiac arrest, respiratory arrest, or when someone is experiencing an obstructed airway. The trainees learn the proper skills in using an automated external defibrillator (AED), performing cardiopulmonary resuscitation (CPR), and relieving airway obstructions for all ages (Red Cross, 2022).

PALS is a program that trains healthcare professionals in the care of pediatric patients experiencing emergencies considered life-threatening (Red Cross, 2022). Emergency education includes subjects such as cardiac arrest, respiratory emergencies, and shock. The training can

assist individuals in streamlining and improving skills and resuscitation training, which will help to provide a higher quality of care. PALS assists providers in rhythm interpretation, electrical interventions, and pharmacologic knowledge. Individuals can be challenged through problem solving and critical thinking through the situations presented. PALS is an important first step in the education of pediatric emergency care (Red Cross, 2022). PALS certification should be required for all emergency department personnel; however, in North Dakota it depends on facility requirements, healthcare provider role, and level of previous education.

Further emergency response training can be obtained through Advanced Trauma Life Support (ATLS). ATLS was developed due to an incident with inadequate medical treatment in a rural Nebraska facility in 1976 (American College of Surgeons (ACS), n.d.). The incident showed the need for a new approach in providing care for individuals having major, life-threatening injuries. The education developed focuses on providing systemic and specific training for the initial care of trauma patients. Individuals learn how to properly assess, resuscitate, stabilize, transfer, and assure that optimum care is being provided (ACS, n.d.). Doctors and other qualified healthcare professionals, such as a Physician Assistant (PA), Nurse Practitioner (NP), or nurse, can take this course. In North Dakota, NPs, PAs, and Physicians in rural hospitals are required to take either ATLS or Comprehensive Advanced Life Support (CALS) if they work in a rural emergency department setting.

Comprehensive Advanced Life Support (CALS) is a rural emergency medical education seminar based in Minnesota. The CALS education works to improve “patient care by providing advanced life support education to rural and/or resource limited healthcare professionals” (Comprehensive Advanced Life Support (CALS), n.d.). Participants in the CALS classes will learn a broad range of infrequent emergency experiences with limited specialized personnel

while utilizing technological support. The course is not commonly used for healthcare provider education in rural areas of North Dakota but is a class that can be utilized in future education.

High Acuity Low Occurrence

Pediatric emergency response education, topics, and goals are commonly determined through High Acuity Low Occurrence (HALO) evaluations. HALO is a term used to describe medical situations that are rare and life-threatening. Such circumstances present difficult clinical situations that occur infrequently and require an expert level of knowledge (Bierer et al., 2021). HALO scenarios can range from high acuity perinatal delivery, to anaphylaxis, to pediatric emergencies. HALO events are experiences that many providers commonly have never seen in their practice, residency, or training. Although there may be a lack of training, healthcare professionals are expected to have the required skill set needed in caring for these patients in practice (Hakemi et al., 2023). However, HALO knowledge commonly requires experiential learning. Addressing HALO situations and practicing them as able through simulations can help to improve clinical outcomes and improve confidence in the health care team.

Pediatric Simulations

Advanced training that includes education and simulations has grown in popularity. The development and implementation of multi-faceted education programs, especially for rural providers, is crucial in caring for pediatric patients in an emergency (Stellflug & Lowe, 2018). Many providers have shown their support for education and simulation in the rural setting. Some proposed a partnership with local children's hospitals to work toward improving national pediatric awareness (Goldman et al., 2018). Many articles recommended increasing awareness of pediatric guidelines, implementing policies and procedures, ensuring that weights are taking in kilograms, and supporting the securement of pediatric equipment (Pilkey et al., 2018). Therefore,

education is valuable to enhance staff comfort in caring for seriously ill pediatric patients in critical access hospitals (Katznelson et al., 2018). Knowledge can lead to improved clinical performance and increased patient outcomes.

Simulation can help to improve resuscitation knowledge and retention over time (Stellflug & Lowe, 2018). The use of simulation can help to enhance knowledgeable responses when rural providers have an uncommon encounter with a pediatric patient and has proven to be a powerful teaching methodology (Auerbach et al., 2021). Providers that have experienced simulation-based training have stated "all team members would greatly benefit from frequent simulation training" (Auerbach et al., 2021, p. 6). Along with this, simulation practices have repeatedly shown improvements in team performance, acquisition of skills and knowledge, and increasing comfort levels when caring for pediatric patients (Katznelson et al., 2018). In practice, simulation allows for providers to practice, debrief, and re-do before experiencing it in a real-life situation. The experience of simulation and education have support within the literature, which strengthens the need for further pediatric practice.

Conclusion

Existing literature suggests that pediatric patients in rural communities face increased challenges related to healthcare. Rural patients are challenged with higher rates of injury, mental illness, increased chronic disease, and many other issues, yet face fewer resources than urban individuals. Critical access hospitals are the main source of primary and emergency medical care for these patients. However, education for providers in these critical access hospitals can be inconsistent due to prior education, experience, and a lack of patients. Due to these factors, pediatric emergency response knowledge and comfort is shown to be low in comparison to urban. Education and simulation-based programs have shown a positive effect on increasing the

comfort levels of providers in critical access hospitals. The following practice improvement project will help address emergency pediatric preparedness needs in a rural critical access hospital.

CHAPTER 3: METHODS

Overall Project Design

The practice improvement project was created due to an identified need by the participating facility and support from the literature. The site was previously seeking simulation training through the SIM-ND program due to a recognized need for increased pediatric education. SIM-ND is a North Dakota based, statewide mobile education system (University of North Dakota, n.d.). The system uses high fidelity human patient simulations to help train both pre-hospital and hospital personnel. SIM-ND mobile unit trucks can provide adult, pediatric, infant, and birth manikins and can travel to anywhere in the state. Staff at the site had identified many scenarios that would be considered high acuity, low occurrence (HALO) situations at the location. A pediatric trauma scenario was among the list of requested SIM-ND educational scenarios with staff. The literature review also supported a lack of knowledge related to pediatric patient care in rural hospitals. Based on the identified needs and the literature review, an evidence-based skills seminar was developed and implemented.

The project plan, implementation, and goals were determined through discussion with the participating facility. First, a facility need had been identified through a verbal response from the site. The site also implemented a previously planned multi-day SIM-ND simulation that was not affiliated with this project in May 2023, which supported a continued need at the site. Second, further pediatric education was determined and developed. The topics were determined through a needs assessment that was provided to key stakeholders, including the Director of Nursing and Assistant Director of Nursing, after NDSU institutional review board approval (Appendix A). The didactic education, skills, and simulations were then adjusted based off facility requests and the available resources and equipment that were needed. Third, project implementation was

performed. Two simulations with didactic pediatric education were completed on September 15th, 2023. Knowledgeable and trained instructors for the course were utilized to ensure thorough and high-quality education. The simulation instructors were highly trained, experienced individuals through the SIM-ND program. Didactic education was developed and taught by a Nurse Practitioner with experience in emergency medicine, the co-investigator, and trained SIM-ND instructors.

The study used pre-test and post-test surveys. The pre-test was distributed to the facility Director of Nursing (DON) and Assistant Director of Nursing (ADON) two months prior to simulation implementation to help review prior trainings, assist in topic selection for the seminar, and to determine further facility educational needs. The post-survey was distributed to subjects after implementation of the seminar. Surveys were created through a combination of previous dissertation evaluations and the project's goals. The post-survey was administered immediately following seminar conclusion to ensure completion.

Implementation Plan

Education is the key to successful outcomes in a critical access hospital with pediatric patients. Increased education and simulation are steps that can help improve the comfort level of providers in a rural community. The implementation of pediatric simulations can be challenging, as resources and knowledge proficiency can be difficult to attain. However, simulation-based education is associated with improvements in overall pediatric preparedness (Auerbach et at., 2021). The assessment of project implementation with a subsequent timeline is critical for the success of education and comfort with pediatric situations. The project ensured that simulation and education provided a high-quality presentation to the healthcare providers within the site.

Evidence-Based Practice Model

The Iowa Model of Research-Based Practice, an evidence-based model was utilized to develop the implementation step within a practice project (Cullen et al., 2022). The model has been commonly used in healthcare settings, classroom teaching, and academic coursework. The Iowa Model works synergistically with the Diffusion of Innovation Theory to ensure wholistic development of a practice project (Cullen et al., 2022). Due to the benefits, the seven-step Iowa Model was utilized to guide, develop, and evaluate this practice improvement project. The project included two SIM-ND simulations, hands-on intraosseous (IO) skill practice, and didactic/lecture education review for healthcare providers in a rural North Dakota hospital. The goal of the project was to improve provider's perceived confidence in pediatric preparedness. Healthcare providers that were invited to the seminar included, but were not limited to, nurses, nurse practitioners, medical doctors, paramedics, and emergency medical service personnel. Permission was obtained from the University of Iowa Hospitals and Clinics to utilize the Iowa Model for this project (Appendix D).

Step 1: Topic Selection

The first step in the Iowa Model was topic selection. The topic of pediatric preparedness in a rural health facility was identified through an evaluation of the literature and conversations with the participating facility. Pediatric care, specifically traumas, are a high acuity, low occurrence (HALO) event in rural healthcare. The low occurrence of pediatric patient exposure in rural hospitals can cause a lack of comfort when caring for this population of patients. The participating facility supported the need for pediatric training, specifically in pediatric trauma, due to the low exposure and high knowledge needed to care for these patients. A needs

assessment was performed by the DON and ADON to evaluate specific seminar topics. Inquiries about simulation, hands-on skills, and didactic education were included in the needs assessment.

Step 2: Forming a Team

Following the identification of a need and proposed topics, the second step was to form a team. The process of forming a team should be directed by the chosen topic and include all stakeholders involved in the implementation (Brown, 2014). The team helped to develop, evaluate, and implement the practice improvement project. The project developed a team including a dissertation committee composed of a committee chair, two additional committee members, and a graduate appointee. The committee chair is a Family Nurse Practitioner and current NDSU nursing faculty member who has experience in rural healthcare. Committee members include two additional Doctor of Nursing Practice providers and NDSU nursing faculty members who have experience in rural healthcare and specialize in pediatric nursing, respectively. The graduate appointee was a Ph.D. professor in Human Development and Family Science at NDSU, with a focus on successful aging and health promotion. All members of the dissertation committee helped to improve the project through their range of knowledge and expertise in the field.

Step 3 and 4: Retrieval and Grading the Evidence

A critical step in a project's development was to evaluate the research relating to the practice improvement project (Brown, 2014). The evaluation was best achieved by first developing a good PICOT question then conducting a comprehensive literature review. Although literature was limited in this subject, the information obtained strongly supported the need for pediatric simulation and education in rural hospitals. The literature that was previously conducted also supported the need for further research and evaluation of this subject. Resources

obtained included scholarly articles from the NDSU's library database system. Articles were evaluated and reviewed for reliability and legitimacy. The articles were sought within the last five years, but some exceptions were made due to the low quantity of articles acquired. Following a comprehensive review of literature, sufficient research and support were identified to proceed with the improvement project.

Step 5 and 6: Developing and Implementing Evidence-Based Practice Standard

An effective teaching and learning approach are critical for the success of pediatric care education. Problem-based learning has been shown to provide a helpful alternative to the traditional didactic-style learning (Harriel & Parboosingh, 2020). An analysis by Harriel and Parboosingh on the improvements of pediatric problem-based learning through physician training identified some common themes (2020). Increased learning can be achieved through interactive videos, peer to peer learning, simulation, and helping educate facilitators in dialogue. Individuals can have a deeper learning experience when thinking about the problem out loud. Most importantly, peers who are comfortable performing and interacting freely with each other will perform better in real-life situations. Peer comfort enables them to present ideas while listening to others, helps them to not worry about being incorrect, and refrain from judging others. Comfort with peers can be achieved through practice and experience working together, which is stimulated through an effective learning process (Harriel & Parboosingh, 2020). The knowledge of this learning approach helped in the development and implementation of the project. High quality training in this project was ensured through utilization of knowledgeable experts in the field and the SIM-ND training instructors.

