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Assessment of knowledge and attitude towards influenza and pertussis vaccination in pregnancy and factors affecting vaccine uptake rates: a cross-sectional survey

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INTRODUCTION

Pregnancy is a known period of increased vulnerability for both the mother and child, and immunisation has been recognised as an effective way to protect the woman and, through passive transfer of immunity, her child from certain infections. As such, numerous international organisations across the world, including Singapore, have started to recommend vaccinations for pregnant women, especially against influenza and pertussis.⁽¹⁻³⁾

The World Health Organization has recommended vaccination against influenza in pregnant women since 2005. Morbidity and mortality due to influenza infection is disproportionately higher in pregnant women and infants below six months of age. Influenza in pregnancy can also affect the unborn child, with increased risk of adverse outcomes such as preterm birth, low birthweight and stillbirth.⁽⁴⁾ Infants who contract influenza before six months of age appear to have the highest rate of hospitalisation and deaths among children.⁽⁵⁾ Unfortunately, there is currently no licensed influenza vaccine for infants below six months of age.⁽⁶⁾ Hence, the most effective strategy is maternal immunisation. Influenza vaccination during pregnancy has been shown to not only protect against adverse outcomes such as preterm birth and low birthweight, but also to reduce infant morbidity.⁽⁷⁾ Importantly, influenza vaccination in pregnancy has been shown to be safe without any evidence of increased risk of miscarriage, congenital malformations, stillbirth or early neonatal death.^(8,9)

There has been a recent increase in the number of pertussis cases in multiple countries, including Singapore.^(10,11) Infants under two months of age have the highest rates of hospitalisation and death due to pertussis.⁽¹²⁾ In fact, most pertussis deaths occur in the first few months of life, when infants have not yet completed their vaccination schedule. Hence, maternal immunisation has been identified as an effective strategy for preventing pertussis in young infants.⁽¹³⁾ The Tdap (tetanus, diphtheria and pertussis) vaccine was shown in multiple

studies to be safe in pregnancy and more effective than postpartum vaccination at preventing pertussis in infants.⁽¹⁴⁻¹⁷⁾

Despite national immunisation programmes and a plethora of evidence surrounding the safety and benefits of vaccination in pregnancy, vaccine uptake rates among pregnant women worldwide remain low.⁽¹⁸⁾ To understand the underlying issues, we performed a survey of pregnant women in our local population to evaluate their awareness and attitudes towards prenatal vaccination.

METHODS AND RESULTS

A cross-sectional survey of 252 pregnant women who presented to the National University Hospital, Singapore, for antenatal care was conducted between July and November 2018. The survey was administered in the form of a questionnaire (Appendix). Each participant provided written consent before completing the survey. The survey response rate was about 70%, with 252 women participating out of a total of 358.

Knowledge of influenza, pertussis and vaccination in pregnancy

As shown in Table I, more than half of the participants were aware that vaccines are not strictly contraindicated in pregnancy and that prenatal vaccination has benefits for the child. However, the majority mistakenly believed that vaccines do not have to be repeated. Awareness of influenza was good and better than that of pertussis. The majority were also unaware of local recommendations and policies for prenatal and neonatal vaccination. This is despite the fact that approximately 50% of women believe that pertussis can be potentially life-threatening in newborns.

Table I. Knowledge about influenza, pertussis and vaccination in pregnancy (n = 252).

Question	No. (%)	
	Correct	Wrong/unsure
Knowledge about vaccination in pregnancy		
If I have been vaccinated against a certain disease as a child, I do not need to be vaccinated again as an adult. (No)	149 (59)	103 (41)
All vaccines should be avoided during pregnancy as they are not safe. (No)	164 (65)	88 (35)
Vaccination during pregnancy can also help to protect the newborn against that particular infection in the early stages of life. (Yes)	163 (65)	89 (35)
Knowledge about influenza and pertussis		
Have you heard about the following infections before?	<u>Yes</u>	<u>No</u>
<i>Influenza</i>	232 (92)	20 (8)
<i>Whooping cough (pertussis)</i>	111 (44)	141 (56)
Compared to adults, newborn babies are more likely to become seriously ill or die due to whooping cough. (Yes)	132 (52)	120 (48)
Pregnant women are more likely to become seriously ill if they acquire influenza in pregnancy. (Yes)	147 (58)	105 (42)
The number of whooping cough cases in Singapore is on the rise. (Yes)	35 (14)	217 (86)
In Singapore, newborns are routinely offered vaccination against:		
<i>Influenza (No)</i>	22 (9)	230 (91)
<i>Whooping cough, i.e. pertussis (Yes)</i>	45 (18)	207 (82)
Ministry of Health recommends the following vaccination during pregnancy:		
<i>Influenza (Yes)</i>	93 (37)	159 (63)
<i>Whooping cough, i.e. pertussis (Yes)</i>	65 (26)	187 (74)

Correct answers to the questions are in parentheses.

