

## Current practice and attitudes towards vaccination during pregnancy:

a survey of GPs across England

### Abstract

#### Background

Antenatal vaccines are commonly delivered in primary care, yet the views of GPs regarding these programmes have been neglected in research to date.

#### Aim

To establish the attitudes and current practice of GPs towards antenatal vaccination and their views on the optimal location for delivery of this service.

#### Design and setting

A multicentre online survey questionnaire.

#### Method

A questionnaire was sent to GPs across England between December 2018 and January 2019.

#### Results

The majority of 1586 responders considered antenatal vaccination safe (96% for influenza, 89% pertussis). GPs were significantly less confident in their knowledge of pertussis compared with influenza vaccination (64% versus 80% were confident,  $P<0.001$ ), and many desired further education (59% versus 48%,  $P<0.001$ ). Few (37%) discussed vaccination with pregnant women regularly, but most (80%) felt their recommendation would influence decision making. Those with greater confidence in their knowledge of pertussis and influenza vaccination, and who were  $>2$  years since qualifying, discussed vaccination significantly more often (odds ratio [OR] 3.52,  $P<0.001$ ; OR 2.34,  $P=0.001$ ; OR 1.76,  $P=0.003$ , respectively), regardless of whether they routinely saw pregnant women. Most (83%) reported that antenatal vaccination was GP led in their region, yet only 26% thought it should be primarily GP based. GPs expressed disconnect from antenatal care, and many suggested that midwives and/or secondary care should take greater responsibility for the delivery of antenatal vaccination.

#### Conclusion

There is support among GPs to embed vaccination programmes within routine antenatal care. Further educational resources, specifically designed for the needs of GPs, are needed to facilitate opportunistic discussion with pregnant women about vaccination.

#### Keywords

antenatal vaccination; general practitioners; influenza; pertussis; pregnancy; vaccination.

### INTRODUCTION

Pertussis and influenza infection can have severe consequences for pregnant women and their infants, including respiratory illness and death.<sup>1,2</sup> Antenatal vaccination is an effective means of protecting newborns until the time of infant vaccination, or until the window period of greatest susceptibility to severe disease has passed.<sup>3-6</sup> Vaccination against pertussis and influenza has been routinely recommended during pregnancy in the UK since 2012 and 2010, respectively.<sup>7</sup> Although initial uptake of antenatal vaccination in the UK was encouraging for a new programme, coverage has since plateaued and further gains are still to be made to ensure optimal protection of pregnant women and their infants. This trend is echoed globally, and the World Health Organization (WHO) has recently called for research into the socioeconomic determinants of vaccine attitudes.<sup>8,9</sup> The uptake of antenatal vaccination against pertussis and influenza in England over the winter season 2017–2018 was 73% and 47%,<sup>10-13</sup> respectively; however, coverage rates vary markedly between different regions of the country, and uptake is 10–20% lower in London than in northern England.<sup>10-13</sup>

It is well acknowledged that a recommendation from a familiar healthcare professional is one of the strongest determinants of vaccination uptake.<sup>14,15</sup> GPs are one of the primary points of contact for

pregnant women in the UK; are well placed to communicate the benefits of vaccination; and remain highly rated as sources of advice among pregnant women.<sup>16-18</sup> Yet, despite this, there is a paucity of research into the current practice and attitudes of GPs towards antenatal vaccination.<sup>19,20</sup> Improving understanding in this area may be important in explaining current vaccination attainment levels, and identifying areas for future intervention.

