Human Vaccines & Immunotherapeutics

ISSN: 2164-5515 (Print) 2164-554X (Online) Journal homepage: https://www.tandfonline.com/loi/khvi20

Vaccine discussions in pregnancy: interviews with midwives to inform design of an intervention to promote uptake of maternal and childhood vaccines

Jessica Kaufman, Katie Attwell, Yvonne Hauck, Saad B. Omer & Margie Danchin

To cite this article: Jessica Kaufman, Katie Attwell, Yvonne Hauck, Saad B. Omer & Margie Danchin (2019) Vaccine discussions in pregnancy: interviews with midwives to inform design of an intervention to promote uptake of maternal and childhood vaccines, Human Vaccines & Immunotherapeutics, 15:11, 2534-2543, DOI: 10.1080/21645515.2019.1607131

To link to this article: https://doi.org/10.1080/21645515.2019.1607131

HUMAN VACCINES & IMMUNOTHERAPEUTICS
2019, VOL. 15, NO. 11, 2534–2543
https://doi.org/10.1080/21645515.2019.1607131

Taylor & Francis
Taylor & Francis Group

RESEARCH PAPER

Vaccine discussions in pregnancy: interviews with midwives to inform design of an intervention to promote uptake of maternal and childhood vaccines

Jessica Kaufman[a,b*], Katie Attwell[c,d,e*], Yvonne Hauck[f,g], Saad B. Omer[h], and Margie Danchin[a,e,i,j]

[a]Vaccine and Immunisation Research Group (VIRGo), Murdoch Children's Research Institute, Parkville, Australia; [b]Faculty of Medicine, Dentistry and Health Sciences, The University of Melbourne, Parkville, Australia; [c]School of Social Sciences, University of Western Australia, Perth, Australia; [d]Wesfarmers Centre of Vaccines and Infectious Diseases, Telethon Kids Institute, Nedlands, Australia; [e]Telethon Kids; [f]School of Nursing, Midwifery & Paramedicine, Curtin University, Perth, Australia; [g]Department of Nursing and Midwifery Education and Research, King Edward Memorial Hospital, Subiaco, Australia; [h]Rollins School of Public Health, Emory University, Atlanta, Georgia, USA; [i]Department of General Medicine, The Royal Children's Hospital, Parkville, Australia; [j]Department of Paediatrics and School of Population and Global Health, University of Melbourne, Melbourne, Australia

ABSTRACT

Presumptive and Motivational Interviewing communication styles have successfully promoted childhood and adolescent vaccination to parents, but less is known about effective communication approaches during pregnancy to promote maternal vaccination and childhood vaccines. In Australian public antenatal settings, midwives provide a substantial proportion of care and are highly accessed and trusted sources of vaccine information for expectant parents. However, there are no evidence-based interventions incorporating communication strategies and resources for midwives to optimize discussions and promote acceptance of maternal and childhood vaccines. This study aimed to gather qualitative data from midwives to inform the design of a feasible and acceptable vaccine communication intervention package building on an evidence-based model utilized with US obstetricians. We explored midwives' attitudes and values regarding maternal and childhood vaccination, their perceived role in vaccine advocacy and delivery, and barriers and enablers to implementation of a potential communication intervention. We recruited 12 midwives for semi-structured interviews at two Australian tertiary public hospitals (one with antenatal vaccines onsite, one without). Interviews were analyzed using thematic template analysis. Midwives supported vaccination but expressed varied views regarding its centrality to their role. Most reported receiving minimal or no training on vaccine communication. Their communication practices focused primarily on vaccine information provision rather than persuasion, although some midwives shared personal views and actively encouraged vaccination. More vaccine and communication training and resources were requested. Findings highlight the need for communication tools that align with midwifery standards for practice to support midwives to address parents' questions and concerns about maternal and childhood vaccines.

ARTICLE HISTORY
Received 11 February 2019
Revised 21 March 2019
Accepted 6 April 2019

KEYWORDS
Pregnancy; midwifery; vaccination; attitudes; health services; communication

Introduction

Pregnancy is a key time in which expectant parents begin making decisions about vaccines.[1] Not only does the mother need to decide whether to accept recommended vaccinations for influenza and pertussis during pregnancy, but both parents usually begin thinking about infant and early childhood vaccines.[1,2] In Australia, current coverage for maternal vaccination is reported to be between 65% and 80% for pertussis and 45–60% for flu, with lower levels in certain at-risk groups.[1,3,4] Increasing and sustaining high coverage rates are critical – especially as new maternal vaccines for respiratory syncytial virus (RSV) and Group B Streptococcus are introduced and antenatal vaccine decisions and discussions become even more complex.[5]

Three quarters of Australian mothers give birth in public hospitals,[1,6] where midwives provide a substantial proportion of antenatal care. Not all public antenatal hospitals deliver vaccines, due to limitations in resources, facilities or funding, but midwives in all settings are expected to provide vaccine information and to recommend maternal pertussis, influenza, and infant hepatitis B vaccinations.[1,7,8] Midwives are not professionally required to discuss later childhood vaccines, but parents indicate that they would like more information about these vaccines during the antenatal period.[1] While expectant parents in the public antenatal system report that midwives are their most highly accessed and trusted source of vaccine information,[1] there are gaps in our understanding of how midwives think about, discuss, or advocate for both maternal and childhood vaccination. In particular, several recent studies have highlighted deficiencies in midwifery education and training related to vaccination and vaccine communication,[9-11] but there have been no studies exploring the types or features of vaccine communication training that would be most acceptable to them.

Communication approaches

The clinical encounter between health professionals and parents is crucial to shaping attitudes towards vaccination, and provider

CONTACT Jessica Kaufman jess.kaufman@mcri.edu.au MCRI, Royal Children's Hospital, 50 Flemington Rd, Parkville VIC, 3052, Australia
*These authors are contributed equally to this work.
Supplemental data for this article can be accessed here.

recommendation is the primary driver of vaccine uptake among pregnant women.[12,13] Effective interactions with providers can address questions and concerns and encourage hesitant individuals towards vaccination, while poor interactions contribute to vaccine rejection.[14] However, there is no firm consensus on the 'best' communication approach for professionals to take. Two different approaches that have proven effective in increasing parents' acceptance of adolescent or childhood vaccines are presumptive communication (e.g. "It's time for your shots")[15] and the more participatory Motivational Interviewing (MI)-based communication.[16-18] MI is a structured counseling approach designed to guide people towards change through active listening, eliciting specific concerns, and asking permission to share information or views.

