

**Integrating a QR Code Identification System for First Responders and Families Within
Special Needs Communities**

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Abstract

Individuals with impaired communication, for whatever reason, can be at risk for delayed or inadequate care from first responders in the event of an emergency. One solution to this problem is utilizing QR code identification systems that allow individuals or caregivers to input the desired information into a system that first responders or good Samaritans can scan the QR code to gain access to the provided, critical information. This project aimed to train first responders on this form of identification while informing the community of this technology. Although COVID-19 added numerous barriers, a virtual training module proved to be an efficient means of training a local police department on QR code identification systems. The officer feedback offered quantitative data for improved confidence and qualitative recommendations for expanding first responder training on this technology. Additionally, the vast majority of the officers reported the perceived benefits of promoting awareness of this form of technology to the community.

Keywords: QR code identification systems, impaired communication, first responders, safety

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Section I. Introduction

Background

Individuals with disabilities, including intellectual disabilities, developmental delays, autism, and dementia, often need additional assistance and various safety measures in place. These individuals are more prone to wandering, can be easily frightened, and may be harder to console or care for when found in an unfamiliar environment. In a 2016 study, up to 34.6% of children with autism, intellectual disabilities, or other developmental delays attempted to wander away from their caregiver at least once within the past year (Kiely et al., 2016). Whether wandering or being found in an emergent situation, these individuals cannot always communicate adequately with first responders or good Samaritan community members. Utilization of a QR code linked to caregiver-controlled information was the focus of this community health project, emphasizing informing and involving first responders. Quick access to crucial information, including medical history, allergies, communication barriers, and any other information caregivers deem necessary, will allow first responders to better care for these individuals in emergency situations.

Organizational Needs Statement

As of 2014, 10.9% of the population in Guilford County was considered disabled somehow, either physically or intellectually (Guilford County Department of Health and Human Services, 2016). In 2010, the North Carolina Autism and Developmental Disabilities Monitoring Project chose eight counties, including Guilford County, to analyze the ratio of 8-year-olds with autism spectrum disorder (ASD) (Centers for Disease Control and Prevention [CDC], n.d.). This project generalized that the prevalence of ASD in North Carolina was one in 58 children, which was higher than the national prevalence rate of one in 68 children diagnosed with ASD (CDC,

n.d.). In 2016, this same project task force found that now one in 39 eight-year-olds in North Carolina are identified with ASD, which remains higher than the national ratio (CDC, 2020). Autism is only one of many types of conditions or disabilities that can impair communication. Other disabilities include various intellectual disabilities and developmental delays such as Downs' Syndrome and dementia. Regardless of the type or extent of the disability or delay, these individuals likely become easily frightened when in unfamiliar places with unfamiliar faces, making it difficult for them to communicate with first responders if found alone or in an emergent situation.

Andrew McGavic, a local police officer, stated that on several occasions, he has worked with autistic children who wandered away from home. He reported that these situations are often “hit or miss,” and the individual either runs away from him or he is able to take a few minutes to build a trusting bond, allowing him to help the individual much more effectively. He reinforced that each case is different. He states that he needs to figure out the situation as quickly as possible to communicate with the individual in the most appropriate way (A. McGavic, personal communication, April 10, 2020).

One of the goals of Healthy People 2020 was to “use health communication strategies and health information technology to improve population health outcomes and health care quality, and to achieve health equity” (Office of Disease Prevention and Health Promotion [ODPHP], 2020, Goal section). By utilizing the QR code system, caregivers will ensure that their loved ones receive personalized care from first responders and improved health outcomes. Some of the Healthy People 2020 objectives for this goal were met through this project by promoting shared decision-making, providing personalized self-management resources, and allowing for quicker, informed responses to health risks for these individuals (ODPHP, 2020).

The Institute for Healthcare Improvement (IHI) recommends the Triple Aim approach to optimizing healthcare which includes “improving the patient experience of care, improving the health of populations, and reducing the per capita cost of health care” (Institute for Healthcare Improvement [IHI], 2020a, “The IHI Triple Aim” section). By encouraging the use of a QR code identification system, individuals with communication limitations will have better experiences with first responders who can access background information to promote positive and effective communication and care. In addition, caregivers utilizing the QR code for their loved ones can have reduced anxiety, knowing that important information can be quickly given to first responders. The health of this population will also improve as this new peace of mind allows caregivers to increase their level of involvement in community activities. The information provided via the QR code identification system gives first responders and emergency department staff quick access to as much information as caregivers offer, including the individual’s past medical history, allergies, medications, blood type, emergency contacts, and other information.

Problem Statement

Individuals with special needs often have trouble communicating and can be easily frightened when out of routine. When these individuals are found by or under the temporary care of first responders, access to key information plays a major role in supporting the individual.

Purpose Statement

The purpose of this project was to implement a QR code identification system to allow first responders quick access to important information to meet the needs of citizens with disabilities, impaired communication, or other special needs.

Section II. Evidence

Literature Review

In searching the literature, no scholarly articles were found directly related to a QR code identification system for individuals with disabilities. Therefore, a broader search was created to look for the relationship between individuals with disabilities and first responders, as well as the knowledge and confidence of first responders in caring for these individuals and any current use of identification systems for these individuals. Initially, PubMed was searched using the following MESH terms: Autism Spectrum Disorder, autistic disorder, intellectual disability, mentally disabled persons, developmental disabilities, Alzheimer's disease, dementia, health smart cards, patient safety, safety, safety management, personal health records, emergency medical tags, emergency responders. After adding a five-year limit, this search found 131 items. Filters for the English language and human subjects were added, resulting in 123 articles. At this point, the terms NOT medicines or medications were added to the MESH search to reveal 113 items. Filters were then updated to include journal articles, reviews, and systematic reviews, leading to 109 articles found within the search. Because Alzheimer's and dementia terms were bringing up many unrelated items, these terms were removed from the search.

This final search resulted in 41 articles. These remaining articles were then narrowed down by reading abstracts and conclusions to determine relatability to the desired topic. Of these articles, eight were selected to read in full, seven of which were added to the literature matrix for possible use in this project (see Appendix A). The same search, without Alzheimer's and dementia, was performed in CINAHL with 16 total articles found, two of which were kept based on abstracts and conclusions. Only one of these articles was added to the literature matrix after reading them both in full. Of the items saved, no quantitative studies were found. Instead, all

articles were qualitative studies consisting of interviews or surveys with both closed and open-ended questions to gain insight on the relationship between first responders and individuals with intellectual or developmental disabilities, as well as qualitative reports on the health passport identification system.