Attitude towards vaccinations in pregnancy and factors affecting decision

Encouragingly, there was a generally positive attitude towards prenatal vaccination, with 63% of women being in favour of vaccination (Table II). While only 20%–30% of women were initially aware of national recommendations for influenza and pertussis vaccination in pregnancy (Table I), more than twice that number agreed to be vaccinated once they knew that this was recommended by the local health ministry (61%–65%). Interestingly, more women could be convinced to accept the vaccine if it was recommended by an obstetrician, corresponding with the fact that women valued the opinions of their obstetricians and partners

most when making this decision. Other major considerations included safety in pregnancy, costs and side effects.

Women were also asked to rank their preferred source of information with regards to prenatal vaccination. The obstetrician was ranked the highest (75%), followed by the general practitioner (12%), authorised websites (5%), patient information leaflets (3%), media (3%) and public forums (2%).

Table II. Attitude towards vaccination in pregnancy and factors affecting decision (n = 252).

Question	No. (%)	
	Yes	No/Not sure
Attitude towards vaccination		
Are you generally in favour of vaccination?	158 (63)	94 (37)
Are you likely to consider vaccination during pregnancy if it was recommended by your health provider?	197 (78)	55 (22)
Ministry of Health recommends vaccination against influenza and whooping cough during pregnancy. Would you agree to be vaccinated against:		
<i>Influenza in pregnancy?</i>	163 (65)	89 (35)
<i>Whooping cough (pertussis) in pregnancy?</i>	153 (61)	99 (39)
Factors influencing her decision		
Safety in pregnancy	235 (93)	17 (7)
Cost and whether there is MediSave subsidy	154 (61)	98 (39)
Side effects	225 (89)	27 (11)
Composition of vaccine (porcine origin/human origin/synthetic)	129 (51)	123 (49)
Opinions of others:		
<i>Partner</i>	187 (74)	65 (26)
<i>Obstetrician</i>	183 (73)	69 (27)
<i>General practitioner</i>	72 (29)	180 (71)
<i>Family and friends</i>	77 (31)	175 (69)

DISCUSSION

Participants in this survey had a generally positive attitude towards vaccination despite suboptimal vaccination rates. This implies that there are factors contributing to vaccine hesitancy that if addressed, would likely bring about an increase in vaccine uptake rates.

One of the potential reasons for poor vaccine uptake in our population is lack of knowledge of pertussis and its impact on our society. Only 14% of the participants were aware that pertussis infections were on the rise locally, despite publications in local newspapers on this issue.^(19,20) Knowledge is also lacking among obstetricians; a local survey demonstrated that a quarter of obstetricians felt that the Tdap vaccine was unnecessary, as pertussis was not a major problem locally.⁽²¹⁾ This can contribute to low vaccination rates, as patients who are unaware of benefits may decline vaccination, and obstetricians who perceive it as unnecessary may not even recommend vaccination at all.

Other reasons for poor vaccine uptake include vaccine-specific concerns as well as safety, side effects and costs, which were identified as the main factors in our study. In order to reduce vaccine hesitancy, it is important that these concerns are specifically addressed. Concerns regarding vaccine safety for the fetus have been cited in many studies as the main obstacle to prenatal vaccinations, compounded by the fact that vaccine labels often do not contain information regarding safety in pregnancy due to a lack of clinical trials in pregnant women.⁽²²⁾ Nonetheless, the safety of the influenza and Tdap vaccines has been proven by numerous studies,^(8,14,15) and this should be effectively communicated to patients. With regard to costs, the Singapore government has aimed to make vaccinations affordable by allowing the use of MediSave to cover Tdap and influenza vaccine costs from November 2017.⁽³⁾ MediSave is a national savings scheme that helps individuals to set aside part of their income for medical expenses. If patients are made aware of this, more are likely to agree to vaccination.

From the aforementioned points, it is clear that patient education and obstetrician involvement is key to increasing vaccine uptake. The role of the obstetrician is clearly essential in this process. In the present study, 75% of women chose the obstetrician as their most preferred source of information, while more women could be convinced to accept the vaccine if it is recommended by an obstetrician (to 78% from 63%). In fact, Offeddu et al showed in a local survey that women who were personally advised to receive the influenza vaccine in pregnancy were seven times more likely to be vaccinated.⁽²³⁾ National guidelines on adult vaccination, including during pregnancy, have been published.⁽²⁴⁾ Ensuring that obstetricians are kept updated on the latest guidelines will give them encouragement and assurance when recommending vaccinations to patients. For patient education, local authorised websites that promote prenatal vaccination can be recommended.⁽²⁵⁾ Information leaflets can also be used as supplementary material.

