

Health Literacy Improvement Project

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Doctor of Nursing Practice Project

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Abstract

Limited or low health literacy has been linked with negative patient outcomes, higher healthcare costs, and difficulty in healthcare decision making. The goal of the Doctor of Nursing Practice project is to improve the health literacy of pediatric caregivers by offering a reliable resource that provides information on childhood illnesses, suggestions for symptom relief for minor illnesses and injuries, and care guides to assist in decision making.

Educational resources utilized were the American Academy of Pediatrics' KidsDoc mobile app, navigational instructions for HealthyChildren.org, or a book about childhood illnesses.

Participants included 75 pediatric caregivers visiting a not-for-profit rural hospital emergency department for a non-urgent illness. Telephone interviews at four and eight weeks were conducted to determine the impact of introducing the educational resources on pediatric caregivers' health knowledge. Major findings from the project indicate an increase in mobile device utilization, a preference for mobile apps as an educational tool, and an increase in health knowledge of pediatric caregivers. Results imply that technological-based health information such as the KidsDoc app can improve patient outcomes, impact nursing practice, and reduce healthcare costs. Future studies on technology-based educational resources and its effects on health literacy are recommended.

Keywords: health literacy, technology, childhood illnesses, mobile applications

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Section I. Introduction

Background

Healthy People 2030 newly defined personal health literacy as “the degree to which individuals have the ability to find, understand, and use information and services to inform health-related decisions and actions for themselves and others” (Office of Disease Prevention and Health Promotion [ODPHP], 2020b, para 1). In addition to defining personal health literacy, *Healthy People 2030* included a definition of organizational health literacy to acknowledge that organizations are responsible for addressing health literacy (ODPHP, 2020b). Many Americans suffer from limited literacy skills, and nine out of ten adults struggle with limited health literacy (ODPHP, 2017). Limited or low health literacy has been linked to increased mortality rates, poor general health status, difficulty in health decision making, poor medication management, more hospitalizations, higher utilization of emergency care, and higher healthcare costs (Heijmans et al., 2015). One of the foundational principles and overall goals of *Healthy People 2030* is the attainment of health literacy (ODPHP, 2020b). This Doctor of Nursing Practice (DNP) project provides an opportunity to implement a health literacy improvement intervention that aligns with *Healthy People 2030*'s foundational principle and overall goal of attainment of health literacy.

This DNP project site is a not-for-profit hospital serving a rural, underserved population with a mission to ensure exceptional healthcare for the people and a vision to be an outstanding community hospital ([REDACTED], 2020). To fulfill the vision of being an outstanding community hospital, the organization identifies community health needs, develops initiatives, and connects community members to resources to improve the population's health status. According to the Office of Disease Prevention and Health Promotion, populations consisting of older adults, racial and ethnic minorities, lower-income levels, people with less

than a high school degree, and non-native speakers of English will most likely experience low or limited health literacy (2010). Appendix A displays a comparison chart of the project site's community demographics versus North Carolina's demographics.

The North Carolina rural community selected for this DNP project is comprised of higher percentages of older adults, African Americans, and people living in poverty than North Carolina, as well as a lower median household income. Furthermore, this county has a lower percentage of residents with a high school diploma or college degree and higher dropout rates. The demographics of this community make its population most likely to experience limited health literacy. Partnering with the organization to implement a DNP project to improve health literacy supports the organization's mission and vision by connecting community members to educational resources such as the American Academy of Pediatrics' symptom checker or a book about childhood illnesses and injuries.

Organizational Needs Statement

During the 2017 Community Health Assessment, the organization identified responsible parenting as a priority health need and has been working to provide funding and educational resources to improve the community's parenting skills (Lenoir County Health Department, 2018). The goal of the DNP project is to improve the health literacy of pediatric caregivers by offering a reliable resource that provides information on childhood illnesses, suggestions for symptom relief for minor illnesses and injuries, and care guides to assist in decision making. Improving the health literacy of pediatric caregivers coincides with the organization's aim to improve parenting skills. The objective to increase the health literacy of the population (HC/HIT-R01) has been identified in *Healthy People 2030* as a high priority with an emphasis in developing evidence-based interventions to address it (ODPHP, 2020b). *Healthy People 2020*

addressed the problem and listed health communication and health information technology as a topic with objectives to increase health literacy skills (ODPHP, 2020a). There were two objectives (HC/HIT-4 and HC/HIT-5) included in the health communication and health information technology topic pertaining to this health literacy improvement project. The first objective was to increase the proportion of patients whose doctor recommends health information resources to help them manage their health. The other objective was to increase the proportion of persons who use electronic personal health management tools. These objectives are addressed by recommending a trusted, reliable resource and encouraging its use by pediatric caregivers at this site.

This project has the potential to meet the three arms of the Institute of Healthcare Improvement's Triple Aim Initiative. By improving the health of the population, improving the patient experience, and reducing the healthcare costs, the project addresses all three of the Triple Aim dimensions (Institute for Healthcare Improvement, 2020b). Empowering patients by increasing health literacy has been proven to promote health and well-being, plus it helps patients make informed healthcare decisions (Paterick et al., 2017). Through empowerment, the health of the population can be improved. Strong health literacy has been linked to more effective patient engagement (Heath, 2017). Improvement in health literacy enhances patient engagement leading to a positive patient experience. Limited health literacy is associated with increased medication administration errors, more inpatient and emergency department care, fewer preventive services, and higher health care costs (Brega et al., 2015). Improvement in health literacy can reduce healthcare costs by increasing preventive services and reducing emergency department care. In pursuit of the organization's desire, the national goals of *Healthy*

People 2020, and the IHI Triple Aim Initiatives, a health literacy intervention will prove to be beneficial to the hospital, the community, and society.

Problem Statement

Health literacy has been a subject of interest for public health since *Healthy People 2010* highlighted the disparities associated with limited or low health literacy. Limited or low health literacy disproportionately impacts people of lower socioeconomic and minority groups' ability to search and use health information and adopt healthy behaviors leading to worse health outcomes and higher costs (ODPHP, 2010). Parents with limited health literacy are less likely to address their children's preventive and health care needs, negatively impacting their health and well-being (Buhr & Tannen, 2020).

Emergency departments across the United States face overcrowding, long wait times, and an overuse of emergency medical care for non-urgent illnesses. It is estimated that more than half of the 22.3 million pediatric emergency department visits are nonurgent (Lepley et al., 2019). While numerous factors influence the parent's decision-making when seeking medical care for a child with a mild acute illness or injury, limited health literacy is an independent predictor of emergency use (Drent et al., 2018). One study by May et al. (2017) concluded that health literacy-related interventions that improve parent understanding of mild acute illnesses, the severity of illnesses, and where and when to seek care could reduce non-urgent emergency department use.

Purpose Statement

The purpose of the DNP project is to introduce a reliable resource with trusted health information to pediatric caregivers visiting the emergency department for a non-urgent illness. The resource will be used to improve health literacy so pediatric caregivers can make informed

healthcare decisions. This health literacy improvement intervention could enhance parenting skills by increasing knowledge of childhood illnesses, suggesting first aid treatments, and providing care guides to assist in healthcare decision-making.

Section II. Evidence

Literature Review

The DNP project's search strategy included computerized focused searches in databases Cumulative Index to Nursing and Allied Health Literature (CINAHL), PubMed, and Google Scholar in June 2020. Selection criteria for the literature review were established in advance. Studies published within the last five years in the English language and published in scholarly (peer-reviewed) journals with full text available were included. Literature published before the last five years, in languages other than English, and not published in a scholarly journal with full text available were excluded. The search was conducted using the initial keywords "health literacy" AND "parents" AND "emergency department." There were 1433 articles identified as relevant to the subject. After the broad search, a Boolean/phrase search using keywords "childhood illnesses" AND "child health" AND "mobile applications" OR "technology" was used to filter the results yielding 127 articles. After screening the abstracts and titles, articles pertaining to health literacy interventions for pediatric caregivers using technology and using Melnyk & Fineout-Overholt's model, twelve studies with Levels of Evidence V or higher were retained for review. See Appendix B for the literature matrix.

Current State of Knowledge

The idea or concept of health literacy has spawned numerous research studies, journal articles, and discussions that examine the health literacy phenomenon and have led to quality improvement within the healthcare delivery system. Improvement in health literacy of the population was identified as an objective for *Healthy People 2010* and continued to be an area of focus for *Healthy People 2020* and now is a subject for *Healthy People 2030* (ODPHP, 2020b). It has been established that lower education levels, older ages, lower incomes, and multiple

morbidities were associated with lower levels of health literacy (Heijmans et al., 2015). Evidence supports that the low health literacy of pediatric caregivers was associated with more non-urgent emergency department use (May et al., 2017). Nearly two-thirds of pediatric caregivers inaccurately assess their child's illness as severe due to low health literacy (Lepley et al., 2019).

Current Approaches to Solving Population Problem

Current approaches to solving the problem of low health literacy include strategies for educational interventions in schools, communities, and healthcare offices. Educational health information has been analyzed for ease of understanding, desired medians, and distribution preferences to improve health literacy (Drent et al., 2018). As reported in the Agency for Healthcare Research and Quality's Health Literacy Universal Precautions Toolkit, the average American adult reading level is at an 8th-9th grade reading level, and 20% of Americans read at the 5th grade level (Brega et al., 2015). Therefore, it is recommended that written materials be designed for 5th grade reading levels. Strategies to use when choosing or writing education materials include making messages clear with short, concise non-medical jargon, choosing the font and font size that is easily read, incorporating visuals, considering cultural differences, and selecting a layout that is easy to follow. Easy to understand verbal explanations involve effective communication and strategies that will help a patient understand health issues. Strategies for effective provider-patient communication include using plain, non-medical terminology, listening carefully, using the patient's own words, making eye contact, and speaking clearly at a moderate pace. The teach-back method is an approach to confirm the patient's understanding of the material by asking the patient to repeat health information and instructions back to the provider. The teach-back method can improve understanding and adherence, decrease canceled appointments, and improve patient satisfaction and outcomes. In addition to these strategies to

improve health literacy, exploring technology access and utilization has been researched in efforts to promote health literacy. Health literacy interventions such as mobile apps or web-based software have shown promise for future positive health outcomes with the potential to reduce healthcare disparities (Donovan et al., 2020).

Evidence to Support the Intervention

The health literacy intervention objectives are to introduce a reliable educational resource to pediatric caregivers, increase their knowledge of childhood illnesses, suggest first aid treatments for minor injuries, and provide care guides for healthcare decision making. At-risk populations for low health literacy include older adults, minorities, low income, less than high school graduate education, and non-native speakers of English (ODPHP, 2010). When comparing the project's site's county to state averages, the county has a 19.2% higher ratio of African Americans, an 8.5% higher proportion of poverty level adults, and a 7% lower rate of individuals who are high school graduates (United States Census Bureau, 2019). In addition, the Hispanic population in the county is the fastest-growing segment of the population (Lenoir County Health Department, 2018). These figures alone place the county as a high-risk area for healthcare consumers with low health literacy. The project site provides care to residents in the county and other surrounding rural counties, so health literacy interventions are needed to improve the population's health outcomes.