The overall goal of the practice improvement project was to increase the perceived level of pediatric skills preparedness among healthcare providers in a rural North Dakota hospital

system. After conversation within the facility, a pediatric trauma simulation scenario was among the identified needs due to a lack of comfort and HALO criteria. Along with the assistance of SIM-ND and other knowledgeable educators, a seminar was developed to perform a pediatric education-based seminar for staff at the facility. The seminar was developed with hands-on skills, SIM-ND simulation, and didactic education.

Step 7: Evaluation

Evaluation is critical to the success of an implementation project as it is needed to understand its success or failure. Brown (2014) states "even after a practice change has been implemented, the team should continue to evaluate the practice changes, watching for any deviation in practice or a decrease in outcomes." Performance and feedback data from the facility's previously completed May 2023 simulation were obtained through a needs assessment from the key stakeholders and allowed for further evaluation of facility needs, comfort, and seminar topics. The practice improvement project also provided a post-survey questionnaire to the participants to evaluate the seminar. The post-test provided a range of questions to evaluate the participant's perceived level of preparedness after the session. Along with perceived level of preparedness, the post-seminar survey collected general, nonidentifying demographic information, evaluations of the session, and feedback and recommendations for future training. The data were evaluated and analyzed to determine if there was a gain in perceived preparedness after seminar completion.

Setting

The practice improvement project was implemented at a critical access hospital in rural southwest North Dakota in September 2023. The site was picked due to an educational need that was identified during conversations and inquiries with staff at the site. The site is a 25-bed

critical access hospital located just west of Highway 49 and north of Highway 21in Grant County, North Dakota. The hospital opened in 1977 after the closing of a previous site, which had been in operation since the 1940s.

The participating facility was in a community based around agriculture, agri-business, service industries, and retail trade (Nissen & Reiten, 2020). The participating facility's community comprises 1,672 square miles with an estimated population of 2,377 in the county. Besides the critical access hospital, the only other healthcare services in Grant County include one dentist, a vision clinic, a basic care facility, a pharmacy, a visiting chiropractor, and some public health services through Custer Health in Mandan and Grant County Social Services (Nissen & Reiten, 2020). The participating site has a level four trauma center that operates their emergency department.

The Hospital Community Needs Assessment from 2020 was assessed along with verbalized needs from the staff. The staff placed tally marks next to SIM-ND scenarios that they felt would be beneficial. Pediatric trauma emergency care was one of the highest-scoring simulations chosen among staff. Along with the staff identification, the community health needs assessment from 2020 was utilized. Grant County ranked 27th out of 48 counties in North Dakota on overall health rankings. The top concerns for pediatrics in this assessment included alcohol use and abuse, smoking and tobacco use, drug use and abuse, and depression/anxiety (Nissen & Reiten, 2020). The lack of healthcare services, the extremely rural nature of the location, the request for this education from the staff, and the community health needs assessment all outlined the high need for this project at the site.

Sample/Sample Size/Recruitment

The sampling method used was purposive sampling. Purposive sampling is a method to select a sample based on the characteristics of a population and the overall objective of the study being conducted. The practice improvement project was offered to all nurse practitioners, nurses, medical doctors, paramedics, emergency medical service personnel, and other direct patient healthcare providers. The inclusion of differing levels of medical professionals was sought to encourage development of team building, comfort, and practice with peers.

The participating site has 89 employees within the entire facility. Staff include nurse practitioners, medical doctors, paramedics, emergency medical responders, nurses, radiology technicians, certified nurse aids, administration, and many other healthcare roles (Nissen & Reiten, 2020). Exclusion criteria included individuals outside of professional bedside roles, such as environmental or nutrition services. Specific numerical data of individuals outside of bedside roles was not available. The goal sample size was 10 individuals as a group of ten would provide opportunity for a comprehensive and realistic situation and was the max that SIM-ND can accommodate in each simulation training event. Given the logistical limitation of class size, individuals who work most often in the emergency department such as the medical doctor, nurses, and nurse practitioners were given priority for attendance.

Recruitment was performed through email invitations to staff and paper flyers hung in team stations. The email invitation and flyer can be viewed in Appendix I. The DON and ADON, who were key stakeholders, were consulted to further encourage participation in the educational seminar. The ADON obtained email addresses of the target population and sent email reminders at increments to remind staff of the education opportunity. The email increments were provided about one month before the project implementation and one week prior. Two

flyers were placed in the team stations about one month before implementation. A signup sheet was created and placed in the team stations next to the flyers by the ADON; however, the signup sheet was not comprehensive and did not correctly reflect the resulting attendance. SIM-ND was consulted through the entire process regarding simulation planning and scheduling.

Institutional Review Board

The NDSU Institutional Review Board (IRB) provided approval of this practice improvement project (PIP). Approval of the project and subsequent surveys were reviewed by the dissertation committee after the co-investigator's dissertation proposal meeting and were addressed prior to submission to the IRB board. Changes by IRB after submission were requested and amended by the co-investigator to meet criteria. IRB approval was achieved through NDSU for the PIP. The IRB application titled IRB Determination of Exempt Human Subjects Research, protocol #IRB0004853 was requested to include human participants in the implementation of this project. An exemption of the research project was determined by IRB in accordance with federal regulations (Appendix A). The chosen facility did not have an IRB process, so no formal approval or letter was needed through the site.

Evidence-Based Project Interventions/Activities

The educational seminar and simulation were hosted at the proposed site with SIM-ND. SIM-ND is a grant-based resource through the Center for Rural Health comprised of nurses and paramedics highly trained in emergency care (University of North Dakota, n.d.). The main resources used in the practice improvement project included personnel, supplies, SIM-ND, and a budget. Personnel included a dissertation committee composed of the committee chair, two additional committee members, and a graduate appointee. The committee helped to ensure the development and implementation of the evidence-based project. Collaboration between the

proposed site, SIM-ND, and the dissertation committee was completed to determine simulations, assist in the development of workshop content, and to determine a date and time for the project.

Supplies were sought through the available resources within the proposed site, SIM-ND, and the co-investigator. The education materials, such as PowerPoint presentations, were printed for participants to utilize during the seminar and made available for the site after implementation. A projector system was located and brought by the didactic instructor, who performed the lecture presentations. Simulation and hands-on IO skill supplies were fully provided by the SIM-ND program.

The budget was reviewed prior to implementation. Participants were paid as part of their employment through the proposed site for their continuing education time. The time commitment was about a 5-hour educational afternoon. SIM-ND, the proposed site, and the co-investigator provided equipment for the simulations and hands-on skill portions of the seminar free of charge. Funds to provide snacks for the participants were supplied by the didactic instructor at $50. A minimal cost was accounted for in printing the participant PowerPoints slides, handouts, and surveys. The utilization of personnel, supplies, and budget have been further described through the relation to the project objectives.

Evaluation/Outcomes/Data Analysis

Three practice improvement project objectives were evaluated as part of the project implementation. The objectives were determined through evaluation of the literature and the identified needs of the site. The assessment process involved collecting relevant data, measuring key performance indicators, and assessing the alignment of the objectives with the project's overall goal. Project objectives and their evaluations are further discussed in this section.

Objective One Evaluation

Objective one was to evaluate the perceived level of preparedness among rural health care providers in performing pediatric emergency skills at a rural healthcare facility. The objective was evaluated by a needs assessment distributed to the DON and ADON. The needs assessment was used to determine seminar topics and to evaluate the facility's perceived outcomes from previous simulations that were performed at the facility in May 2023. Previous simulations were administered by the SIM-ND program and are not affiliated with the current project; however, evaluation of success with previous educational opportunities helped evaluate future educational needs. The evaluation included verbal and observational data assessing needs at the site.

Objective Two Evaluation

Objective two included developing and implementing a pediatric emergency training seminar based on the perceived needs of rural healthcare providers in a critical access hospital. Topic selection for the didactic portion of the educational seminar was determined through identification of the facility's requests in the needs assessment and through a review of literature identifying common pediatric skills needed in emergency care. Instructors included the co-investigator, SIM-ND personnel, and an instructor who has experience in the field. The content was delivered using didactic learning, hands-on skills, and tabletop discussion.

Simulation implementation was utilized through the SIM-ND program. SIM-ND held one-hour simulation-based sessions concerning two real-life pediatric situations. The simulation topics were determined by the site through the needs assessment and outlined two relevant pediatric trauma situations. The scenarios outlined the same topics as the didactic learning content. The process of providing lecture knowledge followed immediately by hands-on

simulation training ensured that the participants had the educational tools to succeed. The educational seminar occurred on September 15, 2023, and could account for two hours of healthcare provider continuing education through the SIM-ND program as the simulations were approved credits. Didactic education and hands-on skill time was not submitted for continuing education credit approval. The timeline of the seminar afternoon was developed with assistance from the facility and is listed in Table 1.

Table 1

Seminar Timeline

	Simulation: Flying Child	Drowning Lecture	Simulation: Drowning	Intraosseous lecture/practice
12:00-12:55	Large Group Lecture: Approach to the Pediatric Trauma Patient- Primary Assessment			
1:00-1:55	Group 1	Group 2		
2:00-2:55	Group 2	Group 1		
3:00-3:55			Group 1	Group 2
4:00-4:55			Group 2	Group 1

Objective Three Evaluation

Objective three states that following the seminar, the health care provider's perceived level of preparedness at pediatric emergency skills will increase. The goal was assessed through a post-survey that was administered to the participants at the conclusion of the seminar afternoon. The survey included quantitative and qualitative questions about demographics, perceived level of comfort, educational topics, methods, and future needs. Survey questions directly assessed the participant's perceived level of comfort in the knowledge prior to the seminar versus after the seminar. Descriptive statistics were used to analyze the data and are

reviewed in Chapter 4. The results of the surveys were assessed to determine if comfort and preparedness increased.

Conclusion

This practice improvement project's success was achieved through the development and implementation of a subject while utilizing models and theories. Objectives of this project were determined following the identification of a need within the site and literature. The objectives were important as they outline the goals to determine further components. The improvement project was then developed based on the steps of the Iowa Model of Research Based Practice. The model helped to further establish the problem, research the subject, develop a response, and implement a project for change.

Personnel, stakeholders, supplies, budget investigation, data collection, and data analysis were all further utilized to ensure success of the implementation. The previously reviewed components that were used during the project were critical to determine outcomes. Supplies, personnel, and stakeholders helped to implement and obtain the data collection. The data collection and analysis were crucial to help measure the objectives and determine a need for further education moving forward. All the outlined components played an important step in the successful development, implementation, and evaluation of this practice improvement project.

CHAPTER 4: RESULTS

Implementation of the practice improvement project occurred on September 15th, 2023. There was a total of six participants who attended the education seminar and five total survey responses. All healthcare providers who provide patient care were invited to the seminar, but limited attendance was attained due to a lack of providers and patient care needs. A signup sheet was given to the facility before implementation, and some participants were recorded. The signup sheet was not comprehensive and did not correctly reflect the final attendance. Knowledge related to the absence of advanced practice providers was not known before the seminar date and rescheduling of the project was unfeasible due to the facility schedule and co-planning with the SIM-ND program. Implementation was achieved and survey results will be discussed in this chapter.

The pre-seminar needs assessment was completed by the Director of Nursing and Assistant Director of Nursing at the chosen facility via Microsoft Word document. Both participants successfully completed the assessment. Pre-seminar needs assessment results are discussed in objective one and objective two results. The post-seminar survey was administered with a QR code via NDSU Qualtrics. Five participants completed the post-seminar survey. A sixth participant attended the first half of the seminar and did not complete the survey.

Pediatric Emergency Care Skill Seminar Participant Demographic Characteristics

Demographic information for the roles of the healthcare providers was obtained in the first seven questions of the post-survey. The questions inquired about their practice position, years of experience, and current facility practices. Of the survey responses, there was one nurse, one paramedic, and three emergency medical technicians (EMT). All the participants in the

seminar were female. The demographic information obtained from the post-survey participants is outlined in Table 2.

