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Vaccine hesitancy and healthcare providers

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ABSTRACT

While most people vaccinate according to the recommended schedule, this success is challenged by individuals and groups who delay or refuse vaccines. The aim of this article is to review studies on vaccine hesitancy among healthcare providers (HCPs), and the influences of their own vaccine confidence and vaccination behaviour on their vaccination recommendations to others.

The search strategy was developed in Medline and then adapted across several multidisciplinary mainstream databases including Embase Classic & Embase, and PschInfo. All foreign language articles were included if the abstract was available in English.

A total of 185 articles were included in the literature review. 66% studied the vaccine hesitancy among HCPs, 17% analysed concerns, attitudes and/or behaviour of HCPs towards vaccinating others, and 9% were about evaluating intervention(s). Overall, knowledge about particular vaccines, their efficacy and safety, helped to build HCPs own confidence in vaccines and their willingness to recommend vaccines to others. The importance of societal endorsement and support from colleagues was also reported.

In the face of emerging vaccine hesitancy, HCPs still remain the most trusted advisor and influencer of vaccination decisions. The capacity and confidence of HCPs, though, are stretched as they are faced with time constraints, increased workload and limited resources, and often have inadequate information or training support to address parents' questions. Overall, HCPs need more support to manage the quickly evolving vaccine environment as well as changing public, especially those who are reluctant or refuse vaccination. Some recommended strategies included strengthening trust between HCPs, health authorities and policymakers, through more shared involvement in the establishment of vaccine recommendations.

1. Introduction

Vaccination is often cited as one of the most effective ways of controlling infectious diseases [1]. However, while most people vaccinate according to the recommended schedule, this success is being challenged by individuals and groups who choose to delay or refuse vaccines [2]. Examples of reluctant individuals include parents delaying vaccinations for their infant, teenagers (or their parents) who choose not to vaccinate against human papillomavirus (HPV), pregnant women deciding not to vaccinate against flu or pertussis, the elderly choosing not to vaccinate against flu or shingles, and even HCPs not vaccinating against influenza.

Over recent decades, some patients have become more critical about healthcare advice and some resist (or are hesitant to accept) recommended vaccinations. HCPs have had different responses to this changing environment. Some practices have dropped patients if they refuse vaccination [3,4] making the case that it puts their other patients at risk, while in other practices, some physicians agree to delay vaccination or administer partial doses, in order to protect the trust relationship with their patient, although recognising there is no clinical evidence to support such an approach [5].

Abbreviations: GP, general practitioner; HCP, healthcare provider; HPV, human papillomavirus; MMR, measles mumps and rubella; SAGE, Strategic Advisory Group of Experts on Immunisation.

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The vaccination decision-making process includes people who agree to be vaccinated immediately, because they see it as the norm, and those that take their time weighing up the pros and cons of vaccination, talking with family, friends or members of their community, searching the internet, and asking their HCP for advice. The importance of HCP's vaccine recommendations in the decision making process has been well documented [6]. HCPs are one of the strongest influencers in vaccination decisions. In a study in six European countries, the general practitioner (GP), pharmacy and local hospital were listed as being the most trustworthy sources of health alerts or information about medicines [7]. However, there are some HCPs who feel ill-equipped to answer questions or engage in difficult conversations with those who are reluctant to be vaccinated.

There is a growing body of literature on the issue of vaccine hesitancy, with the most important reasons identified varying by country, region, sub-population, vaccine, and contextual influences. Despite variations in reasons for hesitancy across geographies and vaccines, there are common themes that emerge globally [2,8]. The World Health Organization (WHO) Strategic Advisory Group of Experts (SAGE) on Immunisation convened a working group to investigate the nature and scope of vaccine hesitancy and they have created a model of determinants of vaccine hesitancy organised around three domains: 1. 'Contextual influences'; 2. 'