Promoting Immunization and Oral Health Literacy Among Parents

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Notes from the Author

I dedicate this paper to my loving husband, Michael, and daughter, Aaliyah. You selflessly sacrificed for many years while I pursued my dreams. You were my sole source of strength and motivation when I wanted to give up. Michael, you faithfully believed in me, even when I did not believe in myself. No matter how trying times were, you supported me, encouraged me, and championed my success. Words cannot express how much I love you both. This is for you.

My sincerest gratitude to my colleagues Gosia Tiger, Jaime Davis, and Sydney Sharpe for the countless hours dedicated to the success of this project. To Mrs. Teandra Ramos-Hardy, I extend my warmest thanks for your commitment to this project. Your insight and assistance were invaluable.

Abstract

Pediatric periodontal and immunization-preventable disease are leading causes of pediatric morbidity. Evidence-based literature supports that improving parental health literacy can reduce pediatric periodontal and immunization-preventable disease. Numerous educational techniques have been researched to promote health literacy. Technology-based education, specifically quick response (QR) codes and website platforms, have been increasingly examined. This quality improvement (QI) project implemented a QR code-linked website that aimed to promote functional, interactive, and critical health literacy regarding pediatric oral health and immunizations. The target population was parents with children ages zero to five years. The QI initiative was in partnership with nonprofit organization Reach Out and Read and four East Carolina University Doctor of Nursing Practice students. The project was implemented in four pilot clinics in North Carolina between November 2020 and April 2021. Website traffic analytics and parental surveys were utilized to determine the project's impact on parental health literacy.

Keywords: health literacy, parental health literacy, oral health, immunizations, periodontal disease, immunization-preventable disease, education, QR code, website

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Section I. Introduction

Background

Parental health literacy refers to the parent's or caretaker's ability to interpret, evaluate, and utilize health-related information to make informed healthcare decisions for their children (Malloy-Weir et al., 2016). Low parental oral health literacy is associated with an increased risk of pediatric dental decay and reduced oral health quality of life (Firmino et al., 2018). Underdeveloped parental health literacy can also contribute to inadequate immunization knowledge, decreased pediatric immunization, and increased pediatric infectious disease (Castro-Sanchez et al., 2016). This project aims to improve parental immunization and oral health literacy. The project was completed in partnership with Reach Out and Read, a national nonprofit organization (Reach Out and Read, n.d.-a).

Organizational Needs Statement

Reach Out and Read identified a need to improve oral health and immunization literacy among parents of children ages birth to five years old. Reach Out and Read's mission is to provide young children with a successful foundation by promoting pediatric literacy through books and reading (Reach Out and Read, n.d-a.). However, the organization discovered that low parental health literacy impedes the child's potential to cultivate literacy. Through clinical observation, the organization recognized a specific deficit in parental oral health and immunization literacy (T. Ramos-Hardy, personal communication, June 22, 2020). While Reach Out and Read does not possess any organizational ACO benchmark data, the 2020-2021 benchmark ACO-5 focuses on health promotion and education (Centers for Medicare & Medicaid Services, n.d.).

The organization's need interconnects with the Triple Aim's three dimensions: patient care experience, population health, and reducing the per capita cost of healthcare (Institute for Healthcare Improvement [IHI], n.d.-a). First, improving parental health literacy can enrich the patient's experience by enhancing self-fulfillment, empowerment, satisfaction with care, and the patient-provider relationship. Improving population health, the second dimension, is also demonstrated in the organizational need. Increasing parental immunization and oral health literacy aims to promote the pediatric population's health by eliminating periodontal disease and immunization-preventable infectious disease. Lastly, increasing parental health literacy may reduce the per capita cost of healthcare. Improving parental health literacy seeks to increase low-cost pediatric immunization and preventative dental care, which will subsequently reduce expensive secondary and tertiary care related to infectious and periodontal disease.

Healthy People 2020 has numerous objectives that pertain to health literacy, immunization, and oral health. Objective HC/HIT-1 aims to improve the population's health literacy (Office of Disease Prevention and Health Promotion [ODPHP]-a, n.d.). Objective IID-1 seeks to reduce or eliminate immunization-preventable disease. Specifically, IID-1.1 IID-1.2, IID-1.3, IID-1.6, IID-1.7, and IID-1.10 target the eradication of immunization-preventable disease in the pediatric population. Similarly, IID-7, IID-8, IID-9, IID-10, and IID-12 strive to improve pediatric immunization rates (ODPHP-b, n.d.). Objectives OH-1 and OH-2 seek to reduce pediatric dental caries and decay, respectively. OH-7 and OH-8 call for increasing the proportion of the pediatric population who have accessed dental care and received preventative dental care within the last year (ODPHP-c, n.d.).

Problem Statement

Reach Out and Read identified inadequate immunization and oral health literacy among their parental population. Low parental health literacy regarding pediatric oral health and immunizations can hinder the parent's ability to understand and provide appropriate care to their child. Consequentially, the child can suffer from periodontal disease and immunization-preventable illness (Castro-Sanchez et al., 2016; Firmino et al., 2018).

Purpose Statement

The purpose of this project was to promote health literacy regarding pediatric oral health and immunization among parents who have children ages birth to five years. Quick response (QR) codes were placed on the back covers of the Reach Out and Read books that are provided to children at their well-child visits. The QR codes directed parents to a webpage containing convenient, understandable, and accurate information regarding childhood immunizations and oral health.

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Section II. Evidence

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Literature Review

PubMed, CINAHL, and ProQuest were the databases utilized in the literature search. MESH terms included in the literature search were "Immunization," "Vaccination," "Health Literacy," "Parents," "Health Education," "Dental," "Oral Health," "mHealth," and "online." Other keywords and key phrases included "QR codes," "patient education," "poster," "motivate," "improving parent health literacy," and "maternal and child oral health." Two search inquiries were limited to systematic reviews only; another inquiry was limited to scholarly journal sources only. Initial search limitations for all inquiries included English language, full-text availability, and a publish date within the last five years. All levels of evidence were considered. A total of 575 articles were returned. Article abstracts were reviewed to determine

relevance to the project's scope. Any irrelevant articles were discarded. The remaining articles were read in their entirety to determine applicability and quality. See Appendix A for the detailed literature search log and Appendix B for the literature matrix.

Current State of Knowledge

The literature did not establish current guidelines or best practices. No educational method was recommended or deemed to be superior in promoting parental health literacy. Furthermore, the literature did not identify specific educational points to include in oral health and immunization literacy promotion efforts.

Parental immunization and oral health literacy promotion efforts are an emerging topic of interest. Therefore, the literature specific to parental immunization and oral health literacy promotion approaches is limited. Available literature shows that parental education improves parental immunization and oral health literacy and knowledge (Borrelli et al., 2019; Dudovitz et al., 2020; Dumit et al., 2017; El Fadl et al., 2016; Ismail et al., 2018; Muscat et al., 2020; Otsuka-Ono et al., 2019; Papapchrisanthou & Loman, 2018; Toniazzo et al., 2019; Watterson et al., 2015). The literature identified several techniques to educate parents on pediatric immunization and oral health. Technology-based educational platforms are gaining popularity and are effective (Borrelli et al., 2019; Dumit et al., 2017; Muscat et al., 2020; Otsuka-Ono et al., 2019; Riera et al., 2017; Toniazzo et al., 2019; Watterson et al., 2015). Parental health literacy promotion efforts regarding other topics, such as childhood asthma and developmental milestones, show promise and may be adapted to promote immunization and oral health literacy (Rosas-Blum et al., 2018).

Current Approaches to Solving Population Problem(s)

A variety of methods were identified in the literature to promote parental immunization

and oral health literacy. Some methods are traditional, while others integrate the use of

technology. Traditional methods include in-person educational sessions, educational pictures,

and educational comics. In-person sessions have improved parental oral health and immunization

literacy in a variety of settings, including Head Start programs, parenting groups, health clinics,

and parents' homes (Dudovitz et al., 2020; El Fadl et al., 2016; Ismail et al., 2018; Muscat et al.,

2020; Otsuka-Ono et al., 2019). Similarly, the literature supports the use of pictures to enhance

parental oral health and immunization literacy (El Fadl et al., 2016; Papapchrisanthou & Loman,

2018). Although not surrounding oral health or immunization, educational comics have increased

parental literacy on childhood developmental milestones and are adaptable to accommodate oral

health and immunization content (Rosas-Blum et al., 2018).

Technology-based educational strategies include text messages, videos, mobile

applications, and websites. Educational text messages containing oral health and immunization

facts have been shown to increase parental literacy (Borrelli et al., 2019; Dumit et al., 2017;

Toniazzo et al., 2019; Watterson et al., 2015). Another evidence-based approach is using

educational videos to increase oral health and immunization parental literacy (Dumit et al., 2017;

El Fadl et al., 2016). Mobile applications are emerging in the literature as successful educational

platforms (Muscat et al., 2020; Toniazzo et al., 2019; Watterson et al., 2015). Finally, website-

based education is beneficial in promoting parental literacy. The literature supports websites as

valuable educational platforms to enhance parental literacy on various topics, including oral

health, immunizations, and asthma (Muscat et al., 2020; Otsuka-Ono et al., 2019; Riera et al.,

2017). Parents also reported personal preferences for and attested to the efficacy of QR codes

that directed the viewer to websites with pediatric cast care instructions (Basso-Williams et al.,

2020).

To determine which strategy to implement, Reach Out and Read representatives were

consulted. The representatives preferred to employ an approach that could be executed through

their books. After evaluating the evidence, all project team members agreed upon implementing

a website-based approach. Specifically, it was decided to apply a QR code on Reach Out and

Read's books to direct parents to a website containing oral health and immunization information.

Educational videos and pictures augmented the website.

Evidence to Support the Intervention

Parent-targeted education yields significant improvement in parental health literacy.

Using websites to communicate immunization information has significantly increased parental

immunization knowledge and literacy (Otsuka-Ono et al., 2019). Website-based education is also

effective in improving parental literacy of other topics, such as childhood asthma and mental

health (Peyton et al., 2019; Riera et al., 2017). Furthermore, qualitative studies have supported

parental preference for website-delivered information and QR code technology (Basso-Williams

et al., 2020; Drent et al., 2018; Muscat et al., 2020). Healthcare providers also report success

using website sources to promote parental health literacy (Muscat et al., 2020). Pictorial and

video education was incorporated into the website. Research shows a significant increase in

parental oral health literacy when utilizing video and pictorial deliveries (Dumit et al., 2017; El

Fadl et al., 2016; Papapchrisanthou & Loman, 2018; Riera et al., 2017). Incorporating

multimodal techniques increases the understandability and engagement of a broader population

(Drent et al., 2018).

Parents may need motivation to utilize the QR code and website. An evidence-based method to improve patient motivation is inspirational posters. Inspirational posters focus on benefits and positive outlooks versus negative consequences. Patients have expressed preference for inspirational posters (Jones et al., 2015). Inspirational posters were strategically placed in pediatric offices' waiting areas and examination rooms. The posters highlighted the benefits of pediatric oral health and immunizations. The posters also displayed the QR code and QR code instructions. In addition, providers and clinical staff were encouraged to recommend parents to access the QR code during the well-child visit.

Evidence-Based Practice Framework

Identification of the Framework

The project utilized two models as a framework. First, Nutbeam's *Model of Health Literacy* was used as a guide to tailor the project's content and evaluation to address all levels of health literacy. Second, the Plan-Do-Study-Act (PDSA) was used to direct project implementation.

Nutbeam's Model of Health Literacy

Nutbeam's *Model of Health Literacy* served as a framework for the project. The model identifies three levels of health literacy. Level one is functional health literacy (Nutbeam, 2000). Functional health literacy conveys information to improve knowledge of health risks, health services, and compliance with recommendations (Nutbeam, 2000). Our website-based education addresses functional health literacy by communicating written information regarding childhood immunizations and oral health care practices. The goal is to improve parental knowledge base. Level two is interactive health literacy. Interactive health literacy aims to improve skill development (Nutbeam, 2000). Our project includes demonstrational videos to assist parents in

acquiring toothbrushing skills. Level three is critical health literacy. Critical health literacy

entails disseminating information and developing skills to initiate political or community action

to change social determinants of health (Nutbeam, 2000). Our educational platform addresses

level three by encouraging others to share information with friends, family, and acquaintances.

The purpose is to increase community-wide literacy.

Plan-Do-Study-Act

Deming's Plan-Do-Study-Act (PDSA) model was implemented within our project. The

first step in the PDSA model is to plan (IHI, n.d.-b). Planning for our project included identifying

the organizational need, collecting available data to support the need, identifying plausible

interventions, finding evidence to support the interventions, choosing an intervention, and

planning the project's implementation and evaluation. The next step is to do, which is achieved

through project implementation (IHI, n.d.-b). Study is the next step (IHI, n.d.-b). We studied our

project by analyzing data and outcomes. Finally, act is the last step. (IHI, n.d.-b). We synthesized

the data we collected in the previous step to determine what project modifications are needed.

The PDSA model consists of multiple, rapid PDSA cycles (IHI, n.d.-b). Our project continually

evolved through numerous PDSA cycles throughout implementation to ensure optimal quality

improvement.

Ethical Consideration & Protection of Human Subjects

This quality improvement project demonstrated equality and equity. Equality was

achieved by providing all parents with children ages six months to five years old with a book and

attached QR code at well-child visits. However, parents with children under six months did not

receive a book through the program. The poster QR codes in the waiting areas and examination

rooms were accessible to those parents to ensure they had access to the same information. Equity

was demonstrated by ensuring information was written below a third-grade reading level; links with more detailed information were located on the website for parents who desired it. Because the project simplified and disseminated pediatric care recommendations to parents, there was minimal potential harm to the parents or children. There was no foreseeable risk of any participant being taken advantage of, and no safety issues were identified. No health information was collected. Due to the minimal risks of this quality improvement project, no informed consent was necessary.

To prepare for the formal approval process, CITI program modules were completed. The CITI program modules selected were designed to train students engaging in social and behavioral studies. The CITI modules cover numerous ethical considerations, each discussed separately below.

Historical events that violated ethical principles were explored within the CITI modules to understand why ethical protection is critical. Past unethical events prompted federal regulations to legally protect study participants. Acknowledging past ethical violations reduces the likelihood of similar offenses within the project.

The *Belmont Report* was created in response to a historically unethical event and was reviewed in the CITI modules. The *Belmont Report* explores three ethical principles: respect for person, beneficence, and justice (Hicks, 2019). Respect for person was preserved in our project; parents possess the ability to autonomously access the website on their own freewill. The project exercised beneficence by posing minimal risk and aiming to promote oral health and immunization knowledge for optimal pediatric well-being. Justice was upheld by ensuring all parents were provided with access to the QR code.

Risk assessment of this project revealed minimal risk; education was provided to parents. Privacy was protected by making the surveys anonymous and available for the parent to fill out in an environment they deem secure. Furthermore, no personal identifying information was gathered. Confidentiality was exercised by not collecting or disclosing any personal data.

The CITI modules outline four vulnerable populations. These populations include pregnant women, children, prisoners, employees, and those incapable of providing informed consent (Hicks, 2019). The project's target population was parents, which is not a vulnerable population.

The Common Rule establishes a set of regulations for all federally funded research to abide by. While this quality improvement project is not federally funded, aspects from the Common Rule was applied. The definition of research and human subjects is a cornerstone of the Common Rule. Knowing the definitions of research and human subjects guides the student to anticipate the appropriate institutional review board (IRB) approval process. Based on the Common Rule guidelines, the project did not meet the definition of research and did not involve vulnerable subjects. Instead, the project was classified as a quality improvement project with minimal risk to the participants. Therefore, the project was exempt from IRB review.

Finally, the CITI modules discussed international and internet-based research. The international ethical guidelines do not apply to this DNP project. While the project is internet-based, no personal identifying information is collected.

There was no formal approval process for Reach Out and Read. The organization did not possess its own IRB and did not have a project approval process. Rather, the regional manager personally approved the project. The project's informational content was personally approved by the regional manager and the online content manager. East Carolina University did have an IRB.

The project's title and brief description were sent to an IRB representative on a standardized form. The IRB representative then declared the project was exempt from the IRB approval process. IRB review was completed prior to project implementation.

Section III. Project Design

Project Site and Population

This project took place within four clinics associated with the Reach Out and Read (ROR) Carolinas, a division of the national nonprofit organization. The project's target population was parents with children ages birth to five years old. The project's facilitators included supportive ROR partners and East Carolina faculty. Also, one student had a prior professional relationship with one pilot site. Language was a barrier among parents who did not read or speak English. Time constraints may have limited providers and staff from explaining and encouraging the QR code. Finally, the COVID-19 pandemic caused a reduction in well-child visits and limited the ability of ROR staff and students to enter clinics to assist with the QR code.

Description of the Setting

Reach Out and Read's mission is to provide young children with a successful foundation by incorporating books and reading into standard pediatric care (Reach Out and Read, n.d.-a). ROR achieves its mission through a three-step model (Reach Out and Read, n.d.-a). First, participating pediatric providers are trained to encourage reading and literacy promotion. Second, providers give a book at well-child visits to children ages birth to five years. Third, waiting rooms contain books and displays that encourage reading (Reach Out and Read, n.d.-a). ROR Carolinas is partnered with 538 pediatric clinics and 2,337 pediatric providers in North and South Carolina (Reach Out and Read, n.d.-b). ROR Carolinas serves 418,947 children (Reach

Out and Read, n.d.-b). The project was piloted in four ROR-participating clinics. The four clinics were located in Craven, Macon, Randolph, and Wake counties in North Carolina.

Description of the Population

The target population was parents of children ages birth to five years old who presented for well-child visits at one of the four piloting clinics between November 2020 and spring 2021. All four sites indicated that parents might speak non-English languages, such as Spanish or Burmese. At each clinic, greater than seventy-five percent of parents utilize Medicaid for their child's health insurance (T. Ramos-Hardy, personal communication, September 30, 2020). It was projected that 1,865 parents would be included in this project (T. Ramos-Hardy, personal communication, September 18, 2020). For additional demographic information for each clinic, please see Table C1, Table C2, and Table C3 in Appendix C.

Project Team

The project team was interdisciplinary and consisted of numerous experienced individuals. The ROR site champions were Teandra Ramos-Hardy and Callee Boulware. Mrs. Ramos-Hardy and Mrs. Boulware are master's degree-prepared regional directors for ROR Carolinas. As site champions, Mrs. Ramos-Hardy and Mrs. Boulware provided insight into the organization's operations, identified the pilot clinics, coordinated website and survey development, provided funding for the QR codes, and collected the data.

East Carolina University's Dr. David Campbell-O'Dell holds a doctoral degree in nursing and served as the project's faculty member. Dr. David Campbell-O'Dell provided invaluable guidance throughout the project's development, implementation, and evaluation. He assisted the students with problem-solving, communication, and collaboration.