Table 2

Demographics

Survey Response	%	Count
Question 1: Years of experience in current practice		
1-3	20%	1
4-6	20%	1
7-10	40%	2
Greater than 20 years	20%	1
Total	100%	5
Question 2: Previous experience in rural facility		
Yes	80%	4
No	20%	1
Total	100%	5
Question 3: If previous rural experience: Years of experience in rural care prior to current position		
Less than a year	25%	1
1-2 years	25%	1
6-9 years	25%	1
Over 9 years	25%	1
Total	80%	4
Question 4: Frequency of Working in a Rural Emergency Department Setting		
Daily	40%	2
Weekly	40%	2
Every 2-3 Months	20%	1
Total	100%	5
Question 5: Considering experiences, perceived level of preparedness for practice in current role		
Generally, well prepared	100%	5
Total	100%	5
Question 6: Average Patient Volume per 12 Hour Shift in Rural Emergency Department		
0-2 patients	80%	4
3-5 patients	20%	1
Total	100%	5
Question 7: Average Volume of Pediatric Patients Seen in a 12-hour Shift		
0-1 patients	100%	5
Total	100%	5

Objective One

Objective one evaluated the perceived level of preparedness among rural health care providers in performing pediatric emergency skills at a rural healthcare facility. A needs assessment related to the evaluation of perceived preparedness and further requests regarding education topics was obtained from the Director of Nursing (DON) and Assistant Director of Nursing (ADON). Seven questions were obtained from the needs assessment, with the first three questions assessing objective one. The assessment goal was to evaluate the observed staff response to a previous pediatric trauma simulation provided to staff about three months before this project. The needs assessment evaluated the participant's perceived level of staff knowledge, comfort related to pediatric care, and their further educational requests. The responses helped to guide the educational topics that were provided in the project seminar.

Question one in the needs assessment asked the DON and ADON's evaluation of staff response during the prior pediatric trauma simulation training. Both participants felt that the previous pediatric trauma simulation went well overall, one stating that "the staff said they really like them." The second question asked participants if they felt their staff were comfortable in their role with pediatric patients prior to their training. Reponses showed that staff felt neither comfortable nor uncomfortable or uncomfortable with caring for pediatric patients prior to their previous simulation. An additional comment for the comfort levels of staff with pediatrics was "our charge nurses are very good and comfortable with their skills, but we don't see pediatric traumas hardly ever so most have never had to actually work one."

The third question in the needs assessment asked if staff were generally more prepared in the care for pediatric patients following the previous pediatric trauma simulation. Both responded that they agreed the pediatric education was beneficial. According to the assessment

response, staff felt they learned a lot and felt comfortable learning and asking questions. The evaluation of these first three questions were used to directly assess the perceived level of preparedness with rural health care providers in pediatric trauma management. Responses from the DON and ADON show that staff feel generally unprepared for pediatric trauma patients and showed that further education was beneficial, based on the previous simulation-based education.

Objective Two

Objective two sought to develop and implement a pediatric emergency training seminar based on the perceived needs of rural healthcare providers in a critical access hospital. The perceived educational gaps of the facility were sought through the needs assessment that was administered to the DON and ADON at the site. Questions four through seven were utilized in the development and attainment of objective two. The responses to these questions helped guide the educational topics provided in the project seminar.

Question four asked the participants to reflect on the previous pediatric simulation experience and evaluate some areas of improvement for staff moving forward with pediatric education. One response stated “any type of practice helps prepare us for when we do have a patient arrive that needs ER care. It is nice to have the practice in a more controlled, learning environment.” The other report stated “the nurses are good with their skills, but most have never used them on a pediatric patient. I feel like running the pediatric scenario was good so they could take their skills and adjust them to a pediatric situation (different equipment use/sizes, etc.). I feel like this controlled environment where they could make mistakes and learn from them was great. They could become more comfortable and feel more prepared though this type of learning.”

The next portion of the needs assessment moved to the DON and ADON’s recommendations for future pediatric education or simulation. Participant responses stated to

"continue to offer pediatric trauma training and education to staff to keep them adequately prepared" and "continuing to include at least one pediatric scenario with SIMS when we have them out." A follow-up question was obtained to inquire on specific topics they had for pediatric education or simulation. One response stated, "I think anything would be helpful since we did not see much of anything." The second participant reported that drowning, since they have a pool and lake nearby, would be a good education topic for the staff.

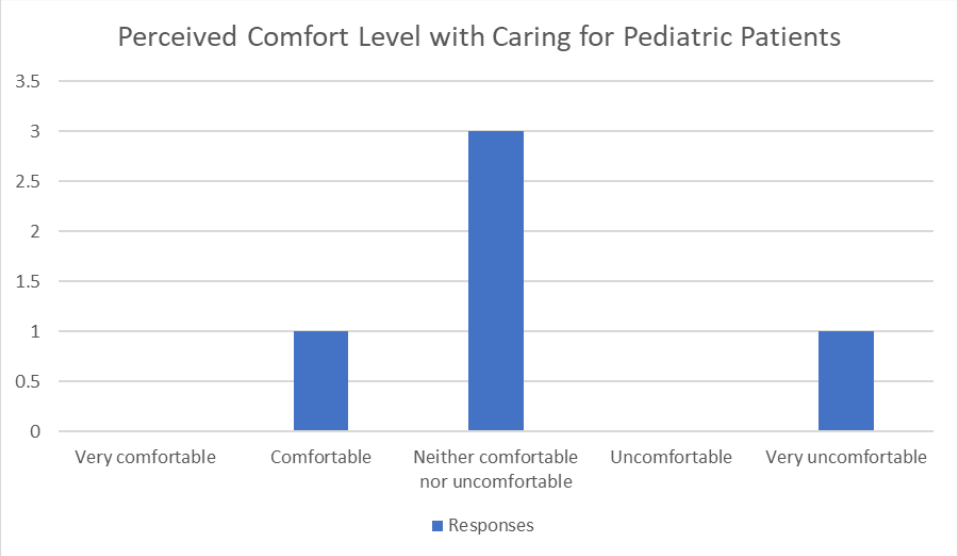
To further evaluate the specific goals of the seminar education topics, the pre-seminar needs assessment participants were asked in question six which future pediatric based training they feel would be more beneficial for their site. The evaluation was presented as a multiple-choice question with two options. The options presented were either 1) to participate in a different pediatric trauma simulation from their previous experience or 2) to re-run the same pediatric trauma simulation that they performed three months prior. One felt that the staff should participate in a different pediatric trauma simulation so staff could have experience in different areas. The other participant recorded both options and provided the following response: "I think both would be helpful. Not all staff went through the pediatric scenario. We did two days with different scenarios each day so not all staff did the same simulations. Even the staff that went through the pediatric scenarios could benefit from doing it again and seeing what they remember from last time since it has been a while now." Finally, the seventh question on the needs assessment asked the respondents to provide any other suggestions or thoughts regarding pediatric trauma training or education. Only one response was recorded and reiterated a previous comment. The comment outlined the continued need to offer training for staff to keep them prepared, comfortable, and confident in caring for pediatric patients.

Objective Three

Objective three states that after the seminar, the health care providers involved in the training perceived level of preparedness at pediatric emergency skills will increase. The goal was evaluated through a post-survey given to the participants via NDSU Qualtrics. Questions 8 through 21 of the post-survey were utilized to achieve objective three evaluation. Question 8 evaluated their preparedness by asking the participants to rate their perceived comfort level with caring for pediatric patients prior to the educational seminar. Participants were asked in the post-survey to reflect on their level of comfort before the completed training. They were asked to rate their prior level of comfort on a Likert scoring scale from comfortable to very uncomfortable. Results are shown in Figure 4.

Figure 4

Question 8: Perceived Level of Comfort Before Seminar Training



Question number 9 and 10 include information about the education seminar skills and how often the participants perform the skills presented. Question 9 was posed as a Likert-type

question asking the individuals to rate their skills preparedness on a scale of unprepared to very well prepared. The question also gave participants the ability to state if the skill is within their scope of practice or not. The results for question 9 are shown in table 3.

Question 10 inquired about how often they may perform the pediatric skills. The question asked participants to select between more than once a month, once a month, once every 2-3 months, once every 4-6 months, every 7-12 months, an option to fill in the blank, or that they have never performed the skill before in their practice. Likert responses are outlined in Table 3. If the participant selected that they have never performed the skill, they were asked if they have ever performed the skill in training and what type of training. The comments entered in the other or never perform categories for question ten were recorded. Reponses for drowning skills included “have not performed”, “once”, and “none at the moment”. One participant reported that they have never performed the skill, but that they had practiced management in the CALS class. When assessing the responses for IO insertion, participants reported “not in scope of practice”, “once”, and “not applicable yet”.

Questions 11 through 13 were a direct assessment of objective three. The questions asked participants to rate on a Likert-type scale if their comfort level in performing the education topics in the seminar had increased. Results are also outlined in Table 3.

Table 3

Seminar Skills Assessment

	Pediatric Trauma Management	Pediatric Drowning Management	IO insertion
Question 9: Participants Preparedness Rating after Performing Skill in the Education Seminar			
Somewhat unprepared	20%	20%	
Not feeling either way			20%
Generally, well prepared	60%	80%	40%
Very well prepared	20%		40%
Total	100%	100%	100%
Question 10: Average Number of Times Performing Pediatric Skill			
Once every 2-3 months	20%		
Once every 4-6 months	20%		
Once every 7-12 months			20%
Other	20%	60%	60%
Never performed	20%	20%	20%
Total	80%	80%	100%
Questions 11-13: Based on seminar today, did comfort level of performing skill increase			
Strongly agree	20%	20%	
Agree	80%	80%	60%
Neither agree nor disagree			40%
Total	100%	100%	100%

Note: One participant did not complete part of question 10.

Questions 14 through 16 on the post-seminar survey evaluated the sustainment that the seminar education could have on the participants and barriers related to utilization. Question 14 asked if the participants have the resources and/or supplies at the facility to sustain skills preparedness long term (longer than 6 months). Eighty percent of respondents stated “yes” and one, or 20%, stated “no.” The participant who stated “no” chose not to provide a requested explanation of their response. Question 15 was a fill in the blank response. The question asked participants to record barriers, if any, in the practice setting that they anticipate when implementing the skills that they learned in the seminar. Three responses, or 60%, of individuals

filled in answer to this question. Responses included “vent skills”, “none”, and “not comfortable with kids.”

The final question regarding future practice was question 16. Question 16 inquired if participants felt the seminar education and simulation would change their current and future practice in caring for pediatric patients. The question was utilized to directly evaluate future practice changes. Answers were provided on a Likert scale ranging from strongly agree to strongly disagree. 20% reported they strongly agreed and 80% responded they agree that the seminar would change their future practice. Questions 14 through 16 all had 100% response rate. Individuals were encouraged to explain their responses to how the knowledge would impact their future practice. Write in responses included “haven’t worked much with pediatric patients. This will help me to be more prepared if or when I need to” and “more comfortable.”

Based on Likert scoring ranging from strongly agree to strongly disagree. The participants were asked in question 17 if, after the seminar today, they felt that their overall level of pediatric knowledge and preparedness has increased. Twenty percent stated they strongly agree and 80% stated they agree with the question. They were encouraged again to provide an explanation of their report. One explanation was recorded which stated, “more knowledgeable.”

To further assess the participants' views on seminar education, question 18 inquired about the teaching methods and if they were perceived as conducive to their learning. Results from question 18 are shown in table 4.

Table 4

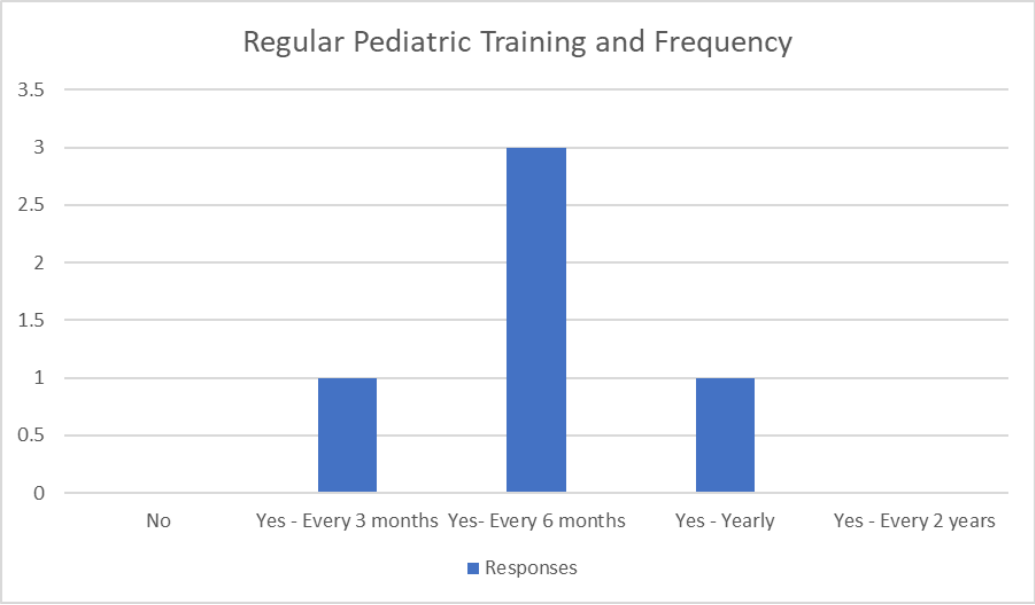
Participants’ Rating of Perceived Effectiveness of Teaching Methods

Teaching Method	Strongly Agree	Agree	Total
Lecture/Didactic	20%	80%	100%
Hands-On Skill Application	40%	60%	100%
Simulation with SIM-ND	40%	60%	100%

The final three questions in the post-seminar survey inquired about future pediatric training. Question 19 asked participants if they would wish to have regular pediatric training and how often they would like training. Participant responses included every three months, every six months, and yearly. Figure 5 shows result distributions for question 19. Question 20 asked if the participants felt simulation-based education (either pediatric or adult) would be beneficial as a yearly education tool. One hundred percent responded "yes" to the question. Question 21 was an open-ended question asking if the participants had any further suggestions or comments about the educational seminar. One response was recorded that stated, "airway hands-on".

Figure 5

Post-survey Question 19



CHAPTER 5: DISCUSSION AND RECOMMENDATIONS

Summary

Key themes and numerical significance were identified from the practice improvement project during analysis of the pre-seminar needs assessment and post-seminar survey. From the pre-seminar needs assessment with the DON and ADON, there was an identified gap in comfort and knowledge in caring for pediatric patients in the facility. The main concern was related to a lack of experience and exposure to pediatric traumas in the facility, which was leading to discomfort when caring for the pediatric population. Due to these results, there was an identified need to provide further training to improve comfort and knowledge of pediatric trauma care. These findings were consistent with the literature review that revealed a lack of experience and comfort in caring for pediatric patients in rural facilities. Specific project objectives and other common themes found in the pre- and post- surveys will be discussed in this section.

The pre-seminar needs assessment identified the facility's evaluation of previous educational experiences, comfort levels of staff with pediatric cares, and their goals for the seminar training. The DON and ADON provided detailed responses to the seven survey questions and the responses were utilized for project development. The feedback provided by the DON and ADON allowed them to actively contribute to the creation of the educational seminar for their staff. This increased the facility's involvement in the overall process of seminar development. Objective one and objective two were attained through the utilization of needs assessment responses with support from post-survey results.

The objectives of this project were evaluated through survey responses and determined if they met criteria. Pre-seminar needs assessment questions one through three and post-survey question eight addressed objective one of this project, which was to evaluate the perceived level

of preparedness among rural health care providers at performing pediatric emergency skills. Objective one of this project was met through these assessments, as adequate understanding was obtained regarding this topic through two different perspectives. The pre-seminar needs assessment responses in questions one through three were obtained from the DON and ADON. Responses reiterated that staff working in the facility had minimal exposure to pediatric trauma experiences and therefore lacked comfort in caring for the pediatric patient population. Question eight in the post-survey asked the seminar participants to rate their comfort level of caring for pediatric patients before performing the seminar and answers ranged from uncomfortable to comfortable. Understanding the overall perspective from the DON and ADON compared to specific seminar participants' thoughts on their perceived level of preparedness helped for the further development of this project.

Pre-seminar needs assessment questions four through seven addressed objective two of this project, which was to develop and implement a pediatric emergency care-based training seminar based on the perceived needs of rural health care providers in a critical access hospital. Specific educational topics for the PIP were obtained in questions four through seven of the needs assessment to ensure that the topics would be relevant. These questions helped to meet the goal of objective two as they enhanced the development and implementation of the pediatric seminar and ensured that the topics would be tailored to the chosen facility. Responses were recorded and analyzed by the co-investigator and topics were finalized with the facility. Needs assessment questions four through seven and supporting post-survey questions will continue to be discussed to further explain the project progression, development, and results.

Questions four and five in the needs assessment asked the DON and ADON to provide areas of improvement for staff and recommendations for future pediatric emergency education.

One qualitative response to these questions supported a need for any pediatric educational topics to be offered, as the facility has an extreme limit in pediatric experiences. Due to the location and pediatric nature, the other respondent had requested cold water drowning education. Cold water drowning education was therefore included in the final didactic and simulation topics. The cold-water drowning simulation involved a five-year-old patient, and the motor vehicle accident trauma simulation was a six-year-old patient.

A general, non-specific approach to the care of a pediatric trauma patient and intraosseous (IO) insertion were also chosen by stakeholders and confirmed with the facility before final decision. These topics were chosen as they could further enhance the seminar educational benefit through generalized pediatric trauma knowledge and IO insertion hands-on skill. IO insertions have been commonly performed as an alternative fluid and medication line to a patient when other routes have not been available. An IO has a high potential for use in a rural setting.

As the identification of skill topics was an integral aspect of the needs assessment, subsequent evaluations were conducted to assess both the chosen topics and educational methodologies. Participants reflected in the postsurvey question 18 that they agreed or strongly agreed that the didactic information, hands-on skill application, and simulations were conductive to their learning. This result speaks to the effectiveness of the educational design of the project. Results from post-survey questions 11-13 supported the educational benefit. Most participants noted that they were more comfortable and more prepared in performing the skills after the seminar, meaning topic selection was successful. The improvement in skills practice, knowledge, and comfort support a positive overall impact from the seminar implementation.

Simulation has previously been identified in the literature as a beneficial tool to enhance the training of staff in rural facilities. To support this finding, the DON and ADON reported in the needs assessment that staff had a positive response to previous simulation training courses and felt that they were beneficial for future educational needs. The DON and ADON stated that staff in previous simulations enjoyed practicing in a controlled and non-judgmental environment. Simulations can provide hands-on, situational experiences for the staff to which they may not usually have access. Simulation was then used in the implementation of the project.

To enhance the planning of the seminar approach, the needs assessment also included an evaluation of the preferences of the DON and ADON regarding either revisiting the previous pediatric simulation or opting for new simulations. Needs assessment participants chose both re-running a previously completed simulation and providing a new simulation topic. The theme of enhancing knowledge through repetition and knowledge retention was recognized as a crucial element to the success of pediatric trauma cares. The previous simulation experience at the facility covered pediatric trauma due to a motor vehicle accident. The new simulation topic of pediatric cold-water drowning was chosen for the project meeting needs identified in needs assessment responses. Therefore, simulation topics of pediatric cold water drowning and pediatric trauma due to motor vehicle accidents were conducted by the SIM-ND program for the facility. The use of simulation was assessed after the seminar in the post-survey to further assess the effectiveness. Staff felt that simulation was a positive addition to the seminar content, which is congruent with previous literature reviews.

Overall, comfort levels of providing care to pediatric patients were assessed within this practice improvement project. Objective three overviewed this goal with the focus to evaluate if the participant's perceived level of preparedness would increase after the education. To best

assess if perceived knowledge had increased after the education, participants were asked in post-survey question eight to rate their comfort level of caring for pediatric patients before performing the seminar. Participants ranged from very uncomfortable to comfortable. When later asked on post-survey question 17 if their perceived comfort level with caring for pediatric patients increased after the seminar, most participants agreed or strongly agreed that they felt more comfortable in the skills. Therefore, the results showed that most participants felt the seminar was beneficial to their current and future practice. The participants stated that they overall felt "more comfortable" after the seminar, which reflects that objective three of this project was met.

The feedback gathered through the postsurvey consistently reflects an overwhelmingly positive response to the seminar. Participants expressed satisfaction with various aspects of the program, highlighting its effectiveness and relevance. Moreover, a recurring theme in responses to the final post-survey questions revealed a shared desire among participants for ongoing and regular training opportunities within the facility. This consensus helps outline the success of the current seminar and the need to continue development through sustained educational initiatives in the future. The interest in future training suggests a proactive and engaged mindset among participants, which emphasizes the potential for continuous learning in the facility.

Interest in future training helps to support consistency with the Diffusion of Innovation (DOI) theory as outlined in chapter two. The seminar provided improvements in knowledge, skills, and evidence-based practices, which helped to assist in healthcare provider progression moving forward (LaMorte, 2022). As stated, the healthcare providers were assessed in the post-survey on their likelihood of using the seminar knowledge in future practice. The assessment of future use in practice, barriers, and recommendations for educational frequency were assessed with the DOI theory in consideration. As previously reviewed, participants were also asked if the

education would change their future practice. The participants felt education would impact their future practice and reported they would like more regular education. These responses could place the participants in the early adopter or innovator categories. The participants took the initiative to attend the education and stated that the knowledge will impact their future practice. The changes in practice and knowledge growth can be shared with other individuals within the facility, which will help to provide comprehensive and impactful changes to the facility in the future. These results support the utilization of the DOI theory in future projects.

The Iowa Model of Evidence-Based Practice was also used to guide, develop, and evaluate this project as outlined in chapter three. The Iowa Model worked synergistically with the DOI theory and was found to be beneficial to the project. The Iowa Model helped to provide a step-by-step process for the project, which helped to keep plans organized and prepared. Having an established team contributed to the project's success, and the project findings were further supported through the previously reviewed literature. Developing, implementing, and evaluating the project were all obtained as outlined in the Iowa Model. The Iowa Model was found to be beneficial and would also be supported in future projects.

Discussion

The findings of this practice improvement project are consistent with literature review results. Themes regarding pediatric trauma comfort, a lack of experience, use of simulation, and a need for more providers in rural critical access hospitals were all found within the project. Notably, the significance of pediatric trauma comfort emerged as a recurring focal point, which emphasized the importance of addressing the needs and anxieties associated with the population. The results of this practice improvement project not only validate the existing body of literature, but also contribute to insights into the specific challenges and opportunities within the context of

pediatric trauma care. The themes and new literature that has been identified provide a foundation for optimizing education related to pediatric trauma care in the future of rural critical access hospitals. Specific themes and their relevance to literature will be discussed in this section.

The project shed light on the challenges faced by rural critical access hospitals, particularly in the limited availability of healthcare providers. The location of the site was within the previously outlined HPSA, MUA, and MUP areas (Center for Rural Health, 2022b). No advanced healthcare providers were able to attend the seminar due to a lack of providers, which is consistent with this finding. A shortage of primary care providers was also found in the previously reviewed literature. The Association of American Medical Colleges (2021) reported that primary care alone could experience between 17,800 and 48,000 physician shortages by 2034. The project site has not been immune to the provider shortage challenges.

To increase the burden from having a shortage of providers, rural health continues to progress. Nearly one in five children live in rural areas of the U.S. (Bettenhausen et al., 2021). As outlined in the SDOH review, rural children face a higher rate of injury, attempted suicide, and other healthcare factors in comparison to urban children (Pilkey et al., 2018). When in trauma situations, rural children rely on critical access hospitals to be able to provide a high quality of care. Critical access hospitals have to be in a rural area and be more than 35 miles away from nearest hospital (CMS, 2021). On average, rural families must travel 31 to 45 miles farther for a child's hospitalization and 24 to 54 miles for pediatric specialty (American Trauma Society, n.d.). The proven travel averages and extremely rural nature of the site enhanced the need for knowledge through the seminar education.