According to the *Healthy People 2020 Mid-Course Review*, between 2007 and 2014, the number of people aged 18 and over who used their mobile devices to access the internet increased from 6.7% to 56.8% (National Center for Health Statistics, 2016). These staggering statistics give rise to the idea of improving health literacy by providing information via the handheld mobile device. According to one study, cell phones have the potential to deliver

electronic health information to a vast number of patients at relatively low costs (Ladley et al., 2018). The use of technology, specifically mobile cellphones with internet access, could be a valuable tool to improve health literacy.

The American Academy of Pediatrics designed a mobile app and an interactive tool located on the website HealthyChildren.org called the KidsDoc symptom checker. This internet software can be used as an educational tool to promote health literacy for childhood illnesses and injuries. The KidsDoc app was identified as the preferred method of education in one focus group study that explored the preferences of educational material for common childhood illnesses (Ohns, 2019). This study's participants consisted of 30 low-income individuals with borderline limited literacy skills and at least one child or expecting a child. Due to the immediate access and wealth of information provided, the KidsDoc app was chosen over a written brochure, a book, and a 24-hour nurse call line. The app and interactive tool include symptoms for childhood illnesses and injuries, medication dosages for common medications such as acetaminophen and ibuprofen, first aid instructions, and parent advice with details when and where to seek medical assistance. A health literacy intervention, such as the utilization of the KidsDoc app or interactive tool, could provide a large number of parents with professionally validated healthcare information that could very well impact their caregiving and decision-making. There is limited evidence about the effectiveness of mobile apps and the use of websites in increasing parents' knowledge of childhood illnesses and assisting them with their healthcare decision-making. The purpose of this project aims to explore this type of health literacy intervention and make suggestions for further projects on internet-based medical information technology. Projects such as this, if successful, may help to increase pediatric caregivers' health literacy as well as assist them with healthcare decision-making.

Evidence-Based Practice Framework

The Institute for Healthcare Improvement uses the Model for Improvement framework to guide quality improvement (Institute for Healthcare Improvement, 2020a). The Plan-Do-Study-Act (PDSA) cycle and the Rapid Cycle Improvement approach allow quality improvement team members to test interventions in a small setting, apply the PDSA cycle, and adjust the interventions as determined by the PDSA cycle review (Institute for Healthcare Improvement, 2020a). The SMART objectives used to track the intervention's success consisted of a survey for pediatric caregivers to report their utilization of the American Academy of Pediatrics' KidsDoc symptom checker. The survey assessed whether the utilization of the KidsDoc symptom checker increased their knowledge of childhood illnesses, provided necessary first aid techniques, and offered care guides that assisted in healthcare decision-making.

The planning stage of the PDSA cycle included an analysis of inputs, activities, and output components needed to implement the program and identification of preferred outcomes. The doing stage of the PDSA cycle of quality improvement was executing the interventions at a rural hospital emergency department. Studying the outcomes to identify problems during the implementation of interventions was the next phase of the PDSA cycle. Lastly, the acting stage was the time to modify and repeat the process or, if completely successful, spread the quality improvement to other practices. The Plan-Do-Study-Act Worksheet provided by the Agency of Healthcare Research and Quality was utilized at least twice during the implementation phase of this quality improvement at the project site (See Appendix C). Through patient-centered quality improvement efforts, pediatric caregivers in the county can be empowered to manage their child's health, gain the ability to make informed decisions regarding their healthcare, and possibly reduce the overuse of emergency departments for non-urgent childhood illnesses.

As noted earlier, the DNP project's objectives were to increase caregivers' knowledge of childhood illnesses and injuries by utilizing the educational tools to assist caregivers in their decision-making. At the time of participation enrollment, each participant provided a phone number and consent to be contacted via a phone call to complete the project's evaluation process. The participants reported how often they used either the KidsDoc app, the web-based interactive tool, or the educational book to seek information about their child's non-urgent illness or injury. Participants conveyed if they learned at least two facts concerning their child's illness or injury. Lastly, participants indicated whether the mobile app or website assisted them to administer a first-aid technique. Appendix D provides details of the SMART objectives for the DNP project. The short telephone follow-up survey provided data to evaluate the project (See Appendix E). Data received from the follow-up survey was used to evaluate the project's success plus make recommendations for future projects of this nature. The project's findings could open the door to future health literacy technological interventions that could be applied to primary providers' offices, health clinics, schools, and community centers.

Ethical Consideration & Protection of Human Subjects

When considering the health literacy improvement project's ethical dilemmas, the target population was examined for any possible inequalities that may exist. Caregivers with low economic status and Spanish-speaking caregivers pose a threat for unequal participation and injustice. Assuring that every individual has the same access to health opportunities and equal treatment implies justice (Hennekens & Drowos, 2017). The DNP project introduced a mobile app or a website interactive tool as a reliable resource for healthcare information for pediatric patients. If a pediatric caregiver did not have a smartphone or internet access with a computer or tablet, the intervention would not be readily available for these participants. Excluding this

portion of the population would be unethical and would simply add to the social inequalities and injustices. To address this ethical consideration, a book by Dr. Barton Schmitt titled *My Child is Sick, 2nd edition* was provided for the caregivers with no internet access or devices. This book is written at a 6th grade reading level with visuals, dosing charts, and decision trees. The author of this book was the primary designer of the KidsDoc mobile application and the interactive website tool (Carey, 2016). The Spanish-speaking population in the project site community is 7.9% of the population and increasing rapidly (Lenoir County Health Department, 2018). The KidsDoc mobile app and website interactive tool can be downloaded in Spanish for this population. The book *Que Hacer Cuando Su Nino Se Enferme (What to do for Health)* by Gloria Mayer and Ann Kuklierus was provided for Spanish-speaking pediatric caregivers with no internet access or devices. This book contains information for more than 50 common childhood illnesses. The project aimed to increase health literacy by providing a reliable resource for all participants in an equitable, non-discriminatory manner. Also, this DNP project should not pose potential harm to this population, nor is there potential for anyone to be taken advantage of during the project implementation. The only personal data obtained was the participant's first names and their phone numbers for follow-up calls. To protect the volunteer participants' privacy and maintain their confidentiality, each participant was assigned a unique numerical identifier listed on a code sheet with their first name and phone number (See Appendix F). The code sheet was stored separately in a password protected nickel drive on the project site's server under the title Nursing Research. The password protected laptop used for inputting the data was stored in a locked office at the project site.

The project lead reviewed the Collaborative Institutional Training Initiatives (CITI) modules and received a certificate of completion to prepare for the formal approval process. The

Social and Behavioral Research Investigators and Key Personnel completed modules examined the sociological, psychological, and educational phenomena that may exist when involving participants in the project. The Essentials of Public Health Research examined justice, non-maleficence, beneficence, and respect for persons as well as informed consent and confidentiality topics. The CITI modules discussed possible ethical principles that may arise during the project. The Chief Nursing Officer approved the project after a discussion with the project lead, the project champion, the Emergency Department Medical Director, a local Pediatric Physician, and Senior Management. Furthermore, the facility's Institutional Review Board (IRB) concluded the project did not warrant formal approval and were in agreement to support the project moving forward. Prior to the project approval, the Project Assessment Tool and the Implementation Tools Worksheet were submitted to the faculty mentor for approval. The project lead completed the Quality/IRB self-certification tool, and the faculty mentor reviewed and approved the materials. Once approved by the faculty mentor, the self-certification tool was submitted via Qualtrics to the University IRB where it was deemed as quality improvement and no further IRB review was required. After careful examination of all project materials by the DNP faculty, the proposed DNP project was approved.

Section III. Project Design

Project Site and Population

The DNP health literacy improvement project was designed to address limited health literacy in a vulnerable population for adverse health outcomes. The population at the project site was comprised of individuals from a community at-risk for limited or low health literacy, and several of these individuals are pediatric caregivers. With the assistance of the project site and site champion, the American Academy of Pediatrics, the faculty mentor, and the project team, the DNP project aimed to positively impact the health literacy of pediatric caregivers. Increasing the health literacy of pediatric caregivers will indirectly improve the health and well-being of their children (Buhr & Tannen, 2020).

Description of the Setting

The setting for this DNP project was an emergency department in rural eastern North Carolina serving the pediatric and adult populations. The emergency department has 29 individual rooms with six rooms designated as the Green Zone for patients with minor illnesses or injuries. The patients that visit the Green Zone are categorized with acuity levels 4 or 5 which constitutes as needing no more than one resource for their illness or injury. These patients most often present with minor issues such as extremity injuries, common cold symptoms, or skin irritations. Most of these patients could be seen by their primary doctors due to their illness's non-urgent status. The Green Zone provided an opportunity to implement a health literacy improvement project for pediatric caregivers, because the clients were not facing a life or death situation, were not in a high stressed environment, and were separated from the chaos of the main emergency department.

Description of the Population

This not-for-profit hospital serves a county with a total population of 55,949 (United States Census Bureau, 2019). The health literacy improvement project's target population was pediatric caregivers responsible for the health and well-being of children under the age of 17. The segment of the county's population under the age of 18 is 22.4% which is the population that would be most impacted with better health outcomes due to the health literacy improvement project (United States Census Bureau, 2019). According to the administration of the emergency department at the project site, during the month of November 2018, 448 patients under the age of 17 with acuity levels 4 & 5 were seen in the emergency department and discharged (██████████, personal communication, March 11th, 2019). During the first phase of the project, 76 pediatric caregivers were invited to volunteer to participate. Inclusion criteria for volunteer participation were English or Spanish-speaking caregivers of children under the age of 17 that visited the emergency department with an acuity level of 4 or 5.

Project Team

The project team consisted of the site champion, the Spanish interpreter, the faculty mentor, and the DNP student who served as project lead. The project lead planned, developed, and implemented the project, as well as, analyzed the data, and disseminated the project findings. The site champion, the Director of Emergency and Ambulatory Care Services, advised the project lead and monitored the project with the organization's interest in mind. The site champion has 35 years of experience in nursing and extensive knowledge of administrative and clinical operations. The Spanish interpreter was available when interacting with the Hispanic participants to translate conversations and assisted with inquiries about the project. The Spanish interpreter is a nationally certified medical interpreter that has been a translator for the hospital

for over ten years. The faculty mentor advised the student in all aspects of the DNP project. With 43 years of nursing experience and five years of experience working with DNP students and projects, the faculty mentor has vast knowledge to share with the student.

Project Goals and Outcome Measures

The goal of the DNP project was to improve the health literacy of pediatric caregivers to impact the health outcomes of their children. The strategy for accomplishing the goal was to introduce a reliable, trusted educational tool to the target population during a healthcare visit to the emergency department. Data collection included tracking the number of patients that entered the Green Zone during the recruitment phase and how many patients met the criteria for participation, the number of pediatric caregivers presented with the opportunity to participate and how many accepted, the number of English and Spanish-speaking participants, and the number of participants that received the mobile app, the website information, or the book. The project's outcome measures included tracking the utilization of the educational tool, the knowledge obtained about childhood illnesses or injuries, and first aid techniques learned using the resource.

Description of the Methods and Measurement

The DNP quality improvement project provided participating pediatric caregivers with a reliable resource to be used as an educational tool to improve health literacy. The American Academy of Pediatrics' mobile app, KidsDoc, and the KidsDoc symptom checker interactive tool on the HealthyChildren.org website was used as educational tools to promote health literacy for childhood illnesses and injuries. Dr. Barton Schmitt, a Professor of Pediatrics at the University of Colorado School of Medicine and Medical Director of the Pediatric After-Hours Call Center at the Children's Hospital Colorado, designed the mobile app and web-based software. The information provided in the KidsDoc app and the KidsDoc symptom checker

interactive tool, available in English and Spanish, is based on triage protocols of 10,000 practices and 400 nurse advice call centers and reviewed by respected professionals listed within the app (Carey, 2016). The American Academy of Pediatrics and their licensing company, Self-Care Decisions, supplied 100 coupons for either iPhones and Androids in English and Spanish to incentivize participation. An English book written by Dr. Barton Schmitt or a Spanish book written by Gloria Mayer and Ann Kuklierus was provided as the educational resource for the participants without mobile devices or internet access. The intervention consisted of introducing the mobile or web-based app on a newly, purchased iPad dedicated solely for the project during a healthcare visit. The project lead made available an educational resource (KidsDoc app, website, or book) to participating pediatric caregivers and educated the participants on how to use the resource. Lastly, the project lead evaluated the participants' utilization of the educational resource and the knowledge gained using the resource.

A follow-up survey tool was used to evaluate the pediatric caregivers' perception of the utilization of the educational resource (KidsDoc app, website, or book) and if utilization of the resource led to increased knowledge of childhood illnesses and first aid techniques (See Appendix E). Participants responded to a telephone survey that consisted of five questions using a four-point Likert scale and one open-ended question.

Discussion of the Data Collection Process

Pediatric caregivers were informed of the health literacy project and invited to participate. Participants volunteering to participate were asked to provide a phone number. The project lead contacted the participants four weeks and eight weeks after the review of educational resource materials. During the telephone follow-up, the project lead asked each participant questions on the follow-up survey. The Spanish interpreter agreed to be available to assist with

the Spanish-speaking participants. The project lead recorded the responses on an Excel survey worksheet with no identifying data (See Appendix G). The survey results were uploaded to a secure password-protected computer only accessible by the project lead in a locked office. IBM SPSS Statistics software was used to analyze the collected data and results were displayed using tables and bar charts for presentation. At the conclusion of the project, the data stored on the computer was deleted according to the project site policy, and the participation forms were shredded.

Implementation Plan

Education

The first step in the implementation plan was to educate the staff about the health literacy improvement project. The project lead sent an email containing a project PowerPoint presentation to all registered nurses and certified nurse assistants working in the Green Zone prior to the January staff meeting. The project lead attended the January staff meeting to answer questions and clarify any concerns.

Recruitment Phase

The second step of the implementation plan was the recruitment phase. Supplies needed for the recruitment phase were participation forms, a script for presentation, an iPad, mobile app coupon redemption codes, instructions for accessing the website, and educational books. The project lead implemented the recruitment phase on Tuesdays and Wednesdays in the Green Zone during the months of January and February. As patients with acuity levels 4 or 5 entered the emergency department's Green Zone, they were guided to their assigned room. The nurse on duty assessed the patient and prepared them for the provider. If the patient was a pediatric caregiver, the nurse invited them to participate in a pediatric caregiver health literacy project.

After the nurse exited the room and identified a potential participant, the project lead entered the room, identified herself as the project lead. The project lead explained the health literacy improvement project and demonstrated the KidsDoc symptom checker on the iPad. After the demonstration, the project lead asked the pediatric caregiver if they were interested in participating. See Appendix H for the script for presentation of educational resources. If there was interest in the project, the project lead reviewed the participation form and obtained consent for participation (See Appendix I).

After the participation form was completed, inquiries were made concerning their cell phone model and access to the internet. If the participant had an iPhone or Android, a coupon was presented with a redemption code to download the mobile app. Once the mobile app's download was completed, the project lead helped the participant set up the app on their phone. If the participant did not have a compatible cell phone but had a device with reliable internet access, the project lead demonstrated the process of accessing the KidsDoc symptom checker on the HealthyChildren.org website and provided navigational instructions for the software. See Appendix J for navigational instructions. If the participant did not have a compatible mobile device or reliable internet access, the participant was presented with an educational book. With the Spanish interpreter's assistance, the Spanish-speaking population downloaded a Spanish version of the educational tools or received a book written in Spanish. If the nurse, provider, or other medical personnel entered the room at any time, all presentations ceased, so there was no disruption in the provision of care. The presentation did not last longer than 15 minutes and did not lengthen the time of the visit. The recruitment presentations were repeated with eligible pediatric caregivers on Tuesdays and Wednesdays from January 19th to February 17th, 2021, with 75 participants volunteering. The project lead tracked the data during the recruitment phase in an

Excel worksheet. The review of the recruitment phase using the PDSA rapid cycle model was completed after the first week of participant recruitment to evaluate and improve the process.

Follow-up Phase

At week four and week eight, the project lead contacted each participant by telephone for the follow-up survey (See Appendix K for Telephone Interview Script). The Spanish interpreter assisted with interviewing the Spanish speaking participants. A second PDSA cycle was completed after one week of telephone interviews to evaluate the telephone interview process. The participants received a second telephone interview at eight weeks after volunteering for the project in which the same follow-up survey questions were asked and answers recorded. Implementing two follow-up telephone interviews allowed the project lead to address any issues the participant may have experienced with the resource and re-evaluate the participant's responses. A third PDSA cycle was completed after one week of the second telephone interviews to evaluate the interview process.

Timeline

The DNP project timeline began May of 2020 with identifying and researching the problem, and developing a plan considering the *Healthy People 2020* goals and objectives. August of 2020 marked the second phase of the project which included project design, identification of the process and outcomes, collaboration with faculty and stakeholders, and the approval process. In January of 2021, the third phase started with the organization's letter of support, implementation, revisions, and was completed with data analysis in April of 2021 (See Appendix L for the project implementation timeline). Results and findings, interpretations and implications, and conclusions began May of 2021 with the fourth phase of the project. Lastly, the fifth phase of the project consisted of project completion, final approval, dissemination of the

findings, and the podium presentation that took place in June and July of 2021 (See Appendix M).

Section IV. Results and Findings

The purpose of the project was to introduce a reliable resource with trusted health information to pediatric caregivers to improve health literacy. Data collected during the Doctor of Nursing Practice (DNP) project consisted of both quantitative and qualitative results used to measure the outcomes and impact on pediatric caregiver's health literacy. Quantitative data included data collected during the recruitment phase as well as during the telephone surveys. Qualitative data was collected during the telephone surveys with specific themes emerging from the participant's comments. Findings, analyzed by SPSS statistical software, will be discussed and compared to the evidence found in the literature.

Results

During the recruitment phase, the green zone saw 229 patients of which 80 (35%) patients met the criteria for project presentation. The criteria for participation were pediatric caregivers above the age of 18 who care for children less than the age of 17, who speak either English or Spanish. There were 76 out of 80 (95%) potential participants who agreed to the project presentation, and 75 out of 76 (98.7%) volunteered to participate of which 73 (97.3%) spoke English and 2 (2.7%) spoke Spanish. Educational resources distributed to participants included 72 mobile app download codes, two website navigational instructions, and six books. Some participants did not know their password to download the mobile app during recruitment, so the download code was provided for home download as well as either a book or website navigational instructions (See Appendix N for Recruitment Data).

During the follow-up phase, telephone interviews were conducted at four and eight weeks of educational resource utilization. At four weeks, 53 out of the 75 participants responded to the telephone interviews yielding a response rate of 70.7%. At the eight week telephone interviews,

36 out of 53 participants responded to the telephone interviews yielding a response rate of 67.9%. The project lead did not attempt to contact the participants that did not respond to the first telephone interview. Data collected from the survey questions included the occurrence of childhood illnesses or injuries, the amount of educational tool utilization, and if they obtained knowledge from the educational resource as well as any additional comments participants wanted to add. Eighteen participants out of 53 (34%) stated their child or children experienced childhood illnesses or injuries during the first four weeks of participation with a range of zero to four illnesses or injuries. Of the 53 participants, 35 (66%) participants indicated their children did not experience any illnesses or injuries. The second follow-up interview at eight weeks yielded a decrease in childhood illnesses or injuries. Of the 36 participants, 29 (80.6%) participants indicated their children did not experience any illnesses or injuries (See Appendix O for the Number of Illness Reported in the Telephone Survey).

The four weeks follow up telephone interview surveyed the amount of resource utilization to seek health information. The data varied among participants with two (3.8%) participants indicating they always used the resource, 26 (49.1%) participants stated they often used the resource, 14 (26.4%) participants rarely used the resource, and 11 (20.8%) participants never used the resource. The eight week follow-up telephone survey yielded a reduction in utilization with only one (2.8%) stating they always use the educational resource to find health information for their child, 13 (36.1%) participants often used the resource, 14 (38.9%) participants rarely used the resource, and eight (22.2%) never used the resource (See Appendix P for Educational Tool Usage).

During the four weeks telephone interview, participants were asked the four-point Likert scale with statements relating to learning at least two facts about childhood illnesses, 20 (37.7%)

strongly agreed, 22 (41.5%) agreed, 11 (20.8%) disagreed, and no one strongly disagreed. In response to the survey statement regarding the obtainment of at least one first aid technique, 17 (32.1%) strongly agreed, 23 (43.4%) agreed, 13 (24.5%) disagreed, and no one strongly disagreed. Lastly, in response to the statement that the educational resource assisted them in deciding what level of care to seek, 22 (41.5%) strongly agreed, 21 (39.6%) agreed, ten (18.9%) disagreed, and no one strongly disagreed (See Appendix Q).

The eight weeks telephone interview revealed similar findings in regard to learning at least two facts about childhood illnesses or injuries from using the educational resource, eight (22.2%) participants strongly agreed, 19 (52.8%) agreed, nine (25.0%) disagreed and no one strongly disagreed. Eight (22.2%) participants strongly agreed they had learned at least one first aid technique, whereas 18 (50.0%) agreed, 10 (27.8%) disagreed, and no one strongly disagreed. In answer to the last survey question of whether the educational resource helped them decide where to seek care, seven (19.4%) strongly agreed, 20 (55.6%) agreed, nine (25.0%) disagreed, and no one strongly disagreed (See Appendix Q).

The two follow-up telephone surveys at four and eight weeks of utilization asked the participants for any additional comments. During the first telephone survey, three themes identified through thematic analysis included 1) the mobile app was useful, helpful, and easy to use 2) participants enjoyed the app and were glad to have the mobile app on their cellphone, and 3) the educational resource was not used because there was not a childhood illness or injury. The thematic analysis of the comments during the second telephone interview yielded an additional theme of the desire to keep the mobile application in case of a childhood illness or injury.

Discussion of Major Findings

The major findings in this DNP project indicate an increase in mobile device utilization, suggest mobile apps are the preferred educational tool, and demonstrates an increase in health knowledge of pediatric caregivers by introducing the KidsDoc mobile app. Furthermore, this health literacy-related intervention could lead to a possible reduction in non-urgent emergency department use due to the increase in health knowledge and the advice of when and where to seek care.

