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# Improving Pertussis Education for Postpartum Women and their Family Members

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Improving Pertussis Education for Postpartum Women and their Family Members

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### Abstract

*Background:* The purpose of this DNP project was to synthesize evidenced based-research related to Tdap vaccination against pertussis for family members of pregnant and postpartum women in order to provide protection from pertussis for newborn infants through cocooning. Cocooning refers to the vaccination of family members and caregivers in close contact with the infant to protect the infant by lowering risk of acquiring pertussis from close contact through an infected family member.

*Methods:* This project utilized the Health Belief Model to understand perceptions and predict behaviors related to the pertussis vaccination of family members who may come in contact with unvaccinated infants. A toolkit was provided to the nursing staff at the University of California San Francisco Benioff Children's Hospital, including an educational handout for nurses to use to educate family members of newly postpartum women. The goal was to improve Tdap vaccination rates among family members to protect newborn infants from acquiring pertussis.

*Results:* Thirty-six nursing staff participated in the educational sessions (five in clinic, 36 from the birth center). The majority of the respondents were Registered Nurses ( $n = 32$ ) and some were Licensed Vocational Nurses (LVN) ( $n = 4$ ). Five areas were addressed through pre and post intervention surveys that assessed the following: Knowledge of pertussis or whooping cough; Knowledge about the term "protection through cocooning"; Likelihood of using an educational tool/handout for patients and families; Likelihood that an educational tool will be useful to patients; and Likelihood for an educational tool to increase rates of pertussis vaccinations. Overall, there was a statistically significant result in the likelihood that the nurses would use an educational tool or handout to educate their patient and their family members about pertussis ( $p < .001$ ). The mean score of nurses' likelihood that an educational tool will be useful to patients

after to receiving the educational session was 4.78 ( $SD = 0.42$ ). This represented a statistically significant difference in the mean pre- and post-education scores for the likelihood that an educational tool will be useful to patients.

*Conclusions:* Nurses are the forefront of patient care and nursing education in an acute setting.

They are trusted and reliable sources for healthcare information and education. Through this study we have examined the likelihood to use a tool or handout after an educational session.

Nurses on this unit have expressed that after an educational session, they were more knowledgeable of the subject matter and the information would be useful to patients to improve pertussis education for pregnant women and their family members.

*Keywords:* pregnancy, pertussis, Tdap, vaccinations, whooping cough, cocooning, cocoon

## Introduction

Pertussis, also known as *whooping cough*, is a highly contagious respiratory tract disease caused by the bacterium *Bordetella pertussis*. It is characterized by uncontrollable bouts of coughing making it difficult to breathe (paroxysmal cough), vomiting induced by coughing (posttussive emesis), and a sharp high-pitched intake of air creating a *whooping* sound (inspiratory whoop) (Barlow, Reynolds, Cieslak & Sullivan, 2014). Pertussis is a very serious disease that can affect people of all ages and can be life threatening and deadly for children less than 1-year-old (Centers for Disease Control and Prevention [CDC], 2015a). Infected adolescents and adults transmit the disease to young children and infants, who are most vulnerable to severe pertussis and its life-threatening complications.

Pertussis is, however, one of the many diseases that can be prevented by vaccinations (Brooks & Clover, 2016; CDC, 2015a). The Advisory Committee on Immunization Practices (ACIP) recommends that all pregnant women get the booster Tdap vaccine during the third trimester of each pregnancy (27-36 weeks), regardless of past vaccine status. They also recommend that all family members and caregivers of the infant are up-to-date with their pertussis vaccines (DTaP or Tdap, depending on age) before coming into close contact with the infant because the infant's first dose of Tdap is not given until two months of age (CDC, 2016). A *cocoon* of protection for the baby could be formed during the first few months of life by making sure those in close contact are up-to-date with the pertussis vaccine (CDC, 2016).

## Problem Identification

Jones, Carroll, Hawks, McElwain, and Schulkin (2015) published a prospective longitudinal study to determine whether an American College of Obstetricians and Gynecologists' (ACOG) guided immunization toolkit increased ob-gyn provider immunization

administration. These toolkits were provided to ACOG members and were successful in increasing Tdap vaccine administration rates by ob-gyn providers (Jones, Carroll, Hawks, McElwain, & Schulkin, 2016).

This study represented the group of ACOG members, but did not include nurses. Nurses have been the forefront of patient education and are trusted sources of patient education. Therefore, it is important for nurses to understand the material they are presenting before educating their patients. Protection against pertussis through Tdap vaccination and reducing the risk for infant pertussis through cocooning are important public health initiatives, particularly for pregnant and postpartum women and their families. Despite the literature supporting the importance of pertussis vaccination, the rates of vaccination are not consistent and vary across the nation. Providing a toolkit containing educational material for nurses will help educate family members of newly postpartum women, which may improve Tdap vaccination.

### **Background**

In 2014, there were 32,971 cases of pertussis reported to the Centers for Disease Control and Prevention (CDC) in the United States, which also marked a 15% increase of reported pertussis cases from the prior year (CDC, 2015a). Despite the significant research and recommendations given by the ACIP, Tdap vaccination rates among adults ages  $\geq 19$  years who report living with an infant less than one year were 32.0% during that year.

Research demonstrates that pregnancy dose Tdap and postpartum cocooning to prevent infant pertussis could reduce annual pertussis incidence rates, hospitalizations, and deaths, while providing additional immunity (Terranella, Asay, Messonnier, Clark, & Liang, 2013). The highest amounts of antibodies to the vaccine were found in those whose mothers received their

Tdap vaccine in pregnancy. Infants born to mothers who received the Tdap vaccine had higher antibody concentrations to pertussis antigens than those of their mothers (2.0- to 2.5-fold greater) at delivery. By two months of age, infant immunity to pertussis continued to thrive and remained higher than those infants of mothers who did not receive the vaccine in pregnancy (Hardy-Fairbanks et al., 2013).

The nurse's scope of practice includes providing instruction and education to patients to assist them in managing their illnesses and obtaining optimal levels of wellness and (Bastable, 2016). One key component to the role of education includes patient and family education (Bastable, 2016). Patient and family education is an important aspect in achieving healthcare goals. The resurgence of pertussis prompted the need for increased education, awareness, and immunity through vaccinations by nursing intervention. Nurses may be the first provider the patients encounter at obstetric visits. They answer phone calls and administer the vaccination, which is why nurses provide a key role in educating these patients regarding the vaccine (Bonville, Cibula, Domachowske, & Suryadevara, 2015).

The health belief model (HBM) is the conceptual framework that was used for this integrative review and development of a toolkit to educate family members regarding the benefits of immunization. The model includes working on perceptions of susceptibility, severity, benefits and barriers as well as providing cues to action. The HBM model is commonly used in health education and promotion to understand the effects of personal beliefs or perceptions and health behaviors (Hayden, 2014). For this project, I utilized the HBM to evaluate the effects of pertussis vaccine education of pregnant women and their family members on nurses and their attitudes towards vaccinations before and after education.



### **Literature Review**

An integrative review was conducted to summarize original research on a specific topic and provides a comprehensive approach of understanding the topic. Whittemore and Knafl's (2005) methodology was chosen for this review and includes problem identification, literature search, data evaluation, data analysis, and presentation of review findings. For the purpose of this review, the data analysis and presentation of review findings are included in the review results section.

### **Search Methods**

A literature search was conducted using Google Scholar, PubMed, CINAHL, JBI, EbscoHost, and Cochrane Systematic Reviews for information on the history and background of Tdap vaccine in pregnancy and evidence-based research to promote vaccinations and implementations into practice. Keywords included: *cocoon, cocooning, mothers, females, women, pregnancy, pertussis, infants, birth, Tdap, risks, health literacy, and vaccine*. Research studies that were included and considered were those of pregnant women that did and did not receive the Tdap vaccine.

The search strategy aimed to find both published and unpublished studies. Studies published in English were considered for inclusion in this review and were limited to Tdap vaccine, pertussis and pregnancy. Each electronic database was searched from the earliest date available until the start date of this review. Any data available within the last five years of the start date of this review were included in this review. Twenty-one articles were read in their entirety; seven articles were subsequently excluded because the content did not fit the criteria of a research article or did not provide information relative to the literature review.