Current State of Knowledge

While no literature was explicitly found related to a QR code identification system for individuals with disabilities, there has been a recent interest in the relationship between first responders and individuals with disabilities. Most of the articles found were related to autism. Autism is one of the more common intellectual disabilities; however, many of the insights from these studies can also be relevant to individuals with other disabilities. Due to the increased likelihood of wandering, elopement, communication impairment, and different physical and emotional responses to stress and unfamiliar faces, individuals with disabilities have a greater chance of being misunderstood or not adequately cared for as first responders often have limited time to take action.

First responders have reported a lack of education focused on caring for those with developmental or intellectual disabilities, which affects their knowledge-base and confidence level in responding to emergencies involving these individuals (Edinger et al., 2019). Because of a lack of first responder training regarding caring for individuals with disabilities or inability to identify that an individual has a disability quickly, first responders may have trouble treating these individuals appropriately. Because of this impaired relationship, high-functioning autistic adults were able to express feelings of distrust, fear, and trauma based on personal experiences with law enforcement officers (Salerno & Schuller, 2019). Parents and caregivers of individuals with more severe disabilities and lower levels of functioning reported concerns of their loved

ones being misunderstood based on their behaviors that the public may consider odd or inappropriate, as well as poor communication skills such as “repetitive speech, off-topic, tangential conversations, difficulty regulating voice volume, lack of awareness of nonverbal behavior such as their facial expressions, misuse of pronouns, and difficulty with reciprocal conversations” (Railey et al., 2020, p. 112). This barrier in communication between individuals with intellectual or developmental disabilities and first responders can pose a safety concern. When vital information such as allergies, medication use, swallowing capabilities, and expression of pain are unable to be clearly articulated to first responders, these individuals can suffer unnecessary harm or delays in care (Northway et al., 2017). For this reason, breaking the communication barrier between these individuals and first responders is a crucial safety measure.

Current Approaches to Solving Population Problems

One recurrent solution found during this literature search was the importance of educating and training first responders on appropriate methods of identifying and communicating with individuals who have disabilities for them to provide the most effective, personalized care. Although most were small sample sizes, numerous studies have shown improvement in knowledge and confidence level of first responders after taking a course on disabilities, specifically autism (Edinger et al., 2019; Gardner, 2018; Lutman, 2017). Various course formats were used, including online, video-based, hands-on, and simulation role-playing, with an overall conclusion that hands-on familiarity with individuals with disabilities provides the best response in knowledge and confidence (Gardner, 2018). Unfortunately, there are no national guidelines or training suggestions for content, duration, or format when training first responders to care for persons with Autism Spectrum Disorder (ASD) (Gardner, 2018). Another recurrent theme regarding improving the comfort level and knowledge of first responders is a personal interaction

with individuals who have disabilities. For example, “meet-and-greet” times when first responders have the opportunity to interact with individuals within their communities would be beneficial for the first responders but also helpful to increase the comfort levels of the families and individuals with disabilities (Railey et al., 2020).

One solution to aid communication between individuals with disabilities and first responders lies in tangible forms of identification. This is a relatively quick, beneficial solution as officers without adequate training to recognize disabilities can simply read the individual’s identification and know this person needs unique communication and care. Interviews of adults with autism, caregivers, and law enforcement officers found that all three groups saw value in having an alert system or symbol, such as identification cards or tags, decal stickers, or smartphone apps, to inform first responders that an individual has ASD or another disability (Railey et al., 2020). A similar method used in the United Kingdom is the hospital passport for individuals with disabilities (Northway et al., 2017). This document is created and named by caregivers of individuals with disabilities, either individually or with the aid of a template, to include any information deemed necessary for the individual, from chronic diagnoses and allergies to consoling methods and personal interests (Northway et al., 2017). This document is meant to travel with the individual any time they are taken to an emergency room or transferred between medical facilities to ensure that medical personnel has the patient’s key personal and medical information to improve safety, health outcomes, and patient and caregiver satisfaction (Northway et al., 2017). But what happens when the individual wanders from home and is found by first responders without this valuable information on hand?

A solution that merges the hospital passport concept with medical identification bracelets is the QR code identification system chosen for this project. This system allows the portability

and accessibility of the medical ID bracelet to merge with the inclusion of detailed information to enable first responders to have quick access to this crucial knowledge. There are numerous similar QR code identification system products on the market that allow users to input as much or as little information as desired into a database. The data is available to individuals who scan the QR code. It is not only essential to encourage community members to utilize this QR system for their loved ones with disabilities, but it is also necessary to educate first responders to look for and use the scanning feature to obtain this important information. This system will help compensate for communication barriers between individuals with special needs and first responders while improving the interaction for everyone involved.

Evidence to Support the Intervention

While there was no literature found that related explicitly to utilizing QR codes as a means of communication between individuals with communication barriers and first responders, it has been noted that misinterpretation of verbal and nonverbal communication of an individual with special needs can be associated with adverse outcomes (Railey et al., 2020). Therefore, quick access to crucial information, including diagnosed disabilities, is essential for appropriate, individualized care from first responders (Railey et al., 2020). In addition, access to information that would commonly be found in a hospital passport, including chronic diagnoses, emergency contacts, allergies, medications, communication troubles, expression of pain, efficient consoling methods, or any other information from caregivers, can allow for timely care with reduced harm and improved safety (Northway et al., 2017). It is believed that a document of this type is essential “given reports of significant numbers of premature and avoidable deaths amongst people with disabilities where poor communication and a lack of information sharing are viewed as contributory factors” (Northway et al., 2017, p. 5161). Systems like the hospital passport have

been deemed as best practices and are being incorporated into acute healthcare systems in Wales (Northway et al., 2017). A study on one hospital's implementation of the hospital passport for individuals with intellectual disabilities showed improvement in care delivery, safety, individualized care, and patient outcomes (Northway et al., 2017).

In contrast to the hospital passport, the QR code system allows any first responder to have access to this crucial information in situations where the individual may not have a physical document in hand or may not be with a caregiver or guardian, for instance, during elopements or motor vehicle accidents. Like the hospital passport, this QR code identification system promotes communication, individualized care, and empowerment with an overall goal of improved safety (Northway et al., 2017).