The evidence presented in the *Healthy People 2020 Mid-Course Review* earlier in the paper stated that between 2007 and 2014, the number of people aged 18 and over who used their mobile devices to access the internet increased from 6.7% to 56.8% (National Center for Health Statistics, 2016). When comparing these figures with the results of this project, of the 75 participants, 72 patients had mobile devices with internet access yielding a percentage of 96% mobile device users. Although this project has a small sample size and the population was pediatric caregivers (younger generation), the difference in statistics was 39.2% which implied a vast increase in mobile device utilization with internet access. Furthermore, most participants chose the KidsDoc mobile app over a book or navigational instructions which aligns with Ohns' (2019) focus group study results identifying the KidsDoc app as a preferred method of education.

The SMART objectives outlined at the beginning of the project provide specific, measurable outcomes that contribute to achieving the project goals (See Appendix R for a Comparison of SMART Objectives and Results). The first goal of the SMART objectives was by the end of the 2-month period, the proportion of participants that report they used the app or website often or always to seek childhood illness information during their child's illness or injury will be 50%. During the first four weeks, 52.9% of the participants often or always used the

mobile app to seek childhood illness information, but during the second telephone survey at eight weeks, only 38.9% reported they often or always use the app to seek childhood information.

When comparing these figures with the number of childhood illnesses during the first four weeks, 66% of the participants encountered no childhood illnesses or injuries whereas during the second four weeks, 80.6% of the participants had no childhood illnesses or injuries. Additional comments made by 13 (36%) of the 36 participants during the second survey indicated that their child had not been sick, so they did not need to use the app.

The second SMART objective was by end of the 2-month period, the proportion of participants that report they strongly agree or agree they learned at least two facts about childhood illnesses from the app or website will be 25%. During the first telephone interview, 79.2% participants reported they strongly agree or agree they learned at least two facts about childhood illnesses and during the second survey, 75% of participants reported they learned at least two facts about childhood illnesses. These findings exceeded the goal indicating an improvement in health knowledge in 75% of the participants.

The third SMART objective was by the end of the 2-month period, the proportion of participants that report they strongly agree or agree they learned at least one first aid technique during their child's illness or injury from the app or website will be 25%. Responses from the first survey indicated that 75.5% of the participants reported they strongly agree or agree they learned at least one first aid technique compared to 72.2% of the participants at week eight. Again, these findings exceeded the goal indicating an improvement in health knowledge in at least 70% of the participants.

Although not a SMART objective, a survey question was posed to the participants about whether they felt the educational resource assisted them in deciding what level of care to seek

during a childhood illness or injury. During the first interview, 81% of the participants reported the resource assisted them to decide when and where to seek care compared to 77% in the second interview. These findings correlate with May et al.'s 2017 study conclusion suggesting a possible reduction in non-urgent emergency department use due to the mobile app improving parents' understanding of mild acute illnesses, the severity of illnesses and where and when to seek care.

A reduction in educational tool utilization was noted from week 4 to week 8, and an explanation for the reduction can be considered from the thematic analysis. The number of childhood illnesses or injuries decreased from 34% of participants reporting illnesses or injuries in the first 4 weeks to only 19.4% participants reporting childhood illnesses or injuries at 8 weeks. Participants expressed the lack of necessity of the mobile app due to their child's wellness which affected their utilization.

Section V. Interpretation and Implications

Costs and Resource Management

In order to fully assess the feasibility and sustainability of this DNP project, the costs and resource management must be evaluated and weighed against the benefits. The total monetary costs associated with this DNP project was \$893.13 (See Appendix S). The iPad and accessories were purchased for \$488.40. The majority of the remaining costs were associated with the book purchases (\$386.73). Lastly, the paper supplies (\$18) were used for the participation forms and navigational instructions. For the purpose of the project, download codes were donated by the American Academy of Pediatrics and their licensing company, Self-Care Decisions with an expiration date of 30 days from the date of issue. Normally, the cost to download the KidsDoc mobile app is \$1.99 per download.

The labor resource for this project includes the labor of the project lead and the Spanish interpreter. The project lead spent 108 hours at the facility during the recruitment phase (nine days for 12 hours) as well as 14 hours interviewing participants. Given the labor cost for a registered nurse, this figure could be over \$3000. The Spanish interpreter was present with the patient during the recruitment, so no extra cost was accumulated for her assistance with the project, and the interview time with the Spanish participants was under ten minutes, so no labor cost was attributed for her participation.

Benefits

When it comes to healthcare, estimating the monetary benefits of a project can be challenging. Data used for this analysis were provided by the administration of the emergency department in order to evaluate the benefits of the project. As noted earlier, during a one-month period (November 2018), 448 patients under 17 years old with acuity levels 4 & 5 were seen in the emergency department and discharged. The aggregate dollar amount billed for services

minus physician compensation equaled \$402,743. Out of the 448 patients, 354 were Medicaid patients with a total of \$317,056 in charges. According to a statistical brief #504 from the Agency Healthcare Research and Quality, in 2015 Medicaid was paying primary physicians a mean total payment of \$126 per office-based visit for common illnesses such as ear infections and sore throats (Muhuri & Machlin, 2017). If 25% of the 354 Medicaid caregivers seen in the emergency department in November had sought advice using the KidsDoc app and decided to go to their primary physician's office instead of the emergency department, then 88 caregivers would have gone to the primary office totaling \$11,088 (88 x \$126) in Medicaid payments to primary physicians' offices reducing the Medicaid payments to the hospital by an astounding \$78,848 in just one month. This calculation is centered around the assumption that the average charge for emergency department visits in November for this particular facility was \$896 based on total Medicaid charges divided by total pediatric Medicaid patients ($\$317,056/354=\896×88). As seen with this one example, the minimal cost for this DNP project could have vast possibilities for increases in the rate of return for this small investment in the long run.

Implications of the Findings

Implications for Patients

Empowering patients by improving health literacy has been proven to promote health and well-being, plus it helps patients make informed healthcare decisions (Paterick et al., 2017). Pediatric caregivers who download and use the KidsDoc symptom checker will have a reliable resource at their fingertips that will enhance parenting skills by increasing knowledge of childhood illnesses, suggesting first aid treatments, and providing care guides to assist in healthcare decision-making. The true beneficiary of the health literacy-related intervention will be the children of the pediatric caregiver. The Buhr and Tannen's study concluded that

strengthening the health literacy of pediatric caregivers contributes to improved health outcomes of their children (2020). Visiting the primary physician in lieu of a non-urgent visit to the emergency department aids with continuity of care, delivery of preventive care, and improved patient outcomes (Pourat et al., 2015). Additionally, *Healthy People 2030* HC/HIT-R01 objective is to increase the health literacy of the population with an emphasis in developing evidence-based interventions. This DNP project health literacy intervention can serve to address this objective by using the findings as evidence of improving the health literacy of the pediatric caregivers.

Implications for Nursing Practice

Knowledge gleaned from the DNP project could influence nursing practice by heightening awareness of technology based education. Findings from this DNP project implies the use of technology based education can not only improve health literacy but is the preferred method to seek healthcare information. Moreover, results and findings may encourage nurses to offer reliable web-based resources in addition to written instructions at discharge. Nurse Practitioners, especially in primary pediatric care settings, could promote using reliable healthcare information for their patients. The findings imply improvement in health literacy attributed to the use of the KidsDoc symptom checker and thus, they could promote its use at well-child visits. In fact, the American Academy of Pediatrics offers the web tool KidsDoc symptom checker to be installed on pediatric office's webpage making the resource even more available. Nurse practitioners could advocate for the installation at their place of work. With interprofessional collaboration, providers, interpreters, and information technologists could forward this initiative to improve health literacy by advocating for technology based educational resources.

Impact for Healthcare Systems

In addition to addressing the objective in *Healthy People 2030*, this DNP project addressed the three arms of the Institute of Healthcare Improvement's Triple Aim Initiative by improving the health of the population, improving the patient experience, and reducing the healthcare costs. Partnering with the interprofessional team to suggest reliable technological based health information could positively impact the healthcare system. Investment in educational technology such as mobile applications could supply a vast number of people with reliable information to assist them with managing their healthcare thereby improving population health and the patient experience. An improvement in health literacy could reduce healthcare cost as shown in the cost-benefit analysis. Reductions in non-urgent emergency department visits could be seen by empowering pediatric caregivers with knowledge that affects their care-seeking behavior. The potential benefits from a reduction in non-urgent emergency department visits translates into reduced wait times and reduced stress related to overcrowding emergency departments.

Sustainability

Given the positive feedback from participants concerning the mobile app KidsDoc symptom checker, continuing to inform pediatric caregivers of the availability and usefulness of the app would be beneficial to the pediatric caregivers in the community. Posters advertising the HealthyChildren.org website and the mobile app purchased from the American Academy of Pediatrics at \$.20 each can be displayed in the Green Zone patient rooms and the Family Birthing Center. Nurses could encourage pediatric caregivers to download the KidsDoc mobile app during discharge instructions by presenting a flyer (\$.02 each) included in the discharge paperwork. Flyers and posters have been purchased by the project lead and presented to the Project

Champion. Approval for their use is pending finalization of project data and presentation to the Chief Nursing Officer. Although the download codes for the mobile app have expired, there are 21 English books and eight Spanish books available that could be dispersed to pediatric caregivers. The findings of this DNP project indicate that providing the mobile app KidsDoc symptom checker can improve the health literacy of pediatric caregivers and possibly reduces non-urgent emergency department use, therefore, every effort should be made to continue this health literacy-related intervention.

Dissemination Plan

The project site presentation will be presented in July of 2021 at a meeting with the chief nursing officer and the project champion. The organization supported this project and deserves a full presentation of findings and outcomes as well as recommendations for sustainability. Further presentations may be available as the organization explores opportunities for implementation in the family birthing center or the emergency department. Presentations at the local level include the pediatrician offices and the community health center with plans underway in establishing dates for presentations. This project was designed with the long term goal to improve the health literacy of the community. Reaching out to the community in efforts to promote a health literacy would not only heighten awareness but offer an intervention to improve health literacy.

A poster presentation of the project will be presented at the University College of Nursing on July 13th, 2021. This DNP project will also be submitted to The Scholarship, the University's institutional repository. Furthermore, publication in *Pediatrics*, the official journal of the American Academy of Pediatrics may be pursued pending advice from the faculty mentor as well as publications in the ANA's *American Nurse* or the NC Board of Nursing's *Nursing*

Bulletin. The NC Pediatric Society virtual annual meeting on August 28, 2021 is a possible forum for a presentation as well.

Section VI. Conclusion

Limitations and Facilitators

Limitations

The DNP project had several limitations. Recruitment for participation was conducted on specific days and was implemented during the COVID pandemic when the census at the hospital was lower than normal contributing to the small number of participants. The response rate to the surveys was 70% (53 out of 75 participants) for the first survey at four weeks and 68.6% (36 out of 53 participants) for the second survey at eight weeks. The participants that did not respond to the first survey were not surveyed during week eight. The results could have been impacted if all participants had responded or were surveyed at week eight. Lastly, the time frame in which the DNP was completed was a limitation. Continued utilization of the mobile app could not be assessed past two months due the time constraint. The utilization of the educational tool decreased from four weeks to eight weeks partly due to the decrease in childhood illnesses or injuries but could also be attributed to the decreases in the number of participants surveyed.

Facilitators

The facilitators for the project came in the form of people and resources. The organization and the project team supported the project making it possible to conduct the project in the Green Zone of the emergency department. Staff within the Green Zone encouraged the project lead and helped identify possible participants by asking permission for the project lead to present the project. The project team not only supported the project but advised throughout the entire process. The administrators made available a password protected laptop with a secured nickel drive to store the participants information, as well as an office to secure the laptop. The American Academy of Pediatrics and their licensing company, Self-Care Decisions, supported

the project and donated download codes for the mobile app. The Emergency Medical Director, the Chief Nursing Officer, and the local pediatrician supported and approved the DNP project.

Without these facilitators, the DNP project would not have been possible.

Recommendations for Others

Recommendations for others that may want to replicate this DNP project would include eliminating the iPad due to the cost. The mobile app can be shown on a personal mobile device or, if available, the electronic medical record handheld device during the discharge instructions educational session. Another recommendation would be to reduce the number of books purchased, because only two Spanish books and four English books were distributed. A recommendation would be to send the survey via text message instead of telephone interviews in order to save time and possibly improve the response rate. Standardizing the discharge process to include the demonstration of the KidsDoc mobile app as an available resource, providing flyers in the education discharge paperwork, and displaying posters advertising the HealhyChildren.org website within patient rooms could promote sustainability within the organization.

Recommendations Further Study

Further study by the technology industry should focus on similar apps specific for adult health as well as specialized apps targeted to assist with a particular diagnosis such as diabetes management or heart disease. While incorporating a 5th grade reading level and making the app easy to use, the apps can broaden the understanding of a particular disease or health concern, and help patients improve their health outcome by improving their health literacy. Continued study of preferences and trends with the growing technology use in the healthcare system is essential to provide the most effective and efficient use of technology as an educational resource.

Future projects focused on reducing limited health literacy are necessary to create a toolbox of evidence-based interventions that address health literacy. Additional studies in the use of the KidsDoc app or other health informational apps related to emergency department visits and primary care offices is recommended. Studies focused on the effects of technological-based health literacy interventions have on the costs and continuity of care have potential to further evidenced-based practices. Evaluations to determine the improvement of patient outcomes due to technological-based health literacy interventions could be valuable.

Final Thoughts

The purpose of this DNP project was to introduce a reliable resource with trusted health information to pediatric caregivers visiting the emergency department for a non-urgent illness. At least 72% of the participants indicated this health literacy improvement intervention enhanced parenting skills by increasing knowledge of childhood illnesses, suggesting first aid treatments, and providing care guides to assist in healthcare decision-making. In addition, participants preferred the mobile app as their educational resource. Results and findings from this project suggest the use of technology as an educational resource shows promise for future health literacy improvement interventions. While improvements in health literacy aligns with the objectives of *Healthy People 2030* and supports the three arms of the Institute of Healthcare Improvement's Triple Aim Initiative, it can also have positive implications for patient outcomes, nursing practice, and healthcare systems.

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Appendix A

Demographics Comparison Chart

Age	DNP Project Community	NC
Under age 18	22.4%	21.9%
65 years and older	20.2%	16.7%
Race		
White	55.4%	70.6%
African American	41.4%	22.2%
Hispanic	7.9%	9.8%
Poverty levels	22.1%	13.6%
Median Household Income	\$38,387	\$52,413
Education		
High School Diploma	80.4%	87.4%
Bachelor's Degree or higher	14.5%	30.5%
High School Dropouts	2.8%	2.3%

(United States Census Bureau, 2019)

Appendix B

Literature Review Matrix

Authors	Year Pub	Article Title	Theory	Journal	Purpose and take home message	Design/Analysis/ Level of Evidence	IV DV or Themes concepts and categories
Peetoom, K., Smits, J., Ploun, L., Verbakel, J., Dinant, G., & Cals, J.	2016	Does well-child care education improve consultations and medication management for childhood fever and common infections? A systematic review.	None Stated	<i>BMJ Journals Archives of Disease in Childhood</i>	Education of parents in regards to fever and common childhood infections prior to episode of childhood illness showed potential to improve parental health care seeking and medication management.	Systematic Review of Literature (RCT) Level of Evidence: II	Concept: The effect of providing education in well child clinics prior to episode of illness on parental healthcare seeking behavior and medication management. IV: Education intervention prior to childhood illness DV: "Parental practices of health seeking behavior (frequency of physician consultations, appropriateness of consultations) and medication management" (Peetoom et al., 2016)
Morrison, A., Myrvik, M., Brousseau, D., Hoffmann, R., & Stanley, R.	2013	The relationship between parent health literacy and pediatric emergency department utilization: A systematic review	None Stated	<i>Academics Pediatrics</i>	1) Review of literature pertaining to health literacy of parents in pediatric ED and the relationship between literacy and ED utilization 2) assessed effectiveness of education interventions and reduction in ED utilization (Morrison et al., 2013, p. 422).	Systematic Review of Literature Level of Evidence: II	Concept in 7 articles: Low health literacy(LHL) in parents of pediatric patients in ED. Concept in 4 articles: The relationships between LHL and ED utilization 8 Articles used IV and DV IV: educational intervention (booklets, home visits, courses) DV: outcome of ED use
May, M., Brousseau, D., Nelson, D., Flynn, K., Wolf, M., Lepley, B., & Morrison, A.	2018	Why parents seek care for acute illness in the clinic or the ED: The role of health literacy	None stated	<i>Academic Pediatrics</i>	"To explore the decision to seek care and decision making regarding location of care among parents with low and adequate health literacy" (May, M., Brousseau, D., Nelson, D., Flynn, K., Wolf, M., Lepley, B., & Morrison, A., 2017, p. 289).	Qualitative study with grounded theory approach Level of Evidence: III	Themes of Care Seeking Behavior: seeking answers, seeking reassurance, prompt care, overestimate of severity of illness, perceived good care, beliefs about health care facilities, timely care, identify urgent conditions, trust and rapport with facility, knowledge of health care navigation, first born or children under 2.

Instr. Used	Sample Size	Sample method	Subject Charac.	Comments/critique of the article/methods GAPS
Literature Search with screening by 3 authors only including RCT. Data organized in two main outcome measures of frequency of physician consultation and medication management. Quality assessment performed according to Cochrane risk of bias tool.	Search identified 4512 references, 43 studies meeting criteria for full text review, and 8 studies eligible for data extraction with population sample sizes ranging from 88-999 from total of 3154 individual household members.	Literature search of Medline, Embase, CINAHL, PsycINFO, Cochrane Library, Web of Science	Parents in well child clinics prior to episode of childhood illness.	<p>The authors found that... "educating parents in well child clinics prior to episodes of childhood fever and common infections showed potential to improve parental practices in terms of healthcare-seeking behavior and medication management" (Peetoom et al., 2016).</p> <p>Limitations: Articles published after 1980. Articles excluded that focused on parental self reports, or when education was provided during a childhood illness. Articles could have been overlooked due to choice of keywords. Study restricted to countries with organizational structure of well child clinics. There was a wide range difference in outcome measures in each of the studies.</p> <p>Synthesis: Literature review revealed potential of single or multicomponent education intervention prior to childhood illness could change parent healthcare seeking behavior.</p>
Low Health Literacy measures - REALM and TOFHLA (long and short versions) in 12 studies reviewed. Parent reports, Medicaid/medical/hospital records, hospital database, and chart reviews were used to measure ED use 8 studies.	17 studies were chosen out of 483 that met criteria for review	Literature search of PubMed, CINAHL from studies completed from 1980-2012	Studies reviewed were restricted to studies that used only parents of children 0-18 years of age in the United States as subjects of study. Review articles were excluded.	<p>The authors found that "Roughly 1 in 3 parents in the emergency department with their children have low health literacy. Low health literacy may have a relationship with increased emergency department use in children. Targeted low literacy interventions can reduce emergency department utilization" (Morrison et al., 2013, p. 421).</p> <p>Limitations: Review was limited to United States, limited to the quality and quantity of peer reviewed literature available, and studies varied in sample size, population, and subject recruitment strategies (Morrison et al., 2013, p.427).</p> <p>Synthesis: Providers need to be aware of low health literacy when communicating with parents of pediatric patients and incorporate literacy strategies. Interventions to improve health literacy in parents could have an impact on ED utilization but further research on this subject would be beneficial and valuable (Morrison, et al., 2013, p. 428).</p>
Newest Vital Sign (health literacy screen), Children with Special Health Care Needs questionnaire, & sociodemographic information survey	50 (44 female & 6 males) parents of children ≤ 8 years old seeking care at clinic (20) or emergency department (30)	Convenience sample/Purposive sample of participants	English speaking, parents aged ≥ 18 years old seeking care for nonurgent or sick children ≤ 8 years of age.	<p>The authors found that....."caregiving skills in addition to physician-patient relationships and perception of care seem to influence the behavior of patients managing their child's mild acute illness. These factors might be amenable to a future health literacy intervention." (May et al., 2017, p.289)</p> <p>Limitations: Study was location specific for large urban clinics and hospitals, included only English speaking subjects, and only interviewed 50 subjects. Rural and small city clinics and hospitals with more diverse ethnic subjects may provide different reasons or viewpoints for seeking care in ED or clinics. An additional amount of interviews may also prove beneficial.</p> <p>Synthesis: Data obtained in this study may support the need for parental health literacy interventions that could lead to a reduction in nonurgent ED use.</p>

Drent, A., Brousseau, D., & Morrison, A.	2018	Health information preferences of parents in a pediatric emergency department	Hypothesis: 1) Low health literacy parents would have equal access to media but use media less often. 2) Low health literacy parents would have different preferences than parents with adequate health literacy for educational material about childhood illnesses.	<i>Clinical Pediatrics</i>	Purpose of study was to evaluate preferences for health education material for childhood illness for parents with low health literacy in order to determine preferences in medium, distribution, content, and impact. In addition, this study aimed to discover media access and use in low health literacy parents of children ≤ 8 years old.	Mixed method analysis with descriptive statistics and qualitative interviews Level of Evidence: III	Themes for semi structured interview questions: current media access and use, educational preferences such as educational medium, location of distribution, content, and impact of health information
Buhr, E. & Tannen, A.	2020	Parental health literacy and health knowledge, behaviours and outcomes in children: a cross-sectional survey	None stated	<i>BMC Public Health</i>	Low parental health literacy negatively impact the health and well-being of the children. Parents with low health literacy less likely to meet the preventive and health care needs of their children. Strengthening health knowledge of parents may contribute to improved child outcomes	Cross sectional quantitative study Level of Evidence: V	Theme: parental health literacy, socio-economic status, educational levels, vocational training, current job, and child health behaviors
Donovan, E., Wilcox, C., Patel, S., Hay, A.D., Little, P., & Wilcox, M.	2020	Digital interventions for parents of acutely ill children and their treatment-seeking behaviour: a systematic review	None stated	<i>British Journal of General Practice</i>	Examine evidence of whether digital interventions facilitate parents deciding to seek treatment for acute illnesses or self care. Little evidence to support digital interventions to help parents caring for children with acute illnesses.	A systematic review Level of Evidence: I	Theme: digital interventions to advise parents on seeking care for acute illnesses
Heijmans, M., Waverijn, G., Rademakers, J., Vaart, R., & Rijkens, M.	2015	Functional, communicative and critical health literacy of chronic disease patients and their importance for self-management	none stated	<i>Patient Education and Counseling</i>	Examine the associations between health literacy and self-management	Cross sectional quantitative study Level of Evidence: V	Theme: Low health literacy may contribute to poor self management of chronic disease