Four students partnered together for this project. Danielle Tupes, Gosia Tiger, Jaime Davis, and Sydney Sharpe were the East Carolina University students. Each held bachelor's degrees and were in pursuit of their doctoral degrees. All were equally and actively involved in the development, implementation, and evaluation of this project. Each student was assigned to one pilot clinic and was responsible for the implementation within the clinic.

Finally, several staff members at each pilot clinic were imperative for the project's success. Staff members included countless social workers, medical assistants, nurses, and providers. These front-line workers explained and encouraged the QR code to parents. Without their assistance, the project would not have been successful.

Project Goals and Outcomes Measures

The goal of this project was to promote parental literacy regarding pediatric oral health and immunizations. A parental survey to measure parental literacy was developed by the students in collaboration with ROR and Dr. Campbell-O'Dell. Data was collected from the survey and website analytics. Data was placed in a Microsoft Excel spreadsheet and analyzed by the students.

Description of the Methods and Measurement

A link to the parental survey was included on the educational website. The survey questions were developed to evaluate health literacy according to Nutbeam's Model of Health Literacy. Questions were focused on the evaluation of functional, interactive, and critical health literacy (Nutbeam, 2000).

Website analytics were also used to evaluate the project. ROR used Google Analytics™ to measure website traffic. Data further categorized what information website visitors viewed by age group.

Discussion of the Data Collection Process

The parental survey was implemented on ROR's SurveyMonkey® platform. The website traffic data was collected by ROR via Google Analytics™. ROR recorded the raw analytical data and sent the data via e-mail to the students weekly during the spring 2021 semester. The students then aggregated the data into one collective Microsoft Excel Spreadsheet to monitor data trends. The data was stored on Microsoft OneDrive, which was only accessible to the students, ROR staff, and ECU faculty.

Implementation Plan

The project's implementation plan was formed using an implementation worksheet, which can be found in Appendix D. The project was implemented in PDSA Cycles. There were three PDSA cycles during the project's implementation. See a description of each cycle below.

PDSA Cycle 1

The first step was developing the website content. The students searched the Centers for Disease Control and Prevention website for reputable oral health and immunization information. Pediatric oral health and immunization recommendations and guidelines were reviewed for children ages birth to five years old. The students synthesized and simplified the information into understandable terminology. The content was recorded in Microsoft Word documents, which were sent via e-mail to ROR. ROR then entered the content into the webpage, which can be viewed at https://www.rorcarolinas.org/oral-health/.

Next, the poster was developed. The poster was created in Microsoft Word using bright, eye-catching colors and graphics. The poster size was 8.5 inches by 11 inches and displayed instructions on using the QR code. The poster was printed and laminated at a local printing

business. Students then visited the clinics and hung the posters in all examination rooms and

waiting areas in plain view. See Appendix E for a graphic of the poster.

Then, the survey was created. Survey questions were formed by students using

Nutbeam's Model of Health Literacy to assess functional, interactive, and critical health literacy

(Nutbeam, 2000). The survey questions were entered into a Microsoft Word document and sent

via e-mail to ROR. ROR staff entered the questions into SurveyMonkey®. A link to the

SurveyMonkey® questionnaire was placed on the educational website for parents to access. The

links to the English and Spanish surveys are https://www.surveymonkey.com/r/HSNXHCX and

https://www.surveymonkey.com/r/HN2NQ9Q, respectively. See Appendix F for an image of the

English survey.

The next step was creating the QR code. The QR code was created using a free online

code generator. The website's URL was entered into the online software, which generated a QR

code. The QR code was downloaded onto the students' personal computers and sent via e-mail to

a local printing company. The printing company printed the QR codes on stickers. One

designated student picked the QR code stickers up from the printing company. The other

students met with the designated student to pick up stickers for their respective clinics. Then,

each student traveled to their assigned clinic to place the QR codes on the books. The clinic staff

was informed and educated about the QR code by the students. The books were distributed by

clinic staff at each well-child check, per the previous protocol. Providers and staff encouraged

parents to utilize the QR code during visits.

The final step in the first cycle was data collection. Initial data was collected for

approximately three months. The students, ECU faculty, and ROR partners met to discuss

preliminary data. Barriers and facilitators were identified, and a new PDSA cycle was initiated to propel the project forward.

PDSA Cycle 2

At the beginning of PDSA Cycle 2, the previous cycle was evaluated using a project management form. The project management form can be found in Appendix G.

Preliminary data from cycle one revealed low site traffic. In response, students visited their respective clinic sites to discuss potential barriers and provide support. Each student brought baked treats to clinic staff to increase motivation and participation in the project. Significant language barriers were discovered during this cycle; two clinics had large Spanish- and Burmese-speaking populations. To overcome this barrier, QR codes that directed parents to Spanish- and Burmese-translated websites were created. These QR codes were printed on bookmarks and delivered to the clinics. Data was collected and analyzed for improvements over the next three months.

PDSA Cycle 3

Cycle three was began by returning to clinics with additional QR code stickers as needed. Positive feedback regarding the QR code bookmarks were received by some clinics. English QR code bookmarks were requested by one clinic. An English QR code bookmark was created, and students distributed bookmarks to each clinic. See Appendix H for copies of each bookmark. Data was collected and monitored for trends.

Timeline

The timeline for this project began in August 2020 and ended in July 2021. The project idea was conceptualized in collaboration with ROR in August 2020. The website content was developed in September 2020. The QR code stickers, parental survey, and promotional posters

were completed between October 2020 and November 2020. The final website was complete and

launched in November 2020. QR code stickers were applied, and posters were distributed in

November 2020. The distribution of books with QR codes began in November 2020 and

continued through April 2021. Burmese and Spanish QR codes and bookmarks were created and

distributed in March 2021. Incentives to improve clinical staff motivation were simultaneously

delivered in March 2021. English bookmarks were created and distributed in April 2021. Data

collection occurred from November 2020 through April 2021. Data analysis and evaluation

occurred between May 2021 through July 2021. See Appendix I for a timeline graphic and

depiction of the PDSA cycles mentioned in the previous paragraphs.

Section IV. Results and Findings

Results

Aggregate data were collected in four pilot clinics. Two types of data were collected:

website traffic data and survey results. Website traffic was analyzed to determine parental

interest and utilization. Survey results were used to analyze health literacy and parental feedback.

Website Traffic Data

The website traffic data included homepage views and views of each age group's

webpage. On average, the website was viewed 1.6 times per day. The website homepage had 184

views between November 2020 and April 2021. The zero to six months webpage was viewed 30

times. The six to twelve months webpage was viewed 16 times. The one to two years page

collected 27 views, and the three to five years page was viewed 15 times. The immunization and

oral health frequently asked questions webpages were viewed 16 and 6 times, respectively.

Please see Appendix J for data trends over time.

Survey Data

Parents were encouraged to complete surveys. Eight surveys were completed during the implementation period. Comprehensibility, health literacy, and parental feedback were assessed.

To assess comprehensibility, parents were asked to describe ease of understanding on a Likert scale. One hundred percent of the completed surveys indicated that parents felt the website was a little to very easy to understand. In other words, no parents described the website content as neutral or difficult to understand.

Health literacy was assessed on all three levels. Approximately 62% indicated they learned "a lot" about pediatric oral health and immunizations, which demonstrates an improvement in functional health literacy. One hundred percent of the survey participants indicated they planned to change their child's oral health routine as a result of the website. Thirty-eight percent answered that their immunization plans had changed after viewing the website. Changing oral health and immunization routines demonstrates an improvement in interactive health literacy. Seventy-five percent indicated that they were "very likely" to recommend the website to other parents, which supports critical health literacy. Please see Appendix K for all individual survey results.

Other survey data regarding the implementation process and suggestions were collected. One survey participant indicated they were not instructed on QR code use at their visit. The one free-text suggestion recommended including car seat safety as a future topic.

Discussion of Major Findings

Evidence-based literature suggested that patients and families prefer QR codes and website-based education. The project's website traffic analytics support this finding; the website was viewed 184 times. Furthermore, literature supported that parental education via technology promotes health literacy. The survey results sample size was small and may be difficult to

generalize. However, the results indicated that parents perceived their oral health and immunization knowledge increased, which reflects an increase in functional health literacy. The results also demonstrated an increase in interactive health literacy; parents indicated a plan to improve their child's oral health and immunization practices. Critical health literacy promotion was demonstrated by the parent's likelihood to recommend the website to other parents. See Appendix L for a post-mortem analysis.

Section V. Interpretation and Implications

Costs and Resource Management

Both financial and non-financial resources were expended to support this project. Resources included labor, travel, project supplies, and technological platform maintenance. Categorical subtotals will be discussed below. See Table M1 in Appendix M for the project's actual itemized budget.

The quality improvement project was labor-intensive. Approximately 197.25 hours were directly spent on project planning, development, implementation, and evaluation. Labor was carried out at no cost by the students. If the organization were to sustain the project, it would need to designate an employee to carry out tasks, including QR code printing and application, poster printing and application, bookmark printing and application, clinic staff education, and data analysis.

Several supplies were needed for the project. QR code stickers, instructional posters, and QR code bookmarks were necessities. The stickers, posters, and bookmarks were printed and laminated for each clinic. The total cost for the posters and QR code vectors was $421.63.

