Increasing Health Literacy of Parents of Children 0 to 5 Regarding Oral Health and Immunizations

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Dedication

I dedicate this work to my beloved dad, Ryszard Kups, and my daughter, Jada. Dad, as you look down from heaven, I hope you are proud of your “little girl.” Jada, you met every struggle of this journey with grace, love, and understanding. You are my inspiration and strength. I love you.

Abstract

Health literacy is the ability of an individual to find, communicate, process, and understand basic health information and services. Limited health literacy is linked with lower health outcomes, increased hospitalization rates, decreased use of preventative services, poor health management, and higher costs. According to the Centers for Disease Control and Prevention (CDC) (2021), only 12 percent of adults in the United States, who make health decisions for themselves and their families, including children, have proficient health literacy. These statistics suggest that most of the population may have trouble understanding medical instructions, filling out complex health forms, managing chronic medical conditions, or making educated health decisions for themselves and family members. Vaccines and oral health are fundamental aspects of healthy development in children and can significantly improve children's well-being. Reducing the rate of infectious diseases and improving oral health is cost-effective, promotes health, and reduces morbidity and mortality in children.

The DNP project was developed to improve health literacy about immunizations and oral care among parents of children ages zero (birth) to five years old by implementing QR codes printed on books provided to families by the Reach Out and Read organization from November 2020 through April 2021. Parents could scan the code and obtain information about immunizations and oral care appropriate for their children's age. The project confirms that QR codes can be a simple tool used to help increase parental literacy.

Keywords: health literacy, QR codes, oral health, immunizations, education, children, social media, internet, health promotion

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Section I. Introduction

Background

Health literacy is an essential element of health care delivery that significantly impacts patients' health outcomes. Patients need to understand health-related information to use it appropriately and comply with providers' recommendations. Patients tend to comply better with prevention measures and treatments when they know why they have to do it. Yet, data suggest that there are still gaps, and health literacy requires improvements. Reach out and Read is a nonprofit organization supported by the American Academy of Pediatrics. Based on research, the organization believes that reading books to children starting at birth can positively improve children's development. The organization's vision is to create a world where reading becomes a part of every child's life. Reach Out and Read was founded in 1989, and it not only encourages to read but also supplies families with books. The organization serves children and families in fifty states in the United States. The organization hopes to use books to create the opportunity for parents and children to spend time together while reading, which promotes brain development and expands language acquisition (Reach Out and Read, 2020). The organization believes that their books could also have a positive impact on improving parents' health literacy.

Organizational Needs Statement

The Reach Out and Read organization recognizes the need to enhance parents' health literacy about important health topics, such as immunizations and children's oral health, which can significantly impact a child's health and development. According to the CDC (2015), about twenty-three percent of children between 2 and 5 years old have caries in their primary teeth.

The World Health Organization (WHO, 2019) reports that immunizations prevent death in approximately two to three million children worldwide. In the United States, the rate of children who received vaccinations has increased; however, there are still many children who do not receive them.

The Center for Health Care Strategies (CHCS) (2013) defines health literacy as a skill needed for individuals to receive, process, and comprehend necessary health-related information and services to the degree that allows them to make educated decisions about health or medical treatment. Parents with a low level of health literacy may not understand given instructions and educational information needed to make appropriate choices for their children, negatively affecting children's health and negatively affecting children's development.

According to Healthy People (2020), adequate health literacy can improve patients' autonomy by increasing the capability of taking responsibility for their health and identify it as a critical issue in the health and health care domain in the United States. According to CHCS (2013), people with low health literacy experience four times higher health care costs, six percent more hospital visits, and two days longer hospital stays when compared with individuals with proficient health care literacy.

Vaccines and oral health are fundamental aspects of healthy development in children and can significantly improve children's well-being. Reducing the rate of infectious diseases and improving oral health is cost-effective, promotes health, and reduces morbidity and mortality in children. Therefore, it is pivotal to educate parents about the benefits of vaccines and appropriate for age oral health.

Immunizations and appropriate oral care are excellent preventative services that improve children's physical and mental health, which are some of the leading health indicators listed by

Health People 2020 (Centers for Disease Control and Prevention, 2020). They also prevent adverse childhood experiences and increase life expectancy, the health indicators by Healthy North Carolina 2030 (North Carolina Institute of Medicine [NCIM], 2020).

Improving health care literacy about immunizations and oral care relates to the three aspects of the Triple Aim. Its goal is to make patients' lives better and improve their well-being. The Triple Aim promotes enhancements to populations' health, improvements in care experience for individuals, and providing cost-effective care (The Institute for Healthcare Improvement, 2020).

The DNP project can improve the population's health through education (The Center for Health Care Strategies, 2013) and the promotion of healthy behaviors from a very young age. Research shows that immunizations and proper oral care are playing a significant role in improving children's health. The project enhances the experience of care for individuals due to education and improved health literacy. Parents become more knowledgeable about what to expect and what is needed for their children to grow healthier and can make educated decisions about their children's health. Parents will feel empowered by receiving patient-centered care. The project may help reduce healthcare costs by educating parents and improving their health literacy, leading to better health choices and behaviors. Health promotion and prevention significantly lower health costs and improve wellness (The Institute for Healthcare Improvement [IHI], 2020).

Problem Statement

Low levels of parents' health literacy about immunizations and oral care in children of age birth to five years old can negatively affect children's well-being and appropriate

development. In addition, a lack of parents' knowledge and gaps in their health literacy affects decisions made by parents and children's health outcomes.

Purpose Statement

The purpose of the DNP project is to improve health literacy about immunizations and oral care among parents of children in the age range from birth to five years old by implementing QR codes printed on books provided to families by the Reach Out and Read organization. Parents can scan the code and obtain information about immunizations and oral care appropriate for their children's age.

Section II. Evidence

Literature Review

The search of databases PubMed and CINAHL databases in July 2020 provided 348 articles addressing health literacy. However, there is not much research done about QR codes and health promotion; I found only two items. PubMed and CINAHL were searched for peer-reviewed original research published within the last five years before July 2020 and minimum level IV of evidence. The search strategy included: a combination of MeSH terms and keyword searches, such as health literacy, children, parents, social media, internet, immunization, health literacy or patient education or health education AND parents or caregivers or mother or father AND intervention or strategies, health literacy AND social media, health literacy AND QR codes, health promotion AND interventions or strategies or best practices AND technology or social media or cell phones or internet, health literacy AND parents AND interventions, health literacy AND parents AND social media OR internet. The search was limited to articles published in the last five years, written in the English language, full text. Two searches had additional limitations for pediatric patients and children 0-5 years of age. Excluded articles did

not relate to a clinical question; see Appendix A. After determining article inclusion, I reviewed and read selected research papers and entered them into the literature matrix table. I included a total of 18 research articles that, in my opinion, will support the project. All of them are Level IV and above evidence; see Appendix B.

Current State of Knowledge

Health literacy is an ongoing problem in today's healthcare. Health literacy is the ability of patients to understand and comply with given instructions or read them (CDC, 2021). Still, it is also access to care and empowerment to take care of oneself or family. Yet, current data suggests that we still have so many health care disparities, and many of them are effects of low health literacy.

Current data suggest that many national health care organizations have recognized the issue of low health literacy levels in the United States. All agree that health literacy is a critical component of good, patient-centered, cost-effective care that requires improvements. After all, how can we expect patients to comply with given instructions and have a positive- desired health outcome when they do not understand what they must do or have no available resources.

Health care organizations are developing and implementing many interventions that could improve patients' health literacy. Health care providers participate in programs and classes that enhance their communication skills and create awareness of health literacy issues. Health care organizations implemented electronic health records, which help providers to provide educational materials to patients written in a simple, easy-to-understand language, often supplied with pictures. The instructional materials are also available in different languages to populations that do not speak English well and prefer to communicate in the native language. Health care organizations require to use translators' services for individuals who do not speak English to

improve patients' care and avoid miscommunication. Research suggests that the teach-back method is a very successful way to improve patients' literacy and ability to comply with treatment.

Technology and its continuous advancements seem to create a sea of opportunities for patients' education and health promotion, even though there may not be much research done yet.

Current Approaches to Solving Population Problem(s)

Health literacy is crucial for the pediatric population. Children, especially young, cannot take care of themselves and rely on their parents and caregivers. Parents and caregivers are the ones who make most health decisions for their children, and it is pivotal to improve their health literacy and enable them to make educated decisions. Health literacy promotion can start from an early age. Reach Out and Read organization promotes reading books as a tool that can enhance literacy in children and parents. Needlman et al. (2018), in their study, reports that parents who were reading books to children aloud were concerned about their reading skills but expressed a desire to learn more about them. The majority of parents stated that the experience of reading books to their children was more memorable and motivated parents to improve their skills in this area. Based on the study, we can see that the joy of reading books together can not only promote literacy but creates an excellent opportunity to educate parents about their children's health.

We live in times when technology is booming. Technology and electronic devices became an indispensable part of our lives. The research may be limited, and there is not enough information that would specifically target parents and young pediatric patients. Still, technology is a promising tool to improve parents' health literacy. Most health care organizations are using electronic medical records, and many utilize technology to communicate with patients. QR (Quick Response) codes are an excellent example of how our practices are changing and how

technology can provide other new ways to improve patients' outcomes. Patients engage with their mobile phones most of their time. They are checking email, or social media, or looking for information. QR codes could be an innovative way to provide parents with health information found on a book given to a child by a provider during a well-check visit. In his study, Hayes (2017) implemented QR codes for patient education about back pain, smoking cessation, URI, and other common health issues. He printed the QR codes and hung them in the patient's waiting room in a primary clinic office. He reports positive feedback from staff and patients about the innovation.

Evidence to Support the Intervention

In this project, we want to combine the benefits of reading books and technology. We want to take advantage of QR codes as a very innovative way to access health information. Using QR codes can be exciting for parents and children. Books and QR codes present an excellent opportunity to access health information and improve parents' health literacy. They provide a good source of information that can be obtained at any place and at any time. Research suggests a great need to improve parents' health literacy, and technology may be an excellent opportunity to execute it.

In the study, Keim – Malpass et al. (2015) identify the importance of health literacy and recommend including the concept as a critical component for future research improving health outcomes for children and families. A systematic review performed by Curran et al. (2019) confirms that appropriate health education and improved health literacy of parents have positive effects and improves children's health outcomes.

In their study, Forshaw et al. (2017) found that increased maternal education increased vaccination completion. The meta-analysis disclosed that children of mothers with secondary

school education received a complete set of vaccinations 2.31 (95% CI 1.90-2.79). The study results suggest that parents' education plays a role in the health outcomes of children.

In a cross-sectional analysis of data collection, as part of a randomized controlled experiment, authors discovered health literacy disparities in parents who use the internet, cell phone, and other electronic devices. Still, parents' willingness to use these technologies to communicate with the provider was strong and not affected by health literacy (Meyers et al., 2019).

In a randomized cluster trial, Dixon et al. (2019) concluded that the tablet-based educational intervention's usefulness was important, tripling the odds of HPV vaccine uptake among adolescents who received the tablets. In addition, the use of technology, such as videos, to improve parents' health literacy is a promising intervention that may improve children's health outcomes. Similarly, Blake et al. (2016) believe that online interventions can increase physical activities and health care outcomes in children with diabetes 1.

Chu et al. (2019) investigated the effect of MyTeen SMS-based mobile intervention for parents of adolescents. They found out that the messaging program seems to be a practical and achievable way to reach and support many parents to improve parental competence and is a less expensive service delivery option. Ross et al. (2020) investigated if texting intervention in Latino families can reduce emergency department (ED) use. In this randomized trial, authors found out the Spanish- language text messaging reduced ER use and increased flu vaccine receipt among the population, with 87 percent of parents with low or borderline health literacy.

Peyton et al. (2019) explored digital health interventions and the effects on mental health literacy among parents of children aged 2 to 12 years. They established that there is preliminary

evidence that digital health interventions may improve mental health literacy in parents of children in the above group age.

A study performed by De Veirman et al. (2019) investigated the effects social media have on children and youth. They found out that social media is a large and very influential market used by children. Coates et al. (2019) looked into social media's influence on healthy behavior habits. They concluded that popular social media became a significant influencer on the young population. Unfortunately, they found out that social media's promotion of unhealthy food intake increased children's fast-food intake. Simultaneously, the equivalent marketing of healthy foods did not affect children's nutritional food intake. Even though the effects on children's food intake were adverse, social media create room for health promotion and education opportunities. Sheerman et al. (2017) performed a three-arm randomized controlled trial and found that social is an excellent platform to promote health behaviors. They also encourage parents' involvement. The study results support using the theory-based program delivered by telegram in improving good oral hygiene behaviors and oral health outcomes among adolescents.

Yeung et al. (2017) designed and investigated the use of low health literacy flashcards and smartphone-activated quick response (OR) coded educational flashcard video to improve medication compliance and disease understanding. They concluded that this intervention was innovative and helped improve patients' knowledge of diabetes, hypertension, and heart failure, and helped them comply with medications regimen. Even though the target population in this study was not children, considering that children are under the care of adult caregivers, this study presents the effectiveness of improving patients' health literacy.

Evidence-Based Practice Framework

Identification of the Framework

Health literacy is a relatively new concept that continuously changes over time. It plays a pivotal role in medicine that creates new challenges due to the implementation of new technologies, new procedures, other medical advancements, health policies, and our diverse population's needs. Health literacy helps people to make the right educated decisions about their own or their families' health. We can see its effects on improved health status, lower health care costs, increased health knowledge, shorter hospitalization stays, and less frequent use of health care services.

According to Nutbeam (2000), health literacy can improve by providing health education. However, he acknowledges the complexity of the concept. Patient education and transmission of health information alone are not enough to improve health literacy. Nutbeam (2000) introduced a health literacy model that helps to analyze literacy capabilities. He proposed in his model three levels of health literacy:

- Level I, functional literacy that assesses the ability to apply necessary literacy skills to health-related materials, such as reading a basic label on a prescription medication bottle,
- Level II, interactive literacy requires more advance cognitive skills and the ability to operate in a social environment,
- Level III, critical literacy, which can be built on functional and interactive literacy.

The goal of functional health literacy is the communication of information. This level of health literacy contains the transmission of factual information on health risks and health services utilization. It improves individuals' knowledge of risks and health services, compliance with prescribed actions executed through existing channels, opportunistic inter-personal contact,

and available media. Participation in population health programs, such as immunization screening, represents functional literacy (Nutbeam, 2000).

The goal of interactive health literacy is the development of personal skills. This health literacy level contains functional literacy elements and opportunities to develop skills in a supportive environment. Level II health literacy improves the capacity to act independently on knowledge and enhances motivation and self-confidence. In addition, people who reach level II of literacy present an improved ability to influence social norms and interact with social groups (Nutbeam, 2000).