Evidence-Based Practice Framework

Identification of the Framework

The framework for this project was focused on the Community Action Model, which was created to help communities get more involved in addressing their health disparities (Lavery et al., 2005). "Its intent is to create change by building community capacity, working in collaboration with communities, and providing a framework for residents to acquire the skills and resources necessary to assess the health conditions of their community and then plan, implement, and evaluate actions designed to improve those conditions" (Lavery et al., 2005, p. 612). The five stages of this model include selecting a focus area, researching and performing a community diagnosis, assessing the results of the community analysis, implementing the action with supporting educational activities, and seeking to maintain the change (Lavery et al., 2005).

The initial step of this model involved partnering with the police department via leadership from one of their lieutenants who has worked extensively with the special needs

community during his career. Step two was accomplished by analyzing this particular community's special needs population and officer involvement with this population. The next step involved compiling the background research on both the special needs community and the police officers, as well as doing a literature review on possible solutions to the communication barrier. The fourth step was the implementation phase, which focused on training the officers on the QR code identification system while also sending information to the community to create awareness of this system. The final step in utilizing this model consisted of compiling feedback from the officer surveys and working towards the sustainability of this project. Ideally, more community members will use this unique identification system, and other groups of first responders will receive training.

Ethical Consideration & Protection of Human Subjects

As with any form of scholarship or research, ethical considerations must remain at the forefront to protect everyone involved. The Belmont Report discussed the fundamental ethical principles of respect for persons, beneficence, and justice (National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1979). With an overall goal of educating first responders and creating community awareness of the QR code identification system, no identifiable information was necessary during the project. Also, direct interaction with individuals with disabilities was not required for implementation or evaluation. With a focus on education and awareness, the overarching desire to improve safety within the community for intellectual or developmental disabilities promotes beneficence.

The primary ethical consideration with this project revolved around the QR code product itself. Individuals would have to purchase the product if they desired to use it. While the cost was reasonable for most families, this project did not intend to persuade the community to spend

money on a particular product or company. However, a partnership with EmergencyScan ® allowed for coupon codes to be available to community members, thereby assisting with the costs of the QR code account as much as possible. To be transparent, education and awareness provided through this project stated that numerous other products on the market are available for use based on individual preference, and participation through EmergencyScan ® was not required. Rather than promoting a specific product or company, the focus of this project was to inform first responders and families within the community of the potential benefits of using a QR code identification system to optimize safety and improve interactions with first responders.

In preparation for reviewing the ethical considerations for this project, Collaborative Institutional Training Initiative (CITI Program) modules on social and behavioral research proved beneficial. Because this project consisted of an educational and awareness program that did not involve direct research on living human subjects, IRB approval was not needed. There was no personal identifying information collected during the evaluation of this program; however, all personal interactions during the program were respectful and professional.

Section III. Project Design

Project Site and Population

This project consisted of a pilot education program for one police department in the Piedmont-Triad area within Guilford County, North Carolina. The project site was the police department, and the population was police officers. Barriers to this site and population included the varying shifts officers work. It would have been challenging to contact each officer since some did not regularly visit the physical department. However, one facilitator was utilizing a form of virtual training sent out via email, which officers checked regularly when on-duty. This allowed for contact with all of the officers to provide education and awareness of the QR code identification system.

Description of the Setting

The chosen police department has been located in an old elementary school in the heart of the city since 1985; although the department is relatively small, space is well utilized, as old classrooms have been turned into conference rooms and training rooms for the officers (Tuman & Bargebuhr, 2020). This department serves a community of almost 115,000 people (Tuman & Bargebuhr, 2020).

Description of the Population

The population in this project was the city's police officers. While there are numerous police officers and varying shifts, the goal was to educate as many of these officers as possible through the virtual training module. This department employs over 200 officers with a mission of "creating the single most livable, safe and prosperous community in America" (City of High Point, n.d., "Our Mission"). Officers in this department are required to have at least a high school diploma or GED. They have varying years of experience as officers can be hired at entry-level,

complete Basic Law Enforcement Training, and serve two to four years as a patrol officer before joining specialized units (City of High Point, n.d.).

Project Team

The project team consisted of the graduate student, faculty mentor, and project site partner. The graduate student was responsible for organizing the project and collaborating with the project site to create a meaningful program for the community. The faculty mentor provided input, wisdom, and accountability in ensuring the project was implemented appropriately for degree requirements and community benefit. One of the department's lieutenants was the project site partner located within the police department. He served as the liaison between the project team and the officers, obtained approval from the police chief, and aided in planning and implementation to ensure the education was appropriate and attainable for as many officers as possible. This lieutenant has worked with the department for over 20 years and has been involved with the Special Olympics community for the past eight years. This connection proved beneficial when creating awareness of the QR code system to families in the community.

Project Goals and Outcome Measures

This project aimed to educate the local police department on the use and benefits of the QR code identification system. In creating awareness among the officers, the overall goal was that they would recognize and scan the QR code to gain valuable information to help them better interact with individuals who have trouble communicating. Additionally, it was essential to create awareness in the special needs community so that families could benefit from this identification system. IRB review was not required because this project was determined to be a quality improvement and program evaluation rather than research.

Description of the Methods and Measurement

The SBAR tool was used for measuring and assessing this project. The method allowed for routine updates to be shared between the student, partner, and faculty member. Breaking down this tool into sections - situation, background, assessment, and recommendations - created a visual reminder of the foundation for this project in the situation and background sections. The assessment section was updated regularly with the project's progress at different stages, including how officers were participating and how community outreach was attempted. Finally, the recommendation section of this project proved essential as many plans had to change due to the COVID-19 pandemic preventing most in-person events in this community. This section of the SBAR allowed for collaborative efforts to improve officer participation and figure out how to reach as many community members as possible with the educational material regarding the QR code identification system. Survey responses from the officers allowed for further recommendations regarding first responder training and community outreach methods.

Discussion of the Data Collection Process

Data collection for this project consisted of recording feedback from the officers following their training session. At the end of the virtual training module, officers received a link to a survey where they offered anonymous feedback regarding the QR code system functionality, the training format and benefits, and suggestions for community involvement. The survey responses were then compiled at the end of the project to offer suggestions for further dissemination and training of other first responders.