## **Review Results**

A total of 14 studies were included in the review. Data were extracted from each article and organized into a matrix table (see Table 1). These articles provided information to support the two aspects of the literature review: the reduction of risk for infant pertussis through cocooning, and the development of educational materials for family members, which included consideration for health literacy.

**Study settings.** Of the 14 studies reviewed, six were from the United States, three from Australia, two from the Netherlands, one from Uganda, and one from India. Two of the studies specified locations in rural settings; two in urban settings and the remaining did not specify or included multiple sites.

**Data collection methods.** The data collection used in the reviewed studies varied. Of the 14 studies reviewed, six used questionnaires/surveys (Bonville et al., 2015; Donnan, Fielding, Rowe, Franklin, & Vally, 2013; Hayles et al., 2016; Johri et al., 2015; Rosenblum, McBane, Wang, & Sawyer, 2014; Visser, Hautvast, Van der Velden, & Hulscher, 2016), seven through electronic data collection (Beel, Rench, Montesinos, Mayes, & Healy, 2013; Carrico & O'Keefe, 2013; De Greeff et al., 2010; Dempsey, Brewer, Sevick, Pyrzanowski, Mazzoni, & O'Leary, 2015; Kayina et al., 2015; Pati et al., 2010; Payakachat, Hadden, & Ragland, 2016; Quinn et al., 2014), and one through focus group (Visser, Hautvast, Van der Velden, & Hulscher, 2016).

## **Samples**

**Population.** Thirteen of the articles contained data from postpartum women and mothers (Beel et al., 2013; Carrico & O'Keefe, 2013; De Greeff et al., 2010; Dempsey et al., 2015; Pati et al., 2010; Payakachat et al., 2016; Quinn et al., 2014; Visser et al., 2016) while one article specifically addressed infants and children involved in pertussis cases (Kayina et al., 2015). Five

articles addressed family units (mothers, father, and siblings) (Carrico & O' Keefe, 2013; De Greeff et al., 2010; Donnan et al., 2013; Quinn et al., 2014; Rosenblum et al., 2014) and one article included new parents, and health care providers such as midwives, maternity assistants, and neonatal nurses (Visser et al., 2016). Race was described in one article as it referenced health literacy among the race (Pati et al., 2010).

**Educational level.** Educational level was taken into account in one article to address health literacy adequacy and to determine if maternal health literacy influenced early infant immunization status (Pati et al., 2010).

**Socioeconomic status.** Socioeconomic status was not addressed in the articles directly, although one article suggests geographic locations and rural and urban settings.

### **Study Design**

The most common study design was a cross-sectional study, which included ten studies. There were two prospective cohort studies, and two case-control studies. Six of the ten cross-sectional studies were conducted through survey data collection among women examining their awareness of the severity of pertussis and understanding attitudes regarding the vaccine. Two surveys included information regarding vaccine status of father, siblings and those in close contact with infant. One survey included obstetric providers addressing Tdap vaccine safety and recommendations.

### **Study Findings Related to Tdap**

**Perceived risks.** Of the articles reviewed, three articles addressed the perceived risks of pertussis. Parents that vaccinated their children agreed that their infants were at risk of contracting pertussis, which was one of the reasons for vaccinating their infant (Donnan et al., 2013). Parents who were vaccinated considered the risk of pertussis disease for the infant and

the possibility that their infant would contract pertussis and the severity of the disease for the infant (Visser et al., 2016). Parents were also concerned with the possibility of a personal risk of contracting pertussis and personal chance of transmitting pertussis to an infant (Visser et al., 2016). Postpartum women who received a pertussis booster vaccine reported a higher perceived severity of pertussis for an adult ( $p < .001$ ), reduced perceived susceptibility for contracting ( $p < 0.001$ ), higher perceived vaccine benefits ( $p < .001$ ), and lower vaccine barriers ( $p < .001$ ) (Hayles et al., 2016).

**Immune responses in pregnancy.** In cohort study, Hardy-Fairbanks et al. (2013) provided an understanding of the effect of maternal Tdap vaccination on infant immunologic responses to routine pediatric vaccines. This study examined infants of mothers who received or did not receive the Tdap vaccine during pregnancy by collecting maternal and cord blood samples at delivery. Infant blood samples were also collected before and after primary series and booster dose of diphtheria, tetanus, and acellular pertussis (DTaP) and other vaccines (Hardy-Fairbanks et al., 2013).

These samples were collected before the administration of the vaccine and one month following the DTaP primary series. The maternal and cord blood collected at delivery showed higher antibody concentrations to pertussis antigens in the Tdap group (mothers who received the Tdap vaccine in pregnancy) than the control group (mothers that did not receive the Tdap vaccine during pregnancy) (Hardy-Fairbanks et al., 2013). The Tdap group infants had higher antibody concentrations to pertussis antigens than those of their mothers (2.0- to 2.5-fold greater) at delivery.

At delivery, infants in the control group had higher antibody concentrations to pertussis antigens than those of their mothers (1.4- to 1.7-fold greater) (Hardy-Fairbanks et al., 2013). By

2 months of age infant immunity to pertussis continued to thrive. Infant pertussis antibody concentrations by two months of age remained higher than those of the control group by 3.2 to 22.8-fold. (Hardy-Fairbanks et al., 2013). The highest amounts of antibodies to the vaccine were highest in those whose mothers received their Tdap vaccine in pregnancy.

Once the primary series of vaccines were administered, there were no statistically significant differences in the two groups (Hardy-Fairbanks et al., 2013). In addition, when comparing pregnancy vaccinations to postpartum vaccination, pregnancy vaccinations could reduce annual infant pertussis incidence cases by 33% versus 20%. They could also decrease hospitalizations by 38% versus 19%, and deaths by 49% versus 16%. Cocooning doses provide additional coverage with father and grandparent for an additional 16% of cases (Terranella et al., 2013).

**Need for cocooning.** A cross sectional survey conducted by Donnan et al. (2013) revealed that 96% of mothers and fathers indicated they would agree to Tdap vaccination to prevent transmitting infectious disease to their child. In 50-55% of pertussis cases; the source of transmission to infant were the parents; 6-8% were grandparents and up to 20% were siblings (Terranella et al., 2013). Household contacts such as parents or siblings were identified as the common source of infection (52%-58%).

In addition to maternal vaccination pre-pregnancy, an immunized father reduced the risk by 51% (95% confidence interval 0% to 76%) (Wiley, Cooper, Wood, & Leask, 2014). A prospective cohort study by De Greeff et al. (2010) revealed that 60% of patients with atypical pertussis, household members were the most likely source of infection; siblings (41%), mothers (38%) or fathers (17%) (2010). Among neonates with atypical pertussis, transmission occurred through siblings (28%), mothers (24%) and fathers (11%) (De Greeff et al., 2010). Based on De

Greeff's et al.'s (2010) study, if immunity to pertussis is maintained or boosted, 35-55% of infant cases could be prevented (2010). A case-control study by Quinn et al. (2014) concluded that the effectiveness of cocooning reduced pertussis infection by 48% (95% *CI*: -2% to 74%) in mother alone; 5% (95% *CI* – 79% to 50%) in father alone.

**Perceived barriers.** Possible contributing factors and barriers to obtaining the Tdap vaccine or completing a cocoon included lack of insurance coverage, inadequate information, knowledge or support, or no recommendation from their providers to get vaccinated (Beel et al., 2013; Carrico & O'Keefe, 2013; Donaldson et al., 2015; Sawyer & Long, 2015). Many viewed the potential side effects of the vaccine to the unborn baby and to themselves as one of the risks and safety concerns of the vaccine, and felt there was not enough evidence to support its use or its effectiveness in protecting the baby from pertussis (Bonville et al., 2014; Dempsey et al., 2015; Donaldson et al., 2015). Concerns that the vaccine would harm the recipient while pregnant and/or harm the baby are barriers to getting vaccinated (Payakachat et al., 2016). Others viewed that “it was too much trouble” to get the vaccine (Payakachat et al., 2016).