The goal of critical health literacy is personal and community empowerment. Level III of health literacy contains level I and II skills and information on social and economic determinants of health and opportunities to achieve policy. People representing this literacy level have improved individual resilience to social and economic adversity, and improved capacity to act on social and economic determinants of health improved community empowerment. Individuals with critical health literacy can provide technical advice to support community action, advocacy communication to community leaders and politicians; facilitate community development (Nutbeam, 2000).

The plan-do-study-act (PDSA) cycle is a continuous quality improvement model, a problem-solving method used by health care organizations to test and learn about change on a small scale. The model consists of a logical sequence of four repetitive steps for continuous improvement and learning. The PDSA cycle is also known as the Deming Cycle. It was introduced by an eminent statistics expert Mr. Walter A. Shewart, in the 1920s. In the PDSA approach, a particular change is planned and implemented. Later the results are studied, and actions are taken based on the results. The PDSA cycle is a scientific method used in action-oriented learning (Institute for

Healthcare Improvement [IHI], 2020). The PDSA model is used to evaluate if a change will improve health literacy in parents and on what scale.

Ethical Consideration & Protection of Human subjects

This DNP project does not involve testing experimental drugs, devices, or biologics, such as vaccines, blood products, or genetic materials. There are no federal or industry fundings that will help execute this project. It is not a research study but a quality improvement study involving only one site participating, the Reach Out and Read (ROR) organization. The primary intent of the DNP project is not generalizability. The project design will not allow the results to be generalizable.

The results of the DNP project will be published and disseminated within the Reach Out and Read organization. The project authors will not benefit professionally from implementing the project, but the program requires its completion upon graduation from the program of study. I am committed to integrity and fairness in the conduct of all activities. The DNP project involves minimal to no risk for harm for the targeted populations, which are parents of children ages birth to 5 years of age. All interventions for the DNP project are bias-free. They will be applied equally to any parents of children ages birth to five years old, willing to participate and see a provider chosen by the ROR pediatric office during project implementation. The ROR organization will provide data to evaluate the project, which will not include any names or sensitive patients' information that could identify patients in any way. Parents who accessed information provided by us will submit anonymously a survey that will help evaluate the effectiveness of DNP project interventions.

The DNP project authors completed CITI modules and submitted the IRB QI/Program Evaluation Self- Certification Tool for approval.

Section III. Project Design

Project Site and Population

The project site is a national nonprofit organization that serves almost five million children across the United States by collaborating with pediatric teams who serve children and families. I will directly partner with one of the organization's network pediatric teams in a rural area of Western North Carolina. At the site, I will be working with the office manager and pediatricians who provide knowledge and recommendations to children and families seen there. The project's cause is to improve the health literacy of the parents of children seen in this medical practice.

Description of the Setting

The project team will work with the nonprofit organization that promotes children's development and helps families bond through reading and engagement in language activities. The organization strongly believes that reading can improve every child's life and give a child a good foundation for success in the future. The organization operates with the support of the Board Members of the organization. It is led by national and regional leadership representatives, collaborating with pediatric offices and pediatric providers across the United States. I will implement the project in one of those pediatric offices that partnerships with the organization and distributes books to children on their practice in a rural town in Western North Carolina. The office is a part of a large group of pediatric clinics in North Carolina and provides services, on average, to five hundred children every month.

Description of the Population

The pediatric office has three highly qualified and board-certified pediatricians providing services to children and their families in the community. The office has a medical office staff

containing the office manager, two registration clerks, one certified translator in English and Spanish, one medical records specialist, and four medical assistants. The medical assistants obtained their degree in accredited schools and are certified in North Carolina to practice. One of the pediatricians speaks fluently in Spanish and English.

Project Team

The project team involves several members who play a pivotal role in the success of this project. The regional director for medical engagement and training is the site champion of the project. The site champion is the liaison between the organization and DNP students, who overlooks the project and collaborates with the DNP students to ensure that the project implementations are acceptable. The clinical associate professor and DNP Program faculty representative lead and support the DNP students' team executing this project. They assist in the project approval and ensure the project meets the academic requirement. The organization's site champion assigned a local representative from the organization to each student involved in the project. The local representative works as the liaison between the students, the organization, and the organization's assigned pediatric office where the project's implementation occurs. Lastly, the team contains four DNP students who created the project's idea and will implement and evaluate the outcome.

Project Goals and Outcome Measures

The project is based on Nutbeam's Health Literacy Theory and created using the PDSA model (IHI, n.d.; Nutbeam, 2000). The project aims to improve parents' health literacy of children ages birth to five years old seen in a pediatric office who received a book with developed QR code leading them to an informational website created by the DNP project team. The project wants to encourage discussion with friends, families, and providers, which are part

of the second level of health literacy, interactive literacy. The team will collect data from the website and analyze it at the end of its implementation. The project exempts the IRB because the data collection method and responses could not place the projects' subjects at risk for liability or could not be damaging to the subject in any way. The DNP project has to be approved by the educational institute and faculty.

Description of the Methods and Measurement

The project will create a QR code attached to the back of age-appropriate books that providers in the designated practice will give to patients and parents at well-check visits. The organization designed the website in collaboration with the DNP student to ensure its unity with the organizational standards. The content is gathered and organized by the DNP student. Each medical office that agreed to pilot the project will have informative posters hung in designated areas so parents can be familiar with the new concept. Providers will inform patients and parents about the QR codes and the informational website. The QR code will lead parents to a website providing information about immunizations and oral care. Parents will be able to choose appropriate for children's age information. The project authors developed a survey that will be available to parents on the website. Parents will answer the survey questions, which will be collected by the organizations and sent to the DNP students. The organization will perform website analytics to investigate project utilization and sent the data for analysis to the DNP students. The project provides quick and easy access to understand critical health concerns and focuses on significant social determinants of health. The essential need to focus on health education and healthcare provider communication skills is necessary to increase health literacy. The project provides easy-to-understand patient information that will improve parents' health literacy about immunizations and oral care, which improves patients' health outcomes.

Discussion of the Data Collection Process

The organization will collect data for four to five months. They will send the data to DNP students, who will enter data into an Excel Spreadsheet and then statistically analyze it. The analysis will help conclude if the website's material helped parents understand better health information and encouraged them to make changes. The statistical analysis determines if the collected data has any statistical significance, and the continuation of the project can help organizations and providers meet the Triple Aim's arm. The information has no identifiable patient data and will be accessible only to the organization and the DNP students involved in the project. Students will store the data on the computer secured by a unique password known only to a student.

Implementation Plan

The planning for the implementation of this project took several months. The site champion, the faculty, and four students met regularly to divide tasks and responsibilities and monitor the project's evolution progress. The students live in different areas of North Carolina. Thus, the organization found one pediatric office in each area that collaborates with the organization and contacted local representatives and managers or providers of these locations, asking for permission to pilot the project. At the same time, students worked on the IRB and school/faculty approvals for the project. Based on patients' load, the organization estimated how many QR codes are needed for each practice. Then the DNP students requested a quote to estimate the cost for the QR codes.

Simultaneously, the students start gathering the content for the website. The faculty and student agreed that the content should be easy to read and understand, straightforward, and as simple as possible. They also decided to use only one or two well-known and reliable sources to

avoid confusion. The CDC was one of those choices. The organization agreed to link that informational website to its website. They contacted their web designer specialist, who decided to build the page. The DNP students shared with the web designer their ideas of how they see the website.

With the faculty's help, the DNP students developed a survey attached to the website. When parents visit the website, they will be asked to complete this short survey to help students gather data for the latter project evaluation. The organization will monitor the utilization of the website using its analytic programs. The organization will collect both data and agreed to share it with the DNP students. The data collection begins when the website is launched. The first set of data will be sent to the DNP students in January. The students will evaluate and modify the project if necessary. The organization and the DNP students with faculty will be meeting continuously to monitor and discuss the pilot's progress. The organization will collect and share data with the DNP students until April or May. The project and data collection will be officially completed in May.

The organization permitted the DNP students to use the official logo of the organization. The DNP designed posters that include information about the QR codes and the website. The pediatric practice managers and providers agreed to hang the posters in their practices and inform patients and parents about the QR codes and the website. The organization kindly undertook the cost of printing the QR codes, and these will be distributed among students. Once the QR codes are available, the DNP students will go to each practice and apply the stickers on books with the pediatric practices' permission. The website should be launched in November. Once it is available, the project will begin.

The DNP students will bring posters to practices and ask managers and office staff to hang them in waiting rooms and exam rooms before the project begins. Next, the providers start giving patients and parents books with QR codes. Providers will educate parents on using the QR codes and explain that the QR code will take parents to a website where they can find information about immunization and oral care appropriate to their children's age. Providers will ask parents to fill out a survey attached to the website, if possible. The student will assist the office managers and providers if any questions or concerns should occur.

The authors of this project hope for the project's evolvement, improvement, and continuation in the future. The project will compromise one PDSA cycle and lay the ground for the next team's second cycle in the fall. The project should improve parents' knowledge about immunizations and oral care. It should encourage parents to change, positively affecting children's health outcomes, providing more communication between providers and parents, and promoting children's health and well-being in North Carolina while engaging in reading activities and bonding families.

Timeline

The project team carefully prepared and planned several months before the actual project implementation. The project's preparations took place in September and October when the organization and DNP students worked on the website's content, created posters, and got approval for the project from the organization and faculty. The organization printed the QR codes and will distribute them among the DNP student, who will apply the QR codes to the back of books in designated offices throughout the end of October and November. The organization will launch the website in November, which will be the starting point of data collection. The DNP students will receive the first data set in January. The DNP students will evaluate the first

data and apply modifications to the project as needed. In February, we will start the new PDSA cycle. The project pilot will stay active until May. The project timeline is presented in Appendix B.

Section IV. Results and Findings

Results

The DNP project implementation developed as planned and as outlined in the DNP project timeline. The DNP students collected data from four pediatric clinics in Eastern and Western North Carolina between December 2020 and April 2021.

All clinics distributed 2,291 books at 2,303 well child visits, at a distribution rate of 99.5% (Table C1). Eighty-five percent of these books were in English and fifteen percent in Spanish. A 68.75% of the targeted population identified English as their primary language, 22.25% Spanish, 3.5% Burmese, 1.5% Karenic, 0.75% Arabic, 0.25% Vietnamese, 0.25% Kinyarwanda, and 2.5% were represented by other unspecified languages (Table C4). Most of the population used Medicaid to pay for provided services (85.8%) (Table C2). Table C3 represents the racial profile and distribution of the targeted population. The majority of children at the clinic identified themselves as White (35.3%), followed closely by Hispanics (34%).

The specific data contains numbers of website views and differentiates unique visits, which are counts for website visits by different people. For instance, if there were ten views listed, but nine are identified as unique, nine different people saw the website, and one of the ten people looked at the website twice. The collected data is categorized by the time when it was collected and children's age. The DNP team created categories of views for immunizations, oral care, and surveys. The latter separated into two languages: English and Spanish (Table D1).

There were 294 views, with 236 being unique views [294 (236)] of the website between November 2020 and April 2021. A total of 184 views of the main splash page were noted during that time, with 151 unique views (Figure D1). The most visited information was for the age group newborn to six months old children: 30 (24), followed closely by age group one to two years old: 27 (18), and six months to one-year-old 16 (11). The least visited age group is two to five years old: 15 (14). There is a noticeable view increase between January and April for all ages 70 (52) compared to November 18 (15), with the most significant gain for the age group six to twelve months of age from 0 in November to 16(11).

The data shows more interest in immunizations than oral care: 16 (12) vs. 6 (6). On average, the website was viewed 1.6 times per day during the implementation period. This data may not be exact since some of the views in November have been done by the DNP students and staff involved in the implementation to test, review, and modify the site.

Only ten surveys were completed while piloting the DNP project: two test surveys and eight "real" surveys (n=8). The surveys were available in two languages: English and Spanish. The only survey completed in Spanish was a test survey. The majority of the surveys were completed later in the implementation phase, 62.5% in April. Data suggests that one survey was conducted in November, one in February, one in March, and five in April. Most surveys were completed by parents of children 6-11 months: 25%, and 3-5 years of age: 25%. There were no surveys completed by parents of children ages 12 to 18 months. In the surveys, 87.5% responded that they were told about the QR codes at the well-child visit. The majority of parents stated that the information on the website was very easy to understand. Only one survey reported "a little easy."

Learning is the 1st level of Nutbeams Health Literacy Continuum. According to the collected data, 62.5 % of parents learned a lot, 25 % learned "some," and 12.5 % learned "a little" about vaccines. Based on the same data, 62.5 % of parents learned "a lot," and 37.5 % learned "some" about oral health. The level of learning differs; however, every respondent learned something from the content on the website.

Intent to change is the 2nd level of Nutbeams health Literacy Continuum. The data suggests that 37.5% of parents participating in the surveys would change their plans for their child's vaccinations; however, the majority, 62.5%, indicated no changes. Surprisingly, 100 % of responders reported they would change their child's oral health habits.

Knowledge sharing is the 3rd level of Nutbeams health Literacy Continuum. All parents (100%) indicated they would share the information they learned: 75% indicated they would share it "very likely," and 25% said "somewhat likely."

Discussion of Major Findings

According to the collected data and small sample size of 8 (n=8), it is challenging to make generalizations; however, the project/ intervention was successful. The DNP project reached all three levels of the Nutbeams Theory of Health Literacy. Parents indicated that the information was understandable, and they have learned something about vaccines and oral health from the website's content. In addition, the majority stated willingness for change based on what they have learned from the website and indicated a desire to share the information with others.

The website traffic indicates that the QR code intervention was successful. The initial traffic was higher and decreased in January, most likely due to the DNP students being absent from school during the winter break, leading to less involvement in the project. However, the traffic picked up again in February after implementing few interventions, such as QR code

bookmarks, specific QR codes for particular languages, and language-specific bookmarks. The repeat traffic on the website suggests that several users came back and viewed the website again for the information.

The small sample size was possibly impacted by several factors such as lack of promotion and lack of patients' education from health care providers. More data would be needed to evaluate the factors that directly impacted the results.

Section V. Interpretation and Implications

Costs and Resource Management

The DNP project cost is 197.25 hours and $879.55 (Table E1). The budget includes supplies, website design and development, and the cost of promotional materials. We predicted that students spent approximately 197.5 hours researching, assessing, planning, implementing, continuous monitoring, and ongoing evaluation of this project. It isn't easy to estimate the students' priceless expertise and involvement and express it in monetary value.