Implementation Plan

The implementation phase consisted of offering training to officers on the QR code identification system. This training included a virtual presentation with a survey to request feedback. A virtual training module that officers could view on their own time was the most

convenient form of training as there are over two hundred officers in this department working varying days and shifts. Survey feedback was collected throughout the implementation period while the virtual content remained active for viewing. Meanwhile, an informational handout was also given to families in the community through connections with a local church and Special Olympics, and Miracle League representatives. This handout informed families of the benefits of using a QR code identification system for their loved ones while also providing a coupon code for personal purchase of the product. The coupon code usage can be tracked through EmergencyScan ® to enable future reports on participation and use.

Timeline

The planning and development of the educational resources were completed by August 2020. After faculty and partner approval of these resources for officer training and community education were verified, officer training began mid-September. Links to the virtual training and post-test survey were sent via the officers' work email to complete at their earliest convenience over the following four to five weeks. Bi-weekly reminders were sent to the officers encouraging participation. During this time, completed surveys were collected, while the educational materials were distributed to local families (see Appendix B). Faculty and project site partner meetings occurred approximately every two to three weeks to ensure the program stayed on track. After completing the data collection, a meeting with the project partner took place to request feedback and recommendations for future implementation to other first responders and promote community involvement.

Section IV. Results and Findings

Results

Officers who participated in the training took a post-module survey, which served as the only data source for this project. The survey questions focused on years of experience, previous familiarity with QR code identification systems, perceived benefits and usefulness of this identification system, training module evaluation, and suggestions for future training and community outreach. The goal was greater than fifty percent of the officers in this department participating in the training and survey; therefore, at least 100 completed surveys were desired for this project.

It was expected that these officers had some basic knowledge of the existence of QR code identification systems but that very few officers had ever utilized the system for an individual in the community. Additionally, the project team expected that most of the officers would find QR code identification systems beneficial for both first responders and families or caregivers of individuals with communication impairments. The confidence level of the officers interacting with individuals with impaired communication was expected to increase when QR identification codes were available and utilized. Following the data collection period, 138 survey responses were collected via Qualtrics. The data was exported into Excel spreadsheets to analyze quantitative data, while qualitative data was reviewed individually.

Outcomes Data

Several different data types were collected in the survey, including qualitative, demographic, and the use of Likert-type scales (see Appendix C). Qualitative data consisted of open-ended questions asking the officers for feedback on the training module and recommendations for improving first responder knowledge and community awareness of QR

code identification systems. Additionally, officers were asked if they were familiar with QR code identification systems and if they had seen it used in the community. The survey contained one demographic question regarding years of experience as a police officer for the participants. Likert-type scales were used to assess the officers' perceived benefits of the QR code system for both first responders and caregivers and the usefulness of the training session and confidence of interacting with individuals using a QR code form of identification.

The primary process measure to determine the progress of this project was the survey participation rates. Because of COVID-19 regulations, sessions were not held in person; therefore, officers were given a few weeks to participate in the survey after completing the training module. Weekly monitoring for participation rates by reviewing Qualtrics was performed. Additionally, the project partner at the police department sent out occasional email reminders to the officers to encourage participation.

Outcome measures are a necessary marker for projects of this sort. For this specific project, community outcome measures were not obtainable. It would be essential to track first responder utilization of QR code identification systems in the community, but this would need to be done over a more extended period than was possible for this project. Tracking data of this sort would allow outcome measures such as increased efficiency, safety, and satisfaction for officers and individuals with communication impairments who have a QR code identification system in place. One outcome measure observed during this project was the increase in confidence levels for officers when interacting with individuals with impaired communication by using a QR code identification system.

Discussion of Major Findings

At the conclusion of this project, there were 138 surveys completed. Of those who participated, there was an average of 14 years of experience working as a police officer. While 42% of participants reported awareness of QR code identification systems, only 18.4% had ever seen at least one individual using a form of QR code identification.

When asked to use a Likert-type scale to rate how beneficial the officers believed utilizing a QR code identification system would be in helping them work with individuals with impaired communication, 95% of respondents reported it would be beneficial or extremely beneficial. In a similar question, 81% believed families or caregivers would find it beneficial to implement a QR code identification system for their loved ones with impaired communication. Additionally, the survey looked at whether an individual having a QR code form of identification would improve interaction confidence for the officers. Officers reported an average confidence level of 2.76 on a scale of one to five, with one being the least confident and five being the most confident, when interacting with an individual with impaired communication before this training. Using this same scale, the confidence level of the officers increased to 3.80 if the individual with impaired communication was wearing a form of QR code identification. In conclusion, 98.5% of officers reported that they were moderately to extremely likely to scan a QR code form of identification if they found one on the individual with impaired communication they were assisting in the community.

In the survey's open-ended questions, officers were asked to offer feedback and recommendations regarding the training session and offer input regarding community involvement and outreach to encourage the use of QR code identification systems among at-risk populations. Those who chose to answer these open-ended questions reported approval and acceptance of the training session and the information provided, saying that it was concise yet

fully informative. Many of them offered suggestions such as including this training in their standard, required training, and encouraging other first responder groups to have access to the training. Additionally, they verbalized a great sense of benefit of spreading the word in the community as this does not seem to be a strongly utilized resource in this area.

Section V. Interpretation and Implications

Cost Benefit Analysis

The primary cost for this project was time. While it took time for the DNP student and project partner within the police department to plan, implement, and evaluate this project, the time required for officer participation was minimal. The training and survey could be completed in about twenty minutes or less. Many of the officers did this training in-house while they were already on the clock, either doing administrative tasks, other required training, or before going off-shift. Ideally, had COVID-19 precautions not required this training to be virtual, this session could be added into one of their regularly scheduled training classes throughout the year, thereby saving the officers from finding their own time to participate in the training and survey. If that were the case in the future, then the cost would be fractioned out of what they usually get paid for in-house required training sessions. If this training were to be approved for use in future first responder training, the primary cost would be the time and supplies of a presenter to give the information. Additionally, during this project, community resources were made. Still, there was no cost of printing as the only option during the COVID-19 restrictions was virtual outreach, primarily via emails and phone conversations.

Not only did this project have minimal costs involved, but it also had significant benefits. This training program for the officers was a quick, simple, and efficient form of education. Having this training virtually allowed for more officers to participate despite having COVID-19 restrictions in place. This format allowed for flexibility in scheduling so that each officer could participate when able. Officers could also retain the information for future reference if needed. Because this training was relatively short, it could easily be added into a regular in-person training day when resumed after COVID-19 restrictions are lifted.

