

Introduction

Vaccination is a fundamental activity in the prevention of disease. Routine immunisation programmes are primarily aimed at infants, young children and older people, because these populations are considered to be the most vulnerable to certain infections (Keener, 2019). However, over recent years, the practice of vaccinating pregnant women has become a strategy which has become more widely used to prevent infection not only in this population, but also to provide protection for infants.

Maternal vaccination was initially introduced routinely in 2010 (UK Health Security Agency (UKHSA), 2019). Since then, it has become established practice in primary care and currently, vaccines are given to protect against three infectious diseases. Given it is over a decade since the first maternal vaccines were offered routinely, it is timely to revisit the importance of this concept – this is especially pertinent given that vaccine coverage during pregnancy is not optimal. This article explores which vaccines are offered and why; it also considers trends in maternal vaccine uptake, and makes recommendations for practice.

Which vaccines are recommended and why?

There are three vaccines which are universally recommended during pregnancy: seasonal influenza, pertussis and most recently, COVID-19 vaccine. The influenza vaccine is offered to women at any stage of their pregnancy during the influenza season, irrespective of any former doses received in a previous season (UKHSA, 2020). Furthermore, a pertussis containing vaccine is recommended between 16 and 32 weeks for maximum benefit, although it can be given after 32 weeks (UKHSA, 2016). For protection against COVID-19 infection, two doses of either the Pfizer or Moderna vaccines 8-12 weeks apart are advised as early as possible during the gestational period (UKHSA, 2022a). Vaccines are offered during pregnancy for different reasons and an awareness of these is vital so that discussions with pregnant women are fully informed.

Pregnancy signifies some important immunological and physiological changes. These changes are necessary for the body to support the developing foetus; however, it also explains why during pregnancy, mothers may be more susceptible to certain diseases (Vojtek et al., 2018). It is primarily for this reason that programmes to support maternal vaccination to prevent seasonal influenza and COVID-19 exist - because these diseases pose a greater threat to women who are pregnant. Studies investigating the effects of influenza infection during the 2009 H1N1 pandemic, reported an increase in stillbirth (Wang et al., 2021) and maternal mortality and morbidity (The ANZIC Influenza Investigators and Australasian Maternity Outcomes Surveillance System, 2010), emphasising the importance of maternal influenza vaccination. Similarly, it was reported in 2021 that 20% of the most critically ill patients with COVID-19 were unvaccinated pregnant women (NHS England, 2021). It follows that a healthy pregnancy and birth can only be supported if the mother remains healthy and free of disease.

The rationale for expectant mothers to be offered a pertussis containing vaccine is slightly different. Maternal immunoglobulin (IgG) antibodies cross the placenta from 13 weeks gestation, although the majority of IgG transfer takes place from 32 weeks (Healy & Baker, 2006) – this explains why vaccination is advised before 32 weeks. It is this action of IgG transfer, or passive immunity that is capitalised on to provide infants with vital protection against pertussis from birth, until they reach eight weeks of age when they can be vaccinated themselves. Ensuring infants are born with adequate protection is important – pertussis infection in young infants is often severe, with associated morbidity and mortality (Cherry, 2016). For reasons which are unknown, in England in 2012, the rates of pertussis infection peaked, when there were over 9,300 cases and 14 deaths in infants under three months old (Vaccine Knowledge Project, 2020). This marked the beginning of the maternal pertussis vaccination programme in 2012, and since then infant deaths due to pertussis have declined, although it is thought that social distancing measures have largely contributed to the decline in recent pertussis activity; between April 2019 and June 2021 there has been one reported infant death due to pertussis (UKHSA, 2022b).

During pregnancy, some women may be offered additional immunisation if they are considered to be at risk of infection. This may make them eligible for certain vaccinations, and an example is Hepatitis B (UKHSA, 2021). Therefore, assessment in the antenatal stage is vital to identify the need for any additional vaccines. It is important to reiterate that the administration of live vaccines during pregnancy is not recommended (Vaccine Knowledge Project, 2022).

Ongoing disease surveillance and the development of novel vaccines signal further opportunities for maternal vaccination and subsequently, greater protection for mothers and infants. Respiratory syncytial virus (RSV) is a leading cause of respiratory tract infections in children, with more severe infection associated with infancy, and Group B Streptococcus (GBS) is a primary cause of pneumonia, meningitis and sepsis in new-borns (Vojtek et al., 2018). These are two examples of vaccines which are in development with the potential to provide protection for new-borns and infants through the practice of maternal immunisation.