Establishing the optimal location for delivery of the antenatal vaccination programme is also a topic of significant debate internationally. In the UK, antenatal vaccination is usually delivered within primary care, which (for many women) presents an additional barrier to accessing vaccination as it usually requires an appointment additional to those for routine antenatal care. More recently, some NHS trusts have started to embed vaccination in pregnancy within antenatal services in the community or in secondary care, as recent evidence suggests that this may be an effective approach to increase uptake.<sup>21-25</sup> A number of studies have explored the views of midwives and obstetricians towards implementing this,<sup>26-29</sup> yet the views of GPs have been significantly under-represented.<sup>26</sup>

The aims of this questionnaire study were to establish the attitudes and current practice of GPs towards antenatal vaccination and

#### CR Wilcox, MBCh, academic clinical fellow

in general practice, NIHR Clinical Research Facility, University Hospital Southampton NHS Foundation Trust, Southampton. **P Little, MD, MRCP, MRCPGP, FMedSci**, professor of primary care, Department of Primary Care and Population Sciences, Aldermoor Health Centre, University of Southampton, Southampton.

**CE Jones, PhD, MRCPCH**, associate professor of paediatric infectious diseases and immunology, Faculty of Medicine and Institute for Life Sciences, University of Southampton; University Hospital Southampton NHS Foundation Trust, Southampton.

#### Address for correspondence

Christopher R Wilcox, NIHR Clinical Research Facility, Southampton Centre for Biomedical Research, C Level West Wing, Mailpoint 218, Southampton General Hospital, Tremona Road, Southampton SO16 6DY, UK.

**Email:** christopherwilcox@soton.ac.uk

**Submitted:** 12 April 2019; **Editor's response:**

16 July 2019; **final acceptance:** 22 July 2019.

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This is the full-length article (published online 28 Jan 2020) of an abridged version published in print. Cite this version as: **Br J Gen Pract 2020; DOI: <https://doi.org/10.3399/bjgp20X708113>**

## How this fits in

Antenatal vaccines are commonly delivered in primary care, yet the views of GPs regarding these programmes have to date been neglected in research. A survey was distributed to GPs across England in order to establish their attitudes towards antenatal vaccination, and their views on the current delivery of this service. Strong support was found among the 1586 responders for the vaccination programme to be further embedded within routine midwife- and/or obstetrician-delivered antenatal care. Many responders also had low confidence discussing vaccination with pregnant women and desired further educational resources (specifically designed for the needs of GPs) in order to facilitate opportunistic promotion of vaccination in the future.

**Table 1. Characteristics of the GPs who responded to the questionnaire**

Characteristic	N(%)
Total	1586 (100)
<b>Region of England in which they are based</b>	
North	280 (18)
Midlands	156 (10)
East	318 (20)
South West	394 (25)
Southern	238 (15)
London	107 (7)
Not stated	93 (6)
<b>Amount of time spent working as a GP since qualification</b>	
<2 years	112 (7)
2–5 years	196 (12)
6–10 years	252 (16)
11–15 years	250 (16)
16–20 years	268 (17)
≥21+ years	411 (26)
Not stated	97 (6)
<b>Additional relevant qualification or specialist interest</b>	
None	1125 (71)
Diploma in paediatrics/obstetrics/family planning/public health/vaccination	310 (20)
Switched to general practice during paediatric/obstetrics specialist training	36 (2)
Informal special interest in paediatrics/obstetrics/vaccination	25 (2)
Not stated	90 (6)
<b>Whether they see pregnant women as part of routine antenatal care</b>	
Yes	525 (33)
No	967 (61)
Not stated	94 (6)

their views on the optimal location for delivery of this service.

## METHOD

### Questionnaire design and development

An anonymous survey was developed by the study team, consisting of a series of closed questions and a free-text box in which participants could add further comments (see Supplementary Box S1). The questionnaire had not previously been validated. Participants were asked questions about their current practice and their attitudes (including perceived responsibility) with regards to discussing antenatal vaccination with pregnant women, as well as their confidence in their knowledge of its risks and benefits, and attitudes to the introduction of new antenatal vaccines. Participants were also asked about the logistics of vaccine administration in their region, and their opinion as to the optimal healthcare site for vaccine administration.

### Study population and recruitment

The survey was administered to qualified GPs working at GP practices across England. Recruitment took place from 11 December 2018 to 25 January 2019. Overall study coordination was undertaken centrally by the principal investigator, in collaboration with the National Institute for Health Research (NIHR) Primary Care Clinical Research Network (CRN), who were responsible for recruitment. Individual GP practices were identified and contacted by research administrators from local CRNs across England, and invitations for participation (containing a link to the online questionnaire) were distributed to these practices via email. Reminders were sent to

practices that did not respond to initial email invitation. Participation was voluntary and all participants gave informed consent. The study was granted ethical approval and registered on ClinicalTrials.gov (NCT03096574) prior to recruitment.

### Questionnaire data analysis

Data were automatically entered into iSurvey (www.isurvey.soton.ac.uk) on questionnaire completion. Statistical analysis was performed using IBM SPSS (version 25). Wilcoxon signed-rank testing and multivariate ordinal regression analyses were performed, and adjusted odds ratios (ORs) were calculated. *P*-values <0.05 were considered statistically significant. Multicollinearity was examined using the tolerance test and the variance inflation factor (VIF) to ensure variables with a VIF value exceeding 2.5 were not entered into the regression model. Coding and thematic analysis of the open-text comments was performed using NVivo (version 12).