In addition to the training being concise, the surveys showed that officers felt using a QR code identification system with individuals in the community would increase their confidence level when interacting with those with impaired communication. On a scale of one to five, with one being the least confident and five being the most confident, the average confidence level of the officers when interacting with individuals with impaired communication was 2.76. However, the confidence level on the same scale increased to 3.80 when officers were asked about interacting with an individual with impaired communication who had a QR code identification system in place. This training aided in equipping officers with the knowledge to recognize and utilize this tool to lead to more efficient and individualized care for community members who use these identification systems.

In conclusion, there were no unexpected negative costs associated with this project. The only cost was time, and the benefits far outweighed the time commitment. The return on investment for this project was very good for the police department. They had the benefit of educating their officers on this system without additional costs or extensive training.

Resource Management

The primary resource needed for this project was a training platform. The police department has several classrooms on-site where many of their regular training sessions are held. The initial plan was to incorporate the training session for this project into the regularly scheduled training sessions during the fall of 2020. However, with COVID-19 restrictions in place during this timeline, the training was transitioned into a virtual training module followed by a survey. Therefore the police department had no overhead resources that were utilized during the project. The training module and online survey were emailed to the officers for completion.

A very valuable resource within the police department was the partnership with the lieutenant who became the project partner during this project. This lieutenant has been very involved with local special needs groups, including those within the school system, Special Olympics, and Miracle League. His insight helped develop the project and promote community awareness via the previously stated organizations. While this was not the main focus of the project, it was our duty of beneficence to inform the community of this incredible resource and the increased confidence that their local police officers were trained to utilize the QR code identification systems.

Implications of the Findings

For the officers, this training was feasible, required minimal time commitment and no cost involvement. It also increased awareness and confidence in recognizing and utilizing a QR code identification system to help care for individuals with communication impairments. Because the focus of this project was on officer training, there was no actual community data. There were attempts to inform the community of these identification systems and let them know their local officers were receiving training; however, these outreach attempts were significantly limited due to COVID-19 restrictions on in-person activities. Even so, officers did report a perceived benefit of community members using QR identification systems and recognized the significance of focusing on community outreach in the future. Additionally, there was positive feedback from the officer surveys, suggesting that this type of training session would be valuable to spread to other first responders.

Implications for Patients

Implications for patients in this scenario would apply to impact for community members. Utilization of QR code identification systems and providing first responder training on these

systems would benefit individuals with impaired communication by allowing a more effective, individualized approach to caring for these individuals when they are in need. Additionally, for the family or caregivers of these individuals, peace of mind would be a significant benefit as they would not only know their loved one has essential information on their person at all times, but they can also be assured that the QR code will be recognized and utilized quickly by these trained first responders in the community.

Implications for nursing practice.

Education is a core component of the nursing profession. Therefore this project has important implications for nursing practice. This project focused on educating one police department, but the same structure could educate other first responders, teachers, and various other individuals in the community. Additionally, educating caregivers and families of vulnerable populations on the benefit of using a QR code identification system to improve the wellbeing of these individuals is also a fundamental implication for nursing.

Impact for Healthcare Systems

Extending first responder training on this system can lead to more efficient, patient-centered care. By allowing for almost immediate access to critical information, time and costs can be reduced while also improving patient and provider satisfaction. In addition to police officers, training other first responders, including EMS, firefighters, and emergency department providers, can lead to more efficient care of individuals with impaired communication.

Sustainability

Not only would it be beneficial for this police department to continue this training in future sessions, but it would be easily sustainable. Since the virtual training module has been completed, a few minor adjustments could be made to update it as needed. The training could be

sent out virtually to officers as often as the department deemed essential. This would remove any financial barrier as the training has already been developed and can be emailed without adding extra time barriers. Additionally, if the department wanted to incorporate this in a live training session, this could quickly be done as the training is in a PowerPoint format already. They would simply need an individual to share the presentation. The only perceived impact to sustainability was the officers' perception of usefulness, which was demonstrated by both Likert-type scale questions and open-ended questions on the survey; therefore, it would be beneficial to continue this training program.

Dissemination Plan

This project and its associated findings have been disseminated in several areas. In April of 2021, a poster presentation of results was presented for faculty and students of the College of Nursing at East Carolina University. The final written report of the project is posted on the university's online portal, The Scholarship. A report of project outcomes was presented to the police department that graciously participated in the project in hopes that they will continue utilizing the education module for future training sessions and community involvement. Project findings and community outreach flyers were also virtually disseminated to Guilford County Special Olympics and Miracle League liaisons. Other potential groups that would benefit from sharing this project include the public school system, local pediatrician offices, churches, first responder agencies, and local leadership, including city council members.

Section VI. Conclusion

Limitations

The primary limitations of this project were related to COVID-19 restrictions. Because of stay-at-home orders and limited capacity gatherings, no in-person training was possible for this project. This limitation was compensated for by ensuring frequent virtual communication with project partners and creating a virtual training module for the officers to complete as they could fit it into their schedules. This flexibility allowed for the majority of the officers to participate in the training and survey.

One extra benefit that the project team was hopeful of tying in with this project was allowing the police department to participate in community outreach by passing out the flyers at school functions, parades, fairs, sporting events, Special Olympics, Miracle League, and various other special events within the community during the implementation period. However, due to COVID-19 and the associated shut-downs, no hands-on community involvement was feasible. Therefore community flyers were emailed to various liaisons within the community who had connections with these vulnerable populations with the hopes of getting the word out at least via email and regular newsletters for the organizations. Unfortunately, there was no way to measure this outcome with no community interaction allowed apart from EmergencyScan® sending reports of usage, none of which showed new accounts set up in this county during the project implementation.

Recommendations for Others

In planning a similar project or continuation of this project in the future, recommendations for others would include spreading the training program to other first responder groups, specifically EMS and firefighters. Once COVID-19 restrictions are

withdrawn, it would also be essential to plan for in-person events where the community education flyers could be posted or handed out. For future implementation, in-person training for the first responders will be beneficial to build rapport and encourage participation. Having sample products with QR codes in place would help practice and role-playing scenarios. Long term, it would be very informative to survey community members to get their perspective on the QR code identification systems and how they feel about their local first responders receiving training dedicated to this technology. Additionally, if EmergencyScan® were the primary company used in this area, it would be helpful to track coupon code use to see how the community usage of QR code identification systems is increasing over time.