Lastly, the role of the woman's partner should not be forgotten. In our survey, the partner's opinion played the greatest role in influencing a woman's decision to be vaccinated. Hence, the partner's presence at antenatal clinic sessions should be encouraged, as it enables the obstetrician to educate both parties at the same time, which may help to increase vaccination rates.

There are some limitations to our study. It would have been helpful to include a question on whether or not vaccination was offered by the obstetrician, as it has been shown to be a major factor influencing a woman's decision. The answers would also indicate if this was a problem in our centre that should be addressed and would help to facilitate an audit of our performance. In addition, it would have been helpful to find out if there were any public misconceptions about prenatal vaccination, as this is a potential reason for vaccine hesitancy and an important area to target in patient education.

In conclusion, our survey has shown that most women are in favour of vaccinations during pregnancy. Direct recommendation by an obstetrician, involvement of the partner in the decision-making process and emphasis on the benefits and safety of maternal immunisation are major factors that are integral to improving vaccine uptake among pregnant women.

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Appendix

SECTION 1: Demographics		
1. Age	21–30 / 31–40 / 41 and above	
2. Marital status	Single / Married / Divorced	
3. Number of previous child birth	0 / 1–2 / 3 and more	
4. Education level	Primary / Secondary / Higher	
5. Race	Chinese / Malay / Indian / Eurasian / Others	
SECTION 2: Knowledge about vaccination during pregnancy		
6. If I have been vaccinated against a certain disease as a child, I do not need to be vaccinated again as an adult.	True / False / Don't know	
7. All vaccines should be avoided during pregnancy as they are not safe.	True / False / Don't know	
8. Women who are pregnant have lower immunity and hence, are more susceptible to infections and serious complications.	True / False / Don't know	
9. Vaccination during pregnancy can also help to protect the newborn against that particular infection in the early stages of life.	True / False / Don't know	
SECTION 3: Knowledge about whooping cough		
10. Have you heard about whooping cough (pertussis) before?	Yes / No	
11. In Singapore, newborns are routinely vaccinated against whooping cough (pertussis).	True / False / Don't know	
12. Compared to adults, newborn babies are more likely to become seriously ill or die due to whooping cough.	True / False / Don't know	
13. The number of whooping cough cases in Singapore is on the rise.	True / False / Don't know	
14. MOH recommends vaccination against whooping cough during pregnancy.	True / False / Don't know	
SECTION 4: Knowledge about influenza		
15. Have you heard about influenza before?	Yes / No	

16. In Singapore, newborns are routinely offered vaccination against influenza.	True / False / Don't know
17. Pregnant women are more likely to become seriously ill if they acquire influenza in pregnancy.	True / False / Don't know
18. MOH recommends vaccination against influenza during pregnancy.	True / False / Don't know
SECTION 5: Attitude towards vaccination in general and during pregnancy	
19. Are you generally in favour of vaccination?	Yes / No / Not sure
20. Are you likely to consider vaccination during pregnancy if it was recommended by your health provider?	Yes / No / Not sure
SECTION 6: Attitude towards vaccination against influenza and whooping cough during pregnancy	
21. MOH recommends vaccination against influenza during pregnancy. Would you agree to be vaccinated against influenza in pregnancy?	Yes / No / Not sure
22. MOH recommends vaccination against whooping cough during pregnancy. Would you agree to be vaccinated against whooping cough (pertussis) in pregnancy?	Yes / No / Not sure
23. What affects your decision about having vaccinations in pregnancy?	
A: Safety in pregnancy	Yes / No / Not sure
B: Cost and whether there is MediSave subsidy	Yes / No / Not sure
C: Route of vaccination (whether it is administered orally or as an injection)	Yes / No / Not sure
D: Side effects	Yes / No / Not sure
E: Composition of vaccine (porcine origin / human origin/ synthetic)	Yes / No / Not sure
24. Whose opinion are you likely to take before making your decision? Please circle your answers. You may choose more than one option.	
A: Husband	
B: Friends and/or family	

C: General practitioner

D: Obstetrician

25. Please rate from 1 to 6 your preferred mode for receiving information regarding vaccinations during pregnancy; number 1 being the most preferred mode and number 6 being the least preferred mode.

A: Your general practitioner	
B: Your obstetrician	
C: Patient information leaflet	
D: Media (newspaper, radio, TV)	
E: Public forums	
F: Authorised websites	