**Embedding the delivery of antenatal vaccination within routine antenatal care: a key opportunity to improve uptake**

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**Abstract**

Improving the uptake of vaccination in pregnancy has been highlighted as a priority by the World Health Organisation, yet establishing the optimal location for delivery of the antenatal vaccination programme remains a topic of debate internationally. In many countries, antenatal vaccines are usually delivered within Primary Care (under the lead of general practitioners [GPs] or family physicians), yet this often presents a logistic barrier to accessing vaccination, and increasing evidence demonstrates that embedding vaccination within routine antenatal care visits may significantly improve uptake. In this commentary, we discuss recent evidence to support this approach, including anonymous feedback from patients and staff at our own institution, in which a dedicated midwife-led vaccine clinic has recently been set up. Furthermore, we highlight a number of individual and institution-level barriers which would need addressing before this approach can be routinely adopted, and suggest targets for future education and research.

**Keywords:** Maternal vaccination; Pregnancy; Midwifery; midwives; community midwives; primary care; secondary care; antenatal care; General practice; family physicians

**Introduction**

Vaccination in pregnancy is an important global health strategy that protects young infants and mothers at a time when they are particularly vulnerable to infection12. Antenatal vaccination against influenza is recommended by the World Health Organisation (WHO), and has been implemented across a number of countries since this recommendation 3. Antenatal vaccination against pertussis was first introduced in the United Kingdom (UK) and United States (US) in 2012, following national outbreaks of pertussis 4. Similar trends have since been observed globally, and at least 14 countries worldwide have adopted similar programmes 3. Furthermore, a number of vaccines with an indication for use in pregnancy or pre-pregnancy are progressing though the development pipeline, including Respiratory Syncytial Virus (RSV), Cytomegalovirus (CMV) and Group B Streptococcus (GBS) 3.

Although initial uptake of antenatal vaccination was encouraging, coverage has since plateaued (particularly in developed countries), and improvement is required to ensure optimal protection of mothers and infants 5. The WHO have therefore highlighted the need to identify and tackle socio-economic barriers to vaccine uptake 6 7. Antenatal vaccination uptake in the UK against influenza and pertussis over the 2017-2018 winter season was 47% and 73% 8–11, respectively, however coverage rates vary markedly between different regions of the country.

Successful examples of educational interventions have included training for healthcare professonals (HCPs) 12 and improved educational resources for pregnant women (such as providing pamphlets in antenatal clinic 13 14, smart phone apps15, text messages 16 and social media 17). Yet, whilst such interventions may improve intention to receive vaccination amongst pregnant women, this doesn’t necessarily equate to receipt of vaccination due to competing time pressures and priorities, and difficulty accessing vaccination 18. Establishing the optimal location for delivery of the antenatal vaccination programme has therefore become a priority globally 5.

**Embedding vaccination within routine antenatal care**

In many countries (including the UK, USA, Canada, and Australia) midwives and/or obstetricians are often the only HCP pregnant women have routine contact with during their antenatal care, and yet vaccination is usually delivered within Primary Care (under the lead of general practitioners [GPs] or family physicians). For many women, this may present a logistical barrier to accessing vaccination as it requires an additional appointment to those for routine antenatal care, and it is usually the women’s responsibility to arrange this 19 20. This may be particularly inconvenient for women working full-time, and those from culturally and linguistically diverse backgrounds. Additionally, it is recognised that mothers often value the expertise of their antenatal care provider above other sources of advice during pregnancy 21, and may therefore be more likely to accept a vaccine if recommended and administered by them.

Increasing evidence demonstrates that embedding vaccination into routine antenatal care visits can increase uptake of both pertussus and influenza vaccination22–28. Surveys of pregnant women have shown that many women find the model of primary care-delivered vaccination to be inconvenient, and that women are up to three times more likely to undergo vaccination if offered by their antenatal care provider 23 25. This is supported by prospective cohort studies demonstrating significant increases in uptake following the introduction of midwife-delivered vaccination programmes 22 24. These include a multi-centre study undertaken in Melbourne, Australia, in which two hospital-based antenatal immunisation models (nurse- and midwife-led) were compared to primary care-delivered vaccination. The greatest improvement in vaccine uptake from baseline was seen following the introduction of standing orders allowing for midwife-administered vaccination (39% to 91%, p< 0.001) during routine antenatal visits 24. Similarly, Mohammed *et al* (2018) demonstrated large increases in the uptake of both pertussis (20% to 90%, p<0.001) and influenza (32% vs 83%, p< 0.001) antenatal vaccination following the introduction of a midwife-delivered vaccination at their institution 22.

The American College of Obstetrics and Gynaecology and US Advisory Committee on Immunisation Practices has therefore recently recommended use of standing orders 29. Furthermore, there are an increasing number of areas in the UK where successful initiatives have been set up (locally commissioned by National Health Service [NHS] midwifery services), many of which offer vaccination at the same time as the 20-week fetal anomaly scan visit 30 31. A dedicated midwife-led vaccine clinic has recently been set up at our own institution, offering vaccination appointments (either booked in advance or undertaken opportunistically) alongside routine antenatal visits. Formal feedback about this service from pregnant women and maternity HCPs (collected prospectively via an anonymous survey administered from October-November 2018) has been encouraging. The clinic was rated as “Excellent” or “Good” by 82% (82/100) of pregnant women and 81% (38/47) of the HCPs who responded. Furthermore, most pregnant women agreed that secondary care antenatal appointments were the optimal location for vaccine administration (61%, 58/95), followed by primary care (12%) and community midwifery appointments’ (6%), whilst 20% did not have a preference. Similarly, amongst HCPs, the most common preference was secondary care antenatal appointments (58%, 27/47), followed by community midwifery appointments (19%) and primary care (6%), whilst 17% had no preference.

**What are the barriers to routine implentation of this approach?**

A number of studies have indicated that there may be a mixed response from midwives and obstetricians as to whether this approach is desirable and feasible, and whether they feel adequately trained and prepared (on both an individual and institutional level) 20,30,32–37. Whilst most would agree that vaccination is important and should be promoted opportunistically, individual barriers to administering vaccination themselves include perceived lack of knowledge/confidence in discussing the risks and benefits of vaccination with pregnant women (particularly amongst midwives), and a lack of formal training in vaccination - highlighting the need for further education targeted at areas of particular need30 32 33. There also remains a significant amount of uncertainty about who should bear responsibility for the recommendation and administration of vaccination amongst maternity staff 34. Qualitative studies have revealed that even amongst those who recognise the importance of vaccination (and the potential implications of not doing so), vaccination remains a low clincial priority for them, particuarly as many would not have experienced actual cases of pertussis/influenza as part of their practice, or in their local community38. There is evidence to suggest however that support amongst staff from may grow after implementation of such a service, once they observe that it indeed works in practice 39 20.

Institution-level barriers may include short appointments for antenatal visits, inadequate staffing and resources, lack of a suitable setting and facilities for safe vaccine storage and delivery, and concerns about appropriate insurance and financial reimbursement 30,35,40. As well ensuring sufficient resources for the delivery of vaccination, it is important to note that resources and training must be in place to deal with any complications or side-effects that arise following vaccination. Whilst serious reactions to vaccination are extremely rare41, the immediate onset and life-threatening nature of anaphylaxis necessitates that vaccine providers have resources in place for effective management. Finally, accurate tracking of pregnant women’s vaccination status is also important to consider, as this feeds directly into national surveillance of vaccine uptake. In England, for example, notification of vaccincation must be communicated to the women’s GP, as national surveillance data is automatically extacted by Public Health England from individual GP practices31 .

It should be noted that there remains a paucity of research regarding the views of GPs and family physicians towards routine adoption of this approach 20 42 43. This is important, as primary care-delivered vaccation has been the traditonal model of care for many countries, and support from GPs will be needed to ensure smooth implentation of a new service (especially given that many GP practices currently receive funding for the administration of vaccines). However, some recent studies (including a large survey of English GPs)  43 have identified that many feel a sense of disconnect from antenatal care, and there is indeed support for maternity healthcare professionals in the community and Secondary Care to take greater responsibility for the promotion and administration of the antenatal vaccination programme, and to embed this within routine antenatal visits. It is important to note, however, that even if antenatal vaccination programmes are exclusively delivered within antenatal care, GPs will continue to have a role in providing advice to pregnant women opportunistically, and continued education of GPs will therefore be essential.

**Conclusions**

Mounting evidence suggests that embedding vaccination within antenatal care visits can improve uptake amongst pregnant women, yet a number of individual and institution-level barriers need to be addressed before this approach can be routinely adopted. Research would be beneficial within settings in which this approach has (and has not) been adopted, in order to establish its feasibility and effectiveness, as well as facilitators/barriers to its acceptance amongst pregnant women and HCPs.

Given the diverse models of antenatal care between different countries (and regions within countries), we acknowledge that it is not feasible to expect a universal model of immunisation delivery. Antenatal care-based vaccination programmes should not necessarily replace primary care-delivered vaccination in settings where offering both approaches simultaneously is beneficial and practical (such as for influenza vaccination where a pregnant woman’s 20-week visit may not occur within influenza season). Furthermore, in some antenatal care settings, establishing a dedicated immunisation service may be unfeasible, in which case a more traditional model of primary care-delivered vaccination will continue. However, in such settings it is key to ensure that at least the active promotion of vaccination occurs routinely as part of antenatal care in all settings. Possible strategies should include reminders for healthcare staff (such as ‘tick box’ prompts) in antenatal care referral forms or notes, written educational resources for pregnant women available within their notes and at GP and antenatal clinics (particularly focussing on the benefits of vaccination for the infant 33), and easily-accessible online guidance for staff 20 14.

**Conflict of Interests Statement**

CRW and CEJ are investigators for clinical trials done on behalf of their respective institutions, sponsored by various vaccine manufacturers, but receive no personal funding for these activities. RR is a vaccination specialist midwife.

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C Wilcox drafted the manuscript, and the other authors critically revised the manuscript. All authors approved the final version of the manuscript. With regards to the Southampton vaccination clinic questionnaire study, all authors contributed to questionnaire design, study delivery and data collection.

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