While these approaches have shown success with parents of children[15,17] or adolescents,[18] there is limited evidence regarding their suitability for midwife-led interventions to enhance maternal and childhood vaccine uptake. Rather than the prescriptive approach that physicians may adopt, the Nursing and Midwifery Board of Australia Midwife Standards for Practice[19] promotes use of evidence to facilitate informed decision-making, participation in care and self-determination whilst supporting the woman's choice.[20,21] It is therefore unclear if the presumptive style or even the guiding approach of MI can align with midwives' values, or whether a hybrid approach may be more acceptable. While recent research suggests that the majority of public antenatal midwives are supportive of vaccination,[1,11] any vaccine promotion intervention must acknowledge and navigate the tensions between advocating for vaccination and respecting a woman's agency.[10]

There are a number of factors that drive uptake of maternal and childhood vaccines, and multicomponent interventions are well suited to addressing multiple barriers simultaneously. An evidence-based framework for such interventions features components targeting the Practice, Provider, and Parent levels (P3).[22] These components include nudges like parent and provider reminders, training to improve provider communication and encourage vaccine recommendation, and parent information resources addressing vaccine benefits and disease severity.[23] To date, no intervention applying this framework has been adapted or developed for use by midwives in the Australian antenatal setting.

Therefore, to inform the design, content and format of a practical and ideologically suitable intervention to optimise midwives' vaccine discussions with expectant parents, we explored how midwives think and feel about vaccination; its place in their professional practice; their receptivity to delivering behaviour-change oriented interventions; and the feasibility of intervention delivery in different antenatal settings.

Results

Participants

We interviewed seven midwives from the Royal Women's Hospital (RWH) in Melbourne, Victoria, and five from King Edward Memorial Hospital (KEMH) in Perth, Australia. Most RWH midwives were recruited through the clinic manager, while most from KEMH responded to the recruitment flyer. While participants varied in age and years of practice, midwives from the same hospital had mostly homogenous professional experiences leading to saturation in themes relatively rapidly. Demographic data from participating midwives are shown in Table 1.

Themes

Our coding template included seven overarching themes: (1) WHO are midwives; (2) HOW do midwives communicate about and/or deliver vaccines; (3) WHEN and HOW MUCH vaccine information do midwives provide; (4) WHERE do midwives practice and communicate; (5) WHAT vaccination resources are available or needed; (6) PERCEPTIONS ABOUT PARENTS' knowledge and attitudes; (7) BARRIERS AND ENABLERS to vaccination delivery and/or implementation of a vaccine promotion intervention. Each main theme included a number of subthemes inductively derived from the transcripts. Key findings are summarised in the text and supporting quotes for each theme are presented in Table 2. Participants are identified with their number and either "RWH" or "KEMH".

1. WHO are midwives

Perceived roles and professional values

We asked midwives to describe their practice structure and reflect on how vaccination fitted into their professional role. Responses were mixed – some saw vaccination as a minor or routine element, while others viewed it as a key feature of their role. There was widespread agreement that delivering and discussing vaccination was a task shared by a number of other health professionals, including specialist immunization midwives, GPs and

Table 1. Demographic attributes.

Location	RWH	KEMH
Number of interview participants	*n* = 7	*n* = 5
Age range *(n)*	18–29 *(4)* 30–39 *(2)* 50–59 *(1)* 60+ *(0)*	18–29 *(0)* 30–39 *(3)* 50–59 *(0)* 60+ *(2)*
Number of years working as a midwife *(n)*	2–3 *(2)* 5–9 *(4)* 10–19 *(1)* >20 *(0)*	2–3 *(1)* 5–9 *(1)* 10–19 *(1)* > 20 *(2)*
In current role as a midwife, sees same mothers regularly *(n)*	Yes *(4)* No *(3)*	Yes *(3)* No *(2)*
Midwifery qualifications *(n)*	Nursing Degree + Midwifery Qualification *(4)* Direct Entry Midwifery Degree *(3)* Hospital based nursing and midwifery training *(0)*	Nursing Degree + Midwifery Qualification *(2)* Direct Entry Midwifery Degree *(2)* Hospital based nursing and midwifery training *(1)*
Received immunisation training as part of midwifery qualification *(n)*	Maternal and childhood immunisation *(4)* Maternal immunisation only *(3)* No, none at all *(0)*	Maternal and childhood immunisation *(1)* Maternal immunisation only *(0)* No, none at all *(4)*
Undertook Continuing Professional Development in immunisation *(n)*	Maternal and childhood immunisation *(1)* Maternal immunisation only *(2)* No, none at all *(4)*	Maternal and childhood immunisation *(5)* Maternal immunisation only *(0)* No, none at all *(0)*

Table 2. Themes and supporting quotes from midwife interviews.

