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Text messages for influenza vaccination among pregnant women: A randomized controlled trial ☆

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ABSTRACT

Objective: To evaluate if text message reminders increase the likelihood of receiving the influenza vaccine among pregnant women.
Methods: Pregnant women were randomized to either receive or not receive weekly text messages. Women were told the messages would be about health-related behavior in pregnancy. Those randomized to the intervention group received two messages weekly for four consecutive weeks reinforcing that the influenza vaccine is recommended for all pregnant women and safe during pregnancy and breastfeeding. Women were contacted six weeks postpartum to determine if they had received the vaccine. Sample size calculation determined that 108 women were required in both groups to see a 75% increase in vaccination rates over baseline in the text message group compared to the control group.
Results: Recruitment began November 4, 2013, and 317 women were randomized. The mean gestational age at recruitment was 22 weeks. There were 40/129 (31%) women in the text message group and 41/152 (27%) women in the control group who received the vaccine ($p = 0.51$). Significant predictors of vaccine acceptance were being married compared to single (95% vs. 67%, $p < 0.001$), having higher household income (55% vs. 39%, $p = 0.03$) and having received the vaccine before (77% vs. 36%, $p < 0.001$). Among women receiving text messages, the majority were satisfied, with only 15/129 (12%) reporting that they did not like receiving the messages, and 24/129 (19%) stating that the information in the messages was not helpful.
Conclusion: Weekly text messages reinforcing the recommendation for and safety of the influenza vaccine in pregnancy did not increase the likelihood of actually receiving the vaccine among pregnant women. Overall vaccination rates were low, highlighting the need for patient education and innovative techniques to improve vaccine acceptance.
Registered with ClinicalTrials.gov at http://www.clinicaltrials.gov, registration number NCT 02428738.

1. Introduction

Influenza is a serious infection with the potential to cause significant morbidity and mortality, especially in certain populations such as the elderly, young children, and those of any age with underlying conditions [1]. Pregnant women are particularly susceptible to the effects of influenza and have higher rates of serious illness and mortality compared to the general population in both

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non-pandemic (seasonal) and pandemic influenza seasons [2–7]. This was observed worldwide in the 2009–2010 H1N1 influenza pandemic, with pregnant women significantly overrepresented among those requiring hospitalization, intensive care unit admission, and dying as a result of influenza [4–7]. Influenza infection during pregnancy has also been associated with a number of deleterious effects on the fetus/infant, including pregnancy loss, low birth weight, preterm birth, stillbirth, and increased perinatal mortality [8–12].

Vaccination during pregnancy provides protection against the effects of influenza for both mother and fetus/infant [13,14]. National bodies in both Canada (the National Advisory Committee on Immunization [NACI]) and the United States (the Advisory Committee on Immunization Practices [ACIP]) recommend the vaccine for all pregnant women regardless of gestational age because of the increased risk for influenza-related complications [15,16]. There is no evidence that the vaccine is associated with adverse outcomes in pregnancy. Despite these guidelines and recommendations, vaccine uptake among pregnant women is poor. Estimated vaccine coverage in the United States among pregnant women was only 50% in the 2014–2015 influenza season, and this has not significantly changed in the past several years [17]. There is an urgent need to develop strategies to aid with improving these rates.

Mobile phone text messaging has emerged as a mainstay of communication in recent years. This technology has been explored as a way to improve health outcomes, and a wide range of studies have been published investigating the use of text messages as reminders to engage in healthy behaviors or to attend physician appointments [18,19]. We designed a randomized controlled trial to investigate the impact of text messages on influenza vaccination rates in pregnancy. A previous trial published by members of our study team failed to demonstrate a change in vaccination rates among women randomized to text messages [20]. Based on the findings of that study, we made some important changes to the study design and the timing and content of the messages themselves. We also were interested in assessing the effect of messages in a different population. The primary objective of this study was to determine if the use of targeted electronic reminders (text messages) increased the likelihood of receiving the influenza vaccine among pregnant women. The secondary objectives were to explore patient characteristics associated with receiving the vaccine, and to determine how the text messages were perceived by the women in the intervention group. Our hypothesis was that women receiving the text messages would have an increased vaccination rate.