A lack of experience with pediatric trauma patients leading to discomfort was also supported in the seminar. Pediatric traumas are considered a HALO event that commonly require experiential learning (Hakemi et al., 2023). However, post-survey results of the healthcare providers reflected that 80% of the participants reported on average seeing about 0-2 pediatric patients per shift. Although infrequent in this facility, literature shows that over 5.8 million pediatric patients presented in rural emergency departments (Auerbach et al., 2021). The potential for caring for a pediatric patient, especially a trauma, is a constant threat in rural healthcare. Survey results inquiring about the participant's level of comfort in caring for pediatric patients before the seminar support that healthcare providers have a low perceived level of comfort when caring for pediatric patients due to the nature and infrequency. However, the participant results also reflected a positive impact of education and an increase in comfort after the seminar.

To aid in the positive impact of pediatric-based education, the practice improvement project and previous literature review continues to support the use of multiple teaching modalities for further educational learning. Education is the key to pediatric readiness, as supported in the post-survey results, and can be achieved through understanding competencies, policies, equipment, and other resources that may be needed to provide high-quality emergency care (Emergency Medical Services for Children Innovation and Improvement Center, n.d.). Increased learning has also been found to be achieved through interactive videos, peer to peer learning, simulation, and talking through situations out loud (Harriel & Parboosingh, 2020). Working on simulations with peers helps to achieve practice, experience working together, and comfort moving forward (Harriel & Parboosingh, 2020). Simulation is shown to enhance knowledge responses when rural providers have an uncommon encounter with a pediatric patient

(Auerbach et al., 2021). The completed project demonstrated these learning values and was shown to be effective as indicated in the post-survey results. The utilization of simulation emerged as a positive strategy in augmenting the skills and preparedness of the healthcare team.

Through an updated literature review, new articles were found supporting increasing pediatric readiness. The Wall Street Journal recently published an article on October 1st, 2023, titled "Children are Dying in Ill Prepared Emergency Rooms Across America" (Whyte & Evans, 2023). The article outlines the increasing prevalence of poor pediatric outcomes related to a lack of pediatric specific preparedness and suggestions for how to be prepared in the future. Concerns are also raised that "many emergency doctors don't treat enough children to be able to spot life threatening illnesses" and "some emergency room staff default to doses and protocols meant for adults and either don't know where to find child-size gear in a crisis" (Whyte & Evans, 2023). However, it is stated that many hospitals do not act, with 25 states not checking pediatric preparedness at all (Whyte & Evans, 2023). Statements like "our emergency care systems were never designed with children in mind" support the continued need to address this issue (Whyte & Evans, 2023).

Personal, real-life stories are also shared in the same Wall Street Journal article. The stories are about children that have been harmed due to a lack of readiness and how they could have been prevented. National articles like this one raise a continuing awareness of the need for pediatric specific readiness. Hence, suggestions on how to move forward with increased preparedness were suggested in this article. The list outlines having doctor and nurse coordinators for pediatric emergency care, testing staff periodically, monitoring quality and safety markers, having child-specific protocols, disaster planning, having evidence-based support tools, having written agreements for transfers, and initiating safety measures such as weighing

only in kilograms (Whyte & Evans, 2023). Facilities should stock appropriate medications, supplies, and equipment and provide training to the staff that will use them (Chung et al., 2023). The suggestions in these articles continue to show support for education in emergency departments, especially rurally.

In support of the recommendations presented in the previous article, The Wall Street Journal published an additional article on October 25th, 2023, titled "Emergency Rooms are Failing Kids. This Hospital Stepped Up" (Imadali, 2023). This congruent newspaper article shows the support for implementing additional training for emergency departments and the positive effect that it can have. The article outlines a 25-bed hospital near the western slope of the Rocky Mountains. This hospital previously scored a 51 on a 100-point test that measured pediatric preparedness, making it one of the least-prepared hospitals in the nation, with the preparedness threshold being 88 out of 100 (Imadali, 2023). The hospital providers discussed in the article how they found success in improving their most recent readiness score to a 97.5 (Imadali, 2023). Naming child-emergency coordinators, color-coding equipment, and training staff to perform procedures on kids were among the list of strategies used to achieve their success. The support for increased education was also found as "like most emergency departments, Grand River's see many more adults than children. The unfamiliarity and inexperience can impair proper care" (Imadali, 2023).

Taking steps like the ones outlined in these articles helps to address the needs moving forward as many gaps continue to be identified in rural and underserved pediatric emergency care (Chung et al., 2023). Considering the unique health needs of pediatric patients in emergency departments is associated with 60-70% fewer deaths (Chung et al., 2023). Chung (2023), among other authors, implore the need for attainable solutions like investing more in pediatric readiness

efforts and growing support for healthcare. The implemented PIP directly addressed these concerns. The project considered the needs outlined in these recent articles and reflected the positive views that can occur after implementing educational steps. The consideration of the implemented project and literature review brings forth recommendations for future pediatric preparedness.

Recommendations

The review of literature and findings within the practice improvement project continues to show support for pediatric education. The advancement of education emphasizing diverse training methods is crucial in highlighting the necessity for pediatric-focused knowledge, particularly in rural healthcare settings. This progression is shown by the earlier examination of challenges associated with social determinants of health and access to care. In the face of increased adversities and a rapidly changing healthcare system, heightened educational efforts can contribute to mitigating some of the difficulties. Education can help to make healthcare providers feel more prepared, comfortable, and supported in their role. Therefore, educational recommendations are at the forefront of the future of pediatric comfort.

The first recommendation after this project is to incorporate more curriculum in educational programs for pediatric patients. This recommendation is based on support from the previous review of literature and a need for increased pediatric knowledge reflected in the surveys. Increased knowledge starts with an increased education base. The additional education should be a series of lectures, hands-on skills, and simulations that could assist health care providers in the care of pediatric trauma patients in their personal practice. No matter if the individual decides to practice rural or urban, education would be beneficial for all as pediatric traumas can occur in any location. Potential topics could include: stabilization of a critically ill

pediatric patient (resuscitation, airway and breathing management, c-spine stabilization, and bleeding control), practice with medication calculation, extremity procedures (fracture/dislocation reduction, growth plate considerations, and compartment pressure), and neurological considerations (concussion protocol and non-accidental trauma). If a healthcare provider does decide to work rurally, emergency care education and training could be further included in orientation for new providers when taking an emergency care role.

Another recommendation is to seek out opportunities for healthcare providers to obtain continuing education at regular intervals in pediatric care to help sustain the knowledge and skills needed. The post-survey reflected support for this recommendation, as 100% of the participants reported they would benefit from regular training, either adult or pediatric. Due to these results, it is recommended that facilities should continue to collaborate with the SIM-ND program and build relationships with community resources to continue to seek out opportunities for further education. SIM-ND is a grant funded state program that provides emergency care education and simulation to pre-hospital and hospital employees (University of North Dakota, n.d.). Utilization of SIM-ND is free to the facility and can be used whenever scheduling allows. SIM-ND can help to further develop educational opportunities. Community resources could include fire departments, EMS services, and public health. The facility should work with these departments to coordinate education and interdisciplinary opportunities. Conferences, such as an annual pharmacology conference, or online education modules could help to enhance the knowledge gained through these hands-on experiences.

The requirement of certain certifications for health care providers helps to sustain knowledge and skill. Certifications for providers include BLS, ACLS, PALS, CALS, and ATLS; however, they are only required every two to four years. Certification provides a base of

knowledge for the individuals but may not require the individual to perform skills often enough to retain the knowledge. Depending on the location and facility, some certifications may not even require simulation and hands-on training. Due to the inconsistencies with regular training, continuing education opportunities would provide a consistent education for pediatric trauma knowledge and skills. Consistency will allow health care providers to feel more comfortable and confident in their pediatric trauma care.

Although not always possible, financial incentives can be encouraged for healthcare providers working in rural areas to obtain further education. Grants, scholarships, and other financial assistance programs can be utilized to help provide educational opportunities. Whyte and Evans suggest that states federal funding should be considered to help pay for staff to attend specific pediatric training (2023). Another way to ensure that further certifications and education are performed by staff through financial support is by providing healthcare workers with a yearly stipend to use for traveling to educational opportunities. A way to prepare for educational endeavors would be to encourage setting aside finances for emergency department education (Imadali, 2023). Recruitment for healthcare providers could be enhanced with some of these initiatives, which could assist with healthcare provider shortages. The ability to provide employees with financial assistance for further education and recruitment is always a helpful component.

Future implementation recommendations were also considered for this project. Critical access hospitals continue to be the focus of this project implementation; however, the information provided in the seminar would be beneficial to all healthcare providers. Therefore, future implementation should be considered at any site. A larger group size would influence a wider range of healthcare providers and be able to further create teamwork. Ensuring that

advanced practice providers and physicians should be present for the implementation would also be a positive recommendation. Although education is beneficial for all healthcare providers, having advanced practice providers and physicians present for the education would create a more realistic learning opportunity. These individuals' attendance would also help impact future use of the knowledge, as they are commonly the people making the patient's medical decisions. Overall, implementing the PIP in the future would be beneficial for increased pediatric preparedness at a healthcare facility.

Dissemination

The dissemination of the project was completed through a poster presentation at the North Dakota Nurse Practitioner Association 15th Annual Pharmacology Conference. Information was shared and questions answered to other Nurse Practitioners at the conference. The PIP will also achieve dissemination. Findings will be available to the public and other healthcare communities through official publication on NDSU's ProQuest website. Further dissemination of the project through journal publication will be considered in collaboration with the project committee. Journals to be considered for publication of the project are American Academy of Pediatrics and the Pediatric Emergency Medicine Journal.

Strengths and Limitations

Strengths and limitations were recognized during the development and implementation of the project were identified for consideration in future implementation. Although considered a strength and a limitation, a small number of participants were included in this project. Having a larger group of individuals within the facility would have allowed for further education and continuity of knowledge. The needs assessment design included evaluation from only the DON and ADON, which limited the perspective of knowledge. Along with the needs assessment, the

small number of post-survey responses due to the limited number of participants was also identified as a limitation to the PIP. The limited data size of the surveys leads to potential global generalizations about the comfort level and preparedness of staff in pediatric trauma situations in rural healthcare.

Along with a small number of participants, the lack of physicians, physician assistants, nurse practitioners, or other advanced practice providers was identified as a limitation to the project. The extent of staffing shortages and patient care needs within the facility was not known prior to implementation, which caused limited attendance of advanced healthcare providers. Implementation of the PIP was followed through on the chosen date due to coordination with the SIM-ND program and time constraints within the facility. The inability to postpone the project due to a lack of advanced care providers could be considered a limitation in this project. Also, when the PIP was in the planning process, focus was given to health care providers in the hospital setting. Several pre-hospital staff attended the seminar, thus meaning the literature review was not completely inclusive.

Many strengths were also identified within this PIP. The small attendance allowed participants to have an adequate amount of time to ask questions, practice skills, and become involved in the SIM-ND simulations. Participants were able to discuss experiences, have breaks when needed, and collaborate with instructors during the seminar. Based on feedback from the participants about the seminar, comments such as “more knowledgeable” and “more comfortable” were identified. These comments reflect the overall success of educational understanding.

The combination of pre-hospital and hospital staff allowed participants to collaborate on the differing roles and mindsets. The participants were able to better understand how health care

approaches may differ depending on role and location. Participants were able to build relationships, educate each other, provide mentorship depending on role, and contribute additional knowledge through differences in experiences. The collaborative nature of this project helped to strengthen future working situations and overall teamwork.