Theme	Subthemes and quotes
1. WHO are midwives	**Perceived roles** ● To be honest I don't consider [discussing vaccination] to be a huge part of my overall role. RWH1 ● I think it's a really important role for us to educate the women about [maternal vaccines]…The other childhood vaccinations, we don't really discuss as much because that's generally what the child health nurse and the GP picks up. KEMH5
	Professional values ● Because we form sometimes a different rapport with women compared to the medical team, sometimes we find it's easier for doctors to have those sort of conversations where it's very, 'We think you should do this'. RWH1 ● I would say it's a minority [of midwives] that are against vaccines, and I wouldn't know who they are, it's only from what I've heard from women. I would say that … most midwives do advocate for it. RWH2
	Previous training ● I think we did a bit at uni [university] for half an afternoon or something. RWH6 ● I think five or six of us now have done that [South Australian] course, even though it's out of pocket for us. KEMH4
2. HOW do midwives communicate about and/or deliver vaccines	**Making recommendations** ● I say the hospital, the hospital recommends. RWH3 ● Sometimes I say the doctors recommend it. I don't actually say 'I recommend that you have this.' KEMH3 *[See Table 3 for more detail]*
	Message content and framing ● I usually talk a little bit more about protecting the baby with the whooping cough. RWH7 ● Now that I am more aware of the protective benefits [of maternal flu vaccine] for the baby as well, I also do add that to my spiel. KEMH2
	Description and perceptions of vaccine delivery and related practices ● It would be convenient if we could provide [vaccines], but I also don't think we've got the time. RWH4 ● I just walk around the waiting room, finding out at what stage people's pregnancies are and educating them about the whooping cough or the flu vaccinations…and then if they're at a stage where it's appropriate, I take them through and vaccinate them. KEMH1 ● I don't want to have to send them down to [the immunization clinic] so I did the course myself, so I can just do it within the appointments. KEMH4
3. WHEN and HOW MUCH vaccine information do midwives provide	**Timing and frequency** ● I usually find in the winter seasons pregnant women are more likely to get [the flu vaccine] … I recommend it now but like people are kind of like, 'Oh nah I'll be fine.' RWH3 ● Usually at booking I would mention [maternal vaccines]…and then I'd often bring it up again after the thirty week mark just to see whether they've had it or not. RWH4
	Information quantity ● It's usually quite a brief conversation probably because there isn't a lot of actual information that we can access. RWH1 ● On average it would be a simple five minute discussion, but sometimes it can be prolonged discussion up to half an hour if they've really got some concerns. KEMH2
4. WHERE do midwives practice and communicate	● Always in a different room. So computer yes, we have access to all of our policies, phone numbers, intranet, so pretty much everything. We have access. Obviously if we wanted to print out information for women we can do that but…usually I have to go out and find the printer. RWH1
5. WHAT vaccination resources are available or needed	**Currently available resources** ● We've got information sheets we hand out to people..we've got one that's headed pertussis and then a separate one for influenza. KEMH1 ● The book that we initially give to women, there's like a section about this [indicates] long that talks a bit about flu, which again, it's not really helpful for us. RWH1
	Suggested resources and training ● Maybe like a link or a form that's sort of in layman's terms. RWH2 ● Evidence-based websites, yeah that would be amazing, that would be really helpful. KEMH2 ● Sometimes we have like stickers and things you can put in [to the chart]…so you can clearly see because it's all handwritten. RWH7 ● I think it's about having a workshop, a professional development day. KEMH1 *[See Table 4 for more detail]*

(*Continued*)

Table 2. (Continued).

Theme	Subthemes and quotes
6. PERCEPTIONS ABOUT PARENTS' knowledge and attitudes	**Knowledge, gaps, and challenges** ● A lot of women seem to actually know about two things, the flu vaccine and pertussis. I've very rarely had to kind of counsel a woman about why we recommend it. RWH1 ● Sometimes they don't even know that it's on offer so you might have to start from scratch. KEMH1 ● There'd be quite a small minority of people wanting to really know the in-depth sort of amounts and what's in it. RWH2 ● Women in pregnancy are very focused on the labor and birth…I talk about vaccinations and they glaze over. RWH6 ● It's hard because there is so much anti-vaccine stuff saturating social media. KEMH2 **Attitudes towards maternal and childhood vaccines** ● The flu jab, they're used to that and it's, they're having it, you know. The pertussis is one that, you know, it's more new than the flu jab. KEMH3 ● [Flu is] just not as important to them I feel…people are kind of like, 'Oh nah I'll be fine.' Whereas the pertussis they do usually get no matter what time of the year it is. RWH3 ● They're like, 'Oh look, you know, I might not subject the baby to another injection, they're just gonna have it [Hepatitis B vaccine] in a few weeks' time.' RWH1 ● Lots of women think that the measles is harmless. KEMH3
7. BARRIERS AND ENABLERS to vaccination delivery and/or implementation of a vaccine promotion intervention	*[See Table 5]*

obstetricians. In particular, discussion of childhood vaccines beyond the birth dose of hepatitis B was seen as the purview of nurses in the community who care for women and children after birth.

Some midwives preferred to defer to other providers to discuss vaccines because they sought to maintain the trust and rapport they see as unique between midwives and pregnant women. Several expressed reservations about pushing vaccination too strongly or sharing their personal views, even though all the interviewed midwives recommended and supported vaccination. As one midwife said, the power of personal stories could be a double-edged sword:

> *I don't know whether I should use my personal feelings about it. Because also it works the other way. You might get some midwives that are not pro-vaccination. And I wouldn't like to think that any of them are saying: 'Well, I wouldn't give my baby that.' KEMH3*

Previous training

Most midwives received little or no training about vaccination or techniques to effectively communicate about vaccines during their degree programs, especially with regard to childhood vaccines. A handful had pursued and self-funded additional training, such as completing a module developed by the South Australian Department of Health.[24] Those who had completed additional training reported feeling confident in their knowledge and ability to discuss vaccines, but about half of the interviewed midwives (predominantly those from the RWH) expressed uncertainty and a lack of confidence. Childhood vaccines presented the greatest challenge.

2. HOW do midwives communicate about and/or deliver vaccines

Making recommendations

All the midwives said they recommended maternal influenza and pertussis vaccines and infant hepatitis B, but there was considerable variation in the perceived origin of the recommendation. Sources of the recommendation included the hospital, the State Health Department, doctors in the hospital, or a vague "we". Few midwives, if any, made a personal recommendation. See Table 3 for specific recommendation practices.

After making a recommendation, the degree to which the midwives pressed or followed up the issue upon encountering hesitance varied. Informed choice was clearly of paramount importance, but individual midwives had different interpretations on how best to achieve this. Some accepted parents' initial decisions ("*Obviously you can't push anything on them; people have their views." RWH2)*, while others explored the reasons for hesitancy, offered additional information, or returned to the conversation several times.

Message content and framing

When discussing vaccines, the midwives all shared the basic information about disease risks, side effects, vaccine benefits, and schedule. Some also said they provided details about vaccine ingredients, government policies (e.g., the Victorian

Table 3. Recommendation language and practices.

Language	Recommendation source	Sample quote
Passive voice: **"It is recommended."**	Research	I say: 'It is recommended. The research shows that it is advantageous.' And people are swayed by things like research because, you know, they know that people are working to better things. KEMH3
Passive voice with encouragement: **"It's highly recommended."**	Personal views on request	I don't generally make it a personal statement. I mean, if they ask me about what I think about vaccines I openly say yes, I have vaccinated my own children. KEMH5
Collective: **"We recommend"; "We're aiming"**	Institution	And sometimes if the person looks quite hesitant, I not only say I recommend but I say our organisation recommends, Vitamin K, Hepatitis B. so it's not usually I personally think your baby should have one, it's usually it would be our recommendation. RWH1 I just tend to say that we've started this program and we're aiming to vaccinate women for whooping cough after twenty eight weeks and tell them why. So there's some ownership but it's not so personal, I don't tend to say I. KEMH1
Meta-institution: **"Health Department… is recommending"**	Health Department	[I say] the health department has funded us, and is recommending that all pregnant women receive this. KEMH2
Another healthcare professional: **The doctors recommend"**	Doctors/ obstetricians	I think I would prefer it, if I was hearing it to say the doctors recommend it because they're the head, they're one above me. And they go and see the obstetricians. And I say, "Well … the obstetrician would recommend that you would have this. But I don't say I do. KEMH3

"No Jab, No Play" mandatory vaccination policy), or more physiological details about vaccines in pregnancy.

However, the way they presented information could vary depending on the vaccine they were discussing. Generally, pertussis vaccination was presented in terms of protecting the baby, while influenza was primarily to protect the mother. The midwives all said that mothers prioritize their baby's health above their own, and agreed that messages about the protective effects of maternal vaccines on newborns seem to resonate most strongly (*"All these women are doing it for the baby, everything they do…they're not thinking about themselves at all." KEMH3)*. Childhood vaccines were discussed much less frequently and with less urgency. Two midwives also said they didn't push the birth hepatitis B vaccine because they knew the infants would have another opportunity to receive that vaccine (*"Because we know that the baby does have it in the community as well, I think that's another reason why we don't probably push it any further." RWH1).*

Description and perceptions of vaccine delivery and related practices

At the RWH, maternal vaccines are not routinely delivered on site. There is no vaccine refrigerator or dedicated space for immunization delivery in the clinic; women are referred back to their GPs to access vaccinations. Some midwives perceived this as a potential barrier, though it wasn't obvious how it could be addressed. At KEMH, there is often an immunization midwife on staff who can deliver the vaccines in the on-site vaccination clinic, and midwives who have completed immunizer training can deliver vaccines in their antenatal consultations. Regardless of vaccine availability, midwives at both hospitals thought that the uptake of maternal vaccines among women in their care was relatively high.

3. WHEN and HOW MUCH vaccine information do midwives provide

Timing and frequency

Hospital- or state-level protocols determine key moments of intervention during pregnancy care, and our research demonstrated differences between settings where midwives deliver vaccines (KEMH) and settings where they do not (RWH). The RWH midwives told us that there is no standardized point in pregnancy to discuss maternal vaccines – it is up to the individual midwives to remember to raise the topic and make time to share information and answer questions (*"We don't really have a very good framework in terms of what education we should be providing at every antenatal appointment." RWH4)*. The majority said they would introduce maternal vaccines at the initial booking visit (generally between 16–22 weeks), and then would follow up around 28–30 weeks. Many midwives discussed vaccines multiples times, throughout pregnancy. Both influenza and pertussis are recommended all year round, although influenza can be harder to promote in the summer months. Most RWH midwives indicated that they would mention hepatitis B vaccine along with the maternal vaccines at the initial booking visit and again late in pregnancy, when women presented during labour, or on the postnatal ward in the days following birth. There did not appear to be a structured time to obtain parental consent for this vaccine at the RWH, and midwives described a reluctance to seek it during labour.

At KEMH, midwives described offering pertussis and influenza vaccines at a set time (early in the third trimester). This was structured by an antenatal vaccination protocol and clinical practice guidelines of the hospital and the Western Australian government.[25] KEMH midwives described the 'schedule of care' for consent discussions regarding birth hepatitis B to occur at 28 weeks of pregnancy, and one midwife described using the discussion about maternal pertussis vaccine as an additional cue to segue into childhood vaccines.

Midwives in both settings said that they discussed other childhood vaccines less frequently, for less time and at less consistent time points. Some said they never really discussed them at all. When midwives were asked when they thought would be most appropriate to bring up childhood vaccines, they generally agreed that they would do so along with the hepatitis B discussion, late in pregnancy or following birth.

Information quantity

Most midwives agreed that vaccine discussions were relatively brief – generally 1–5 min long. Some said most women did not need or want more detailed information, others said they lacked information to provide or did not feel confident

discussing vaccines in more depth, and some described time constraints. Even less time was spent on childhood vaccines, which in many cases, were only discussed if the parents brought them up. Some midwives from KEMH said that occasionally, vaccine conversations could last 20–30 min if the parents had particular concerns.

4. WHERE do midwives practice and communicate

Midwives at both hospitals work across different rooms throughout the day. At the RWH, midwives have access to computers and printers to print materials as needed, but there is no repository of pre-printed materials in the antenatal clinic. On the ground floor of the hospital, there is a community information center with a library of resources. Midwives at KEMH described having intermittent access to computers, but said that pre-printed resources are widely available.

5. WHAT vaccination resources are available or needed

Currently available resources

Midwives described utilizing a range of resources to support their vaccination discussions with expectant parents, but there was no single, comprehensive resource available to them. Most described using print resources to supplement their discussions of vaccines (e.g., "Having your baby at the Women's" booklet, Western Australian Department of Health leaflets, child health and development record). Some midwives – particularly those at KEMH – felt that these resources provided adequate information (*"Anything they ask about, we've got a leaflet for." KEMH3)*. However, an RWH midwife said there was very little detail on influenza in the standard pregnancy booklet: "*There's not a lot of information there" (RWH1).*

In addition to the standard print resources, midwives reported accessing information from the Infection Control department at the hospital (by phone), hospital policy sheets on their intranet, vaccine manufacturer leaflets, an orientation book for new staff or recent graduates, a hospital app (currently not functional), Better Health Channel or other online sources, or the mother's standardised health record. One midwife described telling mothers to do their own research, saying, *"I'd probably tell them to Google it to be honest" (KEMH5)*. However, she subsequently reflected that this might bring up misinformation.