Due to visitor restrictions in the clinics secondary to the pandemic, student entry and project promotion were suboptimal. Staff dedication waned mid-implementation. To boost interest, three

dozen fresh-baked cookies were delivered to one clinic to incentivize staff. The cookies cost $23.40.

Multiple technologies were used for project implementation. A free trial version of SurveyMonkey®, the electronic platform used for the parental survey, was used. Google Analytics™ was used at no cost to the organization. The website was already maintained by ROR, so no additional cost was accrued secondary to the project's implementation.

Travel was required to carry out project implementation. Between all four students, 848 miles were traveled to deliver supplies to the clinics. Using the Internal Revenue Service's 2021 mileage rate, the total travel expense was $457.92 (Internal Revenue Service, 2021).

If the project were to be implemented on a larger scale, additional supplies and printing would be needed. QR code sticker, poster, and bookmark quantities were limited to cover the four pilot clinics. Labor demands would also significantly increase. Additional employee labor would be needed to apply QR code stickers, distribute bookmarks and posters, educate clinic staff, and evaluate data trends. A proposed budget outlining the costs to the organization if the project were to be sustained can be found in Table M2 in Appendix M.

To counteract the increased costs of a larger scale implementation, the organization might consider moving from the QR code sticker avenue to utilizing QR code bookmarks. While the bookmarks cost more per unit than the QR code stickers, labor costs will be drastically reduced. Travel to the clinics to apply QR code stickers would be eliminated. Furthermore, employees would not be compensated for the time required to apply QR code stickers.

To complete a cost versus benefit analysis, the total financial and non-monetary costs of the project must be considered. The actual monetary cost of the project was $902.95. Time spent

was roughly 197.25 hours. Financial expenditure can be anticipated to increase if implemented

on a larger scale and without the free assistance of students.

The benefits included improved parental health literacy regarding pediatric oral health

and immunization. Evidence supports that increased health literacy will reduce periodontal

disease and immunization-preventable illness over time. A reduction in illness supports overall

well-being and enhanced quality of life.

 Between 1996 and 2013, approximately 7.95 billion USD was spent on secondary and

tertiary dental care for children and adolescents (Centers for Disease Control and Prevention,

n.d.). Similarly, it is estimated that immunizations administered to United States children

between 1994 and 2013 will result in a net savings of $295 billion in direct medical costs. Total

societal cost savings are predicted to be 138 trillion dollars. Furthermore, the pediatric

immunizations administered in that timeframe will prevent an estimated 322 million illnesses, 21

million hospital admissions, and 732,000 deaths (American Journal of Managed Care, 2019).

Considering the individual and societal effects of periodontal and immunization-

preventable disease, the benefits outweigh the costs of this project. There is a potential to save

billions of dollars. Furthermore, the protection of life, health, and quality of life is invaluable.

Implications of the Findings

As a result of the project's effort, parents accessed the oral health and immunization

information over 200 times. This supports that easily understood, always accessible, and

technology-based education is positively received by parents. Furthermore, the survey results

captured parental reports of self-perceived improvement in health literacy in all three of

Nutbeam's health literacy domains: functional, interactive, and critical (Nutbeam, 2000). This

information can be adapted to promote health literacy in a variety of topics among many unique

populations and settings.

Implications for Patients

Parents have free, always accessible, easily understood, and accurate information at their

fingertips. This removes several significant barriers to patient education. Health equity is

elevated by ensuring the information is available to anyone, anywhere.

Survey results also show evidence of self-perceived improved health literacy. Increased

health literacy promotes a sense of patient satisfaction and empowerment (MacLeod et al., 2017).

Furthermore, interactive health literacy encompasses applying knowledge into action (Nutbeam,

2000). Parents indicated they intended to improve their child's oral health routine and

immunization plans. Subsequently, the pediatric population should experience less periodontal

and immunization-preventable disease. Decreased disease burden increases health, holistic well-

being, and quality of life. Furthermore, increased immunization can result in herd immunity and

reduce disease burden in society. Some parents indicated they intend to share the website with

others; this demonstrates increased critical health literacy and has the potential to impact a vast

population. Long-term, it is hoped that the literacy will be sustained throughout the lifetime and

shared among new generations.

Implications for nursing practice.

The project's results herald the effectiveness of delivering technology-based education.

The information is convenient, cannot be misplaced, and is always available. The information

can easily be updated to ensure accuracy. In the age of rapid technological advances, many

parents are accustomed to and may prefer to receive information electronically.

Electronically based education may also remove barriers to patient education. Parents can access the information from anywhere, including their own home. Using simple, plain language improves patient comprehension and removes another preventable barrier. Finally, technology-based education is quick and does not require extraordinary efforts by healthcare professionals.

Finally, the framework of this project can be applied to various populations. Infinite educational topics can be selected to benefit the selected population. This model could theoretically be implemented in any setting.

Impact for Healthcare System(s)

This low-cost preventative intervention improves health literacy and promotes pediatric oral health and immunization. Expectantly, the healthcare system should see a decrease in pediatric oral health and immunization-preventable disease burden. Ultimately, a decrease in hospitalization, emergency dental care, lost productivity, healthcare expenditure, and death is anticipated. A paradigm shift to primary prevention from secondary and tertiary prevention is crucial to reduce healthcare costs and free funds to develop health-promoting programs.

Sustainability

The project is easily sustainable, and ROR plans to continue implementation. No additional funding is required to maintain the website, as the organization already maintains the domain. The books will be purchased and distributed to clinics regardless of project implementation. Extra posters, QR code stickers, and bookmarks are needed. ROR employees will assume all responsibilities completed by students, as discussed previously. There is potential to expand the project to ROR Carolinas' entire region and nationally. Currently, there are plans to implement the project at the Charlotte Area Health Education Center (AHEC). There has been

discussion between ROR and the American Academy of Pediatrics (AAP) to join this project

with the AAP's *Book, Brush, Bed* program.

Other organizations may choose to replicate this project. Start-up costs would include

labor, QR code development, content development, and website design. Other organizations may

consider several methods of delivery, including QR code stickers, bookmarks, or handouts.

Dissemination Plan

The project's overview and preliminary results were disseminated at ROR's plenary

session on April 21, 2021. A PowerPoint was submitted by March 29, 2021, and a virtual

presentation was held at the April plenary session. Attendees included ROR representatives,

students from other organizations, healthcare providers, and a wide interdisciplinary team across

the Carolinas region.

ROR intends to publish the project's synopsis in the organization's newsletter, *Medical*

Connections. The synopsis will be published in July 2021. The project's results will be presented

in the October 2021 edition.

The project's synopsis and results will be shared at East Carolina University's

presentation day on July 13, 2021. The results will be displayed on a poster developed by the

students. The students will present the findings to colleagues and East Carolina University

faculty.

Finally, this report will be published in East Carolina University's digital archive, *The*

ScholarShip. The report will be finalized and submitted by July 15, 2021. *The ScholarShip* is

accessible to anyone.

<div align="center">

Section VI. Conclusion

</div>

Limitations and Facilitators

Limitations

The global pandemic presented barriers to the project's implementation. Patients accessed healthcare less frequently to promote social distancing. As a result, well-child visits were decreased during the implementation period. In addition, students were not permitted to enter the clinics to promote and assist with the project. Clinic personnel faced additional responsibilities related to the pandemic and had limited availability to promote the project as planned. Furthermore, healthcare workers experienced fatigue and burnout secondary to the pandemic.

Language barriers were discovered during implementation. Two of the four clinics had large non-English speaking populations. The language barriers were not discovered until four months into implementation; the populations' needs were unmet for that period. Once the language barriers were identified, QR code bookmarks and posters in the appropriate language were promptly created and distributed.

One final limitation is parents who do not possess smartphones or other gadgets with QR code scanning capabilities. It was inaccurately assumed that all parents would have the ability to scan the QR code. While we did not capture data regarding parents who did not have access, it is likely safe to assume that some parents were inadvertently left out of this project.

Facilitators

The project's facilitators included a supportive interdisciplinary team. The ROR team was eager, always available, easily reached, and resourceful. Most clinic personnel were receptive to the project and respectful of the students' time and efforts. The ECU faculty's mentorship offered years of priceless experience and expertise.

Versatility was another asset. The ability to promptly translate the QR code and website into multiple languages promoted the project's success significantly. In addition, the ability to create QR code stickers, bookmarks, and handouts to meet specific clinic needs was beneficial.

Recommendations for Others

A major recommendation moving forward is to consider ways to incentivize healthcare providers to promote the QR codes. While website traffic was impressive, there is room for improvement. The pandemic's student entry restriction is unlikely to resolve in the near future. Therefore, it is imperative to promote provider commitment for the project to remain successful and to increase website utilization.

Another recommendation is to consider ways to encourage parents to complete surveys. The survey result turnout during this implementation period was slight. Incentives, such as a raffle drawing, may increase survey participation.

Expanding the project beyond the four clinic sites is a further recommendation. There are plans to implement the project with Charlotte AHEC. This will undoubtedly expand the population served and collect more invaluable data to further support the project's effectiveness. However, there are concerns about the feasibility of placing QR code stickers when scaling to larger populations. One possible solution is to utilize QR code bookmarks or other similar media to save time and labor.

The long-term impact of this study can be far-reaching. Reduction in the prevalence of periodontal and immunization-preventable disease is possible. The project can be easily sustained and scaled. Furthermore, the website is adaptable. Other topics can be included as deemed necessary.

Recommendations for Further Study

The next recommended step is to partner with the Charlotte AHEC to reach a broader population. It may also be wise to replicate the project in other regions within ROR Carolinas to ensure a heterogeneous population. Language barriers should be assessed prior to implementation, and additional resources created as indicated. Other health topics should be included as the population's needs change over time.