The DNP project's estimated cost without students' labor and expertise, if done entirely with professional design/ development, would cost 36.25 hours and approximately $13,748.80 initially for the first six months period (Table E2). The project's cost would include additional annual charges of $500.00 for website maintenance and the cost of additional books and stickers as needed, which is estimated at +$ 66.00 annually for a QR code design subscription. If an organization planned to do the same number of books and stickers every six months, there would be an additional cost of $14,344.18. Thus, the total annual maintenance and continuation of the project would cost $14,910.18.

We speculate that the research amount would be similar if a similar project would be executed on a larger scale. Yet, a project designed and piloted on a larger scale would require

more staff, more time, and more promotional materials, increasing the cost of the project implementation. On the other hand, the cost would be reduced because there would be no necessity to design and develop a new website. The students already completed the research and data collection, which would also decrease the cost of executing the project on a larger scale. A lot of the promotional material would possibly be purchased cheaper and printed cheaper since there are discounts available when printing on a large scale.

Considering the budget, the work and research delivered by the students are very beneficial and saved a lot of money for interested organizations. Besides cost, students brought new ideas and a "fresh" approach to addressed topics. They opened a new door for further research and projects, not only for other students but also for many organizations.

The costs related to poor oral health and unvaccinated children are much higher when compared to the cost of the project itself. According to Power of prevention (n.d.), we spend $136 billion annually on dental care in the United States. There were $26.5 billion spent on dental care for children in 1996 – 2013, $8 million spent on non-preventative care. In addition, in the United States, we have approximately 2 million ER visits annually due to poor oral health, not to mention the costs of lost days in school and work hours.

A decrease in vaccinations in children increases health care costs tremendously as well. Children who are not vaccinated are at higher risk to inquire preventable diseases, which then require outpatient treatments and continuation of care in many cases. The cost includes loss of work and school hours due to sickness. In addition, those children have a higher mortality rate and poorer quality of life, which are priceless, and no monetary value can be given (Vaccines for Children Program, n.d.).

The cost of continuing the DNP project for the Reach Out and Read (ROR) organization is not very high because the organization already covers the cost of the domain and website hosting. They are the ones who provide the books; thus, there is also no new cost for a book for this organization. Likewise, there is no necessity for new posters. The ROR may consider printing some new posters if the project would expand, but printing in bulk is much cheaper, and the organization would have to cover only the cost of prints since the posters are already designed. The QR code stickers require continuation of printing which could be costly. However, the fee could be somewhat adjusted by printing a large number of QR codes. The same would apply to printing the bookmarks. In addition, some organizations donate printing to non- profit organizations, which would save the cost of printing for ROR.

If other organizations would adopt the project, they could involve volunteers to develop, design, and maintain the program, which would reduce the cost. Most organizations interested in a project like this are more than likely non-profit organizations; thus, they would be eligible for discounts and other cost reductions such a tax credit, etc. As mentioned earlier, the cost of the project would get cheaper with the extension of it. The new organization would not have to do all the promotional interventions done during this DNP project, which could also reduce the expense. There is no need to develop a new website each year; thus, the cost would be only to host and maintain the website. An implementation of dynamic QR codes can save money in the long run. Even though an organization would have to pay for the service, changing the QR code link when needed allows keeping the current QR code valid if the site URL has to change, which will reduce waste of stickers and print more stickers and cheaper. If an organization is confident, they won’t be changing the site URL and has limited funds, some services will provide QR code generation for free but do not allow tracking actual scans used for this DNP

project. The new organization could promote the project using either bookmarks or stickers, which would decrease the cost compared to this project when both were used.

The benefits of using bookmarks are that organizations can provide to patients/ clients' unique language-specific codes and give specific bookmarks to specific patients, ensuring that patients receive a bookmark in the chosen language. On the other hand, bookmarks are easy to lose, someone has to be designated to hand them out, and they are more expensive when compared with QR code stickers.

The benefits of using QR code stickers on books are that every child receives a book, which promotes reading and bonding with parents. Books are more difficult to lose when compared with bookmarks. Books are given to children by the provider and may be more valuable to keep for children and parents. However, the QR stickers cannot be language-specific unless it is predicted what patient gets what book. To put the stickers on books requires people to put them on. If the QR code changes, an organization would need new stickers.

Implications of the Findings

It has been shown in many studies how health literacy can impact people's health outcomes. The COVID-19 pandemic was an excellent opportunity to see how a lack of knowledge, information, or misleading information can lead to catastrophic consequences. It is pivotal for people to be able to make good decisions for themselves and their loved ones. There are many myths and misinformation, especially about our health, that patients can access. As health care providers, we must promote and teach our patients how to make intelligent decisions for themselves, which is vital for any age of the population, especially those who cannot make decisions for themselves yet or anymore. Thus, health literacy is so critical. This DNP project is an example of how health literacy can be improved by using technology as a tool. Even though

there is not enough data collected yet that would make a statistical significance of this project, anyone who realizes the importance of the increased level of health literacy and appreciates knowledge and wisdom can see the importance of this project for today's and future generations.

This project is considered successful and made a difference. Parents reported learning and increased health literacy and indicated a willingness to change and to share provided information. Other organizations, such as Brush, Book, &Bed (AAP program), plan to replicate the project with the QR code linking to their website. The AHEC in Charlotte, NC, will use the project's QR codes and other materials. The ROR organization is expanding this project's QR codes, website, and other materials to other pediatric clinics across North Carolina.

Implications for Patients

Patients are offered easy access to valid information available to them at any time and at any location. That allows them to make better decisions, understand why their child is receiving a particular vaccine or why it is essential that their children brush their teeth. It is scary for a parent to agree for something to be done to their children, especially when it is painful, without a good understanding of its necessity. The DNP project offers patients 24/7 access to essential information about immunizations and oral care. It helps parents understand why these are so important and how these can impact their children's development and health now and in the future. By learning about oral health and vaccinations, parents can learn and implement changes that they were not aware of that can positively impact their children's health. In addition, parents get the opportunity to get involved and share the information with other parents helping to promote healthy habits and behaviors that can improve children' health.

Implications for nursing practice.

Anyone in the nursing world understands the value of patient education. The DNP project offers easy, 24/7 access for patients and health care providers that can be utilized in any health care setting and on any occasion. It is also an excellent way to show patients better ways of taking care of themselves and their children. It helps reduce patients' anxiety by giving them access to a resource that they can easily access and understand when they forget some information or need more time to process it. The DNP project can be used as an educational tool used by health care practitioners. This website with QR codes is a creative way to provide education and improve patients' health literacy, which can play a pivotal role in a healthcare system. Promoting projects like this is essential to assure health care providers encourage and increase health literacy and patients' autonomy.

Impact for Healthcare System(s)

Any health care system can use the DNP project in any location to promote health in the communities they serve. The DNP project promotes the Triple Aim and helps improve healthcare quality. It is cost-effective and improves health care outcomes. Health care systems can use the DNP project's idea and use it for other topics and various populations as an educational tool. The DNP project promotes patients center care and advocates for vulnerable people. The DNP project promotes patient's autonomy. QR codes are a simple and relatively cheap way to promote health information. The process of getting QR codes to patients is easy and can be added to discharge summaries given to patients at hospitals and doctor's offices, not only on ROR books. Providing reliable information sources to patients would help keep patients off Google, where they may find many unreliable and misleading medical information.

Sustainability

The DNP project received tremendous support from the partnering ROR organization and the piloting clinics and other influential organizations, health care providers, and patients. The DNP project will continue evolving and grow to serve more communities in different locations. Few pivotal organizations, such as AHEC, are interested in adopting the project, which was built on solid fundaments of Triple Aim dimensions of improving patients' experience of care, improving the health of populations, and reducing the per capita cost of health care. The DNP project adopted by strong and well-known organizations has a high probability of growth due to its resources to sustain it. The ROR organization can maintain the website and has available staff who can monitor the project's progress. The shared belief and vision of the student and the ROR organization will help the project advance. The DNP project is simple and sustainable. It is effortless to keep the website running since it is linked to the ROR organization’s website. There is a cost associated with stickers/ bookmarks, but this can be easily incorporated into the process without much effort.

Dissemination Plan

The DNP project was presented at the Reach Out and Read Plenary Session event at the end of April 2021. The DNP students worked very closely with the ROR organization on this project. As a result, ROR found several organizations interested in this project and would like to learn more about it and learn what they can do for their initiatives to be successful. ROR site champion has already discussed the project with other organizations and will be given copies of the finding/ paper writ-up to discuss the future of this project with these organizations. In addition, ROR will publish a promotional article in the July 2021 issue of Medical Connections, the ROR newsletter.

The DNP project and DNP project poster will be present at the East Carolina College of Nursing in July of 2021 (see Appendix J) and published at “The ScholarShip” in July 2021. The opportunity to present it at the DNP conference is also an opportunity, but the event and dates are not confirmed yet, possibly in August 2022.

Section VI. Conclusion

Limitations and Facilitators

The DNP project showed an excellent collaboration between students, faculty, staff of piloting project clinics, and the Reach out and Read (ROR) organization. This partnership created an opportunity for future projects and new ideas. Many challenges and barriers required excellent teamwork and continuous evaluation and modification during implementation. Ongoing meetings between all involved and closely monitoring the development of the project helped identify areas of improvement and modify the original plan of action.

The project was not promoted and advertised as planned, which significantly impacts the data outcomes. In addition, there is an ongoing concern about the decreased amount of data collected. Still, the DNP project students have done few interventions during the project's implementation time, leading to increased views on the website. Giving QR code bookmarks in varying languages has seemed to have the most impact on website traffic, but survey responses are still down.

COVID-19 pandemic became to be a barrier in multiple ways, significantly impacting the project in many ways. The DNP students could not go to piloting clinics to promote the project among both the staff and the parents. One of the practices hosted a PR event and write-up to help promote the project. Numbers for site traffic have increased since then. The staff was already overworked in clinics dealing with the varying changes that have occurred since COVID- 19

pandemics began, so there was some degree of burnout related to extra duties. Understandable, promoting the DNP project was not the top priority at this time. We were hopeful, though, that as COVID-19 cases decrease and more people get vaccinated, hopefully, staff will return to some level of normalcy that will allow them to promote the project more. Unfortunately, this did not happen before the project implementation period expired. The DNP project posters had to be removed from clinics and exam rooms due to infection control risk in some clinics, meaning there was a lack of promotion. One clinic participating in piloting the project started printing promotional posters and handing them to parents at the well-child visits. Most patients scheduled to see providers were not allowed to wait for their appointment inside the clinic, waiting rooms, or even in exam rooms anymore. Therefore, they were not getting time to read posters that promote the project. This barrier became an issue that the DNP project student hasn't found a way to address yet.

One of the piloting clinics had a large Burmese population that does not read or speak English, which was not expected during the project's implementation. The development of new QR codes leading straight to a Burmese website during the implementation time and generating bookmarks for this population helped improve the data result. Another piloting clinic had a significant Spanish-speaking population, and the exact implementation had to be put in place just in the Spanish language.

Recommendations for Others

Ideally, it would be beneficial if the presence and active, in-person involvement were allowed for the DNP students to promote the project, which was not possible due to one of the main barriers for this project, the COVID-19 pandemics. Thus, it is recommended to get vaccinated against COVID-19 to help to increase students' abilities to get into clinics.

The DNP project students noticed the most positive response after implementing the Spanish and English code bookmarks included in books. The evaluation of the targeted population and good communication and rapport with piloting clinics play a significant role in the project implementation. Future students should contact the clinic's staff/ site by email or phone at least every two weeks to help keep staff motivated about the project.

There was potentially a lack of incentive for parents to go to the website and fill out the survey. There was also a potentially a lack of staff incentive to promote the project despite students reaching out and promoting the project to staff members. It would be beneficial to create incentives for the targeted population to encourage parents to participate in surveys and involved staff members to promote the project. We discussed a prize drawing, but there would be a few concerns there, such as paying for the prize, promoting the drawing, and finding ways to protect the information given to those entering the drawing.

The DNP students provided some low-cost incentives by thanking site staff and providing goodies for their hard work. However, sites seem to say parents are interested in the information, so we're not entirely sure why there wasn't more traffic other than being busy in their daily lives. Possible ways to help incentivize parents more would be to provide a prize drawing for parents if surveys were filled out; This would be recommended to be implemented by the next year's students.

The project is easily scalable because the website and posters have already been designed, and the cost of bookmarks and stickers becomes cheaper the more buy. In addition, the project can be easily roll out to other clinics, and new topics of interest can be added as the project expands to other clinics and possibly can be targeted at a variety of populations in the community.

Recommendations Further Study

The DNP project opened the door to expand the idea of improving the health literacy of parents and offers endless opportunities for other projects. The DNP project could be expanded on topics, age, and populations. The project could be a way to educate and increase the health literacy of parents and adolescents, adults, and older adults. The topics could include diabetes, hypertension, asthma, and many other chronic diseases that significantly impact our population's well-being. The project could be translated into many languages and implemented globally using technology and QR codes.

Several organizations in North Carolina, such as Brush, Book, Bed, and AHEC, expressed interest in this project. The Brush, Book, Bed is a program developed by the American Academy of Pediatrics that promotes the message to parents: help your children to brush their teeth, read a favorite book, get to be at a regular time each night (American Academy of Pediatrics [AAP], 2021). In addition, Brush, Book, Bed promotes oral care for children in Western North Carolina by adopting QR codes and educating parents about the importance of oral care.

This Area Health Education Center (AHEC) in Charlotte plans to adopt the DNP project around May 2021 and use the project's QR codes. If the pilot implementation will become successful, the organization plans to expand this project to Eastern North Carolina.

Final Thoughts

Poor oral health and poor dentition can lead to dental caries and dental pain, affecting academic performance and quality of life. At the same time, low vaccination rates can impact herd immunity and put patients, and the population as a whole, at risk for preventable diseases and subsequent sequelae (Lebrun-Harris et al., 2019; Mina et al., 2019; Paules et al., 2019).

Web-based interventions, use of children's books for health education, and visually-enhanced educational programs have been shown to improve health literacy in patients (Azevado et al., 2019; Gibbs et al., 2018; Hutton et al., 2017; Papapchrisanthou & Loman, 2018; Peyton et al., 2019; Rosas-Blum et al., 2018).

The DNP project has been created based on belief and evidence that health literacy can improve health outcomes. The DNP project team targeted the project parents of children ages newborn to five years old. This DNP project partnered with the Reach Out and Read (ROR) organization, which provides books to parents at each well-child visit from 6 months to 5 years of age to promote literacy. Utilizing their approach to reach out to parents, this project worked in conjunction with them to provide QR codes on the back of these books that provided health education about vaccinations and oral health from birth to five years of age to increase parental health literacy on these topics. By targeting and increasing parental health literacy, the project improved knowledge about vaccination and children's good oral health and hygiene practices.