Recommendations for Further Study

In future studies, it could be helpful to set up a tracking program where first responders can document when they use QR code identification systems in the community. Without having to save personally identifying information, it would be interesting to track the circumstances and types of interactions that took place and assess how the QR code improved helping the individual. This feedback could be helpful in first responder training to allow for real-life examples and debriefing to aid in them becoming more comfortable using the system to help individuals with communication impairments.

The future use of QR code identification systems has endless possibilities. Using projects similar to this could show the benefit of such identification systems and encourage future projects and studies on implementing these QR code identification systems for other vulnerable groups. For example, not only could populations living with special needs and dementia benefit from these systems, but so could families of small children who are unable to communicate effectively or memorize parents' phone numbers or their medical history. Individuals who speak

foreign languages, those who are deaf or mute, or even those with high-risk occupations that could encounter injuries or loss of consciousness could also benefit from these forms of identification. Individuals with complex or high-risk medical conditions such as diabetes or epilepsy could also benefit from this quick access to medical information and emergency contacts. In conclusion, QR code identification systems have great potential to impact the health and wellbeing of numerous vulnerable and high-risk populations. The education of first responders and local communities is essential in maximizing the potential of this technology.

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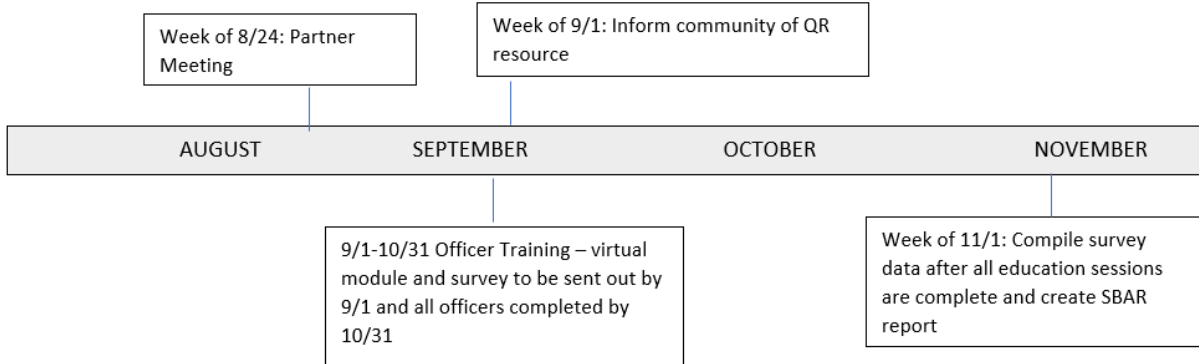
Appendix A: Literature Review

Authors	Year Pub	Article Title	Theory	Journal	Citation	Purpose and take home message	Design/Analysis/ Level of Evidence	IV DV or Themes concepts and categories	Instr. Used	Sample Size	Sample method	Subject Charac.	Comments/critique of the article/methods GAPS
Edinger et al.	2019	Evaluation of an online educational intervention to increase knowledge and self-efficacy in disaster responders and critical care transporters caring for individuals with disabilities		Disaster Medicine and Public Health Preparedness	Edinger, Z. S., Powers, K. A., Jordan, K. T., & Callaway, D. W. (2019). Evaluation of an online educational intervention to increase knowledge and self-efficacy in disaster responders and critical care transporters caring for individuals with developmental disabilities. <i>Disaster Medicine and Public Health Preparedness</i> , 13(4), 677-681. https://doi.org/10.1017/dmp.2018.129	determine what type of education and method of delivery is most beneficial for responders	1 Level VI convenience sample, no control group		intervention: "Do No Harm" online course created by Rutgers University with pretest, posttest, and satisfaction survey	19	convenience sampling; online education module with pretest and posttest	must be English-speaking, over 18 years old, currently employed by one of the two companies chosen for study, and work as emergency responder of critical care transporter	Results: majority of participants had interactions with at least 16 individuals with developmental disabilities (DD) during career; only 24% had ever received education on how to care for those with DD during academic programs; 88% thought education focused on caring for those with DD was beneficial; posttest showed that knowledge increased from average of 66% on pretest to 81% on posttest; self-efficacy questions showed increase in 39% between pretest and posttest; Limitations: small sample size that completed all requirements (possible due to time involved in tests and module); original measurement surveys, not a valid, tested tool; posttest was immediate, therefore did not measure longterm changes in knowledge and self-efficacy; no control group Synthesis: One method of improving responders confidence and interaction abilities with those with DD is online education modules.
Gardner et al.	2018	Brief report: descriptive analysis of law enforcement officers' experiences with and knowledge of autism		Journal of Autism and Developmental Disorders	Gardner, L., Campbell, J. M., & Westdal, J. (2018). Brief report: descriptive analysis of law enforcement officers' experiences with and knowledge of autism. <i>Journal of Autism and Developmental Disorders</i> , 49(3), 1278-1283. https://doi.org/10.1007/s10803-018-3794-4	describe officers' knowledge, training, interactions, and outcomes with ASD individuals	1 VI		updated version of Stone's survey used as pre-test (demographic, knowledge, and experience questions); 15 Likert-type questions)	72	convenience sampling	law enforcement officers from police and sheriff departments in Tampa Bay; 56.9% male, mean age of 42.2 years, mean law enforcement experience of 15.0 years	results support need for ASD training for LEOs Limitations: small sample, voluntary participation, one region (Tampa Bay area), study does not assess if those with training perform better than those without,
Kiely et al.	2016	Prevalence and correlates of elopement in a nationally representative sample of children with developmental disabilities in the United States		PLoS One	Kiely, B., Migdal, T. R., Vietnam, S., & Adelman, A. (2016). Prevalence and correlates of elopement in a nationally representative sample of children with developmental disabilities in the United States. <i>PLoS One</i> , 11(2), e0148337. https://doi.org/10.1371/journal.pone.0148337				CSBQ	3,518	random selection from those who filled out 2011 Pathways survey for CDC; called to ask for follow-up	492 with ASD-only, 924 with ASD + ID and/or DD, 2,085 with ID and/or DD without ASD, 17 not in category because parents unsure of diagnosis	26.7% of children with ASD/ID/DD attempted to elope with previous year Limitations: study only included school-aged children therefore possibly missed "peak" age for elopement found in other studies (5.4 years)
Lutman	2017	Autism awareness for first responders		EAS World	Lutman, A. (2017). Autism awareness for first responders. <i>EAS World</i> , 46(11), 38-41. http://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,url,shibboleth&url=AN=126023893&site=ehost-live&scope=site	to determine if ASD education to first responders is beneficial	1 VI		autism training program with pre and post-tests	50	convenience	fire and rescue personnel from Shenandoah County (total of 3 phases with different sample sizes and interventions)	Benefits of specific training related to ASD to improve knowledge and comfort with these individuals Limitations: results not statistically significant, small sample size,
Northway et al.	2017	Hospital passports, patient safety and person-centered care: a review of documents currently used for people with intellectual disabilities in the UK		Journal of Clinical Nursing	Northway, R., Rees, S., Davies, M., & Williams, S. (2017). Hospital passports, patient safety and person-centered care: a review of documents currently used for people with intellectual disabilities in the UK. <i>Journal of Clinical Nursing</i> , 29(23-24), 5160-5168. https://doi.org/10.1111/jocn.14100	"hospital passports" or "hand-held health records" promote safety, improved treatment and patient-centered care	qualitative content analysis of blank "hospital passports" in circulation on the internet or in the community	n/a	google search and social media posts asking for templates of "hospital passports" (other names included)	60	google search and social media posts asking for templates of "hospital passports" (other names included)	subjects were the blank hospital passports that were analyzed based on content included	Document lengths ranged from 1-39 pages (mean of 7 pgs); not all templates included most relevant information or in most appropriate order for quick access to key points; recommended including information related to behavioral support; Limitations: study in UK, may not be able to generalize;
Railey et al.	2020	An exploration of law enforcement officers' training needs and interactions with individuals with Autism Spectrum Disorder		Journal of Autism and Developmental Disorders	Railey, K. S., Bowers-Campbell, J., Love, A. M. A., & Campbell, J. M. (2020). An exploration of law enforcement officers' training needs and interactions with individuals with Autism Spectrum Disorder. <i>Journal of Autism and Developmental Disorders</i> , 50(1), 101-117. https://doi.org/10.1007/s10803-019-04227-2	understand interactions between LEOs, individuals with ASD, and caregivers and determine recommendations for ASD-training	qualitative		interviews (CGT theory)	6 adults with ASD, 5 caregivers, 6 LEOs	convenience via email/social media via help from local ASD advocacy groups	LEOs: >18yo, current LEO, experience with someone with ASD Adults with ASD: current Dx: >18yo, speak/understand English, cognitive capability to participate in interview as evidenced by UBACC caregivers: >18yo with child with ASD >5yo,	LEOs noted a form of ID signifying ASD was useful; all groups suggest community involvement and "meet and greets" would be beneficial Limitations: small convenience sample from a medium-sized Southeastern city
Salerno & Schuller	2019	A mixed-methods study of police experiences of adults with autism spectrum disorder in Canada		International Journal of Law and Psychiatry	Salerno, A. C., & Schuller, R. A. (2019). A mixed-methods study of police experiences of adults with autism spectrum disorder in Canada. <i>International Journal of Law and Psychiatry</i> , 64, 18-25. https://doi.org/10.1016/j.ijlp.2019.01.002	examine interactions between law enforcement and individuals with ASD and explore how the individuals with ASD perceive those interactions		survey developed with closed and open-ended questions; ADL assessment/survey via Waisman Activities of Daily Living Scale	35	convenience sample recruited via ASD organization's, charities, etc	requirements: Dx of ASD, pervasive developmental disorder, or Asperger syndrome; at least 18 y.o.; 21 females, 13 males, 1 declined to state gender; mean age 36.9; 70% had completed post-secondary education; 58% lived with family; 27% lived independently	Limitations: single community sample, several respondents didn't answer every questions, not representative of all ASD in general as most respondents were mildly impaired and highly independent Results: 3 main responses from individuals regarding their interactions with LEOs were distrust, fear, and trauma	