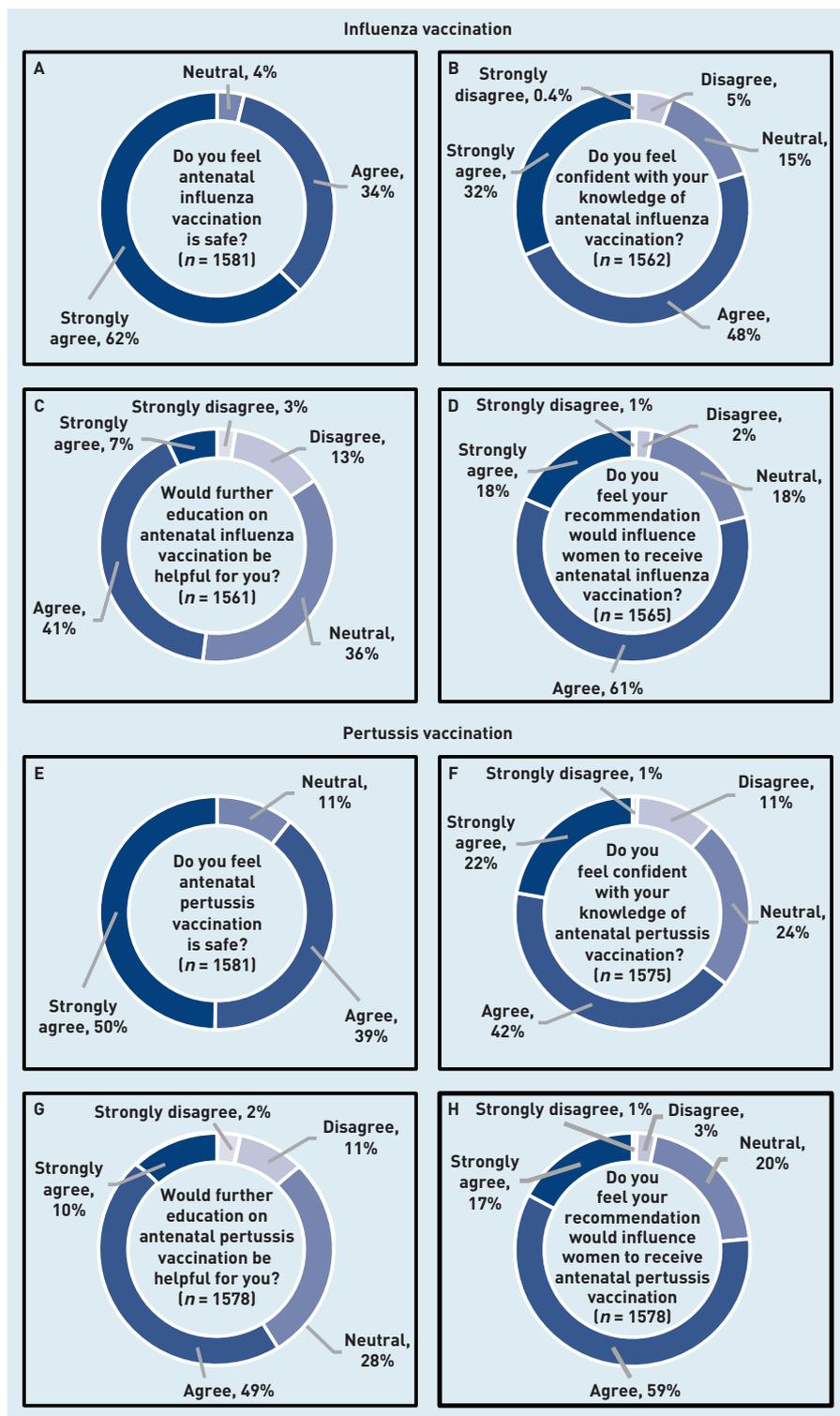
## RESULTS

A total of 1586 GPs took part in the study; all were included in the analysis. There was good distribution of participants from across England, and of spread of experience working in general practice. One-fifth (*n* = 335, 22%) stated that they had some form of additional qualification or special interest in paediatrics/obstetrics/vaccination or a related subject, and 2% (36/1496) had worked as a paediatric or obstetric specialist trainee prior to general practice. The full characteristics of participants are displayed in Table 1.

### Current practice and attitudes towards routine antenatal vaccination

Most GPs felt that antenatal vaccination is safe and were confident discussing its risks and benefits with pregnant women (Figure 1); however, they had significantly less confidence discussing pertussis vaccination compared with influenza (64% versus 80% were confident or very confident, *Z* = -14.1, *P* < 0.001), and were more likely to consider further education on pertussis to be helpful for them (59% versus 48% agreed or strongly agreed that education would be helpful, *Z* = -10.1, *P* < 0.001). The majority of GPs strongly agreed/agreed that a recommendation from them would influence women to receive vaccination against influenza (1236/1565, 79%) and pertussis (1207/1578, 76%).

When asked whether they routinely discuss antenatal vaccination with pregnant women, 10% (160/1574) selected every time, 27% (*n* = 423) often, 35% (*n* = 555) occasionally, 24% (*n* = 371) rarely, and 4%



**Figure 1.** Responses to four questions regarding antenatal influenza (A–D) and pertussis (E–H) vaccination among the responding GPs in this study.

(n = 65) never. Regarding whether discussing antenatal vaccination is a responsibility of GPs, 12% (183/1561) strongly agreed, 46% (n = 720) agreed, 28% (n = 444) were neutral, 14% (n = 214) disagreed, and none strongly disagreed. Multivariate ordinal regression analysis identified that GPs were significantly

more likely to discuss vaccination with pregnant women if they were confident in their knowledge of pertussis (OR 3.52, CI = 2.45 to 5.07;  $P < 0.001$ ) and influenza vaccination (OR 2.34, CI = 1.40 to 3.91;  $P = 0.001$ ) (Table 2). More experience as a GP was a significant predictor; overall, GPs >2 years since qualifying, discussed vaccination significantly more often (odds ratio as OR 1.76,  $P = 0.003$ ; Table 2 shows further results). Other significant predictors included belief that discussing vaccination is a responsibility of GPs, and whether or not they saw pregnant women as part of routine antenatal care (Table 2).

GPs were also asked for their views regarding the primary target of protection from antenatal vaccination. For pertussis vaccination, 52% (829/1583), 38% (n = 602), and 10% (n = 152) selected 'the baby', 'the mother', and 'both equally', respectively. For influenza vaccination 2% (35/1583), 48% (n = 753), and 50% (n = 795) selected 'the baby', 'the mother', and 'both equally', respectively.