Suggested resources and training

When we asked midwives about potential resources that could help them in their work, the value of a single source of information was highlighted: *"I think if there was, like, an education hub type thing for vaccinations in pregnancy." KEMH5*. Several midwives from Victoria also agreed that printed fact sheets would be helpful, and the majority from both hospitals were strongly in favor of online resources, like an educational website or app for parents.

In addition to resources to share with parents, some midwives in Victoria suggested adding a sticker for women's charts to prompt vaccine discussions and/or record whether the mother had received the vaccines during pregnancy. Midwives at KEMH already use stickers to denote both vaccines and vaccination education provided.

When asked what they thought would help midwives in general to become better advocates for vaccination, midwives in both hospitals suggested more professional education and training. Table 4 outlines suggested topics and formats for professional training.

6. PERCEPTIONS ABOUT PARENTS' knowledge and attitudes

While interviews with midwives cannot conclusively determine the knowledge gaps or needs of expectant parents, the midwives' perceptions of what parents know and feel can inform our understanding of what should be included in potential resources.

Knowledge

The most common questions women asked tended to be practical, such as which vaccines are due, who will deliver them and when they should have them. Some midwives felt women were generally well informed about both maternal influenza and pertussis vaccines, but many thought there were gaps in women's knowledge. Interestingly, there was disagreement about the nature of these gaps – some thought influenza was more commonly understood than pertussis, while others thought the reverse. Despite acknowledging these gaps, several midwives felt that women are overloaded with information during pregnancy.

Attitudes

The midwives agreed that most women seemed relatively accepting of vaccinations, with few questions or concerns. Pregnant women who asked more detailed questions or expressed uncertainty were generally more hesitant about the influenza vaccine – hesitancy around pertussis was less common. Some women perceived the flu itself as less serious than pertussis, while others were particularly concerned about the vaccine's side effects (*"Women are maybe more hesitant to get the flu compared to pertussis…They think they're going to have more reactions to it." KEMH4)*. Participants also

Table 4. Suggested topics and formats for professional training.

Topics	• facts about vaccines, including childhood vaccines • vaccine side effects and ingredients • how to deal with vaccine reactions (e.g. anaphylaxis) • up-to-date statistics about vaccine-preventable diseases • how to frame responses to common questions • how to respond to people who are hesitant or refusing vaccines
Formats	• online e-learning module/s • face to face training workshop • role-playing exercises • PowerPoint tutorial • facilitated video-watching session with discussion questions

described some mothers not seeing particular childhood vaccines as necessary.

Several midwives mentioned the influence of social media – both positive and negative – on women's attitudes towards maternal and childhood vaccines. In WA, where a newborn died of pertussis and the Light for Riley media campaign for maternal pertussis vaccination originated in 2015,[26] midwives said this was a driving factor in increasing awareness and acceptance. Media warnings about the upcoming flu season were also seen as encouraging vaccine uptake. However, midwives agreed that social media could also spread misinformation and increase uncertainty (*"It's hard because there is so much anti-vaccine stuff saturating social media" KEMH2)*.

7. BARRIERS and ENABLERS to vaccination delivery and/or implementation of a vaccine promotion intervention

The midwives raised a number of potential barriers to discussing and delivering vaccines in the public antenatal setting. We categorized these barriers according to the COM-B model, which was developed by implementation science researchers to help conceptualize the different drivers and inhibitors of behavior change: capability, motivation, and opportunity.[27] In Table 5, we present the barriers expressed by the midwives, along with implied enablers related to these barriers.

Discussion and conclusion

All the midwives in our study had similar impressions of what expectant parents know, feel and want to know about maternal and childhood vaccinations. Midwives in both hospitals perceived mothers to be more hesitant about influenza vaccine than pertussis. This perception is supported by data from the state of New South Wales[13,28] and a recent Federal Government report,[29] which indicate that despite generally rising coverage rates, women still have safety concerns about the influenza vaccine during pregnancy.

Similar to other Australian research,[29] the midwives told us that women value vaccinations they perceive as benefitting their babies more than vaccines benefitting themselves. This finding adds weight to recent public health ethics arguments regarding whether women should be recommended vaccines that predominantly benefit their unborn babies. It demonstrates that ethicists should take pregnant women's subjectivity and embodied reasoning seriously – women do not make decisions about maternal vaccination in a vacuum, but as mothers who have a legitimate interest in protecting their fetuses and infants.[30] However, despite knowing that women most value vaccines that they perceive as benefitting their babies, we found that many midwives are still presenting the influenza vaccine as primarily benefitting the mother. Our findings regarding some midwives' lack of emphasis on the birth dose of hepatitis B vaccine support earlier studies showing that this is the most commonly refused vaccine,[1] and reporting midwives' ambivalence in promoting it.[31]

While structural levers, such as having vaccines on site, are key determinants of maternal vaccination uptake,[32] provision of maternal vaccines alone does not ensure that midwives are knowledgeable and confident in encouraging mothers to vaccinate. The on-site delivery of maternal influenza and pertussis vaccines may have contributed to KEMH midwives seeing it as important to their role and feeling more confident in their vaccine knowledge, but even among these midwives there were a range of views, communication approaches and expressed knowledge and communication skills gaps. It is possible that having a dedicated immunization midwife on staff may actually create an environment where other midwives have fewer detailed vaccine discussions themselves. While the provision of vaccines on site in all Australian antenatal hospitals is an important goal, this will not replace the need for informed, confident communication between midwives and expectant parents. As additional vaccines are added to the antenatal schedule, discussions, and decision-making about vaccines will become even more complex for both providers and expectant parents. Furthermore, increasing midwives' confidence discussing or directing parents to reliable information about childhood vaccines is an important

Table 5. Expressed barriers and implied enablers to discussion and delivery of maternal vaccines.

COM-B model category	Expressed barriers	Implied enablers
Capacity (psychological and physical ability)	• Lack of confidence in communication skills or knowledge • Lack of prompts or set discussion times at key moments in pregnancy to cue discussions • Viewing vaccination (and vaccine discussions) as another provider's role	• Knowledge and understanding about vaccines and communication • Discussion or delivery prompts • Midwifery-congruent training on importance of vaccination and MW role.
Opportunity (physical and social)	• Insufficient time for discussions • Lack of information or resources for vaccine discussions • Costs associated with upskilling • Inconsistent or insufficient staffing • Lack of time, space, and staff to provide vaccines • Vaccine stock shortages or the hospital not keeping vaccines on site	• Additional appointment time • Hospital policies that prioritise vaccination. • Creation and dissemination of appropriate resources. • Utilization of existing CPD training infrastructure. • Dedicated vaccination staff and space • Vaccines available for delivery on site • Enhanced procurement and delivery practices.
Motivation (reflective and automatic)	• Seeing women as overloaded with information • Viewing vaccine recommendations or challenging discussions as potentially harmful to rapport • Seeing discussing vaccines as a lower priority than other topics	• Varied information formats for different levels of engagement • Midwifery-congruent training in how to discuss vaccines with hesitant parents • Education highlighting severity of vaccine-preventable diseases

goal: providing this information before the first vaccination appointment is not only what parents want,[1,2] it has also been shown to increase intention to vaccinate and vaccine uptake.[33] The midwives we interviewed expressed a desire and preference for additional training and supportive materials that addressed vaccine facts and/or communication strategies that suited their schedules and office infrastructure.[11] There was clearly a need and appetite for more detailed and tailored resources and information, particularly at RWH.

We were particularly interested in the suitability and applicability of either presumptive communication or Motivational Interviewing – or a combination of the two – for Australian midwives discussing vaccination. Professional standards require midwives to discuss the risks and benefits of vaccines, but not specifically to recommend vaccination.[25] Nevertheless, all midwives expressed that they were required to follow clinical guidelines and all recommended vaccination. Most midwives used passive language in their framing to mothers ("It is recommended") even if they added urging qualifiers to this ("highly recommended"). When midwives sought to add more heft to their recommendations, their language of "we" drew on the institutional setting (including as a premise for funding), or they referred to doctors or research. Given that several midwives actively stated that they did not give personal recommendations and generally refrained from sharing their personal beliefs or practices, we concluded that the midwives in our study may reject both the presumptive approach (in general) and the personal recommendation aspect of existing MI-inspired approaches. This is supported by Frawley et al.'s qualitative study of Australian midwives working in a variety of contexts, which found that many of them did not see it as their role to persuade women to accept vaccines.[10] However, we considered that the public hospital midwives we interviewed may embrace the recommendation aspect of MI without making it personal. Some did indicate that they would prefer not to adopt any kind of guiding approach that would influence parents' decision, but the eagerness of other midwives to better understand the reasons for parents' hesitancy suggested that these midwives might embrace an MI-based communication intervention that could help them elicit parents' concerns and share knowledge.

Study limitations

This qualitative study filled an important research gap in Australia and internationally in considering the applicability of existing vaccine communication interventions to midwives' discussions with expectant parents. Although the sample size was small, saturation was reached quickly at each site, possibly reflecting homogeneity of professional experiences at a particular location. A broader sample of study sites may have generated additional themes, though Frawley et al. identified similar themes despite interviewing participants in more varied locations.[10] There were demographic differences across both sites, with KEMH midwives being older and more experienced than the RWH cohort. This may also be due to slight differences in recruitment, with participants self-selecting at KEMH, and identified by a key informant (clinic manager) at RWH. These features may have led to differences in views that may not necessarily reflect the organization more broadly. Differences between the hospitals, particularly with regard to the presence or absence of vaccines on site, should not be taken as indicative of differences between broader state health policies; we know, for example, that other hospitals delivering maternity care in Victoria do have vaccines on site.[32]

Next steps and conclusions

From the themes and views expressed by midwives in this study, we aim to develop a multi-component intervention to optimize midwives' vaccine discussions with expectant parents in the Australian context. In addition to our qualitative data, we will build on the theory and adapt resources developed for the US-based P3+ study, which utilizes the P3 multi-component intervention framework with elements at the Practice-, Provider- and Parent-levels to improve vaccine uptake and acceptance targeted at obstetricians in private practice.[12,22] In our next phase, we are developing practical prototype P3 intervention for the Australian public antenatal setting, which we will present to midwives in focus groups to iteratively adapt and apply changes to the intervention based on their feedback. The P3-MumBubvax intervention package will be piloted in a large, tertiary public maternity hospital to determine the feasibility and acceptability. It will then be tested in a national randomized controlled trial to primarily improve maternal influenza vaccine uptake.

Materials and methods

Study design, setting, and recruitment

We used a descriptive qualitative study design, conducting semi-structured interviews with midwives. This study design is widely used in health care and nursing research to help explain or understand "the who, what and where of events or experiences."[34]

We recruited midwives working in public antenatal settings within two large tertiary hospitals: King Edward Memorial Hospital (KEMH) in Western Australia and the Royal Women's Hospital (RWH) in Victoria. Studying midwives in two different institutions in two Australian states enabled us to consider the impact of differences in healthcare delivery as dictated by State governments, and hospitals within states, who make independent decisions about funding, policy, and practice. At the RWH, vaccines are not available on site and pregnant women need to make a separate visit to their GP. At KEMH, midwives are trained and authorized to deliver vaccines to pregnant women onsite, either in the clinic rooms or at the hospital immunization clinic. For many shifts, there is also a dedicated immunization midwife who discusses vaccines with pregnant women in the waiting area.

In each site, we engaged with clinic managers to develop an understanding of the various clinics, birthing models and care practices. We asked clinic managers to identify potential key informant midwives to interview, representing a range of roles

and levels of experience, and distributed the study recruitment flyer. Interested midwives contacted the research team to organize an interview. To recruit additional midwives, clinic managers also disseminated the recruitment flyer through internal staff emails, and participating midwives were asked to share the study details with their peers (i.e., snowballing).[35]

Midwives were eligible to participate if they were involved in some aspect of antenatal care provision and were able to speak and understand English. All participating midwives were consented, completed a brief anonymous demographic survey, and received a $25 card for their time.

Ethics approval was obtained in WA (RGS00000000736) and VIC (HREC 37338A).

Data collection

We conducted semi-structured individual interviews, both telephone and face-to-face, based on scheduling availability and preference of the participant. Interviews generally lasted between 20 and 40 min. All interviews were audio-recorded and professionally transcribed. The two interviewers (JK and KA) used a single, open-ended question guide (Additional File 1). The questions focused primarily on the participants' perceived professional role, with regard to vaccination, and the nature of their current practice and communication about vaccines. We also asked them to describe how they record vaccine data. Research team meetings were conducted regularly via telephone so that both interviewers could compare their experiences and incorporate reflections for improving subsequent interviews.

Data analysis

Thematic analysis was performed on all interview transcripts, coding them in NVivo10.[36] Given that our aim was to understand midwives' views and roles to inform intervention design, we used template analysis to keep our analysis focused on the applied purpose of the study. Template analysis is a structured yet flexible form of thematic analysis that generally begins with some a priori themes, which are then adapted through initial analysis to form a coding template.[37]

We derived a priori themes from the TIDieR (Template for Intervention Description and Replication) checklist, which outlines the key features to be reported when describing complex interventions.[38] While these themes provide overarching categories for interview data related to intervention features, they were not specific or detailed enough to capture the full range of the interview data. Therefore, two authors (JK and KA) separately analyzed the first interview transcript, using open coding to inductively identify themes emerging from the text. Each author grouped these emerging themes into the template categories where possible, and added or modified categories as necessary. Along with a third author (MD), we discussed and compared our initial analyses and agreed on a single customized coding template fit for our study purpose. One author (JK) then coded all transcripts with this template. Further minor additions and modifications to the template were discussed periodically with the full study team.

Acknowledgments

The authors are grateful to the midwives interviewed at both hospitals, and to clinic managers Barb Lourey and Trish Ryan who facilitated our access. We acknowledge and thank our wider team who consulted on study design: Helen Marshall, Julie Leask, Kerrie Wiley, Tom Snelling, and Penny Haora. Penny provided valuable context and understanding on the regulation and recommendation protocol for Australian midwives. We thank our research assistants Annette Alafaci and Shevaun Drislane, who provided valuable support at different stages of the project. We also thank Anne O'Leary at Women and Newborn Ethics Committee for helping us to navigate the ethics for KEMH.

Disclosure of potential conflicts of interest

Katie Attwell has previously been employed by the Immunisation Alliance of Western Australia to conduct social research using an unrestricted grant from Sanofi Pasteur. She has also received travel, accommodation and conference registration support from GSK, and travel, accommodation and speakers fees from Merck. The other authors have no conflicts to declare.

Funding

This research was funded by the Communicable Disease Control Directorate, Department of Health, Government of Western Australia. MD is funded by the University of Melbourne Bickart Clinician Research Fellowship; University of Melbourne [Bickart Clinical Research Fellowship].

Ethics, consent, and permissions

Ethics approval was obtained in WA (RGS00000000736) and VIC (HREC 37338A). Consent for Publication is not applicable to the current research study.

Availability of data and materials

Supporting data are available from the lead authors upon written request.

References

1. Danchin MH, Costa-Pinto J, Attwell K, Willaby H, Wiley K, Hoq M, Leask J, Perrett KP, O'Keefe J, Giles ML, et al. Vaccine decision-making begins in pregnancy: correlation between vaccine concerns, intentions and maternal vaccination with subsequent childhood vaccine uptake. Vaccine. 2017;36:6473–79. doi:10.1016/j.vaccine.2017.08.003.
2. Vannice KS, Salmon DA, Shui I, Omer SB, Kissner J, Edwards KM, Sparks R, Dekker CL, Klein NP, Gust DA. Attitudes and beliefs of parents concerned about vaccines: impact of timing of immunization information. Pediatrics. 2011;127:S120–S6. doi:10.1542/peds.2010-1722R.
3. Regan AK, Mak DB, Hauck YL, Gibbs R, Tracey L, Effler PV. Trends in seasonal influenza vaccine uptake during pregnancy in Western Australia: implications for midwives. Women Birth. 2016;29:423–29. doi:10.1016/j.wombi.2016.01.009.
4. Rowe S, Morey R, Perrett K, Cowie B, Franklin L, Strachan J Uptake of pertussis vaccine among pregnant women in Victoria, Australia: temporal, geographical and socioeconomic variation. European Society for Paediatric Infectious Diseases (ESPID) Meeting; May 28-June 2 2018; Malmo 2018.
5. Longo DL, Omer SB. Maternal immunization. N Engl J Med. 2017;376:1256–67. doi:10.1056/NEJMra1509044.
6. Australian Institute of Health and Welfare. Australia's mothers and babies 2016—in brief. Canberra: AIHW; 2018. Perinatal statistics series no. 34.