Newest Vital Sign (health literacy screen), Children with Special Health Care Needs questionnaire, sociodemographic information survey, & in person semi structured interview	92 recruited-71 completed questionnaires & 30 completed questionnaires and interviews	Convenience sample/Purposive sample of participants	English speaking parents ≥ 18 years old seeking care for acute illness for non distressed ≤ 8 years old child with Emergency Severity Index of 5 in Wisconsin Children's ED during time frame 12/2013-8/2014.	The authors found that...It is likely parents with low health literacy would benefit from a combination of print, internet, or app-based resources for health education and it has potential to reduce the number of nonurgent ED visits (Drent et al., 2018). Limitations: Study was performed in ED setting so findings may not apply to other settings. Some parents had difficulty articulating preferences for preferred educational information and the use of convenience sampling could lead to interpretative limitations of data. Synthesis: The study provides evidence that multiple information resources is preferred by parents and could possibly have an effect on nonurgent ED visits. When developing educational information for the low health literacy population, this study could direct the modes of material development and disbursement of such material.
cross-sectional survey questionnaires including European Health Literacy Survey Questionnaire	4217 parents, 1518 children age 6-10, 2776 children age 11 and older	Convenience Sample, purposeful selection process	parents and children at 28 public elementary and secondary school in two states in Germany, Brandenburg and Hessen	Authors confirmed relationship between low parental health literacy, socio-economic status and some child health behaviors likely to negatively impact their health and well being. Limitations: Sample not representative of the entire country, participants may have faced challenges with responding to the survey, self reporting on health literacy vulnerable to social desirability bias Synthesis: Strengthening health knowledge of parents may contribute to improved child outcomes.
Two studies used Likert scale questions & one study used qualitative analysis of open comments	294, 4456, & 98 in 3 studies, caregivers of children <18 years of age	convenience sampling/ purposive sample	caregivers visiting ED, app users (any age), parents visiting pediatric office	Outcome: Lack of evidence to support using digital interventions to advise parents on when to seek care or self treat at home. Limitations: Literature search may have missed some articles Synthesis: Future research is needed in the development of apps collaborating with intended users making sure of ease of use and effective advice.
self-report questionnaire, 3 health literacy scales incorporated to assess health literacy and self management (PCCHL, PIH, & PEPP1-5)	1341 chronic disease patients	nationwide random sampling of chronic disease patients from general practices	Patients >15 with chronic disease, not institutionalized, not terminally ill, and mentally able to participate	Outcome: communicative and critical health literacy play a role in successful self management of chronic disease Limitations: Questionnaires filled out at home so possibility of assistance in completing questionnaire. Also, some patients were ill for a long time which could influence the level of health literacy. Synthesis: Health literacy skills are important for some aspects of self management, but context is important as well.

Ladley, A., Hieger, A.W., Arthur, J. & Broom, M.	2018	Educational text messages decreased emergency department utilization among infant caregivers: A randomized trial	Text messages to caregivers of infants can reduce nonurgent ED visits	<i>Academic Pediatrics</i>	To determine if text messages to infant caregivers can reduce nonurgent visits to ED and if text message are feasible and effective.	Randomized Trial study Level of Evidence: I	IV: text messages DV: visits to ED
Lepley, B.E., Brousseau, D.C., May, M. F., & Morrison, A. K.	2019	Randomized controlled trial of acute illness educational intervention in the pediatric emergency department	mHealth app would be preferred by parents as an educational intervention to help care for child compared to written materials	<i>Pediatric Emergency Care</i>	To determine feasibility, demand, acceptability, and usefulness of mobile app compared to written material	Randomized Trial study Level of Evidence: I	Theme: educational resources to improve health literacy of pediatric caregivers
Ohns, M.J.	2019	Identifying the preferred method to educate low income caregivers about common childhood illnesses: A step toward health literacy through a focus group study		<i>Journal of Pediatric Nursing</i>	To discover the preferred method of educational resource for low income caregivers in regards to common childhood illnesses	Qualitative research focus group study Level of Evidence III	Themes discovered in qualitative analysis: access of information and comprehensiveness of information
Paterick, T., Patel, N., Tajik, J., & Chandrasekaran, K.	2017	Improving health outcomes through patient education and partnerships with patients	none stated	<i>Baylor University Medical</i>	Physicians and patients form a partnership where the physician provides information and educating and the patient accepts and acts on the information. The partnership improves shared decision making.	Expert opinion Level of Evidence V	Theme: improved physician-patient relationship can lead to improved health outcomes
Meyers, N., Glick, A., Mendelsohn, A., Parker, R., Sanders, L., Wolf, M., Bailey, S., Dreyer, B., Velazquez, J., & Yin, S.	2020	Parents use of technologies for health management: A health literacy perspective		<i>Academic Pediatrics</i>	to examine how health literacy affects internet and cell phone usage for health management	Cross sectional analysis Level of Evidence V	Theme: technology as a form of communication and education

Newest Vital sign to assess health literacy,	231 caregivers of infants	Convenience sample at pediatric office	n=231 (84.2%- racial or ethnic minorities, 69.7% yearly income <2\$20,000, 70.4% low health literacy)	Outcome: Educational text messages is effective is reducing nonurgent visits to ED Limitations: Results could be swayed due to text messages may have improved relationship between caregiver and pediatric office and this relationship improvement could steer the caregiver to seek care at the office instead of the ED, not necessarily the information provided caused the reduction Synthesis: RCT established the benefits of text messages to caregivers to reduce ED visits and thereby reducing healthcare costs and improves continuity of care
Newest Vital Sign to assess health literacy, 5-point Likert scale, additional qualitative comments health book with video, mHealth app, car seat safety video and handout, and combination of book and app	98 parents of children <12 years of age	convenience sampling at ED	English speaking caregivers of children <12 years of age that visited ED from June 4, 2014- July 2, 2014 with nonurgent complaint	Outcome: low demand for mHealth app with parents that used the book and giving written information to pediatric caregivers has ability to empower parents with knowledge and reduce nonurgent visits to ED Limitations: no Spanish speaking population, inability to download the app due to internet problems within the facility, possibility that too much information on app can be overwhelming, app had medical jargon and complex sentences, Synthesis: Only 1 in 3 parents chose to download the app, a low health literacy book was preferred by parents compared to mHealth app. Parents found the book more understandable. Providing written health information with video has capacity to improve knowledge to care for sick child and potentially decreases nonurgent ED use
Newest vital signs-health literacy screening tool, ranking of preferred educational resource	30 participants either expecting first child or parent of at least one child	Convenience/purposive sample/recruited from WIC services and a prenatal health education program for low income pregnant women	Individuals with low income and at least one child <10 years of age or expecting first child	Outcome: Preferred method of educational resource was KidsDoc mobile app with comments about ease of access and amount of information. Limitations: small sample size, possible bias from PI Synthesis: Although the reasons for nonurgent ED use is multifactorial, low health literacy is one factor. The benefits of determining preferred educational resource could help to improve health literacy of this vulnerable population and decrease health care cost and improve continuity of care.
no instrument used	none	none	none	Article of opinion discussing physician-patient relationship and how with improved health literacy by physician teaching could lead to improved shared decision making and patient engagement
Newest vital sign to measure health literacy, questionnaire and interview	858	convenience sample from 3 urban pediatric clinics	English and Spanish speaking parents of children < 8 years of age recruited from 3 urban pediatric clinics excluding vision or hearing impairments or parents seeking care for children with urgent issues.	Outcome: Higher health literacy, higher income, and English speaking participants were associated with greater use of internet and cell phones. There is an overall desire to use internet and cell phone as modalities of communication and education even among low health literate participants. Limitations: Self reported responses might not reflect actual usage of technologies, findings might not be generalized to the population due to sampling, and limited number of questions pertaining to technology usage Synthesis: Although the current usage of technology is higher in the higher health literacy group, there is a desire regardless of health literacy to use the cell phone and internet for health management. Continued studies of trends and preferences are needed to avoid further disparities in healthcare.

Appendix D

SMART Objectives, Interventions, and Outcome Measures

SMART Objectives	Intervention	Outcome Measure
By the end of the 2-month period from start of project, the proportion of participants that report they used the app or website often or always to seek childhood illness information during their child's illness or injury will be 50%.	Introduction to internet software (mobile app or website) to pediatric caregivers in emergency department in rural NC hospital	Utilization of app or website to seek information about childhood illness
By end of the 2-month period from start of project, proportion of participants that report they strongly agree or agree they learned at least two facts about childhood illnesses from app or website will be 25%.	Utilization of app or website to learn about childhood illnesses	Learned at least two facts about childhood illnesses from app or website
By the end of the 2-month period from start of project, proportion of participants that report they strongly agree or agree they learned at least one first aid technique during their child's injury from app or website will be 25%.	Utilization of app or website to get first aid advice during their child's injury.	Learned at least one first aid technique from the app or website.

Appendix E

Telephone Follow-up Survey

Survey Questions	Available Answers			
Please answer what best describes your experience with the health literacy project.				
How many childhood illnesses or injuries did your child experience during the last 4 weeks (or 8 weeks)?	0	1	2	3 or more
Did you use the educational resource to look up health information?	Never	Rarely	Often	Always
I learned at least two facts about childhood illnesses while using the educational resource.	Strongly Disagree	Disagree	Agree	Strongly Agree
I learned at least one first aid technique while using the educational resource.	Strongly Disagree	Disagree	Agree	Strongly Agree
Using the educational resource assisted me in deciding what level of care to seek during my child's illness or injury.	Strongly Disagree	Disagree	Agree	Strongly Agree
Additional Comments or Suggestions:				

Appendix F
Code Sheet

	A	B	C
1	Code Sheet		
2	Identifier	Name	Phone Number
3			
4			
5			

Appendix H

Script for Presentation of Educational Tools

Hello, my name is Sissie Combs, and I am a student at East Carolina University in the Nurse Practitioner program. I am doing a project for the hospital to improve the health literacy of parents and caregivers of children under the age of 17. Do you have any children in that age category?

Answer: No

Well, I am sorry you are here, but I hope you get to feeling better. Thank you for your time.

Answer: Yes

I would like to tell you about the project and see if you are interested in participating. Is that ok?

Answer: No

Well, I am sorry you are here, but I hope you get to feeling better. Thank you for your time.

Answer: Yes

The American Academy of Pediatrics has developed an App and website tool to help you when your child is sick or injured. So many people are turning to google searches looking for information, and the Academy wanted to provide a reliable resource for parents, so they developed this app. The app is called KidsDoc Symptom Checker. You can get it on your phone if you have an iPhone or Android, or you can access it on a tablet or computer when you have internet access. I would like to demonstrate what this tool can do and how you can use it when your child is sick or injured. Do you have an iPhone or Android?