#### Attitudes regarding the optimal healthcare site for administration of antenatal vaccination

When asked which staff member would usually administer antenatal vaccination in their practice 83% (1227/1486) selected practice nurse, 9% (n = 141) midwife, 4% (n = 59) healthcare assistant, 4% (n = 56) GPs, and 0.2% (n = 3) reported that no one vaccinates. The large majority (83%, 990/1191) believed that pregnant women in their region would need to arrange a separate appointment if they wished to receive vaccination. When asked where they thought antenatal vaccination should primarily be delivered, 41% (651/1584) selected community midwifery, 29% (n = 454) both primary and secondary care, 26% (n = 417) GP practices/primary care, 4% (n = 57) secondary care, and 0.3% (n = 5) both GP practices and community midwifery (Figure 2).

#### Attitudes to the introduction of new antenatal vaccines

GPs were also asked to select the top three factors that would influence their recommendation of a new vaccine. The commonest selected option was the risk of side effects for the developing baby (1160/1499, 77%), followed by effectiveness at preventing severe disease (n = 861, 57%), seriousness of infection in young children (n = 710, 47%), effectiveness at preventing infection (n = 673, 45%), risk of side effects for the mother (n = 627, 42%), number of women who had received the vaccine in research

**Table 2. Multivariate ordinal regression analysis of factors predicting how often GPs discussed antenatal vaccination with pregnant women**

Variable	Number of GPs who reported discussing antenatal vaccination with pregnant women 'every time' or 'often'	Adjusted odds ratio (95% CI)
<b>Length of time working as a GP since qualification</b>		
>11 years	360/922 (39%)	1.84 (1.26 to 2.68) <sup>a</sup>
2–10 years	154/445 (35%)	1.61 (1.09 to 2.40) <sup>b</sup>
<2 years	26/111 (23%)	1.00 (reference)
<b>Presence of extra qualification or special interest in paediatrics, obstetrics, infectious disease, or related subject</b>		
Yes	183/393 (47%)	1.21 (0.97 to 1.51)
No	359/1085 (33%)	1.00 (reference)
<b>Review pregnant women routinely as part of their antenatal care</b>		
Yes	266/523 (51%)	2.00 (1.63 to 2.47) <sup>c</sup>
No	278/958 (29%)	1.00 (reference)
<b>Extent to which they believed discussing vaccination was a responsibility of GPs</b>		
Strongly agree	129/181 (71%)	11.58 (7.60 to 17.64) <sup>c</sup>
Agree	338/716 (47%)	4.15 (3.01 to 5.65) <sup>c</sup>
Neutral	85/441 (19%)	1.66 (1.21 to 2.29) <sup>b</sup>
Disagree	29/213 (14%)	1.00 (reference)
<b>Level of confidence in their knowledge of the risks/benefits of antenatal pertussis vaccination</b>		
Strongly agree/agree	452/1012 (45%)	3.52 (2.45 to 5.07) <sup>c</sup>
Neutral	105/373 (28%)	2.25 (1.53 to 3.30) <sup>c</sup>
Disagree/strongly disagree	20/181 (11%)	1.00 (reference)
<b>Level of confidence in their knowledge of the risks/benefits of antenatal influenza vaccination</b>		
Strongly agree/agree	516/1242 (42%)	2.34 (1.40 to 3.91) <sup>b</sup>
Neutral	46/227 (20%)	1.34 (0.77 to 2.31)
Disagree/strongly disagree	10/84 (12%)	1.00 (reference)

<sup>a</sup>P<0.01. <sup>b</sup>P<0.05. <sup>c</sup>P<0.001. CI = confidence interval.

studies ( $n = 265$ , 18%), and how common the infection is in children ( $n = 211$ , 14%).

