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Review

Predictors of maternal vaccination in the United States: An integrative review of the literature

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ABSTRACT

Objectives: The purpose of this literature review was to identify, analyze, and synthesize existing research related to patient, provider, and health system predictors of maternal vaccination in the United States, strategies used to increase maternal vaccination rates, and major theoretical frameworks used to guide maternal vaccination research.

Methods: A search for evidence was conducted in CINAHL, PubMed, PsychINFO, Cochrane Systematic Reviews, and Google Scholar. Twenty-two articles were identified as best evidence for inclusion in this review: five randomized control trials, one cluster randomized trial, one mixed methods study, 12 observational studies, and three qualitative studies.

Results: Patient-focused predictors of maternal vaccination included provider recommendation; knowledge, attitudes, and beliefs; cues to action; and race and ethnicity. Provider-focused predictors included knowledge, attitudes, and beliefs; and multi-component intervention packages. Health system predictors included standing order protocols and practice site logistics. The major theoretical frameworks that emerged were the Health Belief Model, Theory of Reasoned Action/Theory of Planned Behavior, and Message Framing/Prospect Theory. Provider recommendation was the single most important predictor of vaccine acceptance among pregnant women.

Conclusions: An abundance of theoretically-supported, patient-focused research was found in the literature. A minimal number of U.S.-based, provider-focused research was found and none of these used a theoretical framework. Minimal research examining health system barriers to maternal vaccination was found. Additional research into the logistical barriers to maternal vaccination programs within obstetrical practice locations in other geographical locations within the U.S. is warranted. Future provider- and health system-focused research needs to be grounded in theory. The field of implementation science may offer the theoretical guidance necessary to better understand problems in obstetrical practice work flow and streamlining of vaccinations.

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1. Introduction

Every year in the United States, over four million women give birth [1]. In 2012, the CDC reported 41,880 cases of pertussis with 18 deaths; 14 of those deaths were infants less than 12 months of age [2]. At the same time, during the 2012–2013 influenza season, 18 infants less than six months of age died from influenza [3]. Although the number of infant deaths due to pertussis and influenza is small compared to the total number of births each year, every single death is a tragedy because these are vaccine-preventable diseases. Infants cannot receive the first pertussis vaccine until two months of age [4] nor the influenza vaccine until six months of age [5]. For this reason, maternal vaccination is necessary to provide passive immunity to the infant for protection from these diseases during the first few months of life [6–10].

Despite the evidence, maternal vaccination rates remain suboptimal in the U.S., with only 50% of pregnant women receiving the influenza vaccine during the 2014–2015 influenza season [11] and only 14% receiving the Tdap vaccine from 2007 to 2013 [12,13]. A recent study by Kharbanda et al. [14] acknowledged the low Tdap vaccination rates, but through analysis of Vaccine Safety Datalink (VSD) data from 2007 to 2013 they were able to demonstrate evidence of increasing rates; by 2013, 41.7% of pregnant women (n = 438,487) received the vaccine primarily during the third trimester. Although some progress has been made, optimal vaccination rates have yet to be achieved. Such a disparity in maternal vaccination presents a significant risk to the health and well-being of pregnant women and young infants.

This paper will present a synthesis of evidence related to patient, provider, and health system predictors of maternal vaccination in the U.S. This paper will also identify theoretical frameworks that have been used to describe, explain, and predict vaccine decision-making behaviors among pregnant women and providers. The research questions that guided this literature review were: in the U.S., (1) What are the predictors of maternal vaccination? (2) What strategies have been used to increase maternal vaccine acceptance? and (3) What theoretical frameworks have been used to guide maternal vaccine-related research? The outcomes of this literature review will support an argument for the need to use an alternative theoretical approach to address a major gap in provider- and health system-focused research.

2. Background

The CDC's Advisory Committee on Immunization Practices (ACIP), supported by the National Vaccine Advisory Committee (NVAC) and the American College of Obstetricians and Gynecologists (ACOG) recommends all women who are or who will be pregnant during the influenza season, receive one dose of the influenza vaccine during *every* pregnancy, when available [3,15,16]. Likewise, it is recommended pregnant women receive one dose of Tdap between 27 and 36 weeks of *every* pregnancy [2,3,17].

Integration of vaccinations into obstetrical practice has not always been customary, but this has changed in recent years as the health care system has moved more toward disease prevention and health promotion. In 2013, ACOG called for obstetrical providers to embrace vaccinations as part of their routine practice. ACOG [17] further asked that providers include screening, education, and vaccinations as part of the annual health assessment for women; this includes providing both the influenza and Tdap vaccines during pregnancy. Unfortunately, not all providers agree with or follow the recommendations, as evidenced by one study in which only 60.3% of obstetrical providers reported "always" discussing vaccines with pregnant patients [20]. Further complicating this practice is the reality that even when vaccines are offered to pregnant patients, not all will readily accept. The difference between vaccine acceptance and vaccine uptake should be noted here. Vaccine acceptance refers to intention to receive the vaccine and not actual administration (uptake) of the vaccine itself.

3. Methods

A literature search for best evidence was conducted in CINAHL, PubMed, PsychINFO, Cochrane Systematic Reviews, and Google Scholar. Limiters set included English, humans, female, and research studies. Major keywords used to search the databases included pregnant women, vaccine uptake, pertussis, Tdap, influenza, maternal vaccination, predictors, and barriers. The search and selection process required consideration of two potential confounding factors: (1) the H1N1 influenza pandemic during the 2009–2010 influenza season in which a high proportion of pregnant women were either hospitalized or died from the infection, and (2) the resurgence of pertussis outbreaks in the U. S. in 2010. When selecting articles for this review, it was hypothesized that these events significantly influenced the attitudes and beliefs of pregnant women, providers, and society as a whole, therefore article selection was limited to research conducted from April 2010 until the present. Studies that were conducted outside of the U.S. were excluded because the purpose of this literature review was to identify potential barriers and facilitators to maternal vaccination that exist within the unique health care system of the U.S.

A total of 22 studies were identified as best evidence for this review based on these criteria: five randomized control trials, one cluster randomized trial, one mixed methods study, 12 observational studies, and three qualitative studies (Fig. 1). Information about study design, vaccine focus, sample and setting, theoretical framework, and variables of interest were extracted from each article and organized into a matrix table (Table 1).