This project provided quick access and easy-to-understand information about critical health concerns and focused on a significant aspect of social determinants of health. There is an essential need to focus on health education and healthcare provider communication skills necessary to increase health literacy. Some identified ways to improve are providing easy-to-understand patient instructions, assessing patients' understanding by asking follow-up questions, spending an adequate amount of time with the patient, and carefully listening and showing respect. Improving health literacy and communication will create a healthier population that will lead to fewer health care services, improve the quality and quantity of life, increase productivity, advance economic development, and reduce overall health care costs.

This project set up a pilot program for increasing parental health literacy in four pediatric practices located throughout the state of NC. The project offers the groundwork to be applied to all pediatric clinics that utilize the Reach Out and Read program in the future. The health literacy topics can also be expanded to cover more pertinent issues, including dispersing relevant information regarding coronavirus as the situation changes in the next few years.

This project meets all arms of the Triple Aim. By empowering and equipping parents with the tools they need to start a dialogue with providers, the provider-parent-patient relationship will be strengthened to help provide a better experience. Population health can be impacted by encouraging better oral care at a young age, which can help decrease dental caries and other oral diseases that can cause infections and children's issues. The increase of parental knowledge on the importance of vaccinations, encouraging complete vaccinations, and decreasing vaccine-threatening illnesses in the community can be achieved. Healthcare costs are reduced by minimizing costly dental procedures and treating oral infections and other poor oral health sequelae. Healthcare spending is also decreased by preventing illnesses in the community by encouraging prompt and complete vaccinations.

This project did not directly affect the healthcare outcomes of patients at the time of implementation. However, increased parental health literacy can cause parents to make better, healthier choices for their children and instill better oral health habits, impacting healthcare outcomes in the distant future. Parental health literacy can significantly impact childhood health. This project helps create a program that will help increase parental health literacy on vaccinations and oral health.

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Appendix A

Pre-Implementation Resources

Table 1

Literature Search Log

DNP Project Literature Search Log					
Student: Malgorzata (Gosia) Tiger				**Date of Submission:**	**2020-07-27**
Project Title: Use of books with QR codes to improve health literacy about immunizations and oral care among parents of children age range from birth to five years old					
Date of Search	**Database**	**Key Word Searches**	**Limits**	**# of Citations Found / Kept**	**Rationale for Inclusion / Exclusion (include rationale for excluding articles as well as for inclusion)**
lip-20	CINAHL Complete (EBSCOhost)	Health literacy or patient education or health education AND parents or cargivers or mother or father AND intervention or strategies	5 year period, English language, full text, pediatrics	113 found 2 kept	Included articles directly related to clinical question. Excluded articles that focus on speciality practices.
lip-20	CINAHL Complete (EBSCOhost)	Health literacy AND social media	5 year period, English language, full text, pediatrics, children age 0-5	1 found 0 kept	Excluded article not related to clinical question.
lip-20	PubMed	Health literacy AND QR codes	5 year period, English language, full text	2 found 2 kept	Included article directly related to clinical question.
lip-20	CINAHL Complete (EBSCOhost)	Health promotion AND interventions or strategies or best practices AND technology or social media or cell phones or internet	5 year period, English language, full text, peer reviewed	160 found 6 kept	Included article directly related to clinical question. Excluded articles that did not focus on internet based or mobile interventions.
lip-20	PubMed	Health literacy AND parents AND interventions	5 year period, English language, full text, pediatrics	20 found 3 kept	Included articles directly related to clinical question. Excluded articles that focus on speciality practices, not related to pediatric population.
lip-20	PubMed	Health literacy AND parents AND social media OR internet	5-10 year period, English language, full text, peer reviewed	54 found 6 kept	Included article directly related to clinical question. Excluded articles that did not focus on internet based or mobile interventions.

Table 2

Literature 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	Instr. Used	Sample Size	Sample method	Subject Charac.	Comments/critique of the article/methods GAPS
Ross DeCamp, L., Godage, S.K., Valenzuela Araujo, D., Cortez, J. D., Linxuan, W., Psoter, K. J., Quintanilla, K., Rivera Rodriguez, T., Polk, S.	2020	A texting intervention in Latino families to reduce ED use: A randomized trial	N/A	*Pediatrics*	To evaluate the impact of text messaging intervention on infant emergency department use and well care and vaccine adherence.	Level I Randomized trial	IV Texting about vacines DV health literacy and health disparities	An educational video and interactive text messages throughout the child's first year of life, was evaluated via randomized controlled trial conducted in an urban, academic pediatric primary care practice from February 2016 to December 2017.	157	an educational video and interactive text messages throughout the child's first year of life, was evaluated via randomized controlled trial conducted in an urban, academic pediatric primary care practice from February 2016 to December 2017.	Singleton infants less than 2months of age; parents older than 18 years old with Spanish preffered language; at least 1 cell phone in household	The authors found that Spanish- language text messaging intervention reduced ER use and increased flu vaccine receipt among population with 87% of parents with limited or marginal health literacy. Limitations: Small sample size, limited to only Spanish speaking population. Usefulness: Use of social media, such as textin can improve patients' health outcomes and increase the rate of vaccinated children. Synthesis:Text messeging is promising intervention to improve health outcomes in children.
Yeung, D. L., Alvarez, K. S., Quinones, M. E., Clark, Ch. A., Oliver, G. H., Alvarez, A. A., Jaiyeola, A. O.	2017	Low- health literacy flashcards and mobile video reinforcement to improve medication adherence in patients on oral diabetes, heart failure, and hypertension medications.	N/A	*Journal of the American Pharmacist*	To design and investigate a pharmacist-run intervention using low health literacy flashcards and a smartphone-activated quick response (QR) barcoded educational flashcard video to increase medication adherence and disease state understanding.	Level II Prospective, matched, quasi-experimental design.	IV Medications administrations, type of medications, route DV health literacy and compliance	Newest Vital Sign (NVS), Rapid Estimate of Adult Literacy Medicine–Short Form, and Short Assessment of Health Literacy–50	68	Patients included if 18 years of age or older, spoke either English or Spanish as primary language, filled their medications at Parkland's outpatient pharmacy, had a baseline PDC of less than or equal to 50% for the previous 6 months, and were prescribed targeted oral type 2 diabetes or heart failure medications based on the institution formulary	Primary care patients prescribed targeted heart failure, hypertension, and diabetes medications	The authors found that the use of flashcards and QR-coded prescription bottles for medication and disease state education is an innovative way of improving adherence to diabetes, hypertension, and heart failure medications in a low-health literacy patient population. Limitations: Small sample size, limited to only one facility Synthesis: QR codes and social media are innovative way to improve patients' health literacy and patients' health outcomes.
Keim-Malpass, J., Letzkus, L. C., Kennedy, Ch.	2015	Parent/caregiver health literacy among children with special health care needs: a systematic review of the literature.	N/A	*BMC Pediatrics*	To assess the available evidence of studies investigating parent/caregiver health literacy of children with special health care needs.	Level I A systematic review	IV the relation parent/ caregiver health literacy and literacy instruments DV health literacy of parents	PRISMA flow diagram	13 studies	Databases were searched to retrieve relevant articles for inclusion (dating from 1998 to 2014). Only studies that assessed the relationship between parent/caregiver health literacy on outcomes pertinent to CSHCN were included	The majority of studies; (1) focused on the relationship between parental/caregiver health literacy and asthma outcomes, (2) were cross-sectional study designs, and (3) included samples recruited from pediatric clinics in academic medical settings.	The authors found that health literacy is a critical compnent of future research aimed at improving child health outcomes and health utilization for vulnerable families. Limitations: Several gaps in the literature where more research is needed. Most studues were observational, which may lead to bias in interpretation, heterogeneity in disease samples. Synthesis: Health literacy is a key component for improved health outcomes of children. More research must be done and more policies should be placed to advocate for health literacy.

Curran, J.A., Gallant, A. J., Zemek, R., Newton, A. S., Jabbour, M., Chorney, J., Murphy, A., Hartling, L., MacWilliams, K., Plint, A., MacPhee, S., Bishop, A., Campbell, S. G.	2019	Discharge communication practices in pediatric emergency care: a systematic review and narrative synthesis	The Behaviour Change Wheel (BCW)	*Systematic reviews*	To examine how and why discharge communication works in a pediatric ED context and develop recommendations for practice, policy, and research.	Level I A systematic review	IV patient education interventions DV health literacy and knowledge of parents	PRISMA flow diagram	72	Studies were included if they described or evaluated changes in the structure or process of care in the ED to enhance discharge communication as their primary objective. Quantitative, qualitative, and mixed methods study designs were eligible for inclusion. Studies were excluded if interventions took place outside of the ED or primary outcomes were not relevant to discharge communication.	75 articles were included in the review. Half of the included papers were observational studies (n = 37) and 47% (n = 35) were either randomized controlled trials (RCT) or quasi-experimental studies. Three qualitative studies were also included.	The authors found that improving discharge communication for parents in an ED setting presents a significant opportunity for improving health outcomes for children. Limitations: Heterogenity of interventions and outcomes unabled to perform meta-analysis. Synthesis: Health literacy is a key component for improved health outcomes of children. Even this study was for ED setting, I believe that this would apply to primary care setting as well.
Forshaw, J., Gerver, S.M., Gill, M., Cooper, E., Manikam, L., Ward, H.	2017	The global effect of maternal education on complete childhood vaccination: a systematic review and meta-analysis	N/A	*BMC Infectious Diseases*	To establish if there is a correlation between increasing maternal education and vaccine uptake and if this varies between continents, setting and time.	Level I A systematic review	IV patient education interventions DV health literacy and knowledge of parents	Excel spreadshit and STATA 13.0 software	37	An electronic database search was conducted using Medline Ovid, Embase and The Cochrane Library using a combination of keywords and appropriate MeSH terms for maternal education and child vaccination. Bibliographies were also hand searched.	Of the 37 included papers, 35 were cross-sectional studies, the remaining 2 were cohort studies. All of the data from the studies was conducted between 1989 and 2013.	The authors found that increased maternal education increased the amount of vaccinations completion. Overall, the meta-analysis showed that the odds of full childhood vaccination were 2.31 times (95% CI 1.90–2.79) greater in children whose mothers had received secondary or higher education when compared to those whose mothers had no education or primary level education Limitations: Language bias. Synthesis: Evidence of the corelation between education and child mortality reduction.
Dixon, B.E., Zimet, G. D., Xiao, S., Tu, W., Lindsay, B., Church, A., Downs, S. M.	2019	An educational intervention to improve HPV vaccination: a cluster randomized trial	Theory of planned behavior	*Pediatrics*	To investigate if watching educational videos about HPV vaccines by parents and adolescents will increased number of vaccinations.	Level I A cluster randomized trial	IV watching educational videos about HPV vaccines DV health literacy and increased rate of vaccinations	CHICA and CHIRP, Theo	A total of 1596 adolescents visited 1 of the clinics during the 7-month trial.	Patients were selected from electronic medical recrods using CHICA and CHIRP. Excluded patient who already received vaccines.	Participants were parents or guardians of adolescents aged 11 to 17 who were unvaccinated and partially vaccinated as of the date of visit during the study period.	The authors found that the efficacy of the tablet-based educational intervention was significant, tripling the odds of HPV vaccine uptake among adolescents who received the tablets. Limitations: Limited to only few clinics, evaluates only patient requiring HPV vaccines. Synthesis: Using technology, such as videos, as an intervention to improve parents health literacy is a promising intervention that may improve health outcomes of children.
Blake, H., Quirk, H., Leighton, P., Randell, T., Greening, J., Guo, B., Glazebrook, C.	2016	Feasibility of an online intervention (STAK-D) to promote physical activity in children with type 1 diabetes: protocol for randomized controlled trial	N/A	*Academic journal*	The aim of this research is to explore the feasibility of delivering the STAK-D programme to children aged 9–12 years with T1DM, and to assess the feasibility of further research to demonstrate its clinical and cost-effectiveness.	Level I A randomized controlled trial	IV online intervention to improve patients' physical activity DV increased physical activity of children	A self-efficacy (CSAPPA), objective physical activity, self-reported physical activity (PAQ), fear of hypoglycaemia (CHFS; PHFS), glycaemic control (HbA1c), insulin dose, Body Mass Index (BMI), health-related quality of life (CHU9D; CHQ-PF28), health service use and patient-clinician communication.	50 children	Children aged 9–12 years who have been diagnosed with T1DM for at least 3 months and their parents will be eligible to take part in the study. They must be able to understand spoken and written English	Children aged 9–12 years with T1DM and their parents will be recruited from two paediatric diabetes clinics in the UK	The authors believe that online interventions can increase physical activities in children with diabetes 1. Limitations: Limited results. Synthesis: Using technology can improve health outcomes and well- being of children.

Sun, W.H., Ho WongC. K., , Wai Wong, W. C., Wai Han Wong, S., Ho, C.K., Wong, W. C. W.	2017	A peer-led, social media- delivered, safer sex intervention for Chinese college students: randomized controlled trial	The information-motivation-behavioral skills model	*Journal of Medical Internet Research*	To compare a peer-led, social media-delivered, safer sex intervention with a sexual health website. Social media has extra benefits for health promotion as compared to traditional websites;	Level I A randomized controlled trial	IV social medial delivered education DV Health literacy and improved knowledge about safer sex practices.	Online- visiting frequency and online engagement	196	The participants signed up voluntarily through an open online survey website, SurveyMonkey, and eligibility questions were asked to screen participants.	The eligibility criteria included being an undergraduate student and aged under 25 years.	The authors found that the use of social media can be very effective in health promotion. Limitations: Small sample size,limited only to one type of population Synthesis: Social media can be a new way to improve patients health literacy, knowledge, and improve health outcomes. It is a new way that can be used for health promotion.
Scheerman, J.F.M., Hamilton, K., Sharif, M.O., Lindmark, U., Pakpour, A.H.	2017	A theory-based intervention delivered by an online social media platform to promote oral health among Iranian adolescents: a cluster randomized controlled trial.	N/A	*Psychology & health*	To inestigate the efficacy of a theory-based program using an online social media platform (Telegram) to promote good oral hygiene behaviour among Iranian adolescents.	Level I A three- arm randomized controlled trial	IV Online social media platform promoting brushing teeth DV increased in brushing teeth	Psychosocial variables, toothbrushing behaviour, Visual Plaque Index, and Community Periodontal Index	791	Randomized intervention group of adolescent, second group of mother and adolescents, and randomized selected control group.	Adolescent only intervention group (A group; n = 253), an adolescent and mother intervention group (A + M group; n = 260), and a control group (n = 278)	The authors found out that social media is a good platform to promote health behaviors, which can be further improved when involving parents. Limitations: Small sample size, limited to one population only. Synthesis: Current results support the use of the theory-based program delivered by Telegram in improving good oral hygiene behaviour and oral health outcomes among Iranian adolescents. Involving mothers in an intervention can confer additional benefits for adolescent oral health..
Lin, Pao-Hwa, Intille, Stephen, Bennett, Gary, Bosworth, Hayden B., Corsino, Leonor, Voils, Corrine, Grambow, Steven, Lazenka, Tony, Batch, Bryan C., Tyson, Crystal, Svetkey, Laura P	2015	Adaptive intervention design in mobile health: Intervention design and development in the Cell Phone Intervention for You trial	The social cognitive theory and techniques of behavioral self-management, the trans-theoretical, stages-of-change model and used of motivational enhancement approaches.	*The clinical trials*	The aim of this article is to describe the design and development of the intervention tested in the cell Pphone intervention for You study and to highlight the importance of adaptive intervention design that made it possible.	Level I A randomized controlled trial	IV cell phone intervention and a personal coaching intervention DV Life style changes/ behavioral changes	CITY/ Data collected from all cohorts were combined in the final statistical analyses by a constrained longitudinal data analysis model to estimate changes in absolute weight over time	365	Participants were recruited in four cohorts from January 2011 to April 2012 so that recruitment could be paced with available resources and staffing.	18-35 years old, overweight or obese (body mass index (BMI) ≥ 25 kg/m2), and using a mobile phone	The authors think that technology offers opportunities for health promotion even though it can be very challenging due to continuous changes. Limitations: Length of study, problems with technology, changing technology. Synthesis: Using technology can improve health outcomes and well- being and provide a great tool for health promotion for the future.