#### Open-text comments

Further comments were provided by 34% ( $n = 539$ ) of the GPs. A number of GPs ( $n = 119$ , 22%) stated they had very little/no involvement in routine antenatal care. As antenatal care is predominately midwife and/or obstetrician led in the UK, many GPs stated that their interaction with pregnant women was opportunistic only, and some reported feeling de-skilled with regards to offering advice to pregnant women. Many ( $n = 242$ , 45%) suggested that midwives and/or secondary care should take greater responsibility towards promoting and delivering antenatal vaccination, and that uptake might improve if these were embedded within routine antenatal visits. A small number ( $n = 9$ , 2%)

suggested that antenatal vaccination was best placed exclusively within general practice:

*'I do think getting midwives to discuss and administer vaccines would be helpful to improve uptake. As GPs we rarely see the majority of well pregnant women so have little opportunity to influence their choices regarding vaccination.'* (GP119)

*'As GPs are sidelined in antenatal care it seems silly not to have this area dealt with by the community midwives as part of routine antenatal care.'* (GP245)

Further promotion and education regarding vaccination aimed at pregnant women and the general public were suggested by 69 GPs (13%). Specific ideas included public health campaigns, advertisement through media channels (including social media), public role models or celebrity endorsement, and building specific guidance into commonly used antenatal books and face-to-face classes, such as National Childbirth Trust (NCT) groups. Further education for healthcare professionals was suggested by 48 GPs (9%), and 35 (6%) suggested improving the resources and guidance on antenatal vaccination available to them, in order to facilitate discussion about vaccination with pregnant women:

*'Improved GP education and awareness of vaccination in pregnancy would be useful, especially as most GPs are not routinely involved in antenatal care but may need to counsel a patient who has concerns regarding vaccination in pregnancy.'* (GP246)

## DISCUSSION

### Summary

Improving uptake rates of antenatal vaccination is a global health priority. The aim of this study was to better understand the current practice and attitudes of GPs in England towards antenatal vaccination, and their opinion as to the optimal healthcare site for delivery of the antenatal vaccine programmes.

Most GPs surveyed felt that antenatal vaccination is safe, but confidence in their knowledge was suboptimal (particularly for pertussis vaccination), and many felt that further education would be helpful for them. Only a third discussed vaccination with pregnant women regularly, but most felt that a recommendation from them would influence women to receive antenatal vaccination. Those with greater confidence in their knowledge of pertussis and influenza vaccination, and >2 years since qualifying,

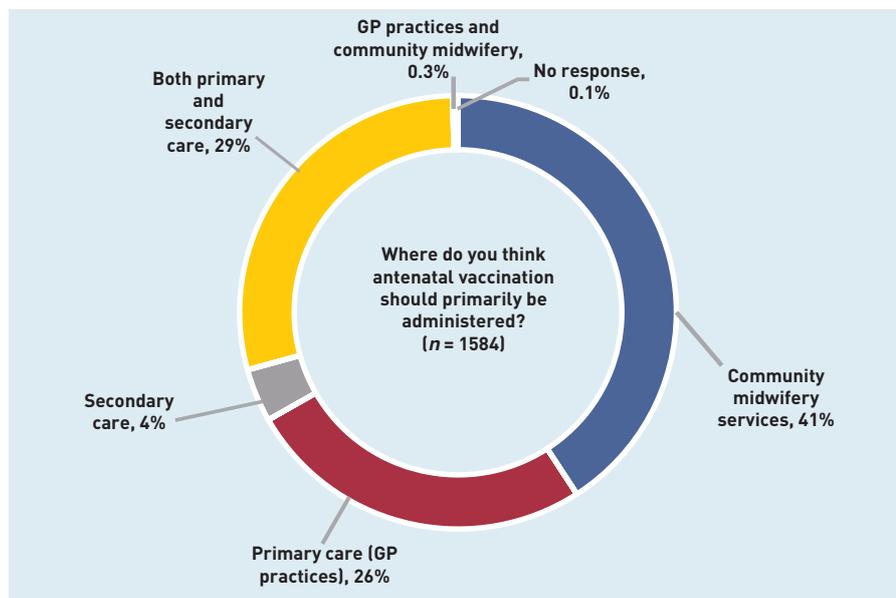


Figure 2. Responders' views about where antenatal vaccination should primarily be delivered.

discussed vaccination significantly more often, regardless of whether they routinely saw pregnant women in their normal role. With regards to the logistics of accessing antenatal vaccination, the large majority reported that pregnant women in their region would have to book a separate appointment at the GP practice to do so, yet only one-quarter thought antenatal vaccination should be primarily the responsibility of the GP practice. Less than 10% reported that midwives administered antenatal vaccination at their practice. These findings were echoed in the open-text comments, where many GPs described feeling a disconnect between themselves and antenatal care, and suggested that midwives and obstetricians take greater responsibility for promotion and administration of vaccination within routine antenatal visits.