The framework of this project could be applied to any population. Parents of young children, adolescents, and adults can all utilize QR codes and website-based education. The project could be implemented in virtually any setting. The educational topics can be easily changed to fit the population's growing needs.

One gap identified is a need to place increased emphasis on immunization health literacy. There has been a recent increase in the anti-vaccination movement. The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) immunization created further mistrust in the medical community among the public. With communicable illness on the rise, immunization health literacy is a priority.

Final Thoughts

The project aimed to improve parental health literacy regarding pediatric oral health and immunizations. A QR code directed parents to a custom-built website with easily understood oral health and immunization information. Website traffic analytics and survey results supported the effectiveness of the intervention on health literacy promotion. Improved health literacy is proven to have a positive long-term effect on the reduction of periodontal and immunization-preventable disease.

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Appendix A

Literature Search Log

			DNP Project **Literature Search Log**		
Student: Danielle Tupes			**Date of Submission:**		**15-Aug-20**
Project Title: Increasing Parental Immunization and Oral Health Literacy					
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)**
7/20/2020	PubMed (Medline)	("Immunization"[Mesh] OR "Vaccination"[Mesh]) AND "Health Literacy"[Mesh]) AND "Parents"[Mesh]	Published between 2015 to 2020	13 found; 1 kept	1 irrelevant to the topic; 10 did not focus on a solution or intervention; kept the one research article that pertained to parental literacy promotion strategies regarding immunization
7/20/2020	PubMed (MEDLINE)	("Health Education, Dental"[Mesh]) AND "Health Literacy"[Mesh]) AND "Parents"[Mesh]	Published between 2014 to 2020 Full-text availability	3 found; 1 kept	1 irrelevant to the topic; 1 greater than 5 years old; 1 pertained to oral health and parental literacy and was kept for review
7/20/2020	CINAHL	"health literacy" AND "parent" AND "online"	Published between 2015 to 2020 Full-text availability Subject topic narrowed to include one of the following: health literacy, caregivers, pediatric care, parents, health promotion, family, or health education	88 found; 2 kept	Most were not focused on parental literacy and were excluded; 2 pertained to website-based health literacy promotion techniques among parents and were kept
7/20/2020	PubMed (MEDLINE)	QR codes, patient education	Published between 2015 and 2020	4 found; 1 kept	3 did not pertain to parental literacy; 1 was specific to parental satisfaction and literacy effects of QR codes
7/21/2020	PubMed (MEDLINE)	improving parent health literacy	Published between 2015 and 2020 Full-text availability English language	285 found; 9 kept	9 were saved for review and researched relevant interventions to improve parental health literacy; the remainder were excluded and were not specific to parental literacy
7/21/2020	PubMed (MEDLINE)	maternal and child oral health	Published between 2015 and 2020 English language Full-text availability Systematic reviews only	55 found; 2 kept	53 were irrelevant to the project's topic; 2 were kept due to high-quality evidence regarding effective literacy techniques targeted towards mothers
7/21/2020	PubMed (MEDLINE)	"mHealth" and "immunization"	English language Full-text availability Systematic reviews only	2 found; 1 kept	1 was kept that explored using mobile health techniques to improve parental vaccination literacy; 1 was discarded because it did not pertain to the intervention
7/21/2020	PubMed (MEDLINE)	"mhealth" and "Oral health"	Full-text availability English language	14 found; 2 kept	2 were kept that explored oral health literacy technology techniques; 12 were discarded due to irrelevance to the project topic or population
7/21/2020	ProQuest	"mhealth" and "immunization"	Scholarly Journals English language Published between 2015 and 2020	106 found; 1 kept	1 was a systematic-review that supported the efficacy of e-health interventions on health literacy; 105 were irrelevant to the topic, were poor quality, or were largely not generalizable
8/13/2020	PubMed (MEDLINE)	"poster" and "motivate"	Published between 2015 and 2020	5 found; 1 kept	1 supported the use of posters to invoke patient motivation; 4 were irrelevant to the topic

Appendix B

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
Basso-Williams et al.	2020	Application of a quick response code as an alternative method to provide pediatric cast care instructions	N/A	*Journal of the American Academy of Orthopaedic Surgeons*	To determine if parents and/or children found discharge cast instructions via QR code/website effective and preferable	Level VI Single qualitative study	**IV:** Discharge instructions QR code **DV:** Satisfaction, perceived efficacy	Post-intervention parent surveys	88	Convenience All consenting parents with children who presented at an orthopedic office for nonsurgical fractures	Average age of child: 8.19	The authors found that the overwhelming majority of participants found the QR code convenient and useful. Participant satisfaction was high and QR codes were viewed as inferior to written or verbal instructions. Limitations: This is a descriptive study. No statistical data or control. Usefulness: Low-quality evidence of patient satisfaction with QR codes as an educational platform is expressed Synthesis: Participant satisfaction with QR codes as an educational platform is supported
Borrelli et al.	2019	An interactive parent-targeted text messaging intervention to improve oral health in children attending urban pediatric clinics: Feasibility randomized controlled trial	Social Cognitive Theory	*JMIR mHealth and uHealth*	To determine the effect of oral health text messages on parental knowledge and child oral health versus standard child wellness text messages	Level II RCT	**IV:** Oral health text messages **DV:** parental oral health knowledge, attitude, and motivation	Basic Risk Factors Questionnaire	55 28 intervention 27 control	Parents with children under the age of 7 years who attended the targeted pediatric clinics near Boston were recruited and randomly assigned to groups	Average parental age: 31.0 years 41% were below poverty line 36% were Black	The authors found that parents reported improved oral health knowledge, attitude, and motivation in the oral health text group compared to the control group. Limitations: Limited sample size and geographical setting Usefulness: Utilizes theory and addresses the impact of oral-health specific SMS on parental literacy Synthesis: Oral health SMS improves parental knowledge, attitude, and motivation
Drent et al.	2018	Health information preferences of parents in a pediatric emergency department	N/A	*Clinical Pediatrics*	To determine internet access and education delivery preferences in parents with low health literacy	Level VI Single qualitative study	**Concepts:** internet access, educational delivery preferences	Newest Vital Sign (NVS), the Children with Special Health Care Needs questionnaire (CSHCN), a sociodemographic survey, and an in-person semistructured interview	71	Parents were eligible if children under 8 years visited an ED in Milwaukee for nonurgent reasons Parents were recruited during the ED visit	Mean parental age was 26 years 50% Black 19% Hispanic 50% had low health literacy	The authors revealed the majority of parents with high and low health literacy had internet access. 45% of parents preferred in-person education, 38% preferred written information, 38% website, 35% email, and 8.5% video. Parents with low literacy preferred to have a means to review information multiple times. Some parents with low literacy preferred pictures and videos for better understanding. Most parents with low literacy preferred brief information. Limitations: Study took place in the ED and may not extend into primary care clinicals. Usefulness: Demonstrates parents' preferences for online material
Dudovitz et al.	2020	Improving parent oral health literacy in Head Start programs	N/A	*Journal of Public Health Dentistry*	To evaluate the impact of educational sessions on health literacy among parents with children in Head Start	Level IV Pre-test/ post-test cohort study Quantitative and Qualitative data	**IV:** Educational session **DV:** Parental oral health literacy (Oral health knowledge, behavior, and sources of information)	Unvalidated pre- and post-intervention surveys/knowledge assessments	2,011 parents	Convenience 29 Head Start offices 2,011 parents from the 29 offices were recruited	Parents of children ages 2-4 years 68% were non-white ethnicities	The authors determined that integrating in-person education for parents with children in Head Start programs increased oral health knowledge, oral health behaviors, use of preventative services, and accessibility of information sources. Limitations: No control group. No standardized measurement tools. Usefulness: Large sample size that reports improved oral health literacy after in-person education in Head Start settings
Dumit et al.	2017	The use of eHealth with immunizations: An overview of systematic reviews	N/A	*Vaccine*	To review systematic reviews to determine if eHealth strategies are efficacious in increasing pediatric immunization rates and parental immunization literacy	Level I Overview of systematic reviews	**IV** eHealth (EHRs, SMS, automated phone calls, interactive computer videos, e-mails, immunization information systems, video games, health information technology) **DV** Immunization uptake, parental health literacy	AMSTAR to evaluate article quality	6 systematic reviews	Searched for systematic reviews pertaining to immunization and eHealth on PubMed, Scopus, Embase, Web of Science In English, Spanish, or French languages Human subjects	Five articles were moderate quality One article was low quality	The authors found that eHealth techniques show efficacy in promoting immunization and health literacy. However, eHealth is an emerging concept and further research is needed. Limitations: Small number of articles included. No high quality articles included. Usefulness: Several systematic reviews that support the use of eHealth strategies to improve immunization health literacy Synthesis: eHealth strategies can improve parental immunization literacy
El Fadl et al.	2016	Integrating maternal and children's oral health promotion into nursing and midwifery practice- a systematic review	N/A	*PLOS One*	To evaluate the nursing professions' ability to promote pediatric oral health and parental knowledge through education	Level I Systematic Review	**IV:** Parental oral health education (in-person counseling, videos, brochures, role playing, phone calls, oral health kits, pictorial information) **DV:** oral health knowledge/practice, dental care utilization, caries	Cochrane's Collaboration Tool and Downs and Black assessment tool used to asses risk of bias in included studies	21 articles	Followed PRISMA guidelines for systematic review Databases: EMBASE, MEDLINE and GLOBAL HEALTH via OVID, CINAHL via EBSCO, Scopus, Web of Science and CENTRAL Several inclusion/exclusion criteria	12 were RCTs 4 Quasi-Experimental 2 Equivalent Control 1 non-equivalent control 1 historically-controlled 1 ecologic	The authors determined the nursing profession can have a positive impact on childhood oral health and parental oral health literacy outcomes by providing health education through a multitude of techniques in a variety of settings Limitations: 9 reviewed articles were not RCTs. Usefulness: Systematic review that reveals moderate evidence in support of nurse-driven oral health literacy promotion in parents through education techniques Synthesis: Nurse-driven oral health education can improve parental health literacy and improve childhood oral health outcomes
Ismail et al.	2018	The impact of anticipatory guidance on early childhood caries: a quasi-experimental study	N/A	*BMC Oral Health*	To determine if regular dental examinations, health education, and anticipatory guidance reduced early childhood caries in high-risk children and their siblings and improved parental oral health literacy	Level III Quasi-Experimental	**IV** Dental exams, health education, anticipatory guidance **DV** Early childhood caries, parental oral health literacy	Dental Health Literacy Assessment instrument Caries Risk Assessment tool	490	All 245 consenting child (2-6 years) /sibling/mother trios at Batu Pahat Dental Clinic were included in the intervention group 245 socio-demographically matched trios at a nearby clinic were used for control group	9.6% Chinese 90.4% Malay Child's mean age: 2.5 years Sibling's mean age: 5.2 years	The authors found that oral health education, anticipatory guidance, oral health demonstration, and dental examinations every 6 months reduced caries risk in children and their high-risk siblings. Parental health literacy also improved. Limitations: Lacks a heterogenous sample. No randomization. Usefulness: Provides some support that anticipatory guidance can be beneficial to improve parental literacy Synthesis: Anticipatory guidance can improve parental oral health literacy while presenting no adverse effects
Jones et al.	2015	Promoting adherence to nebulized therapy in cystic fibrosis: poster development and a qualitative exploration of adherence	COM-B Model	*Patient Preference and Adherence*	To interview patients with CF to determine what poster content would provide motivation to adhere to medication regimens	Level VI Single qualitative study	**Concepts:** medication adherence, barriers, facilitators, motivation	N/A	16	Convenience sampling from an adult CF unit	Patients across all medication adherence levels 10 female	The authors discovered that patients prefer inspirational poster content versus consequential content. Limitations: The sample size was very small. The study was a lower level of evidence. Usefulness: Poster content should be positive and supportive Synthesis: Patients indicate preference for positive and aspirational content