**Health literacy.** Health literacy and diphtheria-tetanus-pertussis (DTP3) vaccine status were assessed using Indian child health promotion materials in a study conducted by Johri et al. The study was designed to document the correlation of maternal education and mother's knowledge and understanding. Women with no education (58.2%/77.5%) had low health literacy and women with some secondary or higher education (greater than grade 9) (76.4%/81.7%) had high health literacy in both rural and urban India (Johri et al., 2015). There was a positive association with maternal health literacy and DTP3 vaccination. In the rural site the adjusted odds ratio (*OR*) was 1.57 (95% *CI* 1.11 to 2.21,  $p = .010$ ) for those with medium health literacy and  $OR = 1.30$ (95% *CI* 0.89 to 1.91,  $p = .172$ ) for those with high health literacy.

In the urban site, the adjusted *OR* was 1.10 (95% *CI* 0.65 to 1.88,  $p = .705$ ) for those with medium health literacy and  $OR = 2.06$  (95% *CI* 1.06 to 3.99,  $p = .032$ ) for those with high health literacy (Johri et al., 2015).

A longitudinal prospective cohort study conducted to determine if maternal health literacy influences early infant immunization status revealed that maternal health literacy was inadequate or marginal among nearly 25% of mothers and 31% had less than high school education (Pati et al., 2010). Infants at three months of age whose mothers had completed high school or beyond or received care in a hospital-affiliated site were most likely to be up-to-date than others with vaccinations (Pati et al., 2010). Therefore, early intervention would ensure that infants are fully protected at an early age.

**Provider influence on decision-making.** The most common reason for non-vaccination and implementation of cocooning was the lack of awareness by mothers and their family members (Donnan et al., 2013). In a cross-sectional survey conducted by Donnan et al. (2013) 43% of mothers and 23% fathers heard about the Tdap vaccine from their health care providers, the majority being their maternal and child health nurse. With a random convenience sample of postpartum women, Beel et al. (2013) surveyed 511 postpartum women regarding their decision to immunize. The results showed that 93% of women were willing to be immunized during their pregnancy if recommended by their health care provider.

Sixty-two percent of these women stated that their health care providers were the most trusted information source (Beel et al., 2013). Beel et al. concluded that health care providers had the greatest influence on vaccine acceptance by pregnant and postpartum women. Obstetric providers also play an important role in Tdap vaccination. Bonville et al. (2014) collected information of obstetrical providers in New York to understand their attitudes and practices

following the recommendation for pertussis vaccination during pregnancy. These providers (92%) were aware of the ACIP recommendations for Tdap vaccine for women in third trimester of each pregnancy and 80% recommended Tdap to eligible patients (Bonville et al., 2014). It was noted that nurses are the first provider the patient encounters at these obstetric visits and are responsible for the administration of the Tdap vaccine to their patients (Bonville et al., 2014).

### **Summary**

This integrative review discusses evidence to support the need for nursing education to promote cocooning. The studies reviewed and considered discussed interventions that were made to promote cocooning such as in-hospital clinics through surveys to mothers, fathers and family members. The surveys identified whether the concept of cocooning was understood, and assessed the success of educational tool kits provided to ACOG members. The education toolkit presented was intended for members of ACOG for use in their private practices and not directed solely for nursing education to family members about the importance of cocooning.

The majority of pregnant women, postpartum women, and their families rely on health care providers as sources for education or information regarding necessary vaccinations and the adequate teaching regarding Tdap immunization and cocooning. It has often been identified by patients that nurses are trustworthy sources, and are often the first providers the patient sees. Nurses are also responsible for administering vaccines and performing patient education and teaching, which is an important aspect of the nursing scope of practice.

The risk of pertussis to the infant is an important point to include in nursing education and why the need for cocooning exists. Since pertussis is spread through direct contact by coughing or sneezing around another person, infected infants have more commonly contracted the disease from their infected older siblings, parents or caregivers. We can reduce the risk of



infection to the infant through maternal vaccination during pregnancy to provide high antibody concentrations to pertussis antigens to the infant in utero (Hardy-Fairbanks et al., 2013). In addition, transmission risk to the infant could be decreased by 51% by methods of cocooning through vaccination of parents, caregivers, and other close contacts. Cocooning indirectly protects infants from transmission by preventing disease in those in close proximity (Forsyth, Plotkin, Tan, & Heinz Wirsin von Kong, 2015).

### **Theoretical Framework**

The HBM was utilized as the theoretical framework of this project to evaluate one's desire to avoid illness, or conversely get well if already ill; and the belief that a specific health action will prevent, or cure, illness (Boston University school of Public Health, 2016). The HBM utilizes the following constructs:

*Perceived susceptibility* – Refers to a person's subjective perception of the risk of acquiring an illness or disease.

*Perceived severity* – Refers to a person's feelings on the seriousness of contracting an illness or disease (or leaving the illness or disease untreated).

*Perceived benefits* - Refers to a person's perception of the effectiveness of various actions available to reduce the threat of illness or disease (or to cure illness or disease).

*Perceived barriers* - Refers to a person's feelings on the obstacles to performing a recommended health action.

*Cue to action* - This is the stimulus needed to trigger the decision-making process to accept a recommended health action.

*Self-efficacy* - This refers to the level of a person's confidence in his or her ability to successfully perform a behavior.

Although the HBM does not suggest a strategy for change, it can help one understand perceptions regarding the pertussis vaccination and suggest incorporating strategies to implement pertussis vaccination as the standard of care (see Appendix A for chart).

### **Perceived Susceptibility**

Perceptions regarding susceptibility of the whooping cough (pertussis) were addressed in a survey conducted by Payakachat et al. (2015). Perceived susceptibility statements included: “If I did not get the “whooping cough” shot, I may catch whooping cough “and “If I don’t get the whooping cough shot, my baby may catch whooping cough” (Payakachat et al., 2015).

Participants agreed and disagreed with these statements and later reassessed to see if more information and education changed their perceptions. Some women did not perceive themselves as a sufficient risk for contracting the disease and believed they lived a healthy lifestyle, which they associated with being “low risk” and not susceptible to the disease. Others believed that breastfeeding provided all the immunity their baby needed and would protect them from an infection (Donaldson et al., 2015).

### **Perceived Severity**

Statements such as “I could die from whooping cough” or “my baby could die from whooping cough” assessed perceived severity (Payakachat et al., 2015). In a study conducted by Chamberlain et al. (2015), 81% of participants surveyed believed that contracting pertussis during pregnancy would be serious or very serious and 92% believed that pertussis would be serious or very serious to their newborn.

Donaldson et al. (2015) conducted a study revealing that women understood the severity of pertussis and received the vaccine. These women believed they were acting in the best interest of their child in order to keep their babies safe by protecting themselves and reducing the

risk of their baby developing pertussis. Others reported that they “heard that it’s very scary” and a “terrible thing” and saw a need to vaccinate because of the presenting danger it has to infants (Wiley et al., 2014). However, some women did not understand the severity of the disease and believed that over-medication could be more of a hazard and believed “natural was better” and “nature would take care of things” (Donaldson et al., 2015).

### **Perceived Benefits**

Participants surveyed believed that the benefit of the vaccine helped protect them and their unborn baby during pregnancy from being infected (Donaldson et al., 2015) and statements such as “getting the whooping cough shot will protect me from getting whooping cough” and “getting the whooping cough shot while pregnant protects my baby from getting whooping cough” were assessed (Payakachat et al., 2015). Many understood the benefits of receiving the vaccine acting as a preventative measure in preventing the disease and preventing any damage associated with pertussis infection (Donaldson et al., 2015).

### **Perceived Barriers**

Many viewed the potential side effects of the vaccine to the unborn baby and to themselves as one of the risks and safety concerns of the vaccine and felt there was not enough evidence to support its use (Donaldson et al., 2015). Concerns that the vaccine would harm the recipient while pregnant and/or harm the baby are some barriers to getting vaccinated (Payakachat et al., 2015). Others viewed that “it was too much trouble” to get the vaccine (Payakachat et al., 2015). Possible contributing factors were lack of insurance coverage, inadequate information or support, or no recommendation from their providers to get vaccinated (Donaldson et al., 2015; Sawyer & Long, 2015).

### **Cue to Action**

Many were more active in information-seeking and vaccination behavior when discussing their concerns about pertussis with their providers (Wiley et al., 2014). Education, proper information, and provider recommendations were some of the interventions that helped promote and encourage others to get vaccinated (Donaldson et al., 2015). In Donaldson et al.'s (2015) study 91% of women suggested that it would be helpful to review more information and have a meaningful discussion with their provider to ask questions if needed.

### **Self-efficacy**

This refers to one's perception and competence to successfully perform a behavior. In this case it would be the confidence that one would be able to go to a clinic to get the vaccine based on their knowledge and the confidence and courage to get the vaccine even if the injection hurts (Payakachat et al., 2015).

### **Project Design and Methods**

The HBM conceptual framework and implementation diagram illustrates the conceptual framework used for this review (see Figure 1). This integrative review was used to create an educational toolkit based on the HBM's construct to have a "cue to action" by providing education and information regarding the history of pertussis, the immune response in pregnancy, cocooning, safety, adverse outcomes of the vaccine, and public health importance of improving immunization coverage. The creation of an educational toolkit for nurses was used to address the likelihood of action and behavioral change for implementation into practice.

The integrative review of literature was conducted to identify, analyze, and synthesize evidence-based literature to understand the importance of the nurses' role in providing education to patients regarding the benefits, safety and adverse outcomes of the Tdap vaccine during pregnancy and for family members of pregnant women. Perceived susceptibility, severity,

benefits, and barriers of the disease (pertussis), which affect one's decision to receive the Tdap vaccination, were also assessed. The toolkit comprised of an educational session for nursing staff provided with a presentation and educational material about pertussis education and vaccination for pregnant women, postpartum women and their family members. The effectiveness of the toolkit was evaluated by conducting a pre-education and post-education survey, which analyzed nurses' perceptions of the effectiveness of the educational material and their willingness to implement it into practice. The results will aid in promoting changes to policies and practices in order to improve the quality of education related to pertussis vaccination.

### **Setting and Resources**

The population for the study were staff nurses at the University of California San Francisco (UCSF) Betty Irene Moore Women's Hospital.

**Description of the group, population or community.** The nurses at the UCSF Betty Irene Moore Women's Hospital are responsible for providing care to pregnant and postpartum women and their infants and interacting with their family members and caregivers. The UCSF Betty Irene Moore Women's Hospital is a designated center the San Francisco Bay Area for providing care for women's reproductive health and fertility, gynecological conditions, cancer, and more. The UCSF Betty Irene Moore Women's Hospital provides care to a culturally diverse population of members in the San Francisco Bay Area of Northern California.

**Organizational analysis of the project site.** Two educational sessions were conducted for nurses employed in the Obstetrics, Gynecology and Perinatal Department at the UCSF Betty Irene Moore Women's Hospital in April 2017. The first meeting was held on April 17, 2017 to nursing staff at the Obstetric Services and Perinatal Medicine clinic. On April 19, 2017, another

educational session was held during the Birth Center nursing staff meeting. The Obstetrics, Gynecology and Perinatal department provides a range of obstetric and gynecological services for women of all ages, including the obstetrical clinic, which manages routine and high-risk pregnancies and genetic testing and the birth center with nine labor rooms, 12 antepartum rooms and 24 postpartum rooms. There are approximately 160 staff nurses in the birth center and 12 nurses in the clinic.

**Facilitators and barriers.** Support from faculty, staff, potential health care workers and providers were necessary for successful initiation and implementation of this project, as well as the cooperation of the hospital management, unit director, department manager, nurse managers, and nurses. Barriers that were encountered were lack of communication among staff regarding educational session, decreased attendance, delayed response time for feedback from nursing staff, and lack of ability to follow up with nurses after implementation of the tool kit.

### **Goals, Objectives, and Expected Outcomes**

The goals for this project were to: provide an educational in-service for nurses on a hospital maternal-child unit on the importance of Tdap vaccination for family members of newborns, provide an educational toolkit to nurses on a hospital maternal-newborn unit to share with postpartum women and family members in order to improve knowledge about pertussis vaccination, and an promoting the use of an educational toolkit to provide useful information for nurses in encouraging family members of newborns to become vaccinated against pertussis. By establishing these goals, the intended objective and outcomes were to have approximately 50% of the staff nurses attend the meeting, with 75% response to the surveys, and demonstrate increased knowledge of pertussis, use the educational material presented to teach patients and family members about pertussis, and report that the educational material was useful and that the

educational toolkit increased patients' and their family members' willingness to receive the tdap vaccination.

### **Implementation Method**

Step One: Investigate the problem by conducting an integrative literature review. This integrative literature review guided the development of an educational toolkit for nurses.

Step Two: Educational in-service for nurses conducted to provide background information and education for nurses to explain why pertussis vaccination is important for postpartum women and their family members. Nurses were evaluated based on their knowledge of pertussis prior to the in-service with a pre-educational survey. After the educational in-service, nurses' knowledge and understanding of the material presented was evaluated by a post-educational survey (see Appendix B).

Step Three: Created the educational tool kit. The purpose of the educational tool kit was to provide a guide in educating postpartum women and their family members of the importance of pertussis vaccination. Included in this tool kit was an educational session that was presented to nursing staff at UCSF during their staff meeting which also included pre- and post-education survey questions to evaluate the nurses knowledge of the subject and the effectiveness of the educational session from the nurses' perspective. The pre-education survey questions assessed the nurses knowledge of the subject , and the nurses' perception of the participants' readiness to learn and knowledge of the topic (pertussis) pre-education. The post educational survey assessed the effectiveness of the toolkit by evaluating the nurses' perception of the participants' understanding of the education provided, willingness to vaccinate, and likelihood to vaccinate.

The pre and post educational surveys were collected and evaluated approximately 2-3 weeks after the educational session (see Appendix C).

Step Four: Analysis of the surveys was used to make recommendations for changing policies and practices to improve the quality of education related to pertussis vaccination.

### **Ethics and Human Subjects Protection**

The project proposal and the Human Subjects Determination form was submitted to to the University of Massachusetts's (UMASS) Institutional Review Board (IRB). The IRB determined that the project was not considered research under human subjects regulation, and therefore did not require IRB approval. Correspondence with the UCSF staff regarding this was communicated through email and IRB approval was not needed. The potential risk factors of this educational toolkit for nurses included the potential burden of having to attend an educational in-service, to learn about a toolkit, to add to their nursing workload, and to use this toolkit with their patients. The DNP student did not interact directly with patients. Patient information was not requested. Surveys were administered to nurses and these surveys addressed nurses' perceptions and beliefs regarding pertussis vaccination and the effectiveness of the toolkit.

## **Project Results**

### **Participants**

Thirty-six nursing staff participated in the educational sessions (five in clinic, 36 from the birth center). The majority of the respondents were Registered Nurses ( $n = 32$ ) and some were Licensed Vocational Nurses (LVN) ( $n = 4$ ). The majority had 1-10 years of service (38.89%), followed by 11 nurses with 0-5 years (30.56%), five nurses with 16-20 years (13.89%), four



nurses with 21 or more years (11.11%) and two nurses with 11-15 years of experience (5.56%) in nursing (see Table 5).

Table 5

*Nurses' Years of Service*

Years of Service	<i>N</i>	%
0-5	11	30.56
6-10	14	38.89
11-15	2	5.56
16-20	5	13.89
21 or more	4	11.11
Total ( <i>N</i> =36)	36	

*Note.* 32 Registered Nurses and 4 Licensed Vocational Nurses participated.

## Goals and Outcomes

### Surveys

The pre- and post-intervention survey included five questions. Prior to the educational sessions, the nurses were either given a paper survey to complete or completed the survey online through Qualtrics (see Appendix B) and were asked to complete the same survey after the educational session through the method they originally used. The first two questions assessed the nurse's knowledge about pertussis or "whooping cough" and the term *protection through cocooning*. The next three questions assessed the likelihood of the nurse to utilize an educational tool or handout to educate patients and families about pertussis and its likelihood to be useful to patients to aid in their decision to receive the pertussis vaccine.

Ratings were based on two five point Likert scales of 1 to 5 assessing knowledge in which 1 = *not knowledgeable at all* 2 = *slightly knowledgeable*, 3 = *moderately knowledgeable*, 4 = *very knowledgeable*, , 5 = *extremely knowledgeable*.

The survey also assessed nurse's likelihood, in which 1 = *extremely unlikely*, 2 = *somewhat unlikely*, 3 = *neither likely or unlikely*, 4 = *somewhat likely*, 5 = *extremely likely*.

### **Data Analysis**

Using SPSS, descriptive statistics (means and standard deviations) were measured for each question. Paired sample *t* tests were used to assess the pre and post surveys; the threshold for statistical significance was  $p < .05$ .

**Knowledge of pertussis or whooping cough.** Prior to the educational session, 44% of nurse participants indicated that they were slightly knowledgeable and 33% indicated they were moderately knowledgeable; the mean knowledge score was 2.28 ( $SD = 0.81$ ). After the educational session, 47% of nurses reported they were extremely knowledgeable of the subject, 41.67% were very knowledgeable, and 11.11% were moderately knowledgeable of the subject; the mean knowledge score was 4.36 ( $SD = 0.68$ ). This represented a statistically significant difference in mean knowledge about pertussis comparing pre- and post-education scores ( $p < .001$ , 95% *CI*: -2.400 to -1.766).

**Knowledge about the term “protection through cocooning.”** Sixty four percent of nurses prior to the educational session reported they were not knowledgeable at all, 22% were slightly knowledgeable, and 11% were moderately knowledgeable with a mean score of 1.53 ( $SD = 0.81$ ). For the post educational session, 53% reported being extremely knowledgeable, 36% were very knowledgeable, and 11% were moderately knowledgeable, with a mean score of 4.42 ( $SD = 0.69$ ). There was a difference in how knowledgeable the nurses felt after the educational

session. Post educational session nurses felt more knowledgeable about the term “protection through cocooning.” This represented a statistically significant difference in mean knowledge about protection through cocooning comparing pre- and post-education scores ( $p < .001$ , 95% *CI*: -3.210 to -2.568).

**Likelihood of using an educational tool/handout for patients and families.** The nurses were assessed on the survey the likelihood they would utilize an educational tool or handout in educating their patients and family members about pertussis and its vaccine. Prior to the educational session, 56% of nurses reported they were somewhat likely, 28% were extremely likely and 11% were neither likely nor unlikely to use an educational tool or handout to educate patient and families about pertussis and vaccinating against the disease. The mean score of nurses’ likelihood to use an educational tool prior to receiving the educational session was 4.06 ( $SD = 0.79$ ). After the education session, 75% of nurses reported they were extremely likely and 25% were somewhat likely to use the educational tool or handout. After providing an educational session about pertussis, nurses felt more likely to use an educational tool/handout for patients and families in educating patients. The mean score of nurses’ likelihood to use an educational tool after to receiving the educational session was 4.75 ( $SD = 0.43$ ). This represented a statistically significant difference in the mean pre- and post-education scores for the likelihood of using an educational tool ( $p < .001$  95% *CI*: -0.984 to - 0.405).

**Likelihood that an educational tool will be useful to patients.** Prior to the educational session, 61% of nurses reported it was somewhat likely that an educational tool will be useful to patients. Thirty-three percent reported it to be extremely likely and 5% indicated being neither likely nor unlikely that an educational tool will be useful. The mean score of nurses’ likelihood that an educational tool will be useful to patients prior to receiving the educational session was

4.28 ( $SD = 0.56$ ). For the post educational session, 78% of nurses reported it was extremely likely that the educational tool will be useful to patients and 22% reported it was somewhat likely. Nurses felt that after an educational session, a tool or handout would be useful to patients. The mean score of nurses' likelihood that an educational tool will be useful to patients after to receiving the educational session was 4.78 ( $SD = 0.42$ ). This represented a statistically significant difference in the mean pre- and post-education scores for the likelihood that an educational tool will be useful to patients ( $p < .001$ , 95%  $CI$ : -0.749 to -0.251).

**Likelihood for an educational tool to increase rates of pertussis vaccinations.** Prior to the educational session, 69% of nurses reported that an educational tool may be somewhat likely responsible to help increase rates of pertussis vaccinations. Twenty five percent of nurses stated it was extremely likely and 3% of nurses reported it was somewhat unlikely or neither likely nor unlikely in increasing rates of pertussis vaccinations. The mean score of nurses' likelihood that an educational tool would increase rates of pertussis vaccinations was 4.17 ( $SD = 0.60$ ) prior to receiving the educational session. For the post education session, 47% stated it was somewhat likely, 44% stated it was extremely likely, and 8% felt it was neither likely nor unlikely that an educational tool will help increase rates of pertussis vaccinations. The mean score of nurses' likelihood that an educational tool would increase rates of pertussis vaccinations was 4.36 ( $SD = 0.63$ ) after receiving the educational session. However, this did not represent a statistically significant difference in the mean pre- and post-education scores for the likelihood that an educational tool would increase rates of pertussis vaccinations (Mean difference: -0.194,  $p > .05$ , 95%  $CI$ : -0.484 to 0.095).

### Summary of Findings

The educational information was presented to the UCSF Betty Irene Moore Women's Hospital Obstetrics and Gynecology Clinic nursing staff in a presentation on April 17, 2017 and to the Birth Center nursing staff on April 19, 2017. Prior to the meeting, the birth center nursing staff received the pre-education survey questions through email using Qualtrics, a UCSF web survey program to assess the nurses' knowledge of Tdap prior to educational presentation. A post-education survey was also administered to assess the effectiveness of the educational presentation and the nurses' knowledge and likelihood for success in order to implement this into practice.

Based on the results of the survey, the nurses felt more knowledgeable about the subject of pertussis and whooping cough after the educational session ( $p < .001$ ). The nurses that attended the educational session also felt that they were more knowledgeable about the term "protection through cocooning" ( $p < .001$ ).

There was a statistically significant result in the likelihood that the nurses would use an educational tool or handout to educate their patient and their family members about pertussis ( $p < .001$ ). The nurses were provided with an educational handout with information similar to what was presented in the educational session. The handout also provided the patient with clinics around the UCSF vicinity providing vaccinations, including Tdap (see Appendix C). Management was receptive of the project and indicated that handouts will be provided in the clinic for distribution for nurses to provide patient education.

### **Discussion**

With the assistance of the management at UCSF, successful coordination was established to hold the educational session with the nursing staff. Time was allotted for the DNP student to present during the staff meeting regarding the project. Management and nurses engaged in the

educational presentation. Attendance of the staff meeting was mandatory for nursing staff; however, few were in attendance. Among those that attended the staff meeting, 31 birth center staff members responded to the survey although reminders and emails were sent to all staff members. The barriers to success of this project were nursing attendance and response to surveys. The original goal was to have at least 75% of the nurses attend the session, however, among the 160 staff members in the birth center and twelve staff nurses in the clinic, only 36 nurses that attended the staff meetings submitted the surveys. Among those that did attend the staff meeting, several emails were sent to them to follow up with the survey responses, but the student was unsuccessful in obtaining all survey results due to time constraints for project.

For the nurses who attended the educational session, positive feedback was acknowledged and questions were addressed. A concern from one of the nurses addressed that it may be the expectation of the patient that UCSF would be providing the Tdap vaccine to their patients during their hospital stay or clinic visit to all family members. The vaccine is currently offered to patients being seen in the UCSF Women's Health Center clinic and offered to postpartum mothers at discharge with no documentation of receiving the vaccine prenatally. Family members are not included in this service and information regarding vaccine clinics were also included in the educational handout that was presented. Family members would have a list of resources and locations to obtain the vaccine although an additional concern was that the resources provided did not include a list of clinics that the Tdap vaccine would be given for free.

All activity for this project was voluntary with the help of staff of the hospital. Educational materials were provided by the DNP student and handouts and copies made at the expense of the DNP student. The electronic version of the presentation was provided to the department manager to be available for distribution on the unit. The unintended cost of

reproduction of the information would have to be factored in and would be expensed by the UCSF departments.

### **Research and Policy Implications**

Further research is needed to demonstrate success of the educational tool kit and implementation in practice across time and in various locations globally. The research studies included in this review were from different parts of the world where resources, funding, and supplies vary. However, a common theme in the diverse locations was the influence of nursing education on patient understanding and decision-making. It would be worthwhile to implement a tool kit to use when teaching nurses and to follow up if the education was a success. Results could be compiled through surveys, telephone calls, and visits to assess if the education prompted a favorable response to receive the pertussis vaccine to establish a cocoon for their infants. It would be necessary to consider the policy and practices in these countries prior to implementing this process.

Research suggests that nurses are important in facilitating education to patients and their family members. Patients' decision making is fostered by the information given to them by nursing staff. It is necessary to provide in-service or educational sessions for nurses to enhance their education and knowledge. As research continues and new practices and policies are established, educational sessions would convey important information to nursing staff regarding policy and practice changes. Follow up is needed to assess the success of an educational tool to increase awareness and address perceptions in order to increase vaccination rates and decrease pertussis outbreaks. The HBM can be used to help address perceptions of pertussis vaccination and provide resources and information for effective decision making and cue to action.

### **Conclusion**

Nurses are the forefront of patient care and nursing education in an acute setting. They are trusted and reliable sources for healthcare information and education. The need to improve pertussis education for pregnant women and their family members exists because of the resurgence of pertussis among newborns and infants. Cocooning decreases the incidence of contracting the disease as it provides additional protection to the newborn via indirect immunity by vaccinating all family members and close contacts of the infant. Many pregnant women and family members are unaware of the risks associated with non-vaccination, the mode of transmission, and the severity of the disease.

The first step in the process of education is to teach the teachers. The teachers in this case are nurses who are responsible for providing education at an appropriate literacy level to our population in the maternal-child health setting. This project assessed a sample of nurses and the effectiveness of an educational session and tool providing information about pertussis and cocooning to use for pregnant women and their family members. Studies indicated that nurses were responsible in providing education to help prompt one's decision to vaccinate. Nurses are more likely to use an educational tool in their teaching practices to increase pertussis vaccination rates and establish the practice of cocooning.



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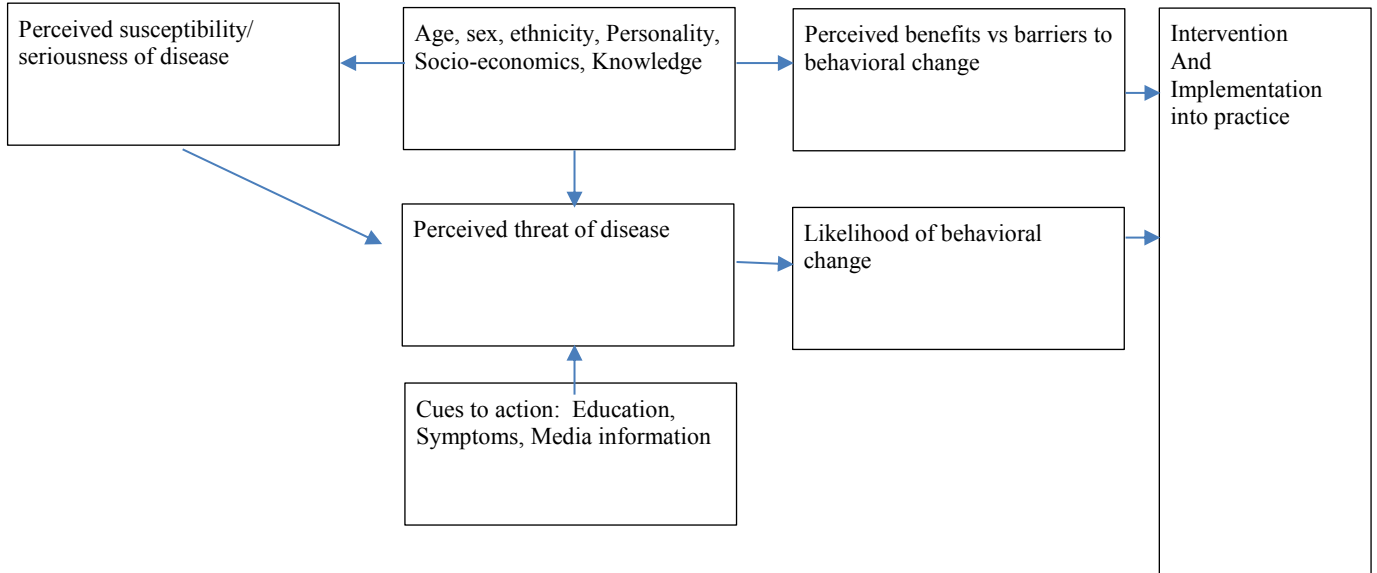
Appendix A

Health Belief Model Conceptual Framework and Implementation

Individual Perceptions

Modifying Factors

Likelihood of Action



Appendix B

Pre and Post Survey Questions for Nurses: In-service

Years of Experience as a nurse on this unit:

0-5            6-10            11-15            16-20            21 or more

1. How knowledgeable are you about pertussis “whooping cough”  
 Not at all            Somewhat Knowledgeable            Very Knowledgeable  
 1            2            3            4            5

2. How knowledgeable are you about protection through “cocooning”  
 Not at all            Somewhat Knowledgeable            Very Knowledgeable  
 1            2            3            4            5

3. How Likely are you to use an educational tool to educate your patient and family about pertussis?  
 Not at all            Somewhat likely            Very likely  
 1            2            3            4            5

4. How likely do you think this educational tool kit will be useful to patients?  
 Not at all            Somewhat likely            Very likely  
 1            2            3            4            5

5. How likely do you think an educational tool kit will increase rates of pertussis vaccinations?  
 Not at all            Somewhat likely            Very likely  
 1            2            3            4            5

Post Education Survey

After the education and material given to you, please answer the following questions:

1.) How knowledgeable are you about pertussis “whooping cough”  
 Not at all            Somewhat Knowledgeable            Very Knowledgeable  
 1            2            3            4            5

2) How knowledgeable are you about protection through “cocooning”  
 Not at all            Somewhat Knowledgeable            Very Knowledgeable  
 1            2            3            4            5

3.) How Likely are you to use an educational tool to educate your patient and family about pertussis?  
 Not at all            Somewhat likely            Very likely  
 1            2            3            4            5

4. How likely do you think this educational tool kit will be useful to patients?

Not at all		Somewhat likely		Very likely
1	2	3	4	5

5.) How likely do you think an educational tool kit will increase rates of pertussis vaccinations?

Not at all		Somewhat likely		Very likely
1	2	3	4	5

## Appendix C- Educational Handout

## Protection against Pertussis in Pregnancy and Postpartum

*Creating a cocoon*

By: Marlene Unika, RN, MSN

**Get the Tdap Vaccine in Pregnancy...**  
...and every pregnancy to protect the newborn from pertussis.  
Infants are most at risk for severe, life-threatening complications from pertussis.

### *What is PERTUSSIS?*

Pertussis, also known as “whooping cough”, is a highly contagious respiratory tract disease caused by the bacterium *Bordetella pertussis*.


Pertussis is a very serious disease that can affect people of all ages and can be life threatening and deadly for children less than one year old.

### *How can you prevent pertussis?*

The best way to prevent **pertussis (whooping cough)** among babies, children, teens, and adults is to get vaccinated.

Also, keep babies and other people at high risk for **pertussis** complications away from infected people.


In the United States, the recommended **pertussis** vaccine for babies and children is called DTaP for adults and pregnant women the vaccine is Tdap



#### Characteristic Symptoms of Pertussis

- **Paroxysmal Cough**  
*uncontrollable bouts of coughing making it difficult to breathe*
- **Posttussive Emesis**  
*vomiting induced by coughing*
- **Inspiratory Whoop**  
*sharp high-pitched intake of air creating a “whooping” sound*

(Barlow et al., 2014).