#### Strengths and limitations

This study had a significant number of responders, and the questionnaire was distributed to GP practices across England in an attempt to maximise the diversity of the study population. That said, it should be acknowledged that the responders cannot be taken as fully representative of the views of all GPs nationally. The authors recognise that there may be an element of selection bias, as GPs with an interest in paediatrics, obstetrics, vaccination, or a related field may have been more likely to participate. The knowledge and attitudes regarding antenatal vaccination among the sample may therefore differ from GPs nationally. As this was solely an email questionnaire, this may also contribute to selection bias by potentially excluding GPs not using email regularly. Finally, the number

of GP practices, and the number of GPs who received the invitation email but declined participation (as well as their reasons for doing so), could not be recorded, and it is therefore not possible to report these data.

#### Comparison with existing literature

The findings of this survey highlight a number of areas for improvement with regards to facilitating promotion and delivery of antenatal vaccination. It is notable that a minority of the GPs surveyed promote antenatal vaccination on a regular basis, and this is supported by recent UK survey data showing that only 16%–24% of women reported having a meaningful discussion with their GP about antenatal pertussis vaccination.<sup>15,30</sup> Further education (particularly for those newly qualified) is clearly warranted and desired among GPs. This is crucial as, although many may only interact with pregnant women opportunistically, familiar healthcare provider recommendation is strongly associated with vaccine uptake<sup>14,15</sup> and, indeed, around 80% of GPs in this survey felt that a recommendation from them would influence pregnant women to receive vaccination. Furthermore, this view is supported by recent data showing that GPs remain highly rated as sources of advice among pregnant women, despite the exponential increase in health-related online resources over recent years.<sup>16–18</sup> Further education might also address other barriers raised by GPs in previous studies, including concerns about liability, ambiguous guidelines, and a sense of isolation from colleagues in secondary care.<sup>19,20</sup>

Importantly, these findings demonstrate strong support from GPs in England for midwives and obstetricians to take further responsibility for the promotion and delivery of antenatal vaccination, and for this to be formally embedded within routine antenatal visits. Recent evidence demonstrates that adopting this approach, thereby bypassing the need for women to arrange a separate appointment in primary care, may significantly improve uptake rates.<sup>21–25</sup> Increasing numbers of institutions in the UK and Ireland are setting up such initiatives, whereby vaccination is routinely offered at antenatal appointments, such as the booking visit, the 20-week fetal anomaly scan, and routine check-up appointments.<sup>31,32</sup> However, a number of studies (based in the UK,<sup>27,29,31</sup> Australia,<sup>26</sup> and North America<sup>20,24,25,33</sup>) have indicated that there may be a mixed response from midwives and obstetricians as to whether or not this is feasible, and whether they are adequately trained and prepared. Lack of formal training in vaccination, short appointments, inadequate staffing, lack of a

suitable setting and facilities for safe vaccine storage, lack of financial reimbursement, and lack of confidence discussing vaccination with women have all been identified as barriers that would need addressing before this approach can be routinely adopted.

### Implications for research and practice

A major implication of these findings is that there is support among GPs in England for embedding vaccination into routine antenatal care visits. Research would be beneficial in settings within which this approach has been adopted and those where it has not, in order to establish its feasibility and effectiveness, as well as facilitators/barriers to its acceptance among pregnant women and maternity healthcare professionals.