Author	Year	Title	Theory	Journal	Purpose	Level/Design	IV/DV	Instruments	Sample	Setting	Demographics	Findings/Limitations/Usefulness/Synthesis
Muscat et al.	2020	Embedding a health literacy intervention within established parenting groups: An Australian feasibility study	N/A	Health Literacy Research and Practice	To determine if postnatal health education, including in-person sessions, websites, and phone applications, improve health literacy regarding nutrition, taking temperatures, medication dosing, safe sleeping, immunization, and oral health among parents with children between 4 and 26 weeks. Also to determine if the program is feasible to sustain	Level IV / Pre-test/ post-test cohort study / Quantitative and Qualitative data	IV: Postnatal health education DV: Health literacy	Likert scale-based surveys pre- and post-intervention	73 initial / 37 upon study completion	Convenience / Parents who attending existing postnatal education groups were recruited	Mostly bachelor degree holders / Mainly foreign-born	The authors found that participants reported increased health knowledge, health skills, and confidence after the intervention. The program was also determined to be feasible to implement in a widespread manner. Limitations: Convenience sampling. No control group/randomization. Limited demographic information obtained. No standardized instrument used to measure health literacy. Usefulness: Low-quality article that supports the use of in-person sessions to improve parental health literacy Synthesis: Integrating parental health literacy into parenting groups may be beneficial
Otsuka-Ono et al.	2019	A childhood immunization education program for parents delivered during late pregnancy and one-month postpartum: a randomized controlled trial	N/A	BMC Health Services Research	To determine the effect of immunization education (including counseling, guidebooks, websites) on women during the prenatal and one-month postnatal period on childhood vaccination rates, maternal knowledge, health literacy, and intent to vaccinate	Level II / RCT	IV: Maternal immunization education DV: Immunization literacy, intent to vaccinate	Unvalidated questionnaires	175 / 88 in intervention / 87 in control	Pregnant women over 18 years old were recruited between 29 and 33 weeks' gestation from a hospital in Japan. Women were randomly assigned to intervention vs control groups	Mostly married women / Most held some formal education	The authors discovered that prenatal and postnatal maternal education regarding immunizations using counseling, websites, and books, improves maternal health literacy, immunization knowledge, and intent to vaccinate. Limitations: The study took place in Japan. The results may not be generalizable to the United States. The pre- and post-intervention questionnaires were not validated. Usefulness: Provides some support for the positive impact that multimodal education has on maternal immunization knowledge, health literacy, and intent to vaccinate.
Papapchrisanthou & Loman	2018	Visually enhanced education and immunization perceptions in low-income parents	The Theory of Multimedia Learning	Public Health Nursing	To determine if visually enhanced education improves parental immunization knowledge, disease knowledge, decision-making comfort, and provider satisfaction	Level IV / Pre-test/ post-test cohort study	IV: Visually enhanced education DV: Parental immunization perception, disease knowledge, decision-making comfort, and provider satisfaction	Wroe's Immunization Questionnaire and Likert-scale questionnaires	40	Low-income parents were identified and recruited from a Midwest health center with a low vaccination rate	Mean parental age was 24 years / 95% were insured through Medicaid / 32.5% Caucasian 55% Black 12.5% Hispanic	The authors found that participants reported increased immunization knowledge, disease knowledge, and provider satisfaction. Immunization perception and decision-making comfort were not affected. Limitations: No control group. No randomization. Wroe's immunization questionnaire has not been validated. Usefulness: Pictures may provide benefit in increasing immunization literacy Synthesis: Including pictures with other forms of education may improve parental immunization literacy
Peyton et al.	2019	Do digital health interventions improve mental health literacy or help-seeking among parents of children aged 2-12 years? A scoping review	N/A	Studies in Health Technology and Informatics	To review published articles to determine if digital health education (websites, decision aids) improves mental health literacy and help-seeking among parents who have children who have ADHD, anxiety, or depression	Level I / Systematic Review	IV: Digital health education DV: Parental mental health literacy, help-seeking behaviors	None	4 studies	Searched Ovid MEDLINE in March 2019 using a variety of key words and inclusion criteria	1 RCT / 3 Uncontrolled pre-test/post-test	The review found that DHI resulted in an increase in parental mental health literacy but did not affect help-seeking behaviors. Limitations: Only 4 studies reviewed. Only one was a RCT. No validated measures of health literacy in the studies. No bias or quality measures were used in the review Usefulness: Provides some evidence of DHI effectiveness in promoting parental literacy Synthesis: DHI efforts can improve parental health literacy
Riera et al.	2017	A web-based educational video to improve asthma knowledge for limited English proficiency Latino caregivers	N/A	Journal of Asthma	To evaluate the efficacy of a website-based educational video in improving parental asthma literacy among parents with limited English proficiency	Level IV / Cross-sectional	IV: Website-based video education DV: Parental asthma literacy	A validated Spanish asthma knowledge questionnaire	20	Latino, English-limited parents of children ages 2-12 years old with asthma and a prescribed inhaler who presented to an ED or a community clinic were recruited	Majority had high-school diploma / Majority identified as speaking English "not well" or worse	The mean asthma knowledge score increased, including knowledge regarding resource utilization, medication delivery, and activity restrictions. Limitations: Small sample size. Limited to Hispanic population. No control or randomization. Usefulness: Provides some support for a website-based education intervention Synthesis: Website-based education can improve parental health literacy
Rosas-Blum et al.	2018	Comics as a medium for parent health education: Improving understanding of normal 9-month-old developmental milestones	N/A	Frontiers in Pediatrics	To evaluate the effectiveness of comic strips to promote parental health literacy regarding developmental milestones	Level III / Quasi-Experimental	IV: Educational comics DV: Parental milestone literacy	Survey questionnaires regarding developmental milestone knowledge	243	Every other parent presenting at one of the three clinics for their child's 9 month-old wellness check were recruited	97% Hispanic 3% Caucasian	The authors found that an educational comic strip improved parents' understanding of developmental milestones. Limitations: No control group Usefulness: Comic strips may be a useful medium to promote knowledge and literacy
Toniazzo et al.	2019	Effect of mHealth in improving oral hygiene: A systematic review with meta-analysis	N/A	Journal of Clinical Periodontology	To review RCTs to determine if mobile applications or text messages related to oral hygiene and oral health education can improve oral hygiene and oral health knowledge among adolescents, adults, and mothers of young children	Level I / Systematic Review	IV: text messages mobile applications DV: dental plaque index, gingival bleeding, oral health knowledge	Cochrane tool and the GRADE system to assess article bias	15 RCTs	PRISMA and Cochrane guidelines used to perform review Databases: Medline- PubMed, Scopus, Embase, Google Scholar and Cochrane Library databases	Moderate risk of bias for 13 studies / High risk of bias for 2 studies	The authors found that the use of eHealth (text messages and mobile applications) increased oral health literacy and self-care and reduced dental plaque and gingival bleeding Limitations: High variability between the studies' techniques and outcomes. Many studies had short-term follow-up. Moderate risk of bias for the majority of studies. Usefulness: Moderate evidence that mobile eHealth can positively influence oral health and oral health literacy Synthesis: Moderate-quality systematic review that provides support for eHealth in parental oral health literacy
Watterson et al.	2015	Using mHealth to improve usage of antenatal care, postnatal care, and immunization: A systematic review of the literature	N/A	BioMed Research International	To determine if mHealth strategies (SMS and mobile applications) containing health education and appointment reminders increased attendance at prenatal and postnatal appointments, as well as improvement in childhood immunization rates	Level I / Systematic Review	IV: SMS, mobile applications DV: Prenatal visit attendance, postnatal visit attendance, childhood immunization	Cochrane Risk of Bias Assessment Tool	10 articles	Databases: Google Scholar, PubMed, Embase, PsycINFO, and EBSCO Host. Keywords: mHealth, mobile health, mobile phone, reminder, recall, mobile medical records, antenatal care, postnatal care, and immunization. Many inclusion criteria	2 RCTs / 8 observational	The authors found high-quality evidence from the 2 RCTs that appointment reminder and education-containing SMS increases antenatal visit attendance rates. Moderate evidence from the observational studies support that SMS reminders and education can increase postnatal visit attendance and childhood immunization rates. Participants subjectively reported the mHealth interventions influenced their health knowledge/behavior. Limitations: Only 2 RCTs were reviewed. Studies took place in low- and middle-income countries only, limiting generalizability. Usefulness: Some usefulness in supporting the use of mHealth in childhood immunization. Focuses more on antenatal/postnatal attendance. Synthesis: SMS/mobile applications can improve visit attendance and childhood immunization, as well as influence maternal health knowledge/behavior

Appendix C

Demographic Information

Table C1

Race Demographics per Clinic

	Craven	Macon	Randolph	Wake
White (%)	19	66	51	7
African American (%)	23	1	25	30
Hispanic (%)	18	32	24	52
Asian (%)	38	0	0	1
Native American (%)	0	0	0	0
Pacific Islander (%)	0	0	0	0
Other (%)	2	1	0	10

Note. Each number demonstrates the racial percentage of each clinic's population.

Table C2

Insurance Demographics per Clinic

	Craven	Macon	Randolph	Wake
Self-Pay (%)	5	1	2	3
Private (%)	3	23	5	12
Medicaid (%)	91	76	93	83
Medicare (%)	0	0	0	0
CHIP (%)	0	0	0	2
Tricare (%)	1	0	0	0

Note. Each number represents the percentage of each clinic's population that holds the respective insurance type.

Table C3

Patient Primary Language per Clinic

	Craven	Macon	Randolph	Wake
Arabic (%)	2	0	0	1
Burmese (%)	14	0	0	0
English (%)	66	76	95	38
Karen (%)	7	0	0	0
Spanish (%)	9	23	5	52
Vietnamese (%)	1	0	0	9
Other (%)	1	1		

Note. Each number depicts the percentage of patients who speak the respective language in each clinic.

Appendix D

Project Implementation Worksheet

Student's Name <u>Jaime Davis, Sydney Sharpe, Gosia Tiger, and Danielle Tupes</u>

Project Site Champion <u>Teandra Ramos-Hardy</u>

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

What data will you be collecting?

<u>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 Google analytic program, and demographic information for the clinics will also be collected.</u>

Where will you get the data?

<u>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.</u>

How often will you be at the project site?

<u>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 implementation 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.</u>

How often will you meet with your site champion?

<u>We will meet with our site champion every two to four weeks.</u>

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

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

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

<u>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</u>

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.

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.

Appendix E

Project Poster

Appendix F

Parent Survey

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https://www.surveymonkey.com/r/HSNXHCX

1. How old is your child who received the book at their recent visit?

☐ 0 – 5 months

☐ 6 – 11 months

☐ 12 – 17 months

☐ 18 – 23 months

☐ 24 – 35 months

☐ 3 – 5 years

2. Did you learn how to use the QR code during your child's recent well-child visit?

☐ Yes

☐ No

3. How easy was the information on the website to understand?

☐ Very hard

☐ A little hard

☐ Not hard or easy

☐ A little easy

☐ Very easy

4. How much did you learn from the website about oral care?

☐ None

☐ A little

☐ Some

☐ A lot

5. How much did you learn from the website about immunizations?

☐ None

☐ A little

☐ Some

☐ A lot

6. Will you change your plans for your child's oral health as a result of the information provided?

☐ Yes

☐ No

7. Will you change your plans for your child's immunization as a result of the information provided?

☐ Yes

☐ No

8. How likely are you to share the website with other parents?

☐ Not likely

☐ Somewhat likely

☐ Very likely

9. We appreciate your time in taking this survey. If you have any comments, suggestions, or other child health areas you are interested in learning more about, please feel free to write them below. Thank you!

Appendix G

Project Management Form

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? <u>The concern about decreased amount of data collected continues, but the group has implemented 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.</u>

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 continues to be a barrier in multiple ways:
  - 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 clinic staff on to encourage website promotion, which has shown some benefit.
    - Update: Jaime's ROR liaison for Randolph County has held a PR event to promote the project. Numbers for site traffic have increased.
  - Clinic staff are overworked secondary to changes due to the pandemic. Staff burnout is a barrier. Promoting the project is not top priority.
    - Update: As the pandemic slows and more people are vaccinated, staff may return to some level of normalcy that will allow them to make project promotion a priority.
  - Posters have been removed due to infection control risk in one clinic, reducing project promotion.
    - Update: The clinic has ordered a bulletin board to hang the posters on. Poster handouts are being given to patients until the board arrives.
  - Waiting time inside the clinic waiting and exam rooms is decreased compared to before the pandemic. Therefore, exposure time to the posters is decreased.
    - Update: We have not found a solution yet.
- Clinic staff motivation to promote the project is low.
  - Update: We have provided some food and thank you cards to the clinic staff to encourage project promotion, which has shown some benefit.
- Danielle's clinic has a large Burmese population that are unable to read or speak English.
  - Update: New QR codes that lead straight to the translate Burmese website were generated and printed on bookmarks. Spanish QR code bookmarks were created for Sydney's clinic, which has a large Spanish speaking population. Numbers have increased since doing both interventions.

- There is potentially a lack of incentive for parents to go to the website and for staff to promote the project despite students reaching out and promoting the project to staff members.
    - Update: Low-cost incentives were delivered to staff. Site traffic seem to support parents are interested in the information. One possibility to help incentivize parents would be a prize drawing for parents if surveys were filled out, but it is too late in this cycle to implement this.

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 (3/1/21, 3/4/21, 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, Teandra Ramos-Hardy, via zoom meeting on 3/31/21.

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 parents to take the survey without being present in the clinics. We discussed a prize drawing, but there are a few concerns.

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.

<div align="center">

<u>Comments</u>

</div>

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 H

Project Bookmarks
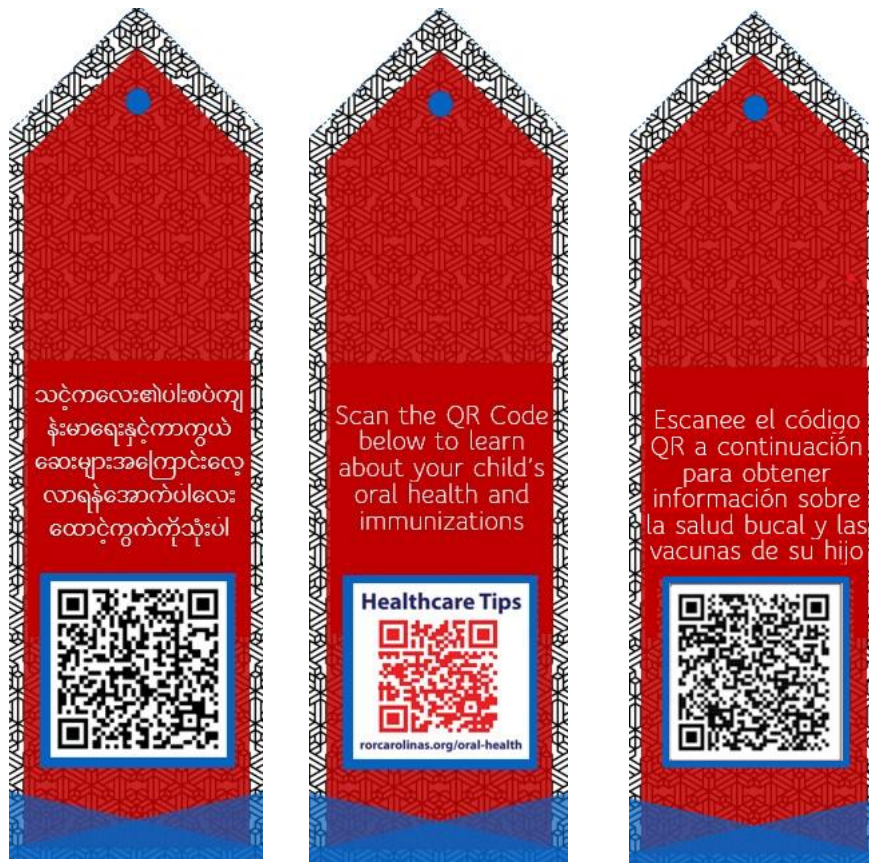
Note. QR-code containing bookmarks used during project implementation. Left bookmark is in the Burmese language and directs parents to the Burmese website. Middle bookmark is in the English language and directs parents to the English website. Right bookmark is in the Spanish language and directs parents to the Spanish website.

