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Philadelphia College of Osteopathic Medicine
Graduate Program in Biomedical Sciences
School of Health Sciences

**Prenatal Counseling from Obstetricians as a Potential Point of Intervention to
Increase Childhood Vaccination Rates in Pennsylvania**

A Capstone in Public Health by Kaitlyn Davis
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ABSTRACT

Vaccine hesitancy is a major public health concern in Pennsylvania, and the reasons for it vary from religious to philosophical. One subgroup of vaccine hesitant parents chooses not to vaccinate because they are misinformed and uneducated about the significance and the safety of vaccines⁴. The objective of this study is to consider the use of an infographic to encourage pregnant women to ask their obstetricians about the importance and safety of vaccines as a way of increasing childhood vaccination rates.

Finding points of intervention to increase childhood vaccination rates is important. In order for a population to maintain herd immunity, 90% of that population needs to be vaccinated⁴. In China, a study was done to determine the effects of educating pregnant women about vaccines on the vaccination rates of their newborns⁹. The researchers saw significantly higher vaccination rates among the group that received education⁹. US obstetricians are prepared for this counseling because they were recently provided a toolkit by the CDC to guide their conversations with their patients¹⁴.

The research strategy that will be utilized for this analysis of vaccine hesitancy will be a literature review of the current vaccination information that the average pregnant woman currently receives and the likelihood that counseling from her obstetrician would be efficacious. The expectations are that there will be studies supporting the fact that women often receive little to no vaccine counseling during pregnancy and are left to make an uninformed decision regarding the vaccination of their child. The end goal is to create a research-informed infographic to be displayed in obstetricians' offices encouraging women to ask their doctor about vaccines.

BACKGROUND

The idea of vaccines has been around since the 1700s when Edward Jenner first conceptualized them⁴. They grew in popularity over the next two centuries because of their ability to protect populations from very serious diseases⁴. The efficacy of vaccines quickly became apparent and some governments went so far as to make them mandatory for their citizens because they recognized them as an important public health tool⁴.

Vaccines are important not only for the people who receive them but also for the people who cannot receive them because of a concept known as herd immunity⁴. Herd immunity is the idea that if enough people in a population are vaccinated against a disease, the disease will not spread easily through the population and an outbreak can be prevented⁴. Scientists have determined that the percentage of a population that must be vaccinated in order to achieve herd immunity is 90%⁴. Unfortunately, the last few decades have seen a rise in vaccine hesitancy, threatening the health of entire groups of people and risking the return of previously eradicated diseases.

The History of Vaccine Hesitancy

Vaccines became very popular throughout the 1800s and 1900s⁴. In 1902, due to a smallpox outbreak in Cambridge, Massachusetts, the board of health required all citizens to receive the smallpox vaccination⁴. One man sued, arguing that he had a right to decide what he put in his body⁴. In response, the Supreme Court would rule 3 years later that any municipality or state was allowed to mandate vaccines in order to protect public health⁴. In 1922, the United States Supreme Court declared that it was constitutional for schools to require that their students be vaccinated⁴. Things were quiet for a few decades and, in

that time, many diseases were classified as eradicated due to vaccines. However, developments in the late 1900s and early 2000s have caused some parents to have concerns about the safety of the vaccine for their children. In addition, these concerns have caused some states to adopt philosophical and religious exemptions to vaccination requirements¹⁷. The following are a few examples of the recent causes of vaccine hesitancy.

The study linking vaccines to autism.

In 1998 Dr. Andrew Wakefield and his colleagues published a study that suggested that there was a link between the MMR vaccine and autism¹⁴. The MMR vaccine is given to children to provide immunity against the diseases measles, mumps, and rubella³. The first dose is given around 12 to 15 months after the child is born and the second dose is given between ages 4 and 6³. There were many problems with the study that Dr. Wakefield had conducted including the fact that the sample size was incredibly small (12 participants) and that the participants were hand-picked as opposed to being randomly chosen¹⁵. Many follow-up studies were conducted that refuted the conclusion that Dr. Wakefield had published and Dr. Wakefield himself even published a retraction to the original study¹⁵. However, the damage that the original paper had caused could not be undone and rates of vaccination with the MMR vaccine dropped¹⁵. The risk of contracting autism from vaccines is still cited as a major reason why parents in the US choose not to vaccinate their children⁴. As recently as December of 2019, a Gallup poll found that 10% of adults still think that vaccines cause autism and a staggering 46% are unsure whether there is a link or not⁷.