“The best way to prevent pertussis is  
to get vaccinated.”

**Table 1**

*Matrix of Literature*

A D	Location	Design/ Setting / Sample	Results
u a t t h e o r	2009-2011	Case-Control study	<b>Household vaccination:</b> Overall maternal vaccination rates at any time: 78% (Cases) vs
u 0	Australia	NCIMS (Notifiable Conditions Information	79% (Control)
i 1		Management System) confirmed pertussis cases age	Tdap vaccination 4 weeks before onset: 22% vs 32%
n 4		<4months at onset	Before pregnancy: 12% vs 20%
n		Control infants identified by using NSW perinatal data	Fathers vaccinate at least 4 weeks before onset: 20% vs 31%
e		collection (PDC)	Vaccinated Siblings 92% in cases and 93% in control
t		Immunized if vaccinated $\geq$ 4 weeks before case	<b>Effectiveness of cocooning:</b>
a		symptom onset	Estimated independent Protection of pertussis with mother alone 48% (95% CI:-2% to
l		217 completed interview for eligible pertussis cases	74%).
		vs 585 Control cases (no pertussis)	The protective effect of father alone 5%(95%CI-79% to 50%)
			Combined protective effect if receive pertussis vaccine 4 weeks before index date was

• 51%(95%CI:0% to 76%)

B o n v i l l e  e t  a l .	2	2012	Cross-Sectional: Qualitative Study	11% of Obstetric providers were concerned of vaccine safety in pregnant women for
	0	United States	Survey collection	pertussis vs 5% influenza.13% concerned with vaccine efficacy
	1	(New York)		92% percent aware of ACIP recommendations for Tdap vaccine for women in third
	5		133 obstetric providers (physicians, mid-level	trimester of each pregnancy
			providers and nurses) completed surveys and were	80% recommended Tdap to eligible patients
			included in analysis	67% offered Tdap in office
			98 (74% females)	Nurses are first provider patients encounter at obstetric visit, answer phone calls and
			68 (51% Physicians)	administer vaccinations.
	2	2010-2012	Case-Control Study	Percent of all household contacts of newborns were immunized prior to newborn's
	0	United States	Telephone interview surveys January – March 2012	discharge from the hospital
1	(San Diego)	Postpartum Vaccine Clinic UCSD	84.8%- Intervention Group	
4		Household contacts of neonates aged 7 year or older.	52.2%- Control group	
		Case population: women or family members of	<b>Full-Cocoon</b> (all members of the household immunized)	

<b>b</b>	women who delivered babies during Family Tdap	76.0% intervention group
<b>l</b>	Clinic Period (August to October 2010)	29.3% control group
<b>u</b>	Control Population: women or family members of	No statistical difference between age, gender race/ethnicity or education in achieving a
<b>m</b>	women who delivered babies during the three months	full cocoon for both the control and intervention groups.
	prior to implementation (May –July 2010)	
<b>e</b>	Intervention Period:	
<b>t</b>	100 families consisting of 381 household members –	
	Pre-intervention (Control):	
<b>a</b>	102 families consisting of 347 household members	
<b>l</b>		
<b>.</b>		





t	253 questionnaires mailed	Mothers heard vaccine from (43%) maternal and child health nurse or (13%) their general
a	105 eligible participant completed and returned (43%)	practitioner (GP) or (13%) friends, family, professional colleagues, immunization staff, childcare, or a poster.
l		Fathers heard of vaccine from (35%) their partner, (23%) Maternal and child health nurse or (13%) general practitioner.
.		70% mothers and 53% of fathers received pertussis vaccine following birth of recent infant. (56% of both parents)
		Common place to receive vaccine:
		Maternity hospital (37%), local council (35%) and general practice (30%)
		96% of mothers and fathers indicated they would agree to vaccination to prevent transmitting infectious disease to child.
		Most common reason for non vaccination was lack of awareness
B	2 June 2010- July	Cross Sectional Analysis: Qualitative study
e	0 2012	Postpartum women at BTGH Houston, Texas
e	1 United States	Random, convenience sample of postpartum women
l	3 (Houston)	18 years and older delivered at BTGH.
e		511 postpartum women- mean of 3 children
t		91 (17.8%) were first-time mothers 496 (97.1%) received prenatal care 474 (93%) were willing to be immunized during pregnancy if recommended by their healthcare provider – The healthcare provider was the most trusted information source for 62%
a		Insufficient knowledge 46.6%; cost 31.4%, lack of transportation 26%, work commitments (13.3%) and fear of needles (13.3%) were perceived barriers to cocooning Healthcare providers have the greatest influence on vaccine acceptance by pregnant and

I			postpartum women.
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H	2 Nov 2010 to June	Cross-Sectional Qualitative study	33.7% (837/2483) reported receiving a pertussis booster vaccine
a	0 2013	Survey using Health Belief model measuring	Higher perceived severity of pertussis for an adult (P<0.001) reduced perceived
y	1 Australia	perceived susceptibility to contracting pertussis,	susceptibility for contracting pertussis (P<0.001), higher perceived vaccine benefits
l	6	perceived severity of pertussis, perceived benefits of	(P<0.001) and lower vaccine barriers (P< 0.001) were associated with prior vaccination.
e		and barriers to vaccination and cues to action	88% of unvaccinated participants reported that their health professionals were most
s		Postpartum women from two maternity hospitals in	influential source in deciding about vaccination, yet 55% had received any information
		Australia.	about “whooping cough”
e		2520 postpartum women participated	Women who had heard of whooping cough from their health professionals and had been
t		37 participants data lost	recommended pertussis vaccination were twice as likely to be vaccinated than those who
			had not been recommended for the vaccine.
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1.) *Responsibility: Adherence to their role as professional or parent*

2.) *Justice: fair in comparison to others*

- Opinions of others

*Like-minded others; opinion experts*

- Perceived autonomy

*Freedom of choice*

- Anticipated regret

*Anticipation of guilt on adverse outcome*

- Decisional uncertainty

*Doubt in deliberation on vaccination; information volume; source, consistency  
and scientific base*

- Perceived organizational barriers

*Timing; Location of vaccination offer; Organizational responsibility*

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C 2	2012	Cross-Sectional Analysis: Qualitative study	50% of mothers stated they had been queried about Tdap (pertussis) vaccination status
a 0	United States	Midwestern University-based family clinic	during their postpartum stay.
r 1		3 of 8 area birthing hospitals	Of the 50% who had not been asked about their Tdap vaccination status, 43% were asked
r 3		Questionnaire to determine if birthing hospitals had	about tetanus vaccination without mention of pertussis vaccination status.
i		administered postpartum Tdap to new mothers per	50% of the postpartum women received Tdap prior to hospital discharge. Reasons for not
c		written protocol or standing orders; did hospital staff	receiving Tdap: previous vaccination (29%), not discussed as an option (14%), was
o		ask about previous pertussis vaccination; postpartum	discussed but not given prior to discharge (14%) and inappropriately assessed due to
		Tdap received prior to discharge, if not, why; and,	tetanus-only inquiry (43%).
&		were family members/close contacts questioned about	
		their pertussis vaccination status.	Immunization records and further questioning revealed 80% of women who had not
O			received a pre-discharge postpartum Tdap were eligible and should have been offered
'		Did accompanying family/close contacts receive Tdap	vaccine.
K		vaccine during office visit	29% of mothers and 14% of visiting family members received verbal or written education
e			on the importance of Tdap to protect the newborn against pertussis.
e		14 mothers and 9 family members/close contacts	
f			Family members/Close contacts:
e			36% accepted and received Tdap vaccine when accompanying mother to office visit
			64% declined due to: previous vaccination (20%), cost (20%), preferred to see their own
			provider(40%) and combined cost and own provider (20%).

<p>D e G r e e f f e t  a l .</p>	<p>2 Feb 2006-Nov 0 2008 1 Netherlands 0  294 reported cases (93 excluded) 201 infected index infants and their families</p>	<p>Prospective Cohort Study Centre for Infectious Disease Control of the National Institute of Public Health and the Environment – Netherlands Reports of any infants aged &lt;6months hospitalized with <i>Bordetella pertussis</i> or <i>Bordetella parapertussis</i> <i>infection</i> 294 reported cases (93 excluded) 201 infected index infants and their families</p>	<p>Infant index cases: Median number of days between date of hospitalization and nurses study 17 days Attack rate on household contacts: 53% had laboratory tested pertussis. Vaccinated children: 46% had typical pertussis 60% of household members most likely source of infections siblings (41%), mother (38%), or father (17%) Introduction in the households and transmission to neonates: 48% had typical pertussis, 28% siblings, 24% mothers, and 11% fathers 35-55%o of infant cases could be prevented with immunity boosters</p>
<p>P a y a k a</p>	<p>2 May – Aug 2014 0 United States 1 6</p>	<p>Randomize prospective study Women’s Clinics in Michigan 279 surveys analyzed</p>	<p>A chart review showed that 131 (47%) received the vaccine post study. There was no significant difference in vaccination rates between the sVIS and mVIS groups (45% vs. 49%). Perceived benefits (B = 0.315) and self-efficacy (B = 0.197) were positively associated with the overall perception (T1), while perceived barriers (B = -0.191) were negatively associated with the overall perception (T1). Social norms (B = 0.230), self-efficacy (B = 0.213), and perceived benefits (B = 0.117) were positively</p>

associated with vaccination intention (T1). The vaccination intention (T2) was positively associated with participants' decision to receive Tdap vaccine (B = 0.223).

K	2	July – Dec 2013	Cross-Sectional Study	Prevalence highest in children >59months of age despite 94% vaccination coverage in age
a	0	Urban Uganda	Makerere-Mulago hospital Acute Care Unity and the	group
y	1		Assessment Center in Uganda	
i	5		449 check enrolled with persistent cough 14 days or	
n			more	
a			58% children below 5 years old	
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t				
a				



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P	2 June 2006- Aug	Longitudinal Prospective cohort study	Primarily African American (84%), Single (905), mothers
a	0 2006	Medic-aid eligible mothers and their healthy infants	Maternal health literacy was inadequate or marginal among nearly ¼ or mothers and 31%
t	1 United States	enrolled in The Health Insurance Improvement Project	had less than high school education.
i	0	(HIP)	At 3 mo. Infants whose mothers had completed high school or beyond or received care in
e			a hospital-affiliated site were more likely to be up-to-date than others with vaccinations
t		Determine if maternal health literacy influences early	Maternal education had significant impact on immunization status at 3months of age but
		infant immunizations status	not at 7 months.
a		3451 live births, 2680 (77.7%) met inclusion criteria	Early intervention would ensure that infants are fully protected at an early age.
l		1395 were eligible mother-infant dyads	
.		637 (46%) refused participation	
		Leaving 744 (53%) enrolled in study	

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J o h r i , e t  a l .	2 May to Oct 2013	Cross-Sectional study- survey  Two site in India – rural district (Hardoi) in the state of Uttar Pradesh and urban slum (Kirti Nagar) in New Delhi  Rural site: 1170 women  Urban Site: 670 women	A positive association between maternal health literacy and DTP3 vaccination  Rural Site: Adjusted OR was 1.57 (95% CI 1.11 to 2.21, p=0.010) for those with medium health literacy, and OR=1.30 (95% CI 0.89 to 1.91, p=0.172) for those with high health literacy.  Urban Site: Adjusted OR was 1.10(95% CI 0.65 to 1.88, p=0.705) for those with medium health literacy, and OR=2.06 (95% CI 1.06 to 3.99, p=0.032) for those with high health literacy
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**Table 2***Objective and Expected Outcomes of Nurses Prior to Attending Educational Session*

Objective	Expected Outcomes
1. Nurses on the hospital unit will attend the educational in-service.	At least 50% of nurses will attend the educational in-service.
2. Nurses will demonstrate increased perceived knowledge about pertussis	On post-test, at least 75% of nurses will respond on the survey that they are knowledgeable about pertussis by rating the question with a score of at least 3 or higher on a Likert scale

**Table 3***Objective and Expected Outcomes of Nurses After Attending Educational Session*

Objective	Expected Outcomes
1. Nurses that attended the educational session will use the educational toolkit with their patients and their family members.	At least 50% of nurses will report using the toolkit with their patients and their family members.
2. Nurses on the hospital unit will report that the educational toolkit increased patient and family member knowledge of pertussis.	At least 75% of nurses will report the toolkit helped increased patient and family member knowledge of pertussis as evidenced by the nurses' perception that the educational tool kit increased patient and family member knowledge by rating the question with a score of at least 3 or higher on a Likert scale.

**Table 4***Objective and Expected Outcomes of Nurses Regarding Usefulness of Educational Toolkit*

Objective	Expected Outcomes
1. Nurses that attended the educational session will report the educational toolkit as being useful with their patients and their family members.	At least 75% of nurses that attended the educational session will report that the toolkit was useful by rating it with a score of at least 3 or higher on a Likert scale.
2. Nurses that attended the educational session will report the educational toolkit has increased patients' and their family members' willingness to receive the tdap vaccination.	At least 75% of nurses will report that after providing education to patients and their family members, patients and family members indicated willingness to receive the pertussis vaccination, as evidenced by the nurses perception that the educational tool kit increased willingness to vaccinate with tdap by rating the question with a score of at least 3 or higher on a Likert scale.

**Table 5***Nurse Participant Breakdown in Years of Service*

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Years of Service	<i>n</i>	%
0-5	11	30.56
6-10	14	38.89
11-15	2	5.56
16-20	5	13.89
21 or more	4	11.11
Totals ( <i>N</i> =36)	36	

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*Note.* 32 Registered Nurses and 4 Licensed Vocational Nurses participated.

**Table 6**

*Paired Samples Statistics of the Nurses Knowledge of Pertussis or Whooping Cough (N = 36)*

Pair	M	SD	SE	Mean	95% Confidence Interval		t	df	p
					Lower	Upper			
				Mean difference					
Pre: How knowledgeable are you about pertussis or "whooping cough"?	2.28	0.81	0.13	-2.08	-2.40	-1.76	-13.33	35	.00
Post: How knowledgeable are you about pertussis or "whooping cough"?	4.36	0.68	0.11						

CI: -3.210 - -2.568).

**Table 7**

*Paired Samples Statistics on Nurses Knowledge About the Term “Protection through Cocooning” (N = 36)*

Pair	M	SD	SE	Mean	95% Confidence Interval		t	df	p
					Lower	Upper			
			Mean	difference					
Pre: How knowledgeable are you about the term "protection through cocooning"?	1.53	0.81	0.13	-2.88	-3.21	-2.56	-18.25	35	.00
Post: How knowledgeable are you about the term "protection through cocooning"?	4.42	0.69	0.11						



**Table 8**

*Paired Samples Statistics on Likelihood of Using an Educational Tool/Handout for Patients and Families*

		<i>M</i>	<i>N</i>	<i>SD</i>	<i>SE Mean</i>
Pair 1	Pre: How likely would you be to use an educational tool/handout to educate your patient and family about pertussis?	4.06	36	0.791	0.132
	Post: How likely would you be to use an educational tool/handout to educate your patient and family about pertussis?	4.75	36	0.439	0.073



**Table 10***Paired Samples Statistics on Likelihood That an Educational Tool Will Be Useful to Patients.*

		<i>M</i>	<i>N</i>	<i>SD</i>	<i>SE Mean</i>
Pair 1	Pre: How likely would it be that an educational tool kit/handout would be useful to patients?	4.28	36	0.56	0.09
	Post: How likely would it be that an educational tool kit/handout would be useful to patients?	4.78	36	0.42	0.07



**Table 12***Paired Samples Statistics on Likelihood for an Educational Tool to Increase Rates of Pertussis**Vaccinations*

Pair	<i>M</i>	<i>N</i>	<i>SD</i>	<i>SE Mean</i>
Pre: How likely do you think it would be for an educational tool kit/handout to increase rates of pertussis vaccinations?	4.17	36	0.60	0.10
Post: How likely do you think it would be for an educational tool kit/handout to increase rates of pertussis vaccinations?	4.36	36	0.63	0.10