Appendix I

Project Timeline

PDSA Cycle 1

August 2020
- Conceptualize project

September 2020
- Create website content

October 2020
- Create QR code
- Create survey
- Create posters

November 2020
- Distribute posters and QR codes
- Finalize and launch website
- Begin book distribution and data collection

January 2021
- Data from November 2020 to January 2021 reviewed
- Barriers identified

PDSA Cycle 2

February 2021
- Planned and coordinated interventions to overcome barriers at all four clinic sites

March 2021
- Incentivized clinic staff
- Created and delivered Burmese & Spanish QR codes/ bookmarks

April 2021
- Review data from February to March 2021 to determine impact of interventions

PDSA Cycle 3

April 2021
- Created & distributed English bookmarks
- Present project at ROR plenary session

May 2021
- Review and analyze all data from November 2020 through April 2021
- Recommendations for next cohort

July 2021
- Disseminate findings at ECU CON
- Publish paper via ECU ScholarShip

Project Completion
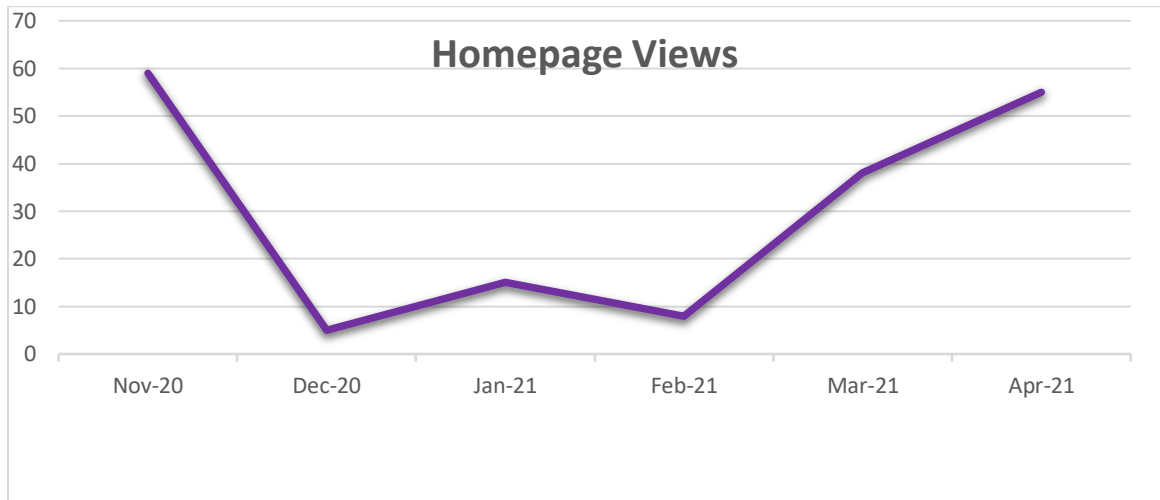
Appendix J

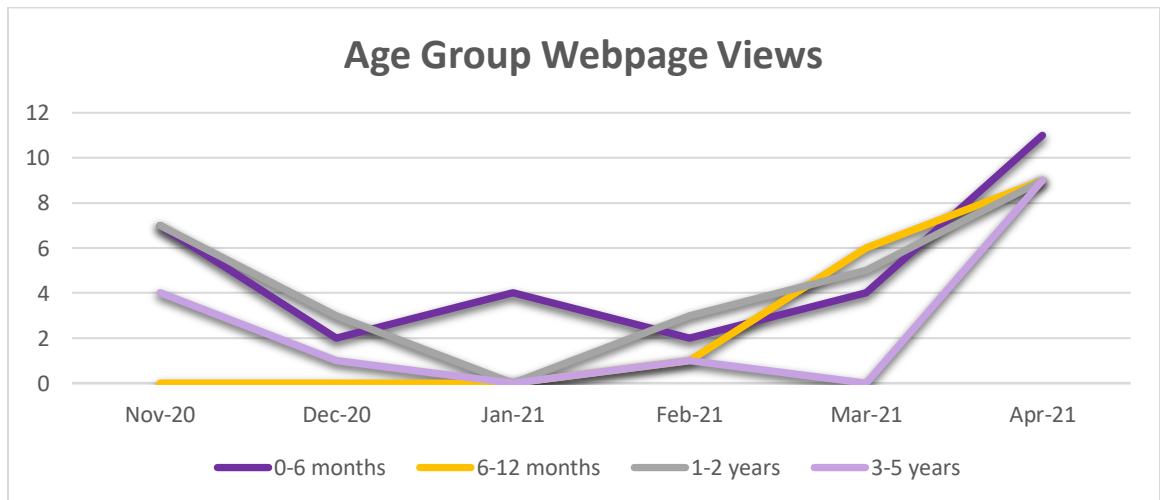**Website Analytics**

Figure H1

Homepage Traffic

Note. Homepage views for each month during project implementation.

Figure H2

Age Group Website Traffic

Note. Views for each age group's webpage each month during implementation.

Appendix K

Survey Results

	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5	Participant 6	Participant 7	Participant 8
Child's age	6-11 months	6-11 months	0-5 months	18-23 months	3-5 years	24-35 months	18-23 months	3-5 years
Receipt of QR code instructions	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
Was website easily understood?	Very easy	Very easy	Very easy	Very easy	Very easy	A little easy	Very easy	Very easy
Oral health knowledge gained	Some	A lot	A lot	A lot	A lot	Some	A lot	Some
Immunization knowledge gained	Some	A lot	A lot	A lot	A lot	A little	A lot	Some
Plans to change oral health routine	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Plans to change immunization practices	No	Yes	Yes	Yes	No	No	No	No
Likelihood of recommending website to others	Very likely	Very likely	Very likely	Very likely	Very likely	Somewhat likely	Very likely	Somewhat likely
Other comments	N/A	N/A	N/A	N/A	N/A	N/A	Car seat safety	N/A

Appendix L

Post-Mortem Analysis

The DNP project was intended to promote parental health literacy regarding pediatric oral health and immunizations. ROR identified a need to increase parental health literacy among their population. After research and feedback, it was determined a specific knowledge deficit was present in the oral health and immunization domains.

Implementation Plan

The project implementation plan was a multi-step process. The process began with the development of the website content, website splash page, QR code, and QR code stickers. The next step was to apply the QR code stickers on the books. These initial steps went according to plan. Facilitators to the development of the project's materials included strong teamwork, student and organizational dedication to the project, easy access to reliable online educational information, and organizational support with website development. QR code sticker placement was facilitated by collaborative relationships with clinics and Reach Out and Read representatives.

Finally, the books were ready for distribution. Books were distributed by clinic staff at each well-child visit. Clinic staff were encouraged to instruct parents on the newly implemented QR code. However, this step did not go as planned. Barriers included decreased staff motivation, increased demands on staff due to the ongoing pandemic, and parental language barriers. Attempts to overcome barriers included creating new QR code stickers for the Burmese- and Spanish-speaking populations. Staff morale was increased by offering continuous student support and bringing in baked goods and food to promote investment in the project. In retrospect, more emphasis needs to be placed on educating clinic staff on the QR code. Placing increased emphasis on clinic staff reward systems could be helpful in promoting QR code use.

Meetings

Communication was ongoing among the students, Reach Out and Read representatives, and the clinic sites. Communication was largely via electronic mail, which occurred at least weekly. Three zoom meetings were held with the students and the Reach Out and Read representative to discuss the project's progress during the implementation phase. In addition, the students attended a zoom meeting for the organization's plenary session. The meeting total was four with continuous communication in between. All communication occurred virtually; no face-to-face meetings were held.

Each student was also in contact with their respective clinic site at least twice. The initial contact included QR code sticker application and staff education. Each student also visited their clinic site mid-implementation cycle to offer support and increase staff morale.

Sustainability

The organization plans to continue the project over the upcoming year. Plans include partnering with the Charlotte AHEC and refining the website content. Organizational changes to promote the project's continuance include a stronger commitment from their clinic partners to implement the project. The Charlotte AHEC will be a new project partner, and it is imperative that the organization garners a solid relationship with the AHEC. Without a demonstrated commitment to the project, implementation will be unsuccessful. However, Reach Out and Read demonstrates a strong commitment to the project's success, which will inevitably be invaluable moving forward.

Project Benefits

The parental population directly benefited from this project. Parents gained oral health and immunization knowledge. Subsequently, they became empowered to make important healthcare decisions regarding their child's health.

Indirectly, the children benefited from this project. Parents were equipped with the knowledge and skills needed to provide age-appropriate oral health and immunization care. The end-goal is to promote pediatric well-being and decrease preventable disease.

Recommendations

One major recommendation is to ensure a dedicated partnership. Clinic involvement is heavily required for successful implementation. Preparation for a multi-lingual population would also be wise. Finally, consider ways to keep clinic staff invested in the project.

Appendix M

Actual and Proposed Budgets

Table M1

Actual Itemized 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 (including stickers + taxes + shipping)	$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	1	~	$0.00

ROR Communication Director			
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 Distribution			
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
Staff Incentives			
Cookies	3 dozen	$7.80 per dozen	$23.40
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***	*~*	***$902.95***

*Resources already utilized by ROR; no additional costs occurred as a result of this project

Table M2

Proposed Itemized Budget

	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 (including stickers + taxes + shipping)	$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 Distribution				
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*	*~*

*Annual recurring cost
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.