Finally, the participants reported discomfort related to the topic of pediatric trauma care within the pre-seminar needs assessment. Education related to a topic that participants were uncomfortable with is a strength of the overall project. Participants were able to perform and practice pediatric specific skills during the seminar. The practice of pediatric specific care is uncommon, as many other education and seminar topics are related to adult care and only briefly discuss pediatric considerations. The seminar allowed participants to completely focus on the care of a pediatric patient, which helped to further enhance knowledge on the topic.

Conclusion

The completed practice improvement project provided insights into the pediatric preparedness of rural healthcare. The need to address discomfort with caring for pediatric patients is critical to the advancement of medical care. Many individuals, both urban and rural, continue to have a lower perceived level of comfort when caring for the pediatric population. This project sought to understand healthcare provider discomfort and the effects that increased training can have on rural healthcare provider perception. Through a comprehensive literature review, implementation of a seminar, and analysis of results, there has shown to be a benefit in providing pediatric based education in a small critical access hospital. The training that was provided made participants feel overall more comfortable in the approach to caring for pediatric trauma patients, which makes the goal of this project successful.

The analysis of this project was shown to be valuable as it can help change the approach and focus of rural health education in the future. The project results reflected that healthcare providers would like to have regular training and the training could utilize different teaching modalities, including didactic lecturing, hands-on skills, and simulations. Due to the positive response, the pediatric trauma-based seminar is one that could be used again in the future at any health facility. Topic choices could be changed to meet the needs for the specific location, which could provide an even greater impact on the future of healthcare education.

The practice improvement project findings are congruent with a Doctor of Nursing Practice (DNP) role. Part of the DNP role is to help provide advancements in healthcare through knowledge in literature analysis. The implemented project identified a need through a literature review, conversations with the facility, and surveys. The need was then addressed through the seminar and a positive result was noted. The findings of this project can be applied in the future through similar recognized educational gaps. A DNP prepared nurse practitioner may recognize that there is an educational need in their facility. The DNP prepared nurse practitioner would then understand how to review and analyze the literature for ways to address and understand the need. They could then utilize resources to create an educational seminar like this project to help advance the knowledge of an appropriate facility. To support this process, there is evidence in the literature for an advanced practice provider to become a coordinator in supporting education related to pediatric emergency care (Whyte & Evans, 2023). The DNP prepared nurse practitioner should step into a coordinator role to ensure that hospitals are properly prepared for the care of pediatric patients. The ability to acknowledge and address the needs of healthcare facilities, especially in rural critical access hospitals, is integral to successful healthcare outcomes.

REFERENCES

American College of Surgeons. (n.d.) *Trauma education: About advance trauma like support.* https://www.facs.org/quality-programs/trauma/education/advanced-trauma-life-support/about/

American Red Cross. (n.d.) *ALS & PALS blended learning.* https://www.redcross.org/take-a-class/als-and-pals/als-pals-training

American Trauma Society. (n.d.) *Trauma center levels explained*. https://www.amtrauma.org/page/traumalevels

Ames, S., Davis, B., Marin, J., Fink, E., Olson, L., Gausche-Hill, M. & Kahn, J. (2019). Emergency department pediatric readiness and mortality in critically ill children. *American Academy of Pediatrics, 144*(3). https://doi.org/ 10.1542/peds.2019-0568

Association of American Medical Colleges. (2021). *AAMC report reinforces mounting physician shortage.* https://www.aamc.org/news-insights/press-releases/aamc-report-reinforces-mounting-physician-shortage

Auerbach, M, Patterson, M, Mills, W & Katznelson, J. (2021). The implementation of a collaborative pediatric telesimulation intervention in rural critical access hospitals. *Academic Emergency Medicine, 5*(3)**.** https://doi.org/10.1002/aet2.10558.

Bettenhausen, J., Winterer, C. & Colvin, J. (2021). Health and poverty of rural children: an under-researched and under-resourced vulnerable population. *Academic Pediatrics, 21*(8), 126-133. https://doi.org/10.1016/j.acap.2021.08.001

Betz, C. (2021). Pediatric nursing education: Trends, challenges, and aspirations. *Journal of Pediatric Nursing, 58,* 7-8. https://doi.org/10.1016/j.pedn.2021.04.030

Bierer, J., Horne, D., Warren, A., Sett, S., Dhillon S. & Coolen, J. (2021). Interprofessional

patient-specific simulation preparation to improve management of neonatal high-acuity low-occurrence (HALO) scenarios. *Canadian Journal of Cardiology, 37*(8), 1271-1274. https://doi.org/10.1016/j.cjca.2021.02.021

Brown, C. (2014). The Iowa model of evidence-based practice to promote quality care: An illustrated example in oncology nursing. *Clinical Journal of Oncology Nursing*, *18*(2), 157-159. https://doi.org/10.1188/14.CJON.157-159

Comprehensive Advanced Life Support. (n.d.). About comprehensive advanced life support. *Rural Emergency Medical Education*. https://www.calsprogram.org/about/

Center for Disease Control and Prevention. (2017). *About rural health.* https://www.cdc.gov/ruralhealth/about.html

Center for Medicare and Medicaid Services. (2021a). *Critical access hospitals.* https://www.cms.gov/Medicare/Provider-Enrollment-and-Certification/CertificationandComplianc/CAHs

Center for Medicare and Medicaid Services. (n.d.b). *Glossary*. https://www.cms.gov/glossary?term=provider&items_per_page=10&viewmode=grid

Center for Rural Health. (2022a). *Flex: Medicare rural hospital flexibility grant program.* University of North Dakota School of Medicine and Health Services. https://ruralhealth.und.edu/projects/flex

Center for Rural Health. (2022b). *Health Professional Shortage Areas.* University of North Dakota School of Medicine and Health Sciences. https://ruralhealth.und.edu/projects/primary-care-office/hpsa-maps

Center for Rural Health. (2020). *North Dakota's significant rural health needs and identified by*

critical access hospital community health needs assessments. University of North Dakota School of Medicine and Health Sciences. https://ruralhealth.und.edu/assets/3694-

Chung, S., Foster, T. & Terry, A. (2023, November 14). *More investment in pediatric readiness will save lives in the ED.* Medpage today. https://www.medpagetoday.com/opinion/second-opinions/107341

Cullen, L., Hanrahan, K., Edmonds, S., Reisinger, H. & Wagner, M. (2022). Iowa implementation for sustainability framework. *Implementation Science, 17*(1). https://doi.org/10.1186/s13012-021-01157-5

Dearing, J. (2009). Applying diffusion of innovation theory to intervention development. *Research on Social Work Practice, 19*(5), 503-518. https://doi.org/10.1177/1049731509335569

Dobis, E., Krumel, T., Cromartie, J., Conley, K., Sanders, A. & Ortiz, R. (2021). Rural America at a glance. *Economic Research Service U.S. Department of Agriculture, 230,* 1-18. https://www.ers.usda.gov/webdocs/publications/102576/eib-230.pdf

Emergency Medical Services for Children Innovation and Improvement Center. (n.d.) *Pediatric readiness.* https://emscimprovement.center/domains/pediatric-readiness/

Goldman, M., Wong, A., Bhatnagar, A., Emerson, B., Brown, L. & Auerbach, M. (2018). Provider's perceptions of caring for pediatric patient in community hospital emergency departments: A mixed methods analysis. *Academic Emergency Medicine, 25*(12), 1385-1395. https://doi.org/10.1111/acem.13509

Hakemi, A., Blamoun, J., Lundahl, A., Armstead, T., Hakemi, K. & Malik, M. (2023). A conceptual framework for instructional design of a high acuity and low occurrence event: Simulation based education training of residents, medical students, and nurses in

anaphylaxis utilizing curated educational theories. *Advanced in Medical Education and Practice, 14*, 101-107. https://doi.org/10.2147/AMEP.S398013

Hardin, A.P., Hackell, J.M., Simon, G.R., Boudreau, A.D., Baker, C.N., Barden, G.A., Meade, K.E., Moore, S.B., Richerson, J & Committee on practice and ambulatory medicine. (2017). Age limit of pediatrics. *American Academy of Pediatrics, 140*(3), https://doi.org/10.1542/peds.2017-2151

Harriel, K. & Parboosingh, J. (2020). Improving pediatric problem-based learning sessions in undergraduate and graduate medical education. *Current Opinion in Pediatrics, 32*(6), 832-836. https.doi.org/10.1097/MOP.0000000000000962

Health Resources & Services Administration. (2022). *What is shortage designation?* https://bhw.hrsa.gov/workforce-shortage-areas/shortage-designation#hpsas

Imadali, E. (2023, October 25). *Emergency rooms are failing kids. This hospital stepped up.* The Wall Street Journal Online. https://www.wsj.com/health/healthcare/how-one-hospital-made-its-er-safer-for-kids-884307c

Katznelson, J, Wang, J, Stevens, M & Mills, W. (2018). Improving pediatric preparedness in critical access hospital emergency departments: Impact of a longitudinal in situ simulation program. *Pediatric Emergency Care, 34*(1), 17-20. https://doi.org/10.1097/PEC.0000000000001366

LaMorte, W. (2022). *Diffusion of innovation theory*. Behavioral Change Models. https://sphweb.bumc.bu.edu/otlt/mph-modules/sb/behavioralchangetheories/behavioralchangetheories4.html

Lipman, T. & Lobo, Marie. (2017). Special issue on social determinants of health. *Journal of Pediatric Nursing, 37*, 1-2. https://doi.org/10.1016/j.pedn.2017.09.004

Mayo Clinic Staff. (2022). *Emergency medicine.* Mayo Clinic. https://www.mayoclinic.org/departments-centers/emergency-medicine/sections/conditions-treated/orc-20536585

Nissen, K. & Reiten, J. (2020). *Community health needs assessment.* Center for Rural Health. http://www.jacobsonhospital.org/CHNA_Report-Elgin.pdf

Oxford Advanced Learner's Dictionary. (n.d.-a) *Comfort.* https://www.oxfordlearnersdictionaries.com/us/definition/english/comfort_1

Oxford Advanced Learner's Dictionary. (n.d.-b) *Emergency.* https://www.oxfordlearnersdictionaries.com/us/definition/american_english/emergency

Oxford Advanced Learner's Dictionary. (n.d.-c) *Pediatrics.* https://www.oxfordlearnersdictionaries.com/us/definition/english/pediatrics

Oxford Advanced Learner's Dictionary. (n.d.-d). *Rural.* https://www.oxfordlearnersdictionaries.com/us/definition/american_english/rural

Pilkey, D, Edwards, C, Richards, R, Olson, L, Ely, M & Edgerton, E. (2019). Pediatric readiness in critical access hospital emergency departments. *Journal of Rural Health, 35*(4), 480-489. https://doi.org/10.1111/jrh.12317.