The survey responses also highlight a clear need for GP-tailored education programmes and resources in order to improve confidence and knowledge, and to empower GPs to promote vaccination to pregnant women. Educational opportunities may include face-to-face educational sessions, supported by easily accessible online guidance, in which the safety and protective efficacy of vaccination is emphasised, and real-life cases describing the consequences of not vaccinating are highlighted.<sup>34,35</sup> Given the findings here that a significant proportion of GPs only see pregnant women occasionally, the motivation for engaging with such educational resources may be limited. A simple and concise information sheet, containing essential information to discuss with women (together with frequently asked questions), might be more appropriate for those giving advice to pregnant women infrequently — and the study team has since developed this.<sup>36</sup> Even if antenatal vaccination programmes are eventually exclusively delivered within antenatal care, GPs will continue to have an important role in providing information and advice to pregnant women, and so resources such as this will continue to be needed. Adding reminders to promote vaccination into GP antenatal care referral forms, as well as setting up automatic notifications or alerts that appear within the patient notes, might also be beneficial to serve as a reminder to healthcare professionals to signpost vaccination to pregnant women. The role of GP financial incentive schemes is controversial, especially given the mixed opinions regarding who should be taking primary responsibility for antenatal vaccination. Furthermore, although some institutions have reported improvements in vaccine uptake following

their introduction,<sup>34</sup> they may receive a mixed response and actually impact negatively on internal motivation.<sup>37</sup>

Finally, ongoing promotion aimed at pregnant women and the general public should also be implemented to ensure that vaccination in pregnancy is perceived as a normal part of antenatal care and part of 'collective knowledge' of the public. Ensuring vaccination in pregnancy remains in the spotlight within mainstream media and social media may be important to this. Ongoing engagement with charities active in antenatal education, use of text message reminders,<sup>38</sup> smart phone apps (such as MatImms),<sup>39</sup> and positive social media<sup>40</sup> may also increase vaccine uptake. However, it is worth noting that social media is known to contain communities of users critical of vaccination, and a recent UK study showed that women who reported gathering information from such platforms were 58% less likely to undergo antenatal pertussis vaccination.<sup>41</sup> Crucially, clear educational resources should be readily available within GP practices and antenatal clinics, such as posters and Public Health England information leaflets [available at: <https://www.gov.uk/government/publications/resources-to-support-whooping-cough-vaccination> and <https://www.gov.uk/government/publications/flu-vaccination-leaflet-for-pregnant-women>]. Two recent studies demonstrated a significant increase in both knowledge and uptake rates of antenatal influenza vaccination following routine provision of an information pamphlet in an antenatal clinic.<sup>42,43</sup> Furthermore, these materials would have the added benefit of providing health professionals with resources to facilitate discussion with pregnant women, a technique that has been shown in a number of studies to improve patients' knowledge, satisfaction, and adherence to advice following primary care consultations.<sup>44</sup>

In conclusion, further education is warranted and desired among GPs to improve confidence and knowledge (particularly for pertussis vaccination), and accessible guidance and educational resources (specifically designed for the needs of GPs) should be made readily available to facilitate opportunistic discussion with pregnant women. There is strong support among GPs for midwives within the community and maternity healthcare professionals in secondary care to take greater responsibility for the promotion and administration of the antenatal vaccination programme, and to embed this within routine antenatal visits.

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### Funding

The study was supported by a British Paediatric Allergy Immunity and Infection Group (BPAIIG) 2017 small grant. BPAIIG had no role in the study design, data collection, data analysis/interpretation, report writing, or the decision to submit the manuscript for publication.

### Ethical approval

Ethical approval was granted from the West London and GTAC NHS Research Ethics Committee [reference number: 17/LO/0537].

### Provenance

Freely submitted; externally peer reviewed.

### Competing interests

Christopher Wilcox and Christine Jones 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.

### Acknowledgements

The authors would like to thank all of the GPs who took part in the study. The authors are also very grateful for the support of their local research and development team, the National Institute for Health Research, and the English Primary Care Clinical Research Networks who helped distribute the questionnaire and facilitate recruitment.

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