De veirman, M., Hudders, L., Nelson, M. R.	2019	What is influencer marketing and how does it target children? A review and direction for future research	N/A	*Frontiers in psychology*	To investigate why and how social media influencers have persuasive power over their young followers. To get an insight into how and why social media influencers became a new source in advertising	Level I A systematic literature review	IV social media DV popularity in young people under 12 years old	SSCI-ranked journals review	8	A literature search was done employing a "title-abstract-keywords" search in the Scopus database using the keywords (influencer OR blog* OR vlog* OR microcelebrit* OR unboxing) AND (child* OR kid* OR minor* OR youth) AND (marketing OR advertis* OR commercial*) to get an insight into the literature that specifically focuses on social media influencers as an advertising source targeting children. At the time of our research (August 2019)	Papers were only included if they met the following predefined criteria: (1) only peer-reviewed articles, (2) articles examining children up to 12 years old, and (3) articles published in English.	The authors found that social media is a large and very influencial market used by children. Limitations: Lack of research, small sample size Synthesis: Social media is very popular and influencial for young generations of children.
Coates, A. E., Hardman, C. A., Halford, J. C. G., Christiansen, P., Boyland, E. J.	2019	Social media influencer marketing and children's food intake: a randomized trial	Social learning theory	*Pediatrics*	To examine the impact of social media influencer marketing of foods (healthy and unhealthy) on children's food intake.	Level I A randomized controlled trial	IV social media DV life style behaviours	A questionaire, VAS hunger rating, SPSS software	176	A convenience sample of 178 participants aged 9 to 11 years were recruited via schools in the UK	9–11 years children. This age group is active on social media19 despite platform terms and conditions setting age of participation at 13 years.	The authors found out that popular social media influencer promotion of food affects children's food intake. Influencer marketing of unhealthy foods increased children's immediate food intake, whereas the equivalent marketing of healthy foods had no effect. Increasing the promotion of healthy foods on social media may not be an effective strategy to encourage healthy dietary behaviors in children. More research is needed to understand the impact of digital food marketing and inform appropriate policy action. Limitations: Small sample size, limited to one population. Synthesis: Social media could be influencing healthy behaviors in children but more research is needed.
Morrison, A. K., Glick, A., Yin, H.S.	2019	Health literacy: Implications for child health	N/A	*Pediatrics*	To recognize key strategies and interventions to improve communication and care in preventive, acute, and chronic care.	Level III Review	IV strategies and interventions to communicate DV improved communication and health literacy	Database review: PubMed and Google Scholar	N/A	N/A	Articles addressing health literacy and interventions to improve communication	Authors found that there are several startegies and interventions to improve health literacy of parents, such as limiting information, providing written information, teaching by demonstration, etc. Limitations: This is only a review and does not provide most reliable data. Synthesis: There are several way to improve parents ' health literacy.
Peyton, D., Hiscock, H., Sciberras, E.	2019	Do digital health interventions improve mental health literacy or help- seeking among parents of children aged 2-12 years? A scoping review	Behaviour change theory (social cognitive theory).	*Studies in health technology and informatics*	To perform a scoping review of DHIs aiming to improve MHL, help-seeking behaviour or access to mental health services among parents of 2-12-year-olds with behavioural and emotional problems (BEP).	Level II A scoping review	IV parents health literacy DV usage of technology for provider communication	Ovid MEDLINE	4	Search databes performed in March 2019, limited to publications in English, peer-reviewed, from developed countries, published between 2000-2019	Studies needed to involve parents or caregivers of children with a BEP, and a DHI aiming at improving MHL, help-seeking behaviour or access to mental health services. Studies that included some participants within the given child age range (2-12 years old) were included.	The authors found out that there is preeliminary evidence that digital health interventions (DHI s) may improve mental health literacy (MHL) in parents of children. Limitations: Small sample size Synthesis: If digital health intervention can improve mental health literacy, then they may also improve health literacy in other areas of medicine.

Meyers, N., Glick, A. F., Mendelsohn, A. L., Parker, R. M., Sanders, L. M., Wolf, M. S., Bailey, S., Dreyer, B. P., Velazquez, J. J., & Yin, H. S.	2019	Parents' Use of Technologies for Health Management: A Health Literacy Perspective	N/A	*Academic pediatrics*	To examin how parent health literacy affects usage of Internet and cell phone technologies for health management	Level II cross-sectional analysis of data collected as part of randomized controlled experiment	IV parents health literacy DV usage of technology for provider communication	Newest Vital Sign	858	Randoomized selection of parents in 3 urban pediatric clinics	Parents English and Spanish speaking of children 8 years old and younger	The authors found out that Health literacy–associated disparities in parent use of Internet and cell phone technologies exist, but parents' desire for use of these technologies for provider communication was overall high and did not differ by health literacy. Limitations: Sample size, more research needs to be done Synthesis: Parents like to use technology to communicate with provider, thus this could be a promising way to provide parents with health education and improve their health literacy
Chu, J., Wadham, A., Jiang, Y., Whittaker, R., Stasiak, K., Shepherd, M., & Bullen, C.	2019	Effect of MyTeen SMS-Based Mobile Intervention for Parents of Adolescents: A Randomized Clinical Trial.	N/A	*JAMA network open*	To evaluate the effects of a text-messaging program (MyTeen) on promoting parental competence and mental health literacy for parents of adolescents.	Level I A randomized trial	IV text messaging DV parental competence and mental health literacy	the Parenting Sense of Competence Scale.	221	Parents and primary caregivers of adolescents aged 10 to 15 years were recruited from March 19 to August 17, 2018, via community outreach and social media and were randomly allocated 1:1 into the control or the intervention group.	Parent of children ages 10 to 15 years old from New Zealand. 210 mothers, 7 fathers, 3 grandparents, and 1 close relative. Most identified themselves as European. A majority of participants were married or living with partner and 168 had a college degree.	The authors concluded that the text-messaging program appears to be an effective and feasible way to reach and support a large number of parents to improve parental competence and may represent a less expensive option for service delivery. Limitation: Overpresentation by highly educated mothers from intact families Synthesis: technology, phone usage can be effective in improving parents health literacy.
Kindratt, T., Bernard, B., Webb, J., & Pagels, P.	2019	Parent-provider paediatric literacy communication: A curriculum for future primary care providers.	N/A	*Perspectives on medical education*	To develop and evaluate a curriculum to improve learners' knowledge, attitudes, and skills towards paediatric literacy concepts.	Level III Review	IV offer books to patients, provide anticipatory guidance, and demonstrate parent-provider communication skills DV Providers knowledge, attitudes, and satisfaction were collected pre- and post-curriculum	OSCE scoresheets were developed based on Reach Out and Read's 'Milestones of Early Literacy Development Chart' STATA 14.0 McNemar tests	68	Volunteers Learners (family medicine residents n = 30; medical students n = 28; physician assistant students n = 36) participated from the University of Texas Southwestern Medical Center.	Most learners were female (69%). Over half were white (32%) or Asian (27%) race/ethnicity. More were physician assistant students (38%) compared with residents (32%) or medical students (30%). All learners were required to complete the online training.	Significant increases in total knowledge were observed after completing curriculum activities ($p < 0.001$). All attitudes improved after training ($p < 0.05$). All learners (100%) recommended that caregivers talk back and forth with their 6- to 12-month-old babies and make eye contact. Few (18.2%) learners recommended playing games like 'peek-a-boo' while reading. When caregivers evaluated learners' basic parent-provider communication skills, all reported that the learners treated them with respect and used plain language.
Needlman R, Lone Z, Chae R, Abdullah N.	2018	Literacy Promotion Strategies Within Reach Out and Read: An Exploratory Study.	N/A	*Clinical Pediatrics*	To begin to fill information gaps by documenting the use of different LP strategies and their effect on parent attitudes and behaviors.	Level II A quasi-experimental cross-sectional cohort study	IV best-practice literacy promotion based on standard ROR training DV Parent attitudes and behaviors	Videotaping, interview, data collected Microsoft Excel and SPSS-13 and two-tailed Ch-square and Fisher's tests	45	Convenience sample of qualifying individuals. Children with acute illness were excluded.	English speaking parents and children aged 6months through 72 months in a primary care clinic of a hospital in large Midwest city.	Authors concluded that observation and feedback may make literacy promotion (LP) more memorable to parents and is more likely to motivate parents to improve their skills in this area. Limitations: Small convenience sample of English only patients Synthesis: Reach Out and Read recognizes that literacy promotion is essential component of primary care and seeks interventions to motivate parents to improve their skills.
Hayes, W. C.	2017	Using QR codes to connect patients to health information	N/A	*Annals of family medicine*	To investigate patients satisfaction and response to QR codes.	Level III Experiment	IV QR codes DV Health satisfaction and access to health information	Survey	Unknown	Convenience sample of anyone in primary care office	Patients of a primary care office, any age	Author found out that QR codes can be used to provide patients with health informations. Limitations: Unknown sample size, would have to be implemented in more practices and in different settings Synthesis: QR codes can be a innovative way to provide patients with health information.

Appendix B

PDSA Project Timeline

Table 1

PDSA Project Timeline

	August 2020	September 2020	Early to Mid-October 2020	Mid- to Late October 2020	November 2020	December 2020
PDSA Cycle #1	X	X	X	X	X	X
Determine components of the project.	X					
Determine and gather team members needed for the project creation and implementation.	X					
Create content for website.		X				
Design sample website.		X				
Determine cost of stickers for the QR code.		X				
Seek approval from ROR for both QR code and website content.		X				
Create website in conjunction with ROR team.			X			
Design QR code sticker.			X			
Design promotional posters for clinics.			X			
Have promotional posters translated to Spanish.			X			
Create QR code and order stickers.				X		
Create surveys for website.				X		
Get approval for survey content from ROR.				X		
Have survey translated into Spanish.				X		
Finish Website content including survey links and graphics.				X	X	
Students will put QR code stickers on the books and deliver to clinics.				X	X	
Launch website.					X	

Clinics will hand out books and promote QR code and website to parents.					X	X
	Early to Mid-January 2021		Mid- to Late January 2021	February 2021	Early to Mid-March 2021	Mid- to Late March 2021
PDSA Cycle #1	X		X	X		
Clinics will hand out books and promote QR code and website to parents.	X		X	X	X	X
Students will collect their first set of data from ROR.	X					
Weekly data will be collected from ROR and analyzed by students.	X		X	X	X	X
Sticker more books as needed per clinic.	X		X	X	X	X
Support clinics as needed.	X		X	X	X	X
Meet with ROR site champion to discuss the project and data.			X			X
Barriers to project will be discussed and ideas developed to combat these barriers.			X	X		
PDSA Cycle #2					X	
Take snacks/treats and thank you cards to the clinic to help increase buy in among staff and promote the project.					X	
Discuss parent's level of interest with clinics and potential barriers.					X	
Create QR codes that lead to Burmese translated website.					X	
Create promotional information/posters in Burmese to provide to clinics.					X	
Print Burmese QR code bookmarks and give to clinics to use for patients that are Burmese.					X	
Review the data to see if interventions made a difference.					X	X
PDSA Cycle #3						X

Attend PR event with the Asheboro clinic and providers to help promote the project.					X
Promote the project through regional Facebook groups and Instagram.					X
Create QR codes that lead to Spanish translated website.					X
	Mid- to Late March 2021	**April 2021**	**May 2021**	**June to July 2021**	
PDSA Cycle #3	X	X	X	X	
Clinics will hand out books and promote QR code and website to parents.	X	X			
Weekly data will be collected from ROR and analyzed by students.	X	X			
Sticker more books as needed per clinic.	X	X			
Support clinics as needed.	X	X			
Review the data to see if interventions made a difference.	X	X			
Print Spanish QR code bookmarks and give to clinics to use for patients that are Hispanic.	X				
Create QR Code bookmarks for English. Provide to single clinic to see if numbers increase with a different format of QR code delivery.	X				
Review other interventions that may be helpful.	X	X	X		
Evaluate data collected and overall project with group.	X	X	X		
Attend ROR Plenary Session and present project to national ROR organization.		X			
Make recommendations for project changes for the next DNP students to continue their PDSA cycles.			X	X	
Disseminate findings to university, organization, and clinics.				X	

Appendix C

Demographic Data

Table 1

Visit and Book Data from 2021 Reach Out and Read Survey

Clinic Name	Well Child Visits (6mos-5yrs)	Books Distributed	Distribution Rate	English Books	Spanish Books
Clinic A	130	130	100.0%	95.0%	5.0%
Clinic B	389	389	100.0%	100.0%	0.0%
Clinic C	1497	1485	99.2%	60.0%	40.0%
Clinic D	287	287	100.0%	85.0%	15.0%
Total:	2303	2291	99.5%	85.0%	15.0%

Table 2

Insurance Data from 2021 Reach Out and Read Survey

Clinic Name	Self-Pay/ Uninsured	Private Insurance	Medicaid	Medicare, CHIP, Tricare, Other
Clinic A	2.0%	5.0%	93.0%	0.0%
Clinic B	5.0%	3.0%	91.0%	1% (Tricare)
Clinic C	3.0%	12.0%	83.0%	2% (CHIP)
Clinic D	1.0%	23.0%	76.0%	0.0%
Total:	2.8%	10.8%	85.8%	0.0%

Table 3

Racial Demographic Data from 2021 Reach Out and Read Survey

Clinic Name	White	Black	Hispanic	Other
Clinic A	51.0%	25.0%	24.0%	n/a
Clinic B	19.0%	23.0%	18.0%	40% (38% Asian)
Clinic C	5.0%	24.0%	62.0%	5% (Multiracial), 4% (Other)
Clinic D	66.0%	1.0%	32.0%	1% (Unknown/ Unreported)
Total:	35.3%	18.3%	34.0%	24.5%

Table 4

Language Data from 2021 Reach Out and Read Survey

Clinic Name	Main Language	Other Languages
Clinic A	English (95%)	Spanish (5%)
Clinic B	English (66%)	Arabic (2%), Burmese (14%), Karenic (7%), Spanish (9%), Vietnamese (1%), Kinyarwanda (1%)
Clinic C	Spanish (52%)	Arabic (1%), English (38%), Other (9%)
Clinic D	English (76%)	Spanish (23%), Other (1%)
Total:	English (68.75%)	

Appendix D

Website and Survey Data

Table 1

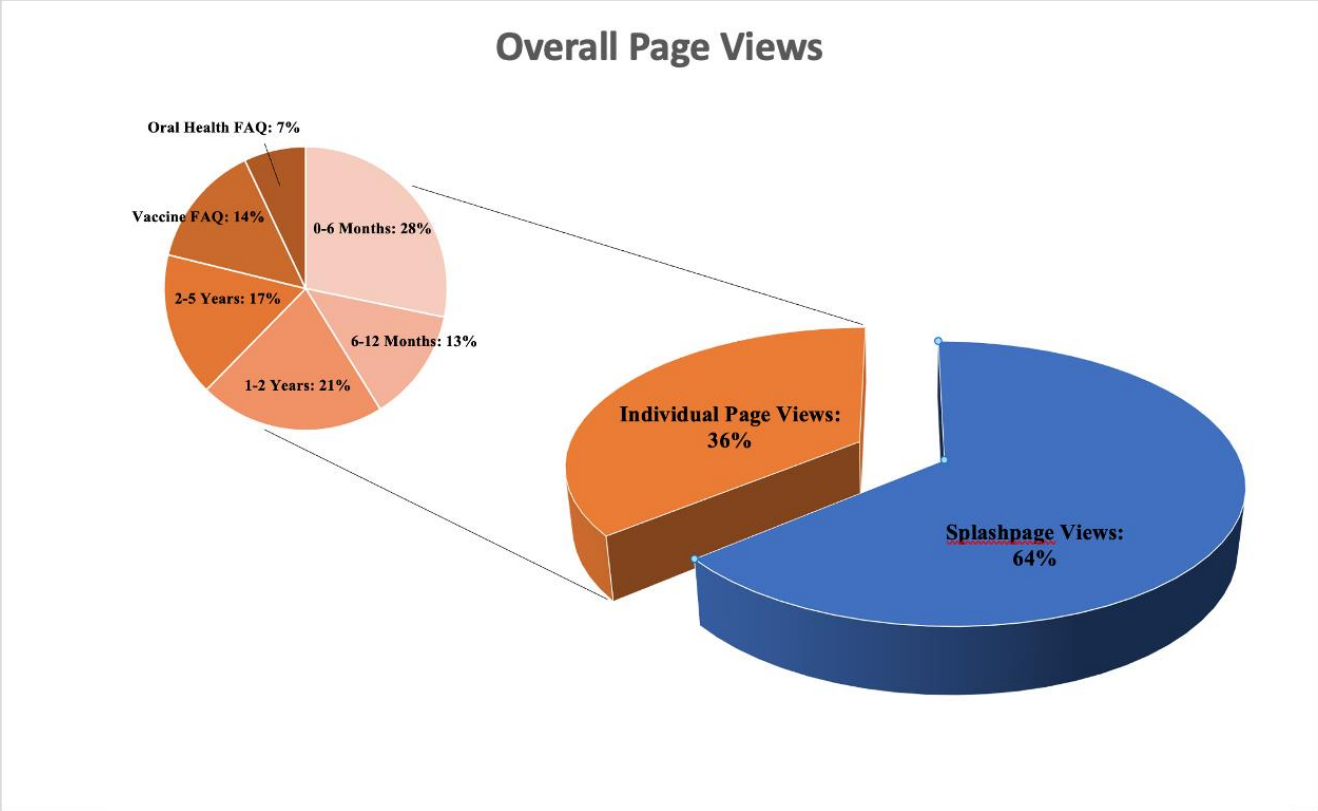
Website Analytics

Overall Views	Splashpage	0-6 months	6-12 months	1-2 years	2-5 years	Vaccine FAQ	Oral Health FAQ
November	63	7	0	7	4	6	0
December	5	2	0	3	1	1	1
January	15	4	0	0	0	1	2
February	8	2	1	3	1	2	0
March	38	4	6	5	0	1	0
April	55	11	9	9	9	5	3
Total:	184	30	16	27	15	16	6
Unique Views	**Splashpage**	**0-6 months**	**6-12 months**	**1-2 years**	**2-5 years**	**Vaccine FAQ**	**Oral Health FAQ**
November	52	6	0	5	4	3	0
December	5	2	0	3	1	1	1
January	15	4	0	0	0	1	2
February	7	2	1	1	1	1	0
March	29	4	6	4	0	1	0
April	43	6	4	5	8	5	3
Total:	151	24	11	18	14	12	6

Note: The data above was collected using ROR's website analytics from November 1, 2020 to April 30, 2021.

Figure 1

Reach Out and Read Health Literacy Website: Overall Page Views



Note: Overall, the majority of website views occurred on the main splash page. This is expected, as this is where the QR code takes parents to when scanned. More than 1/3 of the views occurred on the individual pages for various age groups with the majority of views on the 0-6 month page (28%), followed by 1-2 years (21%), 2-5 years (17%), Vaccine FAQs (14%), 6-12 months (13%), and finally Oral Health FAQs (7%).

Appendix E

Table 1

Project Budget

	TIME	MONEY	TOTAL
INITIAL COSTS			
Website			
Developing Website Content	63	~	$0.00
Creating, Building, and Designing Website	~	~	$0.00
Students	25	~	$0.00
ROR Communication Director	20	~	$0.00
Website Hosting*	~	~	$0.00
Website Domain*	~	~	$0.00
Total:	***108***	***~***	***$0.00***
Project Books			
ROR Books**	0	~	$0.00
Stickering Books	31.75	~	$0.00
Total:	***31.75***	***~***	***$0.00***
QR Code			
Design and Development	1	~	$0.00
Ordering Stickers	1	2,500 1"x1" stickers***	$156.88
Dividing Supplies for various clinics	6.5	~	$0.00
Total:	***8.5***	***~***	***$156.88***
Posters			
Developing Content and Designing Posters by students	9	~	$0.00
Redesigned to Fit ROR Parameters by ROR Communication Director	1	~	$0.00
Translation of Poster Into Spanish using ROR translators	1	~	$0.00
Printing, Laminating, and Sorting Posters for each clinic (68 total)	5	~	$0.00
Ink (2 cartridges)	~	$28.69 x 2=$57.38 + $4.30 (tax) =	$61.68
Paper (1 pack)	~	$22.40 + $1.68 (tax) =	$24.08
Laminator (1 machine)	~	$28.43 + $2.13 (tax)=	$30.56
Laminating Pouches (2 packs)	~	$20.44 x 2=$40.88 +$3.07 (tax)=	$43.95
Total:	***16***	***~***	***$160.27***
Supply Distrubution			
Distribution of Supplies to clinics	14	848 miles x $0.54 per mile****	$457.92
Total:	**14**	**~**	**$457.92**
PDSA CYCLE COSTS			
Language Specific QR Code Design, Translation, & Bookmark Design			
Burmese	8	~	$0.00
Spanish	6	~	$0.00
English	3	~	$0.00
Printing Bookmarks			
Burmese	~	Professionally Printed (80)	$71.74
Spanish	1	Printed by Student (100)	$16.37
English	1	Printed by Student (100)	$16.37
Total:	***19***	***~***	***$104.48***
OVERALL COST:	***197.25***	***~***	***$879.55***

Notes: *Utilized ROR's current website, so this was not an additional cost of the project

**ROR was already giving out books at well child visits, so this was not an additional cost to the project

***Includes stickers, taxes, and shipping

****Standard reimbursement rate for mileage

Table 2

Proposed Project Budget for Other Organizations

	TIME	MONEY	TOTAL	REFERENCES
INITIAL COSTS				
Website				
Developing Website Content and Creating, Building, and Designing Website	~	~	$5,000.00	(Carney, 2020)
By Website Developer	~	~	~	~
Website Hosting*	~	~	$450.00	(Carney, 2020)
Website Domain*	~	~	$50.00	(Carney, 2020)
Total:	***0***	**~**	***$5,500.00***	**~**
Project Books				
Books	0	$3 x 2,303=	$6,909.00	~
Stickering Books	31.75	~	$0.00	~
Total:	***31.75***	**~**	***$6,909.00***	**~**
QR Code				
Design and Development*	1	Ranges $60-72	$66.00	(Payment, n.d.; Plans & Pricing, n.d.; Pricing & Plans, n.d.)
Ordering Stickers	1	2,500 1"x1" stickers**	$263.09	(Custom Roll Labels, n.d.)
Dividing Supplies for various clinics (per clinic)	1.5	~	$0.00	~
Total:	***3.5***	**~**	***$329.09***	**~**
Posters				
Professionally Designed Posters	0	$150 Per Poster x2=	$300.00	(Custom Poster Design Packages Plan & Pricing, n.d.; Pricing Guide, n.d.)
Translation of Poster into Spanish	0	$20 per translation	$20.00	(Spanish Translation Services Prices, n.d.).
Professional Printing of Posters (68)	0	~	$248.36	(Grand Format Posters, n.d.)
Professional Lamination of Posters (68)	0	~	$34.00	(Copies, Binding, & Lamination, n.d.)
Total:	***0***	**~**	***$602.36***	**~**
Supply Distrubution				
Distribution of Supplies to Clinics (per clinic)	1	Additional Shipping to Clinics	$8.55	(Price List, n.d.)
Total:	***1***	**~**	***$8.55***	**~**
Bookmarks				
Professionally Designed English Bookmark	0	$178	$178.00	(Bookmarks, n.d.)
Translation of Bookmark Into Spanish and Burmese	0	$2.42 (Spanish)+$1.98 (Burmese)	$4.40	(Average Rates Charged for Translations, n.d.)
Professionally Made Pre-Translated Bookmarks	0	$38 x 2 bookmarks=	$76.00	(Bookmarks, n.d.)
Printing Bookmarks (500 per language)	0	$47 x 3 runs of bookmarks=	$141.00	(Bookmarks, n.d.)
Total:	***0***	**~**	***$399.40***	~
OVERALL COST:	***36.25***	**~**	***$13,748.40***	**~**

Notes: By utilizing the proposed budget, an organization would spend $12,868.85 more to have things designed and printed professionally. However, they would save 161.25 hours in organizational labor.

*Annual Recurring Cost **Includes stickers, taxes, and shipping

Appendix F

Project Implementation Worksheet Form 8274A

FORM 8274A

Project Implementation Worksheet & Tools

(this form should be completed while meeting with your site champion(s) on or after 1/19/2021 & should contain specific detailed information)

Student's Name Jaime Davis, Sydney Sharpe, Gosia Tiger, and Danielle Tupes

Project Site Champion [redacted]

Project Name Increasing Health Literacy of Parents with Children Ages 0 to 5 Regarding Oral Health and Immunizations

What data will you be collecting? We will be collecting responses recorded in a parental survey that was created by the students and organization. Traffic to the website will also be recorded via Reach Out and Read's analytic program and demographic information for the clinics will also be collected.

Where will you get the data? Reach Out and Read (ROR) will collect survey responses from SurveyMonkey and send the data to students. ROR will use a website analytics program to analyze traffic data and forward the data to the students.

How often will you be at the project site? We will meet with ROR every two to four weeks. We have already been in the clinic to apply QR codes at the beginning of the project implementtation phase in November. We may return to the clinics as needed if more QR codes need applied later. At least sixty hours will be spent in direct engagement with ROR.

How often will you meet with your site champion? We will meet with our site champion every two to four weeks.

What tools will you use to track implementation and data (PDSA, Excel tracking form, etc)?

We will be using the PDSA model for our project and will use an excel spreadsheet to track the data we collect.

Why did you select this tool or method? Succinctly and thoroughly tell faculty why this seemed like the optimal tool/method.

We chose the PDSA because the cycles can be fluidly adjusted to meet our project's timeline and evolution. We have planned the first cycle of our project. We began our project implementation in November 2020 ("do"). Data was collected over the holiday break and ROR provided the data for us to review upon returning in January 2021 ("study"). We will "act" on the data by making project adjustment recommendations. We will then apply the implementation adjustments and begin a new cycle.

What is the implementation methodology or change theory that you are using to guide you through the implementation phase of the project?

We will be using the PDSA model for our project, as well as Nutbeam's Health Literacy Theory to guide the implementation of our project.

Why did you select this tracking tool/method? Succinctly and thoroughly tell faculty why this seemed like the optimal tool/method.

As mentioned above, we chose the PDSA because the cycles can be fluidly adjusted to meet our project's timeline and evolution. We also chose Nutbeam's Health Literacy Theory for our project because it is specific to our problem and it focuses on individual as well as system changes to help increase health literacy.

How will you communicate changes and project status to each member of your project team – academic and team members with the project site?

We will communicate within the group members, faculty, and site champion via e-mail and/or Zoom or WebEx meetings regarding changes and project status.

Complete the following dates and map these on a timeline (Google "timeline" and construct your timeline using Word, Powerpoint, or Excel)

Date Implementation began or will begin November 2020.

Date (after 1/19/2021) for meeting with site champion to discuss your chosen tools and timeline. February 1, 2021

Discuss your plan(s) for meeting with the site champion (frequency, specific dates, phone vs face-to-face, etc). ***Be as specific as possible.***

We will meet with our site champion every 2-4 weeks via Zoom or e-mail meetings. Ideally, we will have at least one Zoom meeting each month to touch base with e-mail communications between the project team and the site champion.

I have met with and discussed my tools and implementation plan with my site champion. We are in agreement to the tools, processes, and timeline.

Student Signature Malgorzata Tiger_____ Date _2/4/2021_____

Site _ROR Carolinas_____

Site Champion Signatur[redacted] Date 2/4/2021

Appendix G

Project Management Report Form 8274B #1

FORM 8274.B

Project Management Report

Name _Jaime Davis, Sydney Sharpe, Gosia Tiger, and Danielle Tupes_____

Were you able to collect the data you thought you'd collect? (**Yes**) No

If no, why not? _We have been able to collect the specific data that we thought we'd be able to collect, but the amount of data has been less than we were expecting due to less than anticipated site traffic. Also, the demographic data available to the clinic has been slightly different than what we anticipated we'd be able to collect, because ROR only collects the data twice a year and has given clinics the ability to opt out of answering some demographic questions due to COVID. We are also missing November site traffic and survey data, but we anticipate Teandra providing this information at our next meeting.

Did you meet with your site champion on the date(s) you had planned to meet? (**Yes**)

No If not, why not?

_____

Succinctly identify & discuss barriers to your implementation.

- COVID has been a barrier in multiple ways because:
  - We are unable to go into clinic to promote the project among staff and parents.
  - Staff are overworked in the clinic dealing with the varying changes that have occurred since COVID began. There is some degree of burnout related to extra duties. Promoting the project is not top priority.
  - Posters have been ordered to be removed due to infection control risk in some clinics. o Patients are not waiting inside the clinic waiting rooms or exam rooms as long as before COVID, if at all. Therefore, they are not getting time to read the project-promoting posters.
- Staff are having to promote the project and are not as invested.
- Danielle's clinic has a large Burmese population that are unable to read or speak English, which was not expected.

- There is potentially a lack of incentive for parents to go to the website and potentially a lack of incentive for staff to promote the project despite students reaching out and promoting the project to staff members.

Did you update/revise your tools (PDSA, data collection tools, etc.)? **Yes** No

If No, why not? _____

_____

What date(s) were you at your project site during this implementation interval (face-to-face or virtually)? We were in contact with our ROR site champion via e-mail at least weekly (1/27/21, 1/28/21, 2/1/21, 2/2/21, 2/3/21, 2/4/21, 2/8/21, 2/16/21, 2/22/21, and 2/24/21). Each student was in contact with their individual clinic a few times during this implementation interval to check in on the status of the project and promote the project. The group met with our site champion, Teandra Ramos-Hardy, via zoom meeting on 2/19/21.

Succinctly identify 1-3 things you've learned during this implementation interval.

- The website traffic and survey responses are not as plentiful as we were hoping for initially.
- Our demographic information will be collected from surveys done prior to the project, and it will not be collected again until after project completion.
- Some demographic information may not be available as clinics were given the option to opt out of providing some information due to COVID.
- We need to find ways to incentivize both staff and parents without being present in the clinics.
- Danielle's clinic may need new QR codes to direct the Burmese population to the translated website.

Statement of Collaboration

We have collaborated on the revision of the Operational Tool, Tracking Tool, and agree that this project is on target with the timeline. As needed, provide additional comments on the following page.

Student Signature [redacted] Date 3/5/21

Site Champion Signa[redacted]ate 3/4/2021

Comments

Please share addition thoughts/notes on progress, barriers, concerns, etc.

My thoughts are:

We will not be able to collect the amount of data that we were initially expecting and hoping to gather. However, we will still be able to utilize the information that is available to us. The above-mentioned barriers give us a great learning opportunity and will help us to improve this and future projects. We are looking into ways that would allow us to promote our project to targeted populations more effectively. We are also discovering ways to encourage staff in pilot clinics to promote our project since they are directly in contact with the patient population.

Appendix H

Project Management Report Form 8274B #2

FORM 8274.8#2

Project Management Report

Name Jaime Davis, Sydney Sharpe, Gosia Tiger, and Danielle Tupes

Were you able to collect the data you thought you'd collect? Yes

If no, why not? The concern about decreased amount of data collected continues, but the group has done a few interventions and numbers are starting to pick up. Giving QR code bookmarks in varying languages has seemed to have the most impact on website traffic. but survey responses are still down.

Did you meet with your site champion on the date(s) you had planned to meet? Yes

If not, why not?

Succinctly identify & discuss barriers to your implementation.

- COVID continues to be a barrier in multiple ways because...
    - We are unable to go into clinic to promote the project among both staff and parents
        - Update: We have provided some food and thank you cards to the staff on site to help remind them about promoting the website, which has shown some benefit.
        - Update: Jaime's ROR liaison for Randolph County has done a PR event and write up to help promote the project. Numbers for site traffic have increased since then.
    - Staff are already overworked in clinic dealing with the varying changes that have occurred since COVID began, so there is some degree of burnout related to extra duties so promoting the project is not top priority
        - Update: As COVID cases decrease and more people are vaccinated, hopefully, staff will return to some level of normalcy that will allow them to promote the project more.
    - Posters have been ordered to be removed due to infection control risk in some clinics meaning there is a lack of promotion there
        - Update: Sydney's clinic was one of the sites that had to remove posters and a bulletin board case has been ordered to hang the posters in that will minimize infection risk and the infection control team is okay with this. However, it may take a while for this to go into effect. Therefore,

the clinic has started printing the promotional posters and handing them to parents at the well child visits until this can happen.

- Patients are not waiting inside the clinic waiting rooms or even in exam rooms as long as before COVID, if at all. Therefore, they are not getting time to read posters which promote the project.
    - Update: This continues to be an issue that we haven't found a way to address yet.
- Staff are having to promote the project and there is not as much buy in o Update: We have provided some food and thank you cards to the staff on site to help remind them about promoting the website, which has shown some benefit.
- Danielle's clinic has a large Burmese population that are unable to read or speak English which was not expected.
    - Update: New QR codes that lead straight to the website, already translated in Burmese, were generated and printed as bookmarks. Clinic staff can put them in the books for parents that need Burmese translation. We've also done this for Spanish for Sydney's clinic who has large Spanish speaking population. The site coordinator there has been concerned about it not being in Spanish and therefore, has not been very motivated to engage parents since she doesn't know how to instruct them to get to the site in Spanish. Numbers have increased since doing both interventions.
- There is potentially a lack of incentive for parents to go to the website and potentially a lack of incentive for staff to promote the project despite students reaching out and promoting the project to staff members.
    - Update: We've tried to provide some low-cost incentives with thanking site staff and providing goodies for their hard work. Sites seem to say parents are interested in the information, so we're not entirely sure why there isn't more traffic other than being busy in their daily lives. Possible ways to help incentivize parents more would be to provide a prize drawing for parents if surveys were filled out, but it seems too late in this cycle to be able to raise the funds to pay for a prize and then promote it but could be a likely approach for next year's students. Did you update/revise your tools (PDSA, data collection tools, etc.)? Yes

What date(s) were you at your project site during this implementation interval (face-to-face or virtually)? We were in contact with our ROR site champion via e-mail at least weekly (3/1/21, 3/4121. 3/5/21, 3/8/21, 3/10/21, 3/15/21, 3/16/21, 3/22/21, 3/25/21, and 3/29/21). Each student was in contact with their individual clinic a few times during this implementation interval to check in on the status of the project and promote the project. The group met with our site champion, [redacted], via zoom meeting on 3/31121.

Succinctly identify 1-3 things you've learned during this implementation interval.

- The website traffic has picked up some with our various interventions, although we've seen the most response after implementing the Spanish and English QR code bookmarks.
- The survey response still seems to be down despite interventions.
- We need to find ways to incentivize both parents to take the survey without being present in the clinics. We discussed maybe a prize drawing, but there would be a few concerns there like paying for the prize, promoting the drawing, and finding ways to protect the information given for those who enter the drawing.

Statement of Collaboration

We have collaborated on the revision of the Operational Tool, Tracking Tool, and agree that this project is on target with the timeline. As needed, pfovide additional comments on the following page.

Student Signature [redacted] 3/31/2021

Site Champion Signature [redacted] Date 3/31/2021

Comments: Please share addition thoughts/notes on progress, barriers, concerns, etc.

My thoughts are —

Overall, the interventions of providing language specific QR codes, as well as bookmarks, seems to be helping promote website traffic. We still are having difficulty assessing whether the intervention has been effective in promoting health literacy due to low survey response. While I think it's too late in this project for our group to find a way to incentivize surveys, I think the next group may be able to get more responses on surveys with prize drawings.

Appendix I

DNP Essentials

	Description	Demonstration of Knowledge
Essential I ***Scientific Underpinning for Practice***	**Competency** – Analyzes and uses information to develop practice **Competency** -Integrates knowledge from humanities and science into context of nursing **Competency** -Translates research to improve practice **Competency** -Integrates research, theory, and practice to develop new approaches toward improved practice and outcomes	Researching and analyzing project topics and using evidenced-based resources to develop project ideas. Using and translating the research into a QI project to improve practice outcomes related to improving the health literacy of parents of children ages 0-5 about immunization and oral care.
Essential II ***Organizational & Systems Leadership for Quality Improvement & Systems Thinking***	**Competency** –Develops and evaluates practice based on science and integrates policy and humanities **Competency** –Assumes and ensures accountability for quality care and patient safety **Competency** -Demonstrates critical and reflective thinking **Competency** -Advocates for improved quality, access, and cost of health care; monitors costs and budgets **Competency** -Develops and implements innovations incorporating principles of change **Competency** - Effectively communicates practice knowledge in writing and orally to improve quality **Competency** - Develops and evaluates strategies to manage ethical dilemmas in patient care and within health care delivery systems	Developed project outline and presented to the leadership of project team. Advocated and developed a project that can improve education, health literacy, and access to care during a global pandemic.
Essential III ***Clinical Scholarship & Analytical Methods for Evidence-Based Practice***	**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	Literature review and analysis of literature used to determine the best intervention for the project would improve outcomes for the patients, nursing community, and healthcare organization.
Essential IV ***Information Systems – Technology & Patient Care Technology for the Improvement & Transformation of Health Care***	**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	Utilized technology to develop an educational website, QR codes, and promotional material to implement a project and to be used by health care providers and parents of children ages 0-5 to improve their health literacy regarding vaccinations and oral care of children.

	Description	Demonstration of Knowledge
Essential V ***Health Care Policy of Advocacy in Health Care***	**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 **Competency** – Advocates for nursing within the policy arena **Competency**- Participates in policy agendas that assist with finance, regulation and health care delivery **Competency** – Advocates for equitable and ethical health care	Educational material about immunization and oral care and meetings with stakeholders to discuss development of project prior to implementation.
Essential VI ***Interprofessional Collaboration for Improving Patient & Population Health Outcomes***	**Competency**- Uses effective collaboration and communication to develop and implement practice, policy, standards of care, and scholarship **Competency** – Provide leadership to interprofessional care teams **Competency** – Consult intra-professionally and inter-professionally to develop systems of care in complex settings	Worked with ROR site champion, ROR information technology specialist, the staff of clinics where the project was piloted, and faculty of the ECU to develop and communicate project ideas. Collaborated with group team members to develop and evaluate the implementation of the project.
Essential VII ***Clinical Prevention & Population Health for Improving the Nation's Health***	**Competency**- Integrates epidemiology, biostatistics, and data to facilitate individual and population health care delivery **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	Utilized change models, including the PDSA cycle and Nutbeam Theory of Health Literacy framework, to develop and continue to modify the project when barriers arose to improve outcomes related to health literacy of parents ages 0-5 regarding immunizations and oral care.
Essential VIII ***Advanced Nursing Practice***	**Competency**- Melds diversity & cultural sensitivity to conduct a 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	Included diversity and cultural findings of the community where the project was performed and the needs of that region. Also designed, implemented, and evaluated interventions to improve outcomes, including quality outcome measures, care delivery, and fiscal responsibility.

Appendix J

DNP Project Poster

Figure 1

DNP Project presentation slides one and two

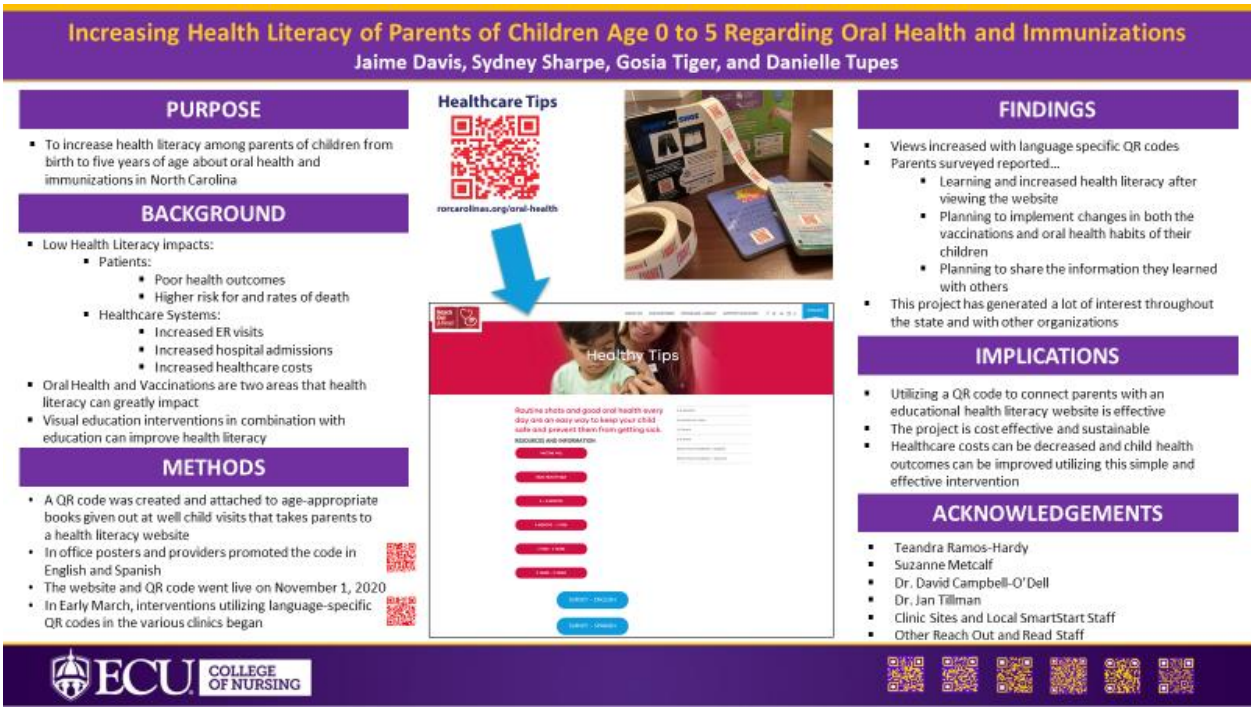
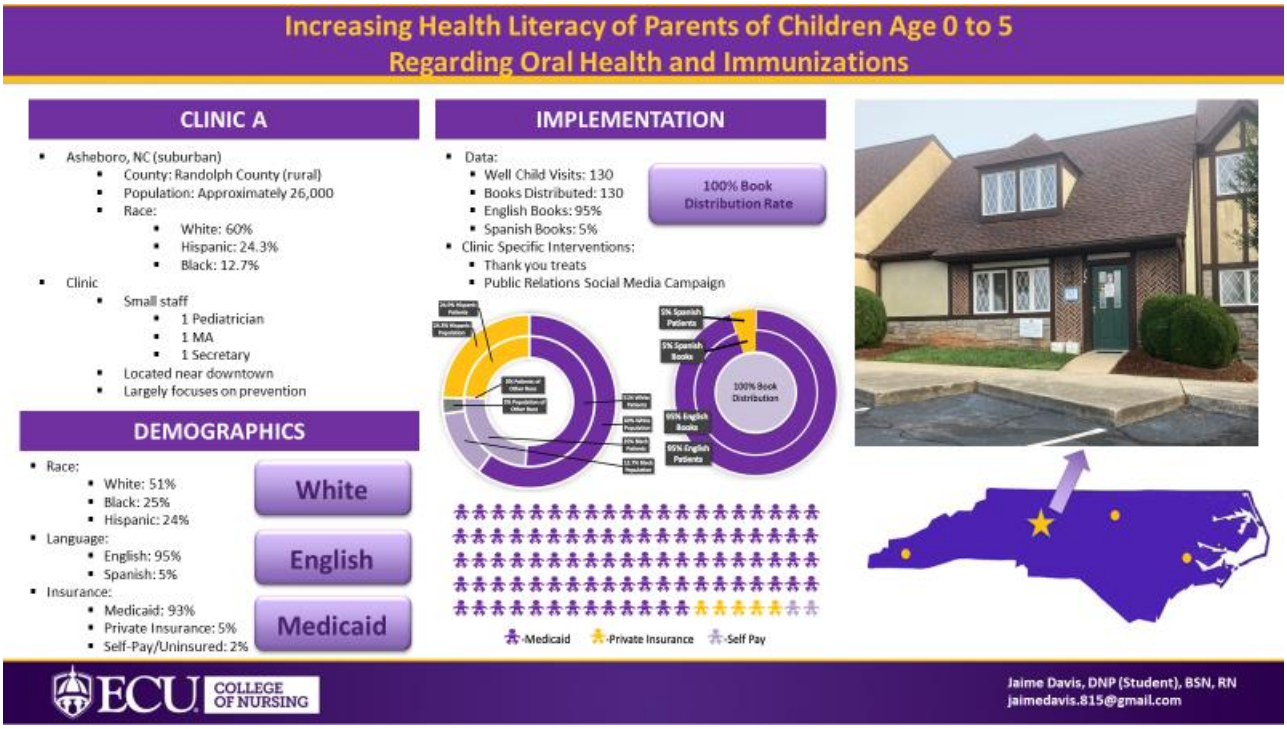


Figure 2

DNP Project presentation slides three and four



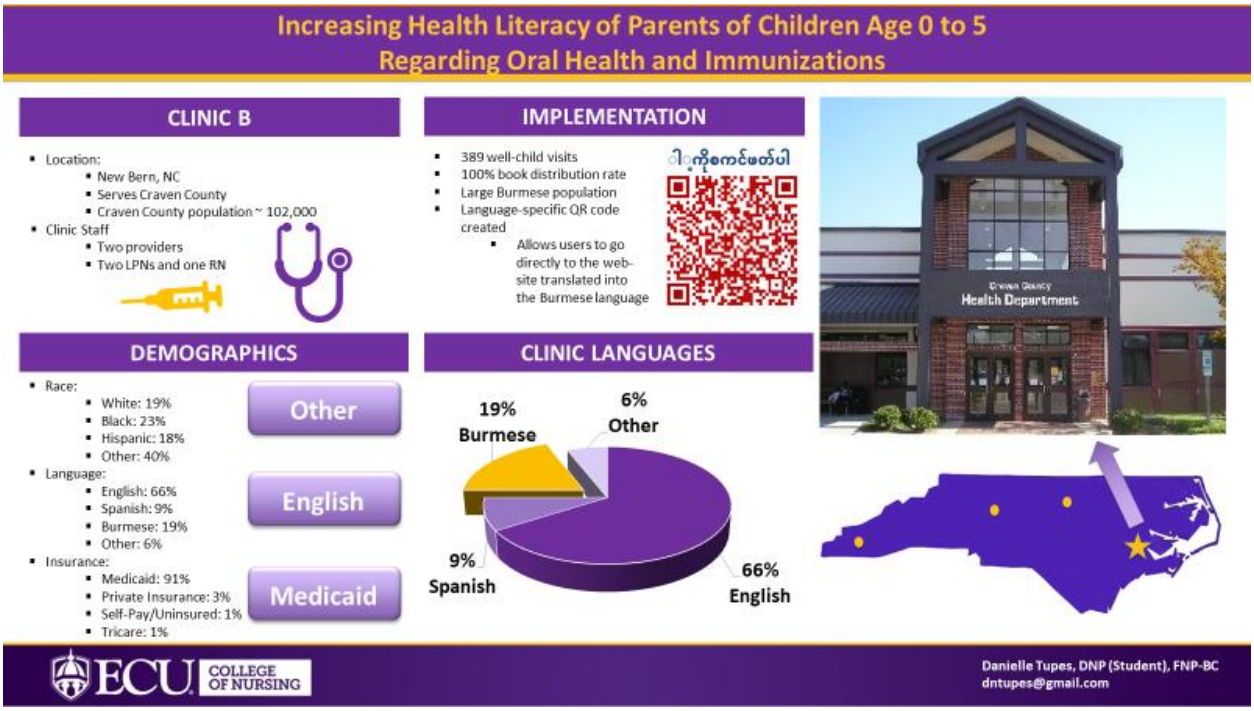


Figure 3

DNP Project presentation slides five and six

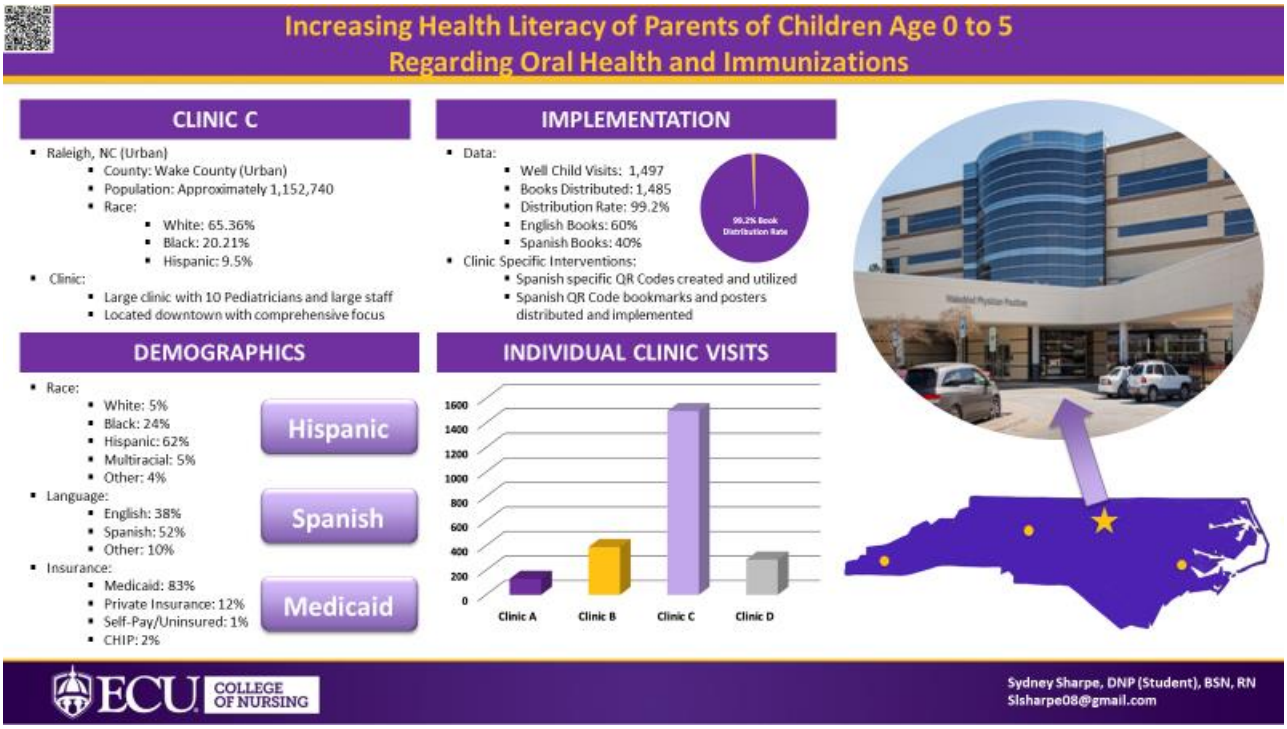
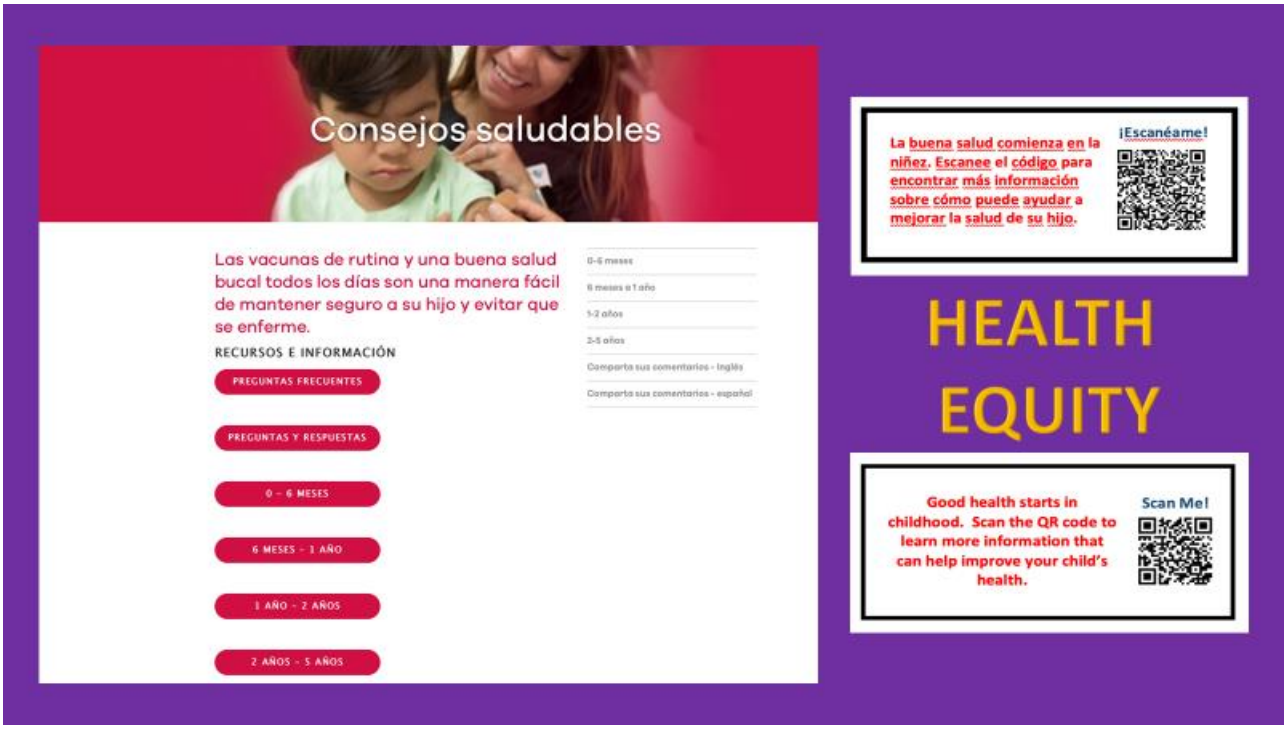


Figure 4

DNP Project presentation slides seven and eight



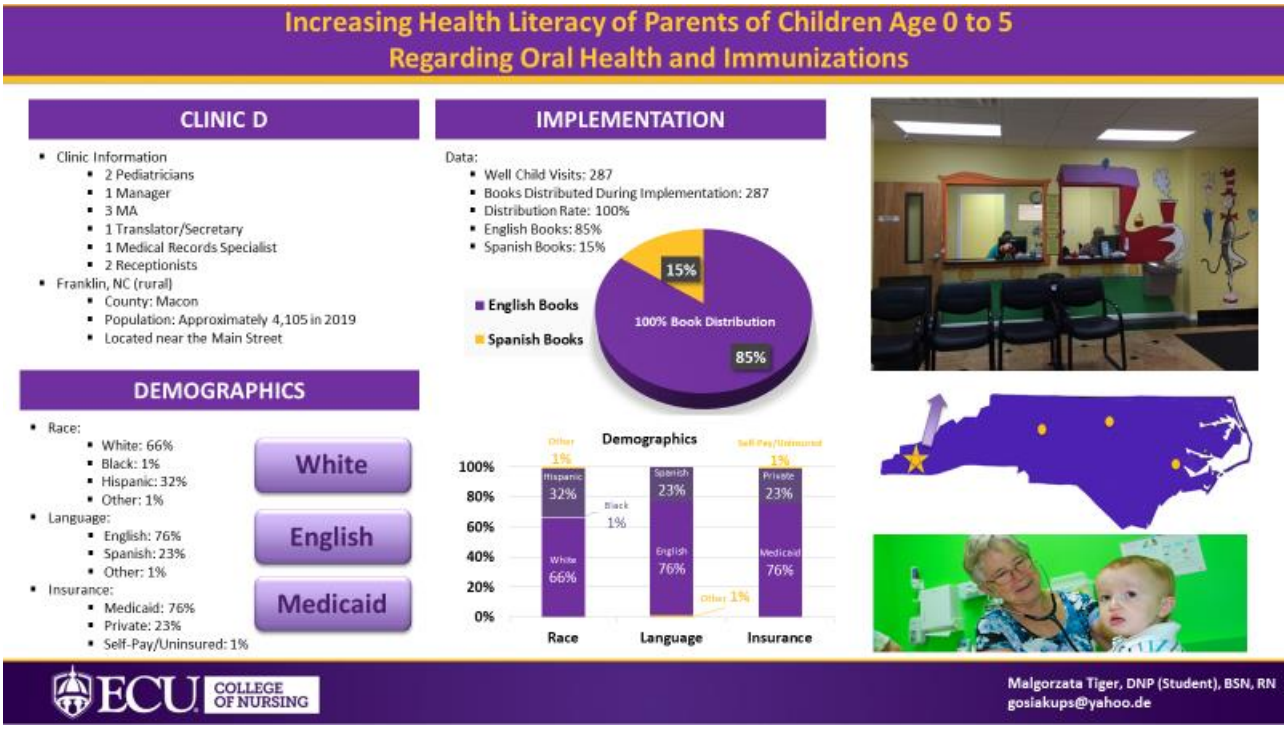


Figure 5

DNP Project presentation slide nine