Answer: Yes

(Proceed to the app and demonstrate how to use it using ear pain as the symptom)

Answer: No

Do you have internet access in your home and a device to use such as a tablet or computer?

Answer: Yes

(Proceed to the website and demonstrate how to use it using ear pain as the symptom)

Answer: No

In that case, I would like to show you a book by the same doctor that designed the app. (Provide the book and demonstrate how to look up ear pain as a symptom)

(After demonstrating the app, website, or book, proceed to recruitment)

Now that you have seen the resource, would you be interested in participating in the project and receiving (a coupon for the app, OR instructions to access the website, OR the book)? If you are willing to participate in the project, I will need for you to complete a participant form that will include you providing your first name and phone number. I will provide you free of charge (a coupon code for the app, OR instructions for accessing the website, OR a book). In one month, I will call you to see if you have used the resource and ask you about 6 questions concerning the resource. And then you will get another phone call after two months with the same questions. The app has no expiration, and you can use it as long as you like, OR the website is available as long as HealthyChildren.org is working, OR the book is yours to keep. The telephone call will be short and at your convenience. I will only need your first name and phone number; no other private information will be needed. Are you interested in participating?

Answer: No

Ok, well, thank you for your time and I hope you get to feeling better.

Answer: Yes

Wonderful, I will get the participation form for you to complete as well as (the coupon code so we can download the app, OR the instructions for the website, OR the book for you).

(Provide resource: help to download app, OR give Navigational instructions handout, OR the book)

I look forward to talking with you on the phone to see how things are going with the resource. I hope it provides you with information that you find is helpful. So, I will call you in a month, when is the best time to call? (Write down on the participation form)

Thank you for your participation and enjoy the resource!

Appendix I
Participation Form

You are being invited to participate in a Health Literacy Improvement Project. The purpose of this project is to improve the health literacy of pediatric caregivers with the use of a reliable educational resource (a mobile app or web-based interactive tool designed by the American Academy of Pediatrics or an educational book). This project is led by Yvette Combs, a DNP student at East Carolina University.

You will be provided an educational resource focused on childhood illnesses and injuries in your preferred language. You will be contacted twice via telephone by the project lead to answer survey questions about the educational tool provided to you after four and eight weeks of participation.

You must be 18 years or older to participate, speak either English or Spanish, and provide care for an individual under the age of 17. No identifying private data will be needed except for your first name and telephone number.

You have the right to refuse participation or withdraw participation at any time during this project. Your acceptance or rejection of participation will in no way affect your provision of care during this healthcare visit. If you would like to participate in this DNP project, please provide your name and telephone number in the space provided.

First Name: _____

Date: _____ **Telephone Number:** _____

Best Time to Call: _____

Appendix J

Instructions for KidsDoc Symptom Checker

1. Go to HealthyChildren.org on your device's browser
2. Click on Tips & Tools
3. Scroll down to KidsDoc Symptom Checker and click on "View"
4. If you would like to view in the Spanish language, click on "en Espanol" icon at the right lower part of your screen
5. Once you are in the KidsDoc Symptom Checker, you can search for a child's illness or injury by clicking on the body part or use the A-Z index.
6. Once you have the symptom selected, you have options to view the "definition" of the illness or injury, "when to call" your pediatrician for care, or "care advice" for suggestions for first aid or home treatments

Instrucciones para KidsDoc Control de síntomas

1. Ve a HealthyChildren.org en el navegador de tu dispositivo
2. Haga clic en Consejos y herramientas
3. Desplácese hacia abajo hasta KidsDoc Symptom Checker y haga clic en "Ver"
4. Si desea ver en el idioma español, haga clic en el icono "en Español" en la parte inferior derecha de la pantalla
5. Una vez que esté en el Comprobador de síntomas KidsDoc, puede buscar la enfermedad o lesión del niño haciendo clic en la parte del cuerpo o utilizando el índice A-Z.
6. Una vez que haya seleccionado el síntoma, tiene opciones para ver la "definición" de la enfermedad o lesión, "cuándo llamar" a su pediatra para la atención, o "consejos de cuidado" para sugerencias de primeros auxilios o tratamientos en el hogar

Appendix K**Script for Follow-up Telephone Interview**

Hello, my name is Sissie Combs, and I am the ECU student that talked with you at the emergency department (4weeks ago OR 8 weeks ago). You provided your phone number so I could call you to ask about the educational resource you received. Do you have time to talk with me, or should I call you back at another time that is best for you?

Answer: No. I don't have time.

I understand. When would be a better time to connect with you? Answer: _____ Wonderful, I will call you back (time specified) (make notes regarding call back date and time)

Answer: I no longer want to participate

OK, I apologize for any inconvenience, and thank you for allowing UNC Lenoir to serve you and your healthcare needs.

Answer: Yes

I understand you received the (mobile app download OR website instructions OR the book) during our last conversation. I have 5 survey questions I would like to ask you. Is that OK?

Answer: No

Have you decided not to participate in the survey?

Answer: Yes

Ok, I apologize for any inconvenience, and thank you for allowing UNC Lenoir to serve you and your healthcare needs.

Answer: Yes

Great. Thank you for your time.

My first survey question is....

How many childhood illnesses or injuries did your child experience since you received the (mobile app OR website instructions OR book)? 0, 1, 2, or 3 or more

The next survey question asks you to choose between never, rarely, often, and always.

Did you use the (mobile app OR website instructions OR book) to look up health information? So you can choose between never, meaning you did not use the (mobile app OR website instructions OR book), rarely, meaning you used it but rarely, often meaning you used often, or always meaning you used it every time your child was experiencing a childhood illness symptom.

The next three questions ask you to choose if you agree, strongly agree, disagree, or strongly disagree with the statements I provide.

The first statement is, “I learned at least two facts about childhood illnesses while using the educational resource.” Would you say you strongly agree, agree, disagree, or strongly disagree with that statement?

The second statement is, “I learned at least one first aid technique while using the educational resource. Would you say you strongly agree, agree, disagree, or strongly disagree with that statement?

The third statement is, “Using the educational resource assisted me in deciding what level of care to seek during my child’s illness or injury.” Would you say you strongly agree, agree, disagree, or strongly disagree with that statement?

OK, that completes the survey, but do you have any additional comments about the (mobile app OR website instructions OR book) or your experience with the (mobile app OR website instructions OR book)?

Thank you for participating in the survey.

First Interview: *Is it ok to call you again in 4 weeks to complete the survey again?*

Answer: Yes

Well, I will look forward to our next conversation. Have a great day!

Answer: No

Thank you for your time and participation in my project.

Second Interview: *Thank you for participating in the survey. I hope you enjoy the (mobile app OR website instructions OR book).*

Appendix L

Timeline for Project Implementation

Project Implementation	January 19, 2021
Participation Recruitment	January 19 – February 17, 2021
PDSA Rapid Cycle	January 22, 2021
Project Champion Meeting-Face to Face Agenda: Data Collection	February 2, 2021
Project Champion Meeting -Face to Face Agenda: Recruitment Completion	February 17, 2021
1st round of Telephone Interviews Data Collection	Feb 23 – March 17, 2021 (4 weeks after recruitment for each participant)
PSDA Rapid Cycle	Feb 24, 2021
Project Champion Meeting-Face to Face Agenda: 1 st Round of Interview Progress	March 2, 2021
Project Champion Meeting-Face to Face Agenda: 1 st Round of Interview Completion	March 17, 2021
2nd Round of Telephone Interviews Data Collection	March 19 – April 14, 2021 (8 weeks after recruitment for each participant)
Project Champion Meeting-Face to Face Agenda: 2 nd Round Interview Progress	March 30, 2021
Project Champion Meeting-Face to Face Agenda: 2 nd Round Interview Completion	April 13, 2021
Data Analysis and Reporting	April 12 – April 22, 2021
Project Champion Meeting to share Results	April 26, 2021

Appendix M**DNP Project Timeline**

Appendix N

Recruitment Data

	Patients in Green Zone	Met Criteria	Presented Project	Accepted Participation	Rejected Participation	English	Spanish	Mobile App	Website	Book
Totals	229	80	76	75	1	73	2	72*	2	6

*Participants that could not download mobile app while in the ED were supplied a download code and an additional educational resource.

Appendix O

Number of Illnesses Reported in Telephone Survey

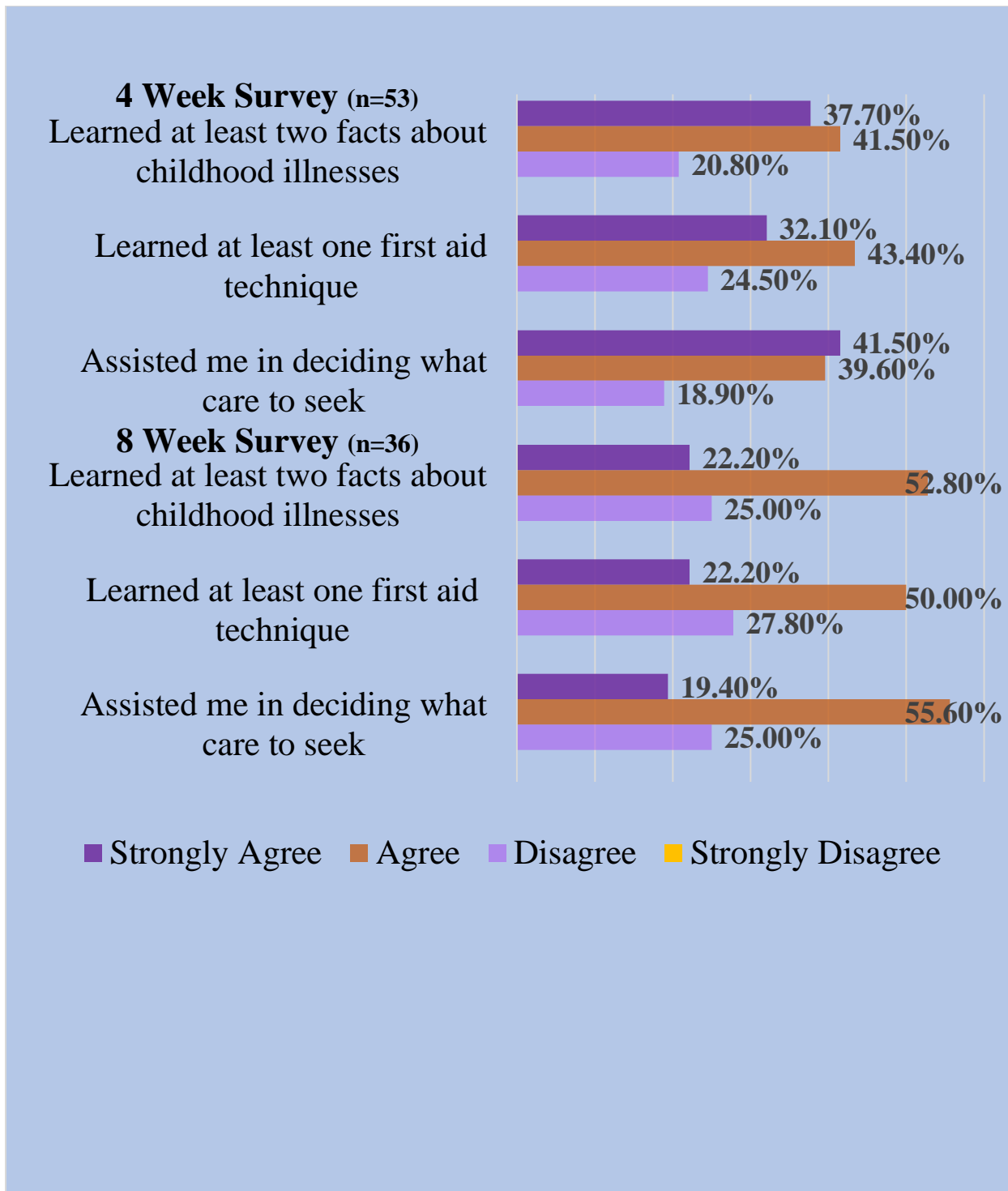
Number of Illnesses Reported in Telephone Survey				
# of illnesses	Four Weeks		Eight Weeks	
	Frequency	%	Frequency	%
0	35	66.0	29	80.6
1	11	20.8	6	16.7
2	5	9.4	1	2.8
3	1	1.9	0	0
4	1	1.9	0	0
Totals	n=53		n=36	
	22 of the 75 participants did not respond to the first follow up call		17 of the 53 participants did not respond to the second follow up call	