Influence of celebrities and politicians.

Dr. Wakefield's study alone may not have had such an effect on the average person, considering it was published in a scientific journal; however, several celebrities and politicians facilitated the spread of the information contained in the article⁴.

Celebrities such as Jenny McCarthy and Jim Carrey have been outspoken about their mistrust of vaccines⁴. In addition, the current president of the United States, Donald Trump, has publicly voiced his belief that vaccines cause autism⁴. Most notably, during his 2016 campaign for president, he was in a debate with Dr. Ben Carson, a surgeon with training in pediatrics, when his beliefs about vaccines came up⁴. Instead of taking the opportunity to talk about the importance and safety of vaccines, Dr. Carson did not do much to refute Mr. Trump's beliefs⁴.

Social media.

The rise of social media is another factor that is cited as contributing to the spread of misinformation regarding vaccines and their safety³. A study found that many patients are looking to the internet for medical advice instead of looking to their doctor. 70% of people use what they find online to guide their medical care despite not having a way to tell if what they are reading is true or false¹¹. In fact, social media sites such as Facebook, Twitter, and Reddit are so fraught with anti-vaccine information that another study found that just having an account on one of these platforms makes a person more likely to be vaccine hesitant¹¹.

The Current Situation in Pennsylvania

Vaccination rates in Pennsylvania have been dropping due to the spread of misinformation regarding the safety and importance of vaccines. According to the American Academy of Pediatrics, the current rate of childhood vaccination with the MMR vaccine in Pennsylvania is 91.7%⁵. At first glance, this number seems to be positive, however, the vaccination rate needed to maintain herd immunity and prevent a disease outbreak is 90%, therefore this number is concerning. The legislation in Pennsylvania currently contains both religious and philosophical exemptions to mandatory vaccines¹⁷.

Vaccine counseling for pregnant women.

The American College of Obstetricians and Gynecologists has acknowledged the power that a recommendation to receive vaccines can have on a pregnant woman when it comes from her obstetrician¹⁰. A committee representing this group published recommendations for both obstetricians and gynecologists encouraging them to include vaccinations for pregnant women as a central part of their practice¹⁰. After a lengthy search, it appears that obstetricians only talk to their pregnant patients about vaccinating themselves and not about vaccinating their child when they are born. This finding is supported by information from the National Institute of Health entitled “What happens during prenatal visits?”¹⁸. Vaccines were not mentioned at all in this lengthy overview of topics discussed at prenatal visits¹⁸. While this is still important, not only to the health of the mother but also to the health of the baby, obstetricians should also be talking to mothers about the importance of preparing to vaccinate their newborn. The first vaccine a

child receives is the Hepatitis B vaccine which is given within 24 hours of their birth³. It is important for mothers to understand the importance of vaccinations before the child is even born instead of waiting until the high stress hours immediately after delivering the baby. The Gallup poll referenced earlier found that 11% of parents think that vaccines are more dangerous than the disease they are meant to prevent, therefore it is important for new mothers to receive information on vaccine safety⁷.

Problems seen in other parts of the country.

A measles outbreak occurred in California in 2015 and highlights the importance of addressing the dropping vaccination rates in Pennsylvania before it is too late, and the state sees an outbreak⁴. In 2014 and 2015, California saw a steep drop in vaccination rates with almost 20% of the state's children being unvaccinated⁴. In early 2015, measles cases began to be reported in the state. By February, there were reports of 125 cases, most of which occurred in children who were unvaccinated due to personal belief exemptions⁴.

CDC Toolkit and Healthy People 2020

In 2010, the federal government's Office of Disease Prevention and Health Promotion published an agenda with a set of goals and objectives for the next 10 years entitled *Healthy People 2020*¹³. The goal of this initiative was to improve the nation's health, and immunization was identified as a topic that needed to be improved upon¹³. During that time, the Centers for Disease Control and Prevention has published a toolkit for prenatal care providers on their website¹⁴. The intent of this resource is to give prenatal care providers the training, information, and materials they need to increase

maternal vaccination rates¹⁴. Many of the resources contained in this toolkit could also help obstetricians counsel women about vaccinating their newborn child. One resource in particular is information referring to a smartphone app that informs a mother which vaccination to expect at which of her child's doctor's visits¹⁴. Another resource offered to obstetricians in this toolkit is continuing education regarding childhood vaccines¹⁴.