2. Materials and methods

This study was approved by the St. Michael's Hospital Research Ethics Board. Recruitment for the study occurred in the fall of 2013 in our hospital-based antenatal clinic at St. Michael's Hospital, which is a women's health ambulatory care clinic in downtown Toronto serving a multi-ethnic patient population that is of varied socioeconomic status. All patients attending the clinic were given a pamphlet containing information about the risks of influenza during pregnancy, the importance of the vaccine for pregnant women, and the fact that the vaccine is safe in pregnancy and breastfeeding. This is standard of care in our clinic and is part of our usual mandate to encourage women to receive influenza vaccination in pregnancy.

Women were approached in the waiting room by research personnel that were not part of the clinical care team and were asked if they were interested in enrolling in a study investigating the use of text messages in pregnancy. Women were told the messages would be about health-related behavior in pregnancy, but no mention was made of influenza or vaccination at the time of recruitment. All women attending the clinic were considered eligible for the study as long as they had a working cellular telephone with the ability to receive text messages and none of the exclusion criteria. Exclusion criteria were age less than 18, inability to speak, read, or understand English, the presence of any contraindication to vaccination, or receipt of the vaccine in the current influenza season. After informed consent, women who agreed to enrollment completed a baseline data collection sheet documenting demographic information, pregnancy history, and past history of influenza vaccine receipt. Women were then randomized to the receive text messages (intervention group) or no text messages (control group) in a one-to-one fashion using a computerized random number generator. Group allocation was assigned using sequentially numbered, sealed, opaque envelopes which were opened at the time of randomization by study staff. Those in the text message group received messages twice weekly for four weeks for a total of eight messages. In contrast to the previously published trial by members of our team, all messages in this study were specifically focused on influenza and the vaccine. The messages were developed using principles from the Health Belief Model of preventive health behavior [21], and emphasized the susceptibility of pregnant women to influenza, the effectiveness of the vaccine for decreasing disease and poor outcomes in both mother and baby, the safety of the vaccine, and that it is recommended for pregnant women. The messages were designed to emphasize a clear, strong recommendation about receiving the vaccine. Prior to study initiation, the messages were pilot tested among a small group of prenatal care providers, obstetric nurses, and pregnant women for content and clarity. The text messages are presented in Table 1. Messages were sent via a password-protected online service, Memotext (Memotext LLC). Medical and nursing staff caring for the women were blinded to study group allocation and were not involved in any aspects of the study. All women received usual prenatal care, including the verbal recommendation for influenza vaccination.

Study participants were contacted by phone by research staff up to six weeks postpartum for a follow-up interview to determine whether or not they had received the vaccine during pregnancy. For those in the text message group, a data collection sheet was completed to assess their perceptions and satisfaction with receiv-

Table 1
Text messages.

Message 1	The flu can be serious for pregnant women. We recommend a flu vaccine for all pregnant women
Message 2	The flu can be serious for newborn babies. Getting a vaccine during pregnancy can help protect your baby after birth
Message 3	The flu vaccine is safe to get when you are pregnant. We recommend a flu vaccine for all pregnant women
Message 4	The flu vaccine is safe for women who are breastfeeding. We recommend a flu vaccine for all pregnant women
Message 5	The risk of complications from the flu is higher in pregnant women and new babies. We recommend a flu vaccine for all pregnant women
Message 6	The Public Health Agency of Canada and the Society of Obstetricians and Gynaecologists of Canada recommend a flu vaccine for all pregnant women
Message 7	Studies have shown that the risk of flu is lower in babies whose mothers were vaccinated during pregnancy. We recommend a flu vaccine for all pregnant women
Message 8	Studies have shown that there is no increased risk of complications in women who get the flu vaccine during pregnancy and that it is safe. We recommend a flu vaccine for all pregnant women

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