Rural Health Information Hub. (2023). *Critical Access Hospitals*. Health Resources and Services Administration. https://www.ruralhealthinfo.org/topics/critical-access-hospitals

Stellflug, S.M. & Lowe, N.K. (2018, April). The effect of high fidelity simulators on knowledge retention and skill self efficacy pediatric advanced life support courses in a rural state. *Elsevier, 39,* 21-26. https://doi.org/10.1016/j.pedn.2017.12.006

United States Census Bureau. (2016). *New census data show differences between urban and rural populations.* https://www.census.gov/newsroom/press-releases/2016/cb16-

210.html

United States Census Bureau. (2023-a). *Urban and rural.* https://www.census.gov/programs-surveys/geography/guidance/geo-areas/urban-rural.html

United States Census Bureau. (2023-b). *Growth in the nation's largest counties rebounds in 2022.* https://www.census.gov/newsroom/press-releases/2023/population-estimates-counties.html

University of North Dakota. (n.d.) *SIM-ND.* https://med.und.edu/education-training/sim-nd/

Whyte, L. & Evans, M. (2023, October 1). *Children are dying in ill-prepared emergency rooms across america.* The Wall Street Journal Online. https://www.wsj.com/health/healthcare/hospitals-emergency-rooms-cost-childrens-lives-d6c9fc23

World Health Organization. (n.d.) *Social determinants of health.* Pan American Health Organization. https://www.paho.org/en/topics/social-determinants-health

APPENDIX A: IRB APPROVAL

NDSU NORTH DAKOTA STATE UNIVERSITY

08/03/2023

Dr. Adam G Hohman
Nursing

Re: IRB Determination of Exempt Human Subjects Research:
Protocol #IRB0004853, “Pediatric Preparedness in a Rural Health System”

NDSU Co-investigator(s) and research team:

- Adam G Hohman
- Sarah Mueller

Approval Date: 08/03/2023
Expiration Date: 08/02/2026
Study site(s): The practice improvement project will be implemented at a critical access hospital in rural southwest North Dakota. The site was picked due to an educational need that was identified during conversations and inquiries with the staff at the site. The site is a 25-bed critical access hospital and is located just west of Highway 49 and north of Highway 21in Grant County, North Dakota. The participating facility is in a community that is based around agriculture, agri-business, service industries, and retail trade (Nissen & Reiten, 2020). The participating facility’s community is comprised of 1,672 square miles with an estimated population of 2,377 in the county. Besides the critical access hospital, the only other healthcare services in Grant County include one dentist, a vision clinic, a basic care facility, a pharmacy, a visiting chiropractor, and some public health services through Custer Health in Mandan and Grant County Social Services (Nissen & Reiten, 2020). The participating site is a level four trauma center that operates their emergency department.
Funding Source:
The above referenced human subjects research project has been determined exempt (category 1,2) in accordance with federal regulations (Code of Federal Regulations, Title 45, Part 46, *Protection of Human Subjects*).

Please also note the following:

- The study must be conducted as described in the approved protocol.
- Changes to this protocol must be approved prior to initiating, unless the changes are necessary to eliminate an immediate hazard to subjects.
- Promptly report adverse events, unanticipated problems involving risks to subjects or others, or protocol deviations related to this project.

Thank you for your cooperation with NDSU IRB procedures. Best wishes for a successful study.

NDSU has an approved FederalWide Assurance with the Department of Health and Human Services: FWA00002439.

RESEARCH INTEGRITY AND COMPLIANCE
NDSU Dept 4000 | PO Box 6050 | Fargo ND 58108-6050 | ndsu.research@ndsu.edu
Shipping Address: Research 1, 1735 NDSU Research Park Drive, Fargo ND 58102

APPENDIX B: EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

Pediatric Preparedness in a Rural Health System

INTRODUCTION

- Pediatric emergencies are highly stressful and emotional situations
- Rural facilities often see fewer pediatric patients and commonly have limited resources
- Low exposure to pediatric emergencies can cause a lack of perceived confidence and provider discomfort, especially in an emergent situation

DESIGN/IMPLEMENTATION

- One-day educational seminar in a rural southwest North Dakota Critical Access Hospital on September 15th, 2023 in conjunction with the UND SIM-ND simulation services
  - Included: hands-on skills, discussion, didactic learning, and two SIM-ND pediatric simulations
  - Topics: pediatric IO insertion, rapid assessment of the pediatric patient, pediatric MVA trauma, pediatric drowning management

Pre-Seminar Needs Assessment Results

Reflected a lack of comfort with caring for pediatric patients and a need for education

Helped to determine education topics: IO insertion, general trauma care, drowning

Showed a positive response from past simulation trainings and a request for further training

Post-Survey Results

Overall, there was an increase in perceived comfort in caring for pediatric patients after seminar completion

After the seminar, participants felt that their overall level of pediatric knowledge and preparedness had increased

Recommendations

To provide regular, pediatric based education within rural and urban health systems

SIGNIFICANT FINDINGS

80% participants responded that their future practice will be changed

100% of participants felt they would like regular educational training

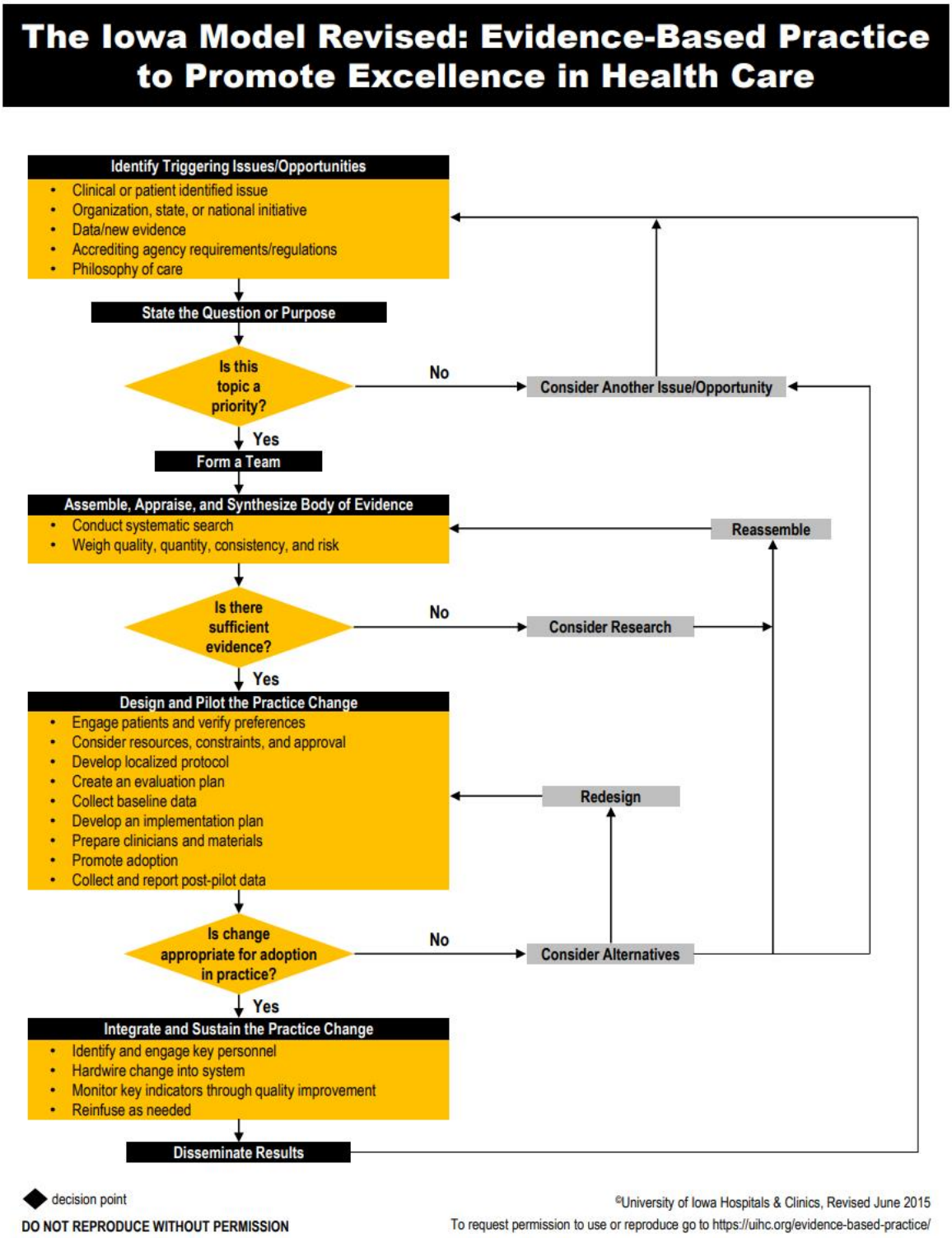
Participants see on average only 0-2 pediatric patients a 12 hour shift

Overall Results

Multi-faceted education can enhance perceived level of comfort in rural healthcare providers when caring for pediatric patients

References References can be viewed at the end of this official document.

APPENDIX C: THE IOWA MODEL REVISED: EVIDENCE-BASED PRACTICE TO PROMOTE EXCELLENCE IN HEALTH CARE



APPENDIX D. UNIVERSTIY OF IOWA HOSPTIALS AND CLINICS PERMISSION LETTER

You have permission, as requested today, to review and/or reproduce *The Iowa Model Revised: Evidence-Based Practice to Promote Excellence in Health Care.* Click the link below to open.

Iowa Model - 2015.pdf

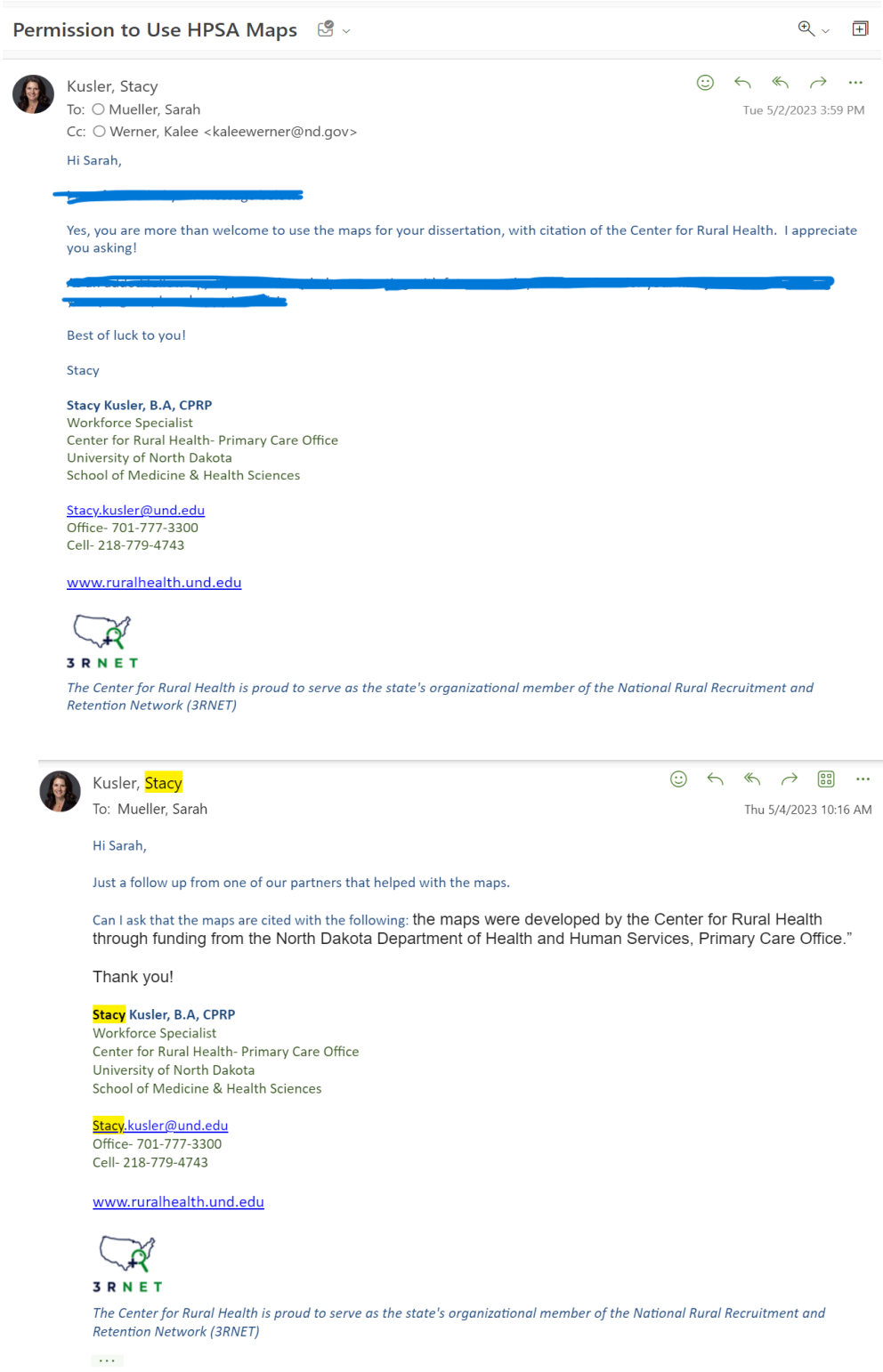
Copyright is retained by University of Iowa Hospitals and Clinics. **Permission is not granted for placing on the internet.**

Reference: Iowa Model Collaborative. (2017). Iowa model of evidence-based practice: Revisions and validation. *Worldviews on Evidence-Based Nursing, 14(3), 175-182. doi:10.1111/wvn.12223*

> In written material, please add the following statement:
> *Used/reprinted with permission from the University of Iowa Hospitals and Clinics, copyright 2015. For permission to use or reproduce, please contact the University of Iowa Hospitals and Clinics at 319-384-9098.*

Please contact UIHCNursingResearchandEBP@uiowa.edu or 319-384-9098 with questions.

APPENDIX E. CENTER FOR RURAL HEALTH PERMISSION TO USE HPSA MAPS



Permission to Use HPSA Maps

Kusler, Stacy
To: Mueller, Sarah
Cc: Werner, Kalee <kaleewerner@nd.gov>
Tue 5/2/2023 3:59 PM

Hi Sarah,

[redacted]

Yes, you are more than welcome to use the maps for your dissertation, with citation of the Center for Rural Health. I appreciate you asking!

[redacted]

Best of luck to you!

Stacy

Stacy Kusler, B.A, CPRP
Workforce Specialist
Center for Rural Health- Primary Care Office
University of North Dakota
School of Medicine & Health Sciences

Stacy.kusler@und.edu
Office- 701-777-3300
Cell- 218-779-4743

www.ruralhealth.und.edu

3RNET

The Center for Rural Health is proud to serve as the state's organizational member of the National Rural Recruitment and Retention Network (3RNET)

Kusler, Stacy
To: Mueller, Sarah
Thu 5/4/2023 10:16 AM

Hi Sarah,

Just a follow up from one of our partners that helped with the maps.

Can I ask that the maps are cited with the following: the maps were developed by the Center for Rural Health through funding from the North Dakota Department of Health and Human Services, Primary Care Office."

Thank you!

Stacy Kusler, B.A, CPRP
Workforce Specialist
Center for Rural Health- Primary Care Office
University of North Dakota
School of Medicine & Health Sciences

Stacy.kusler@und.edu
Office- 701-777-3300
Cell- 218-779-4743

www.ruralhealth.und.edu

3RNET

The Center for Rural Health is proud to serve as the state's organizational member of the National Rural Recruitment and Retention Network (3RNET)

APPENDIX F. SEMINAR NEEDS ASSESSMENT

PRESEMINAR QUESTIONNARE

1. How do you feel the (previously completed) pediatric trauma simulation went overall?
    a. Very Good
    b. Good
    c. Acceptable
    d. Poor
    e. Very Poor

    Comments:

2. Do you feel your staff were comfortable in their role with pediatric patients prior to the simulation?
    a. Very comfortable
    b. Comfortable
    c. Neither comfortable nor uncomfortable
    d. Uncomfortable
    e. Very uncomfortable

    Comments:

3. Do you feel staff were generally more prepared in the care for pediatric patients following the pediatric trauma simulation?
    a. Strongly Agree
    b. Agree
    c. Neither agree nor disagree
    d. Disagree
    e. Strongly Disagree

    Comments:

4. Based on the pediatric simulation experience, what do you feel were some areas of improvement for your staff?

5. What are your recommendations for future pediatric education or simulation?

    a. Please state specific topics.

6. Which future training do you feel would be more beneficial for your site?
    a. Participating in a different pediatric trauma simulation
    b. Re-running the same pediatric trauma simulation

7. Please provide any other suggestions or thoughts regarding pediatric trauma training or education.

APPENDIX G. SEMINAR POSTSURVEY

SEMINAR POSTTEST

Background Questions

1. What is your current position? Please circle, if not listed, fill in the blank.
    a. Registered Nurse
    b. Nurse Practitioner
    c. Physician Assistant
    d. Medical Doctor
    e. Other:_____

2. What are your years of experience in your current practice position (NP, RN, PA, MD, etc)? Please circle.
    a. 1-3
    b. 4-6
    c. 7-10
    d. 11-14
    e. 15-20
    f. Greater than 20 years

3. Do you have previous experience working in a rural facility?
    a. Yes
    b. No

    3a. If you answered yes to the previous question, how many years of experience in rural care did you have prior to your current position?

        i. Less than a year
        ii. 1-2 years
        iii. 3-5 years
        iv. 6-9 years
        v. Over 9 years

4. On average, how frequently do you work in a rural emergency department setting?
    a. Daily
    b. Weekly
    c. Monthly
    d. Every 2-3 months
    e. Every 4-6 months
    f. Every7-8 months
    g. Every 9-11 months
    h. Once annually
    i. Less than once annually

5. Considering experiences from your education program, previous employment, and job orientation, how prepared did you feel for actual practice in your current role?
    a. Unprepared
    b. Somewhat unprepared
    c. Generally, well prepared
    d. Very well prepared

6. On average, what is the patient volume per 12 hour-shift in your rural emergency department? Please circle.
    a. 0-2 patients
    b. 3-5 patients
    c. 6-8 patients
    d. 9 or greater patients

7. On average, how many of those patients (per 12-hour shift) are pediatric (less than 18 years old)?
    a. 0-1 patients
    b. 2-3 patients
    c. 4-5 patients
    d. Greater than 5 patients

8. What is your comfort level with caring for pediatric patients (before the seminar)?
    a. Very comfortable
    b. Comfortable
    c. Neither comfortable nor uncomfortable
    d. Uncomfortable
    e. Very uncomfortable

9. After completing the education seminar, how prepared do you feel in performing the following skills?

Clinical Skills	Unprepared	Somewhat prepared	No feeling either way	Generally, well prepared	Very well prepared	Is the skill within your scope of practice? Yes/ No/Unsure
Pediatric Trauma Management						
Pediatric Drowning Management						
IO insertion						

10. On average, how often do you perform the following pediatric skills in the emergency department?
    a. Pediatric Trauma Management
        i. More than once a month
            1. If selected, how many times a month? _____
        ii. Once a month
        iii. Once every 2-3 months
        iv. Once every 4-6 months
        v. Once every 7-12 months
        vi. Other:_____
        vii. I have never performed this skill before in my practice.
            1. If selected, have you performed this skill during any form of training?
            2. If yes, what type of training? _____

b. Pediatric Drowning Management
    i. More than once a month
        1. If selected, how many times a month? _____
    ii. Once a month
    iii. Once every 2-3 months
    iv. Once every 4-6 months
    v. Once every 7-12 months
    vi. Other:_____
    vii. I have never performed this skill before in my practice.
        1. If selected, have you performed this skill during any form of training?
        2. If yes, what type of training? _____

c. IO insertion
    i. More than once a month
        1. If selected, how many times a month? _____
    ii. Once a month
    iii. Once every 2-3 months
    iv. Once every 4-6 months
    v. Once every 7-12 months
    vi. Other:_____
    vii. I have never performed this skill before in my practice.
        1. If selected, have you performed this skill during any form of training?
        2. If yes, what type of training? _____

11. Based on the seminar today, do you feel your comfort level of performing Pediatric Trauma management has increased?
    a. Strongly Agree
    b. Agree
    c. Neither agree nor disagree
    d. Disagree
    e. Strongly Disagree

12. Based on the seminar today, do you feel your comfort level of performing Pediatric Drowning care has increased?
    a. Strongly Agree
    b. Agree
    c. Neither agree nor disagree
    d. Disagree
    e. Strongly Disagree

13. Based on the seminar today, do you feel your comfort level of performing IO insertion has increased?
    a. Strongly Agree
    b. Agree
    c. Neither agree nor disagree
    d. Disagree
    e. Strongly Disagree

14. Based on the skills you learned today; do you have the resources and/or supplies at your facility to sustain your skills preparedness long term (longer than 6 months)?
    a. Yes
    b. No

    If not, what resources or supplies would be needed to help support the sustainment of the skills you learned today? _____

15. What barriers, if any, in your practice setting do you anticipate when implementing the skills learned today? _____

    Additional comments:

16. Do you feel the seminar and simulation provided today will change your current practice in caring for pediatric patients?
    a. Strongly Agree
    b. Agree
    c. Neither agree nor disagree
    d. Disagree
    e. Strongly Disagree

    Please explain.

17. Based on the seminar and simulation today, do you feel your overall level of pediatric knowledge and preparedness has increased?
    a. Strongly Agree
    b. Agree
    c. Neither agree nor disagree
    d. Disagree
    e. Strongly Disagree

Please explain.

18. The following teaching methods utilized in the educational seminar were conductive to my learning.

Teaching Method	Strongly Agree	Agree	Neither agree nor disagree	Disagree	Strongly Disagree
Lecture/didactic					
Hands-on Skill Application					
Simulation with SIM-ND					

19. Do you wish to have regular pediatric training?
    a. No
    b. Yes - Every 3 months
    c. Yes - Every 6 months
    d. Yes - Yearly
    e. Yes - Every 2 years
    f. If you have a specific topic, please list_____

20. Do you feel simulation-based education (either pediatric or adult) would be beneficial as a yearly education tool?
    a. Yes
    b. No
    c. If no, please explain.

21. Do you have any further suggestions or comments about the educational seminar?

Thank you so much for participating! We hope you learned something you will use in your future pediatric patient practice!

APPENDIX H. CONSENT TO PARTICIPATE

NDSU Dept. 2670
PO Box 6050
Fargo, ND 58108-6050
701.231.7395

Pediatric Preparedness in a Rural Health System

Hello!
My name is Sarah Mueller, and I am a Doctor of Nursing Practice student at North Dakota State University. I am conducting a practice improvement project to improve pediatric skills preparedness among rural healthcare by developing a Pediatric Emergency Care Seminar. The seminar will include hands-on skills, discussion, didactic learning, and a SIM-ND pediatric simulation. By participating in this project, it is my hope that you will have educational/training resources, knowledge, and enhanced preparedness to provide evidence-based pediatric emergency skills.

Because you are a healthcare provider, you are invited to take part in this practice improvement project. Your participation is entirely your choice, and you may change your mind or quit participating at any time, with no penalty to you.

It is not possible to identify all potential risks in research, but we have taken reasonable safeguards to minimize any known risks. By participating in this practice improvement project, you may benefit by receiving education related to pediatric emergency skills. The education will provide one hour of accredited education through the SIM-ND program.

After completion of the Emergency Care Skills Seminar, I will request your feedback on the seminar as well as some demographic information. The post-survey should take about 10-15 minutes to complete. The survey is voluntary and seminar data is anonymous. That means that no one, not even members of the practice improvement project team, will know that the information you give comes from you.

If you have any questions or concerns about this project, please contact me at s.mueller@ndus.edu, or contact my chair Adam Hohman at adam.hohman@ndus.edu

You have rights as a research participant. If you have questions about your rights or complaints about this research, you may talk to the researcher or contact the NDSU Human Research Protection Program at 701.231.8995, toll-free at 1-855-800-6717, or by email at ndsu.irb@ndsu.edu.

Thank you for your time and taking part in this practice improvement project,
Sarah Mueller, DNP-student
Email: s.mueller@ndus.edu

APPENDIX I. SEMINAR INVITATION

North Dakota State University School of Nursing DNP Program

Invites you to attend: Pediatric Emergency Skills Seminar

September 15th, 2023 from 12:00pm 5:00pm

Lead by: Sarah Mueller, RN, BSN, DNP-student

Speakers: Dr. Adam Hohman DNP, APRN, FNP-BC

Topics: Approach to the Pediatric Trauma Patient- Primary Assessment Lecture, Hands-on IO Skills Training, and SIM-ND Emergency Response Pediatric Simulations

Education will be completed through lecture, discussion, hands-on skills, and simulation scenarios. SIM-ND will be in attendance for simulation scenarios. 1 hour of continuing education time will be given for participation.

Learning objectives: At the end of the seminar, participants will have increased comfort in performing pediatric emergency care.

Snacks will be provided!

RSVP: Please place name on sign-up sheet if planning to attend or email Sarah Mueller

Email: s.mueller@ndus.edu