Authors	Year Pub	Article Title	Theory	Journal	Citation	Purpose and take home message	Design/Analysis/Level of Evidence	IV DV or Themes concepts and categories	Instr. Used	Sample Size	Sample method	Subject Charac.	Comments/critique of the article/methods GAPS
Wachob & Pesci	2016	Brief report: knowledge and confidence of emergency medical service personnel involving treatment of an individual with autism spectrum disorder		<i>Journal of Autism and Developmental Disorders</i>	Wachob, D., & Pesci, L. J. (2016). Brief report: knowledge and confidence of emergency medical service personnel involving treatment of an individual with autism spectrum disorder. <i>Journal of Autism and Developmental Disorders</i> , 47 (3), 887-891. https://doi.org/10.1007/s10803-016-2957-4	understand the knowledge and confidence level of EMT/paramedics regarding individuals with ASD			Western Region ASERT Autism Spectrum Disorder Survey (ask about demographics, ASD knowledge, and comfort level scale)	73		EMT's paramedics across 6 counties in Western PA in 3 separate agencies; 60.3% male, 46.6% with at least 16 years of experience, 61.6% certified paramedics	findings: familiarity with autism increased both knowledge and comfort scores, therefore having more interaction opportunities for first responders may provide benefits to both first responders and individuals with ASD in future interactions or emergent situations
Glasgow et al.	2019	RE-AIM planning and evaluation framework: adapting to new science and practice with a 20-year review		<i>Frontiers in Public Health</i>	Glasgow, R. E., Harden, S. M., Gaglio, B., Rabin, B., Smith, M. L., Porter, G. C., Ory, M. G., & Estabrook, P. A. (2019). RE-AIM planning and evaluation framework: adapting to new science and practice with a 20-year review. <i>Frontiers in Public Health</i> , 7(64), e1-9. https://doi.org/10.3389/fpubh.2019.00064	describe application and evolution of RE-AIM including lessons learned							

Appendix B: Project Implementation Timeline

Fall 2020



Appendix C: Officer Training Survey

1. How many years of experience do you have in law enforcement?

2. Before this training, were you aware of QR code identification systems?

Yes No

3. In your career, how many times have you seen an individual with QR code identification system?

0 1-5 6-10 >10

4. How beneficial do you think using a QR code identification system will be in helping you work with individuals with impaired communication? (1 = not beneficial, 5 = extremely beneficial)

1 2 3 4 5

5. How beneficial do you believe this type of ID will be for parents of children with special needs who have trouble communication for themselves? (1 = not beneficial, 5 = extremely beneficial)