7. Benin AL, Wisler-Scher DJ, Colson E, Shapiro ED, Holmboe ES. Qualitative analysis of mothers' decision-making about vaccines for infants: the importance of trust. Pediatrics. 2006;117:1532–41. doi:10.1542/peds.2005-1728.
8. Glanz JM, Wagner NM, Narwaney KJ, Shoup JA, McClure DL, McCormick EV, Daley MF. A mixed methods study of parental vaccine decision making and parent-provider trust. Acad Pediatr. 2013;13:481–88. doi:10.1016/j.acap.2013.05.030.
9. Attwell K, Yusuf A, Frawley J. Is immunisation education in midwifery degrees adequate? Hum Vaccin Immunother. 2019;15:109–12. doi:10.1080/21645515.2018.1515448.
10. Frawley JE, McKenzie K, Cummins A, Sinclair L, Wardle J, Hall H. Midwives' role in the provision of maternal and childhood immunisation information. Women Birth. 2019. doi:10.1016/j.wombi.2019.02.006.
11. Regan AK, Hauck Y, Nicolaou L, Engelbrecht D, Butt J, Mak DB, Priest R, Cukierman R, Effler PV. Midwives' knowledge, attitudes and learning needs regarding antenatal vaccination. Midwifery. 2018;62:199–204. doi:10.1016/j.midw.2018.04.004.
12. Chamberlain A, Seib K, Ault KA, Rosenberg ES, Frew PM, Cortés M, Whitney EA, Berkelman RL, Orenstein WA, Omer S. Improving influenza and Tdap vaccination during pregnancy: a cluster-randomized trial of a multi-component antenatal vaccine promotion package in late influenza season. Vaccine. 2015;33:3571–79. doi:10.1016/j.vaccine.2015.05.048.
13. Wiley KE, Massey PD, Cooper SC, Wood NJ, Ho J, Quinn HE, Leask J. Uptake of influenza vaccine by pregnant women: a cross-sectional survey. Med J Aust. 2013;198:373–75.
14. Leask J, Kinnersley P, Jackson C, Cheater F, Bedford H, Rowles G. Communicating with parents about vaccination: a framework for health professionals. BMC Pediatr. 2012;12:154. doi:10.1186/1471-2431-12-34.
15. Opel DJ, Heritage J, Taylor JA, Mangione-Smith R, Salas HS, DeVere V, Zhou C, Robinson JD. The architecture of provider-parent vaccine discussions at health supervision visits. Pediatrics. 2013. doi:10.1542/peds.2013-2037.
16. Rollnick S, Miller WR. What is motivational interviewing? Behav Cogn Psychother. 1995;23:325–34. doi:10.1017/S135246580001643X.
17. Gagneur A, Lemaître T, Gosselin V, Farrands A, Carrier N, Petit G, Valiquette L, De Wals P. A postpartum vaccination promotion intervention using motivational interviewing techniques improves short-term vaccine coverage: promoVac study. BMC Public Health. 2018;18:811. doi:10.1186/s12889-018-5724-y.
18. Dempsey AF, Pyrznawoski J, Lockhart S, Barnard J, Campagna EJ, Garrett K, Fisher A, Dickinson LM, O'leary ST. Effect of a health care professional communication training intervention on adolescent human papillomavirus vaccination: a cluster randomized clinical trial. JAMA Pediatr. 2018;172:e180016. doi:10.1001/jamapediatrics.2018.1273.
19. Nursing and Midwifery Board of Australia. Midwife standards for practice. Melbourne: AHPRA; 2018.
20. Dubé E, Vivion M, Sauvageau C, Gagneur A, Gagnon R, Guay M. How do midwives and physicians discuss childhood vaccination with parents? J Clin Med. 2013;2:242–59. doi:10.3390/jcm2040242.
21. Attwell K, Wiley KE, Waddington C, Leask J, Snelling T. Midwives' attitudes, beliefs and concerns about childhood vaccination: a review of the global literature. Vaccine. 2018;36:6531–39. doi:10.1016/j.vaccine.2018.02.028.
22. Bednarczyk RA, Chamberlain A, Mathewson K, Salmon DA, Omer S. Practice-, Provider-, and patient-level interventions to improve preventive care: development of the P3 model. Prev Med Rep. 2018;11:131–38. doi:10.1016/j.pmedr.2018.06.009.
23. Ellingson MK, Dudley MZ, Limaye RJ, Salmon DA, O'Leary ST, Omer SB. Enhancing uptake of influenza maternal vaccine. Expert Rev Vaccines. 2019;18:191–204. doi:10.1080/14760584.2019.1562907.
24. SA Health. Understanding vaccines for midwives – vaccination requirements during pregnancy and early childhood. Adelaide, Australia: Government of South Australia; 2016.
25. Government of Western Australia, North Metropolitan Health Service. Antenatal Vaccination Protocol: Pertussis and Influenza. Perth (WA): King Edward Memorial Hospital; 2017 [accessed 2019 Apr 29]. https://www.kemh.health.wa.gov.au/~/media/Files/Hospitals/WNHS/For%20health%20professionals/Clinical%20guidelines/OG/WNHS.OG.VaccinationPertussisandInfluenza.pdf
26. Immunisation Foundation of Australia. Light for Riley. Sydney (NSW): Immunisation Foundation of Australia; 2019 [accessed 2019 Apr 29]. https://www.immunisationfoundation.org.au/light-for-riley
27. West R, van Stralen Maartje M, Michie S. The behaviour change wheel: a new method for characterising and designing behaviour change interventions. Implement Sci. 2011;6:42. doi:10.1186/1748-5908-6-42.
28. King CL, Chow MY, Leask J, Wiley KE. Australian caregivers' perceptions of influenza vaccination in pregnancy: a mixed methods exploration. Women Birth. 2018. doi:10.1016/j.wombi.2018.07.010.
29. Duffy C, Smith C. Communications research on vaccination during pregnancy: qualitative research report. Crows Nest (NSW): Snapcracker Research + Strategy; 2018.
30. Chamberlain AT, Lavery JV, White A, Omer SB. Ethics of maternal vaccination. Science. 2017;358:452–53. doi:10.1126/science.aao4219.
31. Pearce C, Leask J, Ritchie J. Tapping midwives' views about the neonatal hepatitis B vaccine: how welcome is a move towards a health promoting orientation? Health Promot J Austr. 2008;19:161–63.
32. Krishnaswamy S, Wallace EM, Buttery J, Giles ML. Strategies to implement maternal vaccination: a comparison between standing orders for midwife delivery, a hospital based maternal immunisation service and primary care. Vaccine. 2018;36:1796–800. doi:10.1016/j.vaccine.2017.12.080.
33. Jackson C, Cheater FM, Reid I. A systematic review of decision support needs of parents making child health decisions. Health Expect. 2008;11:232–51. doi:10.1111/j.1369-7625.2008.00496.x.
34. Kim H, Sefcik JS, Bradway C. Characteristics of qualitative descriptive studies: a systematic review. Res Nurs Health. 2017;40:23. doi:10.1002/nur.21768.
35. Berg BL. Qualitative research methods for the social sciences. Allyn and Bacon: Boston, MA; 2001.
36. NVivo qualitative data analysis . Version 11. [software]. Doncaster (VIC): QSR International Pty Ltd; 2015.
37. King N. Doing template analysis. In: Symon G, Cassell C, editors. Qualitative organizational research: core methods and current challenges. London, UK: SAGE Publications Ltd.. 2012; 426–450.
38. Hoffmann TC, Glasziou PP, Boutron I, Milne R, Perera R, Moher D, Altman DG, Barbour V, Macdonald H, Johnston M, et al. Better reporting of interventions: template for intervention description and replication (TIDieR) checklist and guide. BMJ. 2014;g1687–348.