Uptake and vaccine hesitancy

Since the maternal seasonal influenza programme was introduced in 2010, uptake has gradually increased with time. In the initial 2010/2011 season, vaccine uptake in England was 38% (Begum & Peabody, 2011). This remains at a low level with the 20/21 season, seeing an uptake of 43.7% (Public Health England, 2021a). In comparison, maternal pertussis vaccination rates are higher; when the vaccine was first introduced in 2012, rates were 54.5% in England (Public Health England, 2012). The most recent data are from the first quarter of 2021 with an average uptake of 64.5% reported for England (Public Health England, 2021b), although this has likely been affected by the COVID-19 pandemic as rates of 71.7% had been reported in 2017-18 (Public Health England, 2019). Despite these increases, uptake rates for both of these vaccines remain at sub-optimal levels, indicating that understanding the reasons for them is important to develop strategies aimed at increasing coverage. Data on coverage of maternal COVID-19 vaccine in England currently indicate that it is increasing. In

August 2021, 22.5% of women had received at one vaccine dose at prior to delivery and by October 2021, this had almost doubled to 41.3% (UKHSA, 2022c).

To address the low rates of vaccine uptake among pregnant women, understanding what influences this is important. Vaccine hesitancy is a term often used to explain reasons for uptake, however, it is argued that this is not accurate. Included in the World Health Organisation definition of vaccine hesitancy is the statement: "Vaccine hesitancy refers to delay in acceptance or refusal of vaccines despite availability of vaccine services." (Strategic Advisory Group of Experts, 2014;7); furthermore, the term 'hesitancy' suggests a psychological state. However, if the reasons for vaccine uptake are to be fully understood, then all reasons must be considered; not only reasons that explain decision making, but also those that affect access to vaccines and vaccination services.

In a UK based study, Ralph et al. (2022) used interviews to establish pregnant women's views and experiences of maternal vaccination. They found that key factors associated with decision making were healthcare professional recommendations, and perceived risk and susceptibility of the disease. Previous experiences of vaccination and the disease were also influential factors. Interestingly, it is reported that perceptions of pertussis indicated that it was a more serious infection than influenza, signifying that the desire to protect their infant promoted vaccine acceptance (Ralph et al., 2022). This could explain the higher rate of uptake seen for pertussis vaccination compared with influenza in pregnant women.

Initially, maternal influenza and pertussis vaccines were delivered predominantly in primary care. This created a situation where further appointments needed to be made in general practice for vaccination in addition to the routine antenatal contacts. Llamas et al. (2020) report that an increasing number of NHS trusts are now delivering vaccination as part of routine antenatal care, and that this has had a moderate impact on coverage. This suggests that convenience is important and therefore, improved access to vaccination services is a significant factor to consider when exploring and addressing influences on uptake. Bisset and Paterson (2018) undertook a systematic review to identify successful strategies to increase the uptake of maternal influenza and pertussis vaccines. The review concluded

that although evidence was limited, some effective approaches included vaccination reminders on antenatal care notes, midwives administering the vaccines, and education and information for staff as well as pregnant women.

Maternal vaccination to provide protection against COVID-19 infection has been recommended since April 2021 (Joint Committee on Vaccination and Immunisation, 2021). At the start of the COVID-19 vaccination programme in 2020 however, the vaccine was not advised for pregnant women. This may explain why coverage in this population was initially limited – confidence levels about COVID-19 vaccination among pregnant women could have been affected by the changes in this guidance, resulting in ambivalence. Factors related to maternal COVID-19 vaccination have been primarily about concerns over vaccine safety, but other sociodemographic characteristics including women from ethnic minorities and those with a lower-income are also associated with lower acceptance (Skirrow et al., 2022).

Conclusion

Maternal vaccination is proven to be a valuable action in the protection of both pregnant women and infants against certain diseases, and it is a concept which is currently being harnessed for greater protection against other infections. Current coverage data indicate that more needs to be done to promote uptake, and this article raises some important implications for practice. First, that all health professionals coming into contact with pregnant women not only raise the topic of immunisation, but that they recommend it. This a significant finding in the research by Ralph et al. (2022), but has also been identified as a key influence on maternal vaccine coverage by Wales et al. (2020). Second, knowledge of the diseases with a focus on the increased susceptibility during pregnancy for influenza and COVID-19 infection is essential. Equally, understanding the importance of maternal IgG transfer to infer protection against pertussis for infants is important – these are both key messages that need to be effectively communicated. This suggests that staff coming into contact with pregnant women need to have the knowledge and skills to support decision-making. Finally, the logistics of maternal

vaccine delivery should be configured to promote access and opportunities to optimise uptake, and the administration of vaccines as part of antenatal care appears to be a key strategy in this.

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