1 2 3 4 5

6. Before this training, how confident were you in working with an individual with impaired communication? (1 being the least confident and 5 being the most)

1 2 3 4 5

7. After this training, how confident are you in working with an individual with impaired communication who uses a QR code identification system? (1 being the least confident and 5 being the most)

1 2 3 4 5

8. How likely are you to scan an individual's QR code when you find them in need of assistance in the community?

Extremely Likely Moderately Likely Slightly Likely Unlikely

9. Please offer feedback and recommendations regarding officer training on this system:

10. Please offer feedback and recommendations regarding community involvement and outreach to encourage the use of QR code identification systems among at-risk populations:

Appendix D: Doctor of Nursing Practice Essentials

	Description	Demonstration of Knowledge
Essential I <i>Scientific Underpinning for Practice</i>	<p>Competency – Analyzes and uses information to develop practice</p> <p>Competency -Integrates knowledge from humanities and science into context of nursing</p> <p>Competency -Translates research to improve practice</p> <p>Competency -Integrates research, theory, and practice to develop new approaches toward improved practice and outcomes</p>	<p>-Literature review</p> <p>-Course reading</p> <p>-IHI modules</p>
Essential II <i>Organizational & Systems Leadership for Quality Improvement & Systems Thinking</i>	<p>Competency –Develops and evaluates practice based on science and integrates policy and humanities</p> <p>Competency –Assumes and ensures accountability for quality care and patient safety</p> <p>Competency -Demonstrates critical and reflective thinking</p> <p>Competency -Advocates for improved quality, access, and cost of health care; monitors costs and budgets</p> <p>Competency -Develops and implements innovations incorporating principles of change</p> <p>Competency - Effectively communicates practice knowledge in writing and orally to improve quality</p> <p>Competency - Develops and evaluates strategies to manage ethical dilemmas in patient care and within health care delivery systems</p>	<p>-Used literature review and critical thinking to plan, implement, and evaluate an evidenced-based project</p> <p>-Paper composition</p> <p>-Poster presentation</p> <p>-Worked with EmergencyScan ® for partnership and discounts for community members</p> <p>-Adapted project to COVID-19 restrictions and barriers</p>
Essential III <i>Clinical Scholarship & Analytical Methods for Evidence-Based Practice</i>	<p>Competency - Critically analyzes literature to determine best practices</p> <p>Competency - Implements evaluation processes to measure process and patient outcomes</p> <p>Competency - Designs and implements quality improvement strategies to promote safety, efficiency, and equitable quality care for patients</p> <p>Competency - Applies knowledge to develop practice guidelines</p> <p>Competency - Uses informatics to identify, analyze, and predict best practice and patient outcomes</p> <p>Competency - Collaborate in research and disseminate findings</p>	<p>-Literature review</p> <p>-Project planning and implementation</p> <p>-Paper composition</p> <p>-Developed officer training and community outreach flyers</p> <p>-Survey utilized to evaluate training</p> <p>-Poster presentation and dissemination plan</p>
Essential IV <i>Information Systems – Technology & Patient Care Technology for the Improvement & Transformation of Health Care</i>	<p>Competency - Design/select and utilize software to analyze practice and consumer information systems that can improve the delivery & quality of care</p> <p>Competency - Analyze and operationalize patient care technologies</p> <p>Competency - Evaluate technology regarding ethics, efficiency and accuracy</p> <p>Competency - Evaluates systems of care using health information technologies</p>	<p>-Online literature review/search</p> <p>-Utilized technology to create virtual training</p> <p>-Educated officers and community on EmergencyScan ® technology</p> <p>-Utilized Qualtrics and Excel for data collection and analysis</p>

	Description	Demonstration of Knowledge
Essential V <i>Health Care Policy of Advocacy in Health Care</i>	<p>Competency- Analyzes health policy from the perspective of patients, nursing and other stakeholders</p> <p>Competency – Provides leadership in developing and implementing health policy</p> <p>Competency –Influences policymakers, formally and informally, in local and global settings</p> <p>Competency – Educates stakeholders regarding policy</p> <p>Competency – Advocates for nursing within the policy arena</p> <p>Competency- Participates in policy agendas that assist with finance, regulation and health care delivery</p> <p>Competency – Advocates for equitable and ethical health care</p>	<p>-Worked with EmergencyScan ® for discount code</p> <p>-Attempted community outreach for health/safety promotion</p> <p>-Trained police officers to promote community safety and advocated for special needs groups</p>
Essential VI <i>Interprofessional Collaboration for Improving Patient & Population Health Outcomes</i>	<p>Competency- Uses effective collaboration and communication to develop and implement practice, policy, standards of care, and scholarship</p> <p>Competency – Provide leadership to interprofessional care teams</p> <p>Competency – Consult intraprofessionally and interprofessionally to develop systems of care in complex settings</p>	<p>-Routine collaboration with faculty advisor, project site partner, EmergencyScan ®, and with other students participating in a similar project in other counties</p>
Essential VII <i>Clinical Prevention & Population Health for Improving the Nation's Health</i>	<p>Competency- Integrates epidemiology, biostatistics, and data to facilitate individual and population health care delivery</p> <p>Competency – Synthesizes information & cultural competency to develop & use health promotion/disease prevention strategies to address gaps in care</p> <p>Competency – Evaluates and implements change strategies of models of health care delivery to improve quality and address diversity</p>	<p>-Analyzed research and data to show benefit of QR code identification systems</p> <p>-Virtually implemented project to reach as many as possible despite COVID-19 barriers and restrictions</p>
Essential VIII <i>Advanced Nursing Practice</i>	<p>Competency- Melds diversity & cultural sensitivity to conduct systematic assessment of health parameters in varied settings</p> <p>Competency – Design, implement & evaluate nursing interventions to promote quality</p> <p>Competency – Develop & maintain patient relationships</p> <p>Competency –Demonstrate advanced clinical judgment and systematic thoughts to improve patient outcomes</p> <p>Competency – Mentor and support fellow nurses</p> <p>Competency- Provide support for individuals and systems experiencing change and transitions</p> <p>Competency –Use systems analysis to evaluate practice efficiency, care delivery, fiscal responsibility, ethical responsibility, and quality outcomes measures</p>	<p>-Critical thinking and planning required to adapt this topic into a DNP project and complete the project during COVID-19</p> <p>-Maintained community relationships to ensure project implementation would be successful</p> <p>-Evaluated project and provided recommendations for future study and interventions</p>