Infographics and Their Importance as a Public Health Intervention

According to the American Public Health Association, "infographics can be a powerful tool for sharing important public health information and helping people understand the issues"¹. Infographics convey information and data quickly and efficiently in a way that is easy for the viewer to understand². They often include images as opposed to large bodies of text because images are eye catching and can be easier to understand². One study found that infographics can be effective because the brain processes images quicker than text in a line and viewers' attention spans are getting shorter and shorter².

Objectives of this Paper

A long history of multifactorial vaccine hesitancy has put children in Pennsylvania in a dangerous position. Many public health initiatives have been created with the aim of increasing childhood vaccination rates. The goal of this paper is to create a research-informed infographic to be used in the waiting rooms of obstetricians' offices to encourage pregnant women to talk to their obstetrician about vaccines before their child is born. The purpose of the infographic and the counseling that the pregnant women will receive is to combat the misinformation about vaccines in the media and to convince

them of the significance of vaccinating their child. The overall goal of the intervention is to increase childhood vaccination rates.

RESEARCH STRATEGIES

There were two main phases of research for this project. The first phase, and the most substantial portion of the research, was a literature review that included searches for information on topics including vaccines, vaccine hesitancy, vaccination rates, standard prenatal obstetrician visits, previously attempted interventions, and public health tools. The second phase involved research to create the infographic itself.

Literature Review

Vaccines, vaccine hesitancy, and current vaccination rates.

The goal of this project is to increase childhood vaccination rates in Pennsylvania. In order to get there though, it was necessary to start by understanding vaccines themselves and, more importantly, the factors that led to vaccine hesitancy becoming such a widespread problem. Understanding the causes of this problem was important when it came to tailoring the intervention appropriately. In addition, having an idea of the current rates of vaccination, both in Pennsylvania and in the United States at large, helped to underscore just how important this issue is. Awareness of how vaccination rates vary by location or even from one vaccine to another was also helpful when it came to adapting the intervention to the issue.

Previous interventions to increase childhood vaccination rates.

After the problem of low childhood vaccination rates and the severity of this problem were identified, the next step was to look at previous interventions in order to understand what has and has not worked before. There is no point in trying the exact

same intervention that has been tried before, regardless of outcome, so it was helpful to know about previous intervention attempts. It was also helpful to see if there have been any studies done that support the reasoning behind the intervention that is being designed here.

Standard information received by pregnant women during OB/GYN visits.

After using research on previous studies, the intervention chosen for this project was counseling for pregnant women from their obstetrician on vaccine importance and safety. Using resources available from the American College of Obstetricians and Gynecologists (ACOG), research was done into what vaccine related information, if any, pregnant women currently receive from their obstetrician during prenatal visits. This information was gathered by reviewing “Clinical Guidance” publications from the organization. In addition, information from the National Institute of Health regarding prenatal visits was reviewed¹⁸.

Preparedness of obstetricians.

Upon deciding to aim the intervention at encouraging pregnant women to ask their obstetrician about vaccines during prenatal visits, it was important to make sure that obstetricians were prepared with the information they needed to talk to pregnant women about vaccines and their child’s health. Using information available from the ACOG and from the Centers for Disease Control and Prevention, information was gathered about the tools that obstetricians have at their disposal and their preparedness to have these conversations with women when they bring it up.

Infographics as public health tools and why they are effective.

The final piece that needed to be considered was how to communicate with pregnant women and encourage them to ask their obstetrician about vaccines. After reviewing different public health tools and their effectiveness, infographics were chosen as the mode of communication. Reviews were done into why infographics are popular public health tools, why they are effective, and how to best use them. An infographic hanging in the waiting rooms of obstetricians' offices and targeted at pregnant women was chosen as the tool that would be used to implement this intervention.

Infographic Research

Finally, research was done in order to create the infographic itself. There were a few different things that were considered when creating the infographic. The first was the kind of color schemes and visual effects that are known to be most appealing. The second concern was finding facts and figures about vaccines, as well as their importance and safety, that could be included. The next thing researched was how to make sure the information was delivered at an appropriate health literacy level. This was done using an online health literacy calculator that reads the text on the infographic and determines the readability score for it. The last thing that was considered was what information would be most important for pregnant women to see on the infographic to encourage them to ask their doctor about vaccines. This was accomplished by considering the most common concerns women have when it comes to vaccines and whether or not they will choose to have their child vaccinated.

RESULTS AND DISCUSSION

The background information and literature review support the idea that prenatal counseling from obstetricians would be an effective measure to increase childhood vaccination rates. In addition, similar studies have been conducted in other countries with similar results. Finally, the research done into what the infographic should look like and what information it should include was used to create a draft of an infographic that will be presented and discussed here.

Supporting Studies

A study was done in eastern China in 2017 to test “the effectiveness of prenatal vaccination education intervention on improving mother's vaccination knowledge and child's vaccination status”⁹. This was done by recruiting pregnant women and then assigning them to either an intervention group that would receive vaccine education or a control group that would not⁹. The researchers then used surveys to evaluate vaccine knowledge and tracked the numbers of fully vaccinated children between the two groups⁹. Their results were that women in the intervention group had significantly higher vaccine knowledge after receiving the education and that their children had significantly higher rates of full vaccine coverage than the control group’s children⁹. The results seen in this study in China support the idea that increasing prenatal counseling for women in Pennsylvania will increase childhood vaccination rates as well.

Obstetricians as the Intervention Point

Obstetricians were chosen as the mediators for this intervention because research has shown that during a pregnancy is one of the most effective times for a woman to receive vaccine education and because obstetricians have already been provided a lot of the tools that they need for this counseling from the Centers for Disease Control and Prevention and from the American College of Obstetricians and Gynecologists^{9,14}. The study that was done in China supports the timing of obstetricians providing education during prenatal visits⁹. In addition, the CDC toolkit that was provided to obstetricians contains resources that will help them to communicate important information to their patients¹⁴. Additionally, it is important that mothers plan to vaccinate before the child is born because the Hepatitis B vaccine is given within 24 hours of a child's birth, not allowing for much time for discussion³.

The Use of Infographics

Infographics were chosen as the tool to communicate with pregnant patients directly to encourage them to talk to their provider about vaccines. They were chosen because they have been proven to be effective in communicating information with patients in ways they can easily understand². This is particularly important in the United States because the average person reads at a middle school level, so flyers that contain too much text or are full of medical jargon will not be effective at communicating with the average patient². Infographics by definition are "unique and attractive" so they should stand out in an obstetrician's waiting room where there is a lot of information posted². The objective of an infographic is for viewers to "quickly understand and learn"². The

goal of this infographic in particular is that it will both communicate accurate and compelling information about vaccines to the patient and encourage the patient to initiate a conversation with their provider about vaccines.

Infographic Sample

Figure 1 shows the sample infographic that was created for this project. To create this infographic, guidelines on color and organization as well as on health literacy were referenced. Additionally, to determine what information would be featured in the infographic, the most common concerns that vaccine hesitant parents have were considered. The infographic focuses on the fact that vaccines are “safe, necessary, and effective” because most parents seem to be concerned about the safety of vaccines, their efficacy, and how necessary they even are for their children. A Gallup poll mentioned earlier reported that 10% of adults think that vaccines cause autism⁷. That same poll found that 11% of adults think vaccines are more dangerous than the disease they prevent⁷. Finally, the infographic encourages women to speak to their obstetrician during that day’s visit because this is a time sensitive issue.

PROTECT YOUR BABY
VACCINES. IMMUNIZATIONS. SHOTS.
WHATEVER YOU CALL THEM, YOUR BABY WILL NEED THEM

SAFE
✓
NO KNOWN CONNECTION WITH AUTISM OR SIDS

NECESSARY
🕒
1 CHILD DIES EVERY 20 SECONDS FROM A DISEASE THAT COULD HAVE BEEN PREVENTED WITH A VACCINE

EFFECTIVE
😊
3 MILLION LIVES ARE SAVED EACH YEAR BY VACCINES

VACCINES

Hep B
Mumps
Measles
Rubella

TALK TO YOUR DOCTOR DURING TODAY'S VISIT ABOUT YOUR PLANS TO VACCINATE YOUR NEWBORN

Sources: Centers for Disease Control and Prevention, Immunization Action Coalition of Washington

Figure 1. Sample Infographic for Obstetrician’s Waiting Rooms
This is a sample of an infographic that can be hung in the waiting room of obstetrician’s offices to encourage pregnant women to speak to their doctor about vaccines.