Appendix P
Educational Tool Usage

Educational Tool Usage				
Likert Scale	Four Weeks		Eight Weeks	
Did you use the educational resource to look up health information?	Frequency	%	Frequency	%
Always	2	3.8	1	2.8
Often	26	49.1	13	36.1
Rarely	14	26.4	14	38.9
Never	11	20.8	8	22.2
Totals	n=53		n=36	

Appendix Q

Telephone Survey Results



Appendix R

Comparison of SMART Objectives and Results

Comparison of SMART Objectives and Results		
	Four Weeks n=53	Eight Weeks n=36
By the end of the 2-month period from start of project, the proportion of participants that report they used the app or website often or always to seek childhood illness information during their child's illness or injury will be 50%.	52.9% 2.9% above goal	38.9% 11.1% below goal
By end of the 2-month period from start of project, proportion of participants that report they strongly agree or agree they learned at least two facts about childhood illnesses from app or website will be 25%.	79.2% 54.2% above goal	75% 50% above goal
By the end of the 2-month period from start of project, proportion of participants that report they strongly agree or agree they learned at least one first aid technique during their child's injury from app or website will be 25%.	75.5% 50% above goal	72.2% 47% above goal
<u>Additional Survey Statement</u>		
Proportion of participants that report they strongly agree or agree the educational resource assisted them in deciding what level of care to seek during a childhood illness or injury.	81%	77%

Appendix S
DNP Project Budget

Electronic Supplies			
Ipad	1	\$329	\$329.00
Taxes for Ipad			\$23.03
Apple Support and Damage Care	1	\$69.00	\$69.00
Ipad Case	1	\$62.96	\$62.96
Taxes for case			\$4.41
Office Supplies			
Paper	2	\$4.00	\$8.00
Printing	100	\$0.10	\$10.00
Educational Resources			
KidsDoc App Coupons	50	0 (Donated by Self Care, Inc)	\$0.00
English book (<i>My Child is Sick</i>)	25	\$10.17	\$254.25
Spanish Book (<i>Que Hacer Cuando Su Nino Se Enferme</i>)	10	\$8.99	\$89.90
Shipping			\$25.42
Taxes			\$17.16
TOTAL			\$893.13

Appendix T

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>	<ul style="list-style-type: none"> • Developed the health literacy improvement DNP project. • Searched literature for evidence based practice regarding technology and its use for health literacy education. • Developed a DNP project that furthered the objectives of Healthy People 2010, 2020, and 2030. • Developed a new approach to improve health literacy with the use of technology.
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>	<ul style="list-style-type: none"> • Analyzed literature to determine best practice in health literacy improvement, for example, the teach-back method. • Assumed responsibility for the DNP project, researched the evidenced based interventions, and analyzed the DNP project for ethical concerns. • Evaluated project using measurement tools to monitor the outcome. • Discussed the quality improvement with organization’s administration. • Evaluated costs and benefits of the project by comparing the current costs of a non-urgent ED visit and the costs of a primary care visit. • The DNP project strived to meet the three arms of the Triple Aim. • Developed a budget for the DNP project taking in account all costs associated with implementation. • Introduced the mobile app to improve health literacy of pediatric caregivers. • Wrote a scholarly paper using APA format and relaying the information to the organization’s leadership. • Reviewed the CITI modules, provided alternatives for participants without internet access or smartphones, and used an interpreter for the Spanish speaking population.

<p>Essential III <i>Clinical Scholarship & Analytical Methods for Evidence-Based Practice</i></p>	<p>Competency - Critically analyzes literature to determine best practices Competency - Implements evaluation processes to measure process and patient outcomes Competency - Designs and implements quality improvement strategies to promote safety, efficiency, and equitable quality care for patients Competency - Applies knowledge to develop practice guidelines Competency - Uses informatics to identify, analyze, and predict best practice and patient outcomes Competency - Collaborate in research and disseminate findings</p>	<ul style="list-style-type: none"> • Critically analyzed literature to determine best practices in improving health literacy. • Compared SMART objectives with project findings. • Designed and implemented a health literacy improvement strategy that was safe, efficient, and equitable. • Applied knowledge to develop a DNP project that could lead to a change in practice guidelines by standardizing the discharge process to include a demonstration of the mobile app. • Used informatics to identify and analyze patient flow and the number of pediatric clients with acuity levels 4 & 5 that could be impacted with the health literacy intervention. • Collaborated with ED Nursing Director, Faculty mentor, Chief Nursing Officer, ED Medical Director, and local Pediatrician. • Disseminated the findings to nursing and pediatric organizations as well as the stakeholders.
<p>Essential IV <i>Information Systems – Technology & Patient Care Technology for the Improvement & Transformation of Health Care</i></p>	<p>Competency - Design/select and utilize software to analyze practice and consumer information systems that can improve the delivery & quality of care Competency - Analyze and operationalize patient care technologies Competency - Evaluate technology regarding ethics, efficiency and accuracy Competency - Evaluates systems of care using health information technologies</p>	<ul style="list-style-type: none"> • Selected and utilized software such as SPSS to analyze data collected from DNP project in order to improve delivery and quality of care. • Utilized Excel software to data track the recruitment and survey results. • Selected a reliable health information mobile app to present to participants to improve health literacy. • Evaluated technology selected to assess if efficient, ethical, and accurate. The mobile app was downloaded in both English and Spanish language. • Analyzed data for a period of a month to establish an average number of pediatric client visits and the costs associated with these visits.
	<p>Description</p>	<p>• Demonstration of Knowledge</p>
<p>Essential V <i>Health Care Policy of Advocacy in Health Care</i></p>	<p>Competency- Analyzes health policy from the perspective of patients, nursing and other stakeholders Competency – Provides leadership in developing and implementing health policy Competency –Influences policymakers, formally and informally, in local and global settings Competency – Educates stakeholders regarding policy</p>	<ul style="list-style-type: none"> • Analyzed health policy from the perspective of patients such as the “whys” associated with ED visits for non-acute illnesses. • Analyzed the health policy regarding long wait times in the ED

	<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>and the effects on nurses and stakeholders within the organization.</p> <ul style="list-style-type: none"> • Provided leadership when recommending a policy (standardizing discharge process) to decrease the amount of non-urgent visits to the ED by improving health literacy. • Provided evidence of a strategy to improve health literacy. Healthy People 2030’s objective to improve the health literacy of the population is seeking evidence for strategies to improve health literacy. • Educated stakeholders regarding the findings and proposed sustainability by including mobile app demonstration at discharge and posting signage advertising the mobile app. • Advocated for nursing within the policy arena by proposing an intervention designed by an APRN that can improve health literacy. • Participated in project that led to a health literacy improvement strategy that could reduce cost and improve the health care delivery in the ED. • Addressed the gaps associated with limited health literacy in a rural underserved population.
<p>Essential VI <i>Interprofessional Collaboration for Improving Patient & Population Health Outcomes</i></p>	<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>	<ul style="list-style-type: none"> • Used effective collaboration and communication to develop and implement a DNP project to improve health literacy of pediatric caregivers. • Provided leadership in the green zone to nursing staff while implementing DNP project. • Consulted with organization’s leaders, local pediatrician, and ED medical director to develop health literacy improvement intervention in the green zone of a busy ED in a rural community. • Collaborated with interpreters to communicate with the Spanish population. • Prepared abstract of project for submission for dissemination to influence practice, policy, standards of care, and scholarship.
<p>Essential VII <i>Clinical Prevention &</i></p>	<p>Competency- Integrates epidemiology, biostatistics, and data to facilitate individual and population health care delivery</p>	<ul style="list-style-type: none"> • Performed the community assessment for the DNP project and identified a practice issue based on

<p><i>Population Health for Improving the Nation's Health</i></p>	<p>Competency – Synthesizes information & cultural competency to develop & use health promotion/disease prevention strategies to address gaps in care Competency – Evaluates and implements change strategies of models of health care delivery to improve quality and address diversity</p>	<p>research and considered national goal and objectives set forth in Healthy People 2010, 2020, and 2030.</p> <ul style="list-style-type: none"> • Synthesized information & cultural competency to develop & use health promotion when addressing the gaps of care associated with limited health literacy. • Evaluated and implemented a change strategy by addressing the limited health literacy using a mobile app to improve health literacy that is available to a diverse population.
<p>Essential VIII <i>Advanced Nursing Practice</i></p>	<p>Competency- Melds diversity & cultural sensitivity to conduct systematic assessment of health parameters in varied settings Competency – Design, implement & evaluate nursing interventions to promote quality Competency – Develop & maintain patient relationships Competency –Demonstrate advanced clinical judgment and systematic thoughts to improve patient outcomes Competency – Mentor and support fellow nurses Competency- Provide support for individuals and systems experiencing change and transitions Competency –Use systems analysis to evaluate practice efficiency, care delivery, fiscal responsibility, ethical responsibility, and quality outcomes measures</p>	<ul style="list-style-type: none"> • Conducted systematic assessments of limited health literacy within the African American community and Spanish speaking population. • Designed, implemented, and evaluated the nursing intervention to improve health literacy by providing a reliable health information mobile app to participants with measurable outcomes. • Developed patient relationships by interacting with the patients during the presentation of the project and maintained that relationship with follow up telephone surveys. • Demonstrated advanced clinical judgment and systematic thought in order to improve health literacy to improve patient outcomes. • Mentored and supported fellow nurses by conducting peer reviews of their DNP project, interacted with fellow nurses during immersion, and participated in social media groups. • Provided support for individuals and systems experiencing change and transitions while implementing the project. • Used system analysis (PDSA model) to evaluate practice efficiency, care delivery, fiscal responsibility, ethical responsibility, and quality outcomes measures during the implementing and evaluation stage of the DNP project.