RECOMMENDATIONS FOR FUTURE STUDIES

There are a few different ways that this project can be developed further in the future and can be tailored to different populations of pregnant women. First, creating a focus group of pregnant women and applying the concepts of design thinking to the development of the infographic itself would be useful to make sure it is appealing to the target population. Second, in order to supplement the information that was gathered regarding standard prenatal visits, calls could be placed to OB/GYN offices to find out more about prenatal visits. Third, more research can be done into how to reach impoverished communities specifically because different barriers may exist in this community than for pregnant women in general. Finally, it would be interesting to explore the role that telemedicine can play in an obstetrician's ability to communicate important vaccine related information to pregnant women.

Utilizing the Design Thinking Process

Design thinking is a process used during periods of innovation or invention¹⁶. The focus is on the opinions of a group of participants that are representative of the target population¹⁶. There are five stages of design thinking and it is during the "synthesis phase" that the focus group is incorporated¹⁶. During this phase, the researchers or designers present a prototype to the group for their feedback. The designers then rework the prototype based on the feedback and present it to the group again. This cycle continues until the focus group approves of the prototype and has no more suggestions for improvement¹⁶.

Design thinking can be utilized in this project during the development of the infographic and there are two different ways that focus groups can be used. First, a group can be formed consisting of pregnant women regardless of whether they are planning on vaccinating their child or not. When the infographic is presented to them, they can simply be asked: “Does the design of this infographic catch your attention?” and “Based on the information, are you likely to ask your doctor about vaccines for your child?” In order to take the development of the infographic a step further, a second focus group can be formed. This group would be made of mothers who were previously against vaccinations but are no longer against them. When presented with the infographic, this group could be asked, “Would the information on this infographic have changed your mind about vaccinating your baby when you were pregnant?”. The groups would be presented with the infographics over and over until they both agreed that the design and the information were effective in encouraging them to talk to their doctor about vaccinations for their child. This process could also be used to tailor the infographic to different populations and translate it into different languages.

Calling OB/GYN Offices

In order to supplement the information that was gathered from the ACOG and NIH, office managers at OB/GYN offices can be contacted in Pennsylvania. They can be asked about standard prenatal visits and what information, if any, their pregnant patients typically receive concerning vaccines. They can also be asked if their offices have any “nurse navigators” or other professionals available on site to answer questions that patients have after their visit with their doctor. Finally, they can be asked if they have any

literature that they hand out and where they receive this literature from. Offices can be chosen that represent different geographic, racial, and socioeconomic areas and populations in Pennsylvania.

Considering Impoverished Communities and Uninsured Patients

The focus of this research so far has been addressing the contribution of misinformation to low childhood vaccination rates. However, there are many other barriers that pregnant women face that also contribute to their decision or ability to vaccinate their child. One major barrier that cannot be ignored when discussing vaccination rates is the burden of the cost of vaccines to a child who is uninsured or underinsured⁸. More research needs to be done into how to overcome the barrier of cost and provide vaccines to this population. Specifically, in Philadelphia, it would be important to consider the role that Federally Qualified Healthcare Centers play in the community and what they do to provide vaccines⁶.

The Role of Telemedicine

Telemedicine is emerging as a popular way to deliver healthcare as well as a way for providers to communicate more with their patients. Especially given the recent rise of telemedicine use as a result of COVID-19, it is a great time to make telemedicine a part of standard practice and procedures. Further considerations for this project could include finding ways to incorporate telemedicine into the vaccine conversations between pregnant patients and their obstetricians. Telemedicine has a wide array of services and some things that can be utilized here include, for example, online portals with vaccine information or emails from obstetricians to their pregnant patients providing information

or reminders about vaccines¹². In addition, research can be done to see if this would be an effective alternative to vaccine conversations happening during prenatal visits because those visits are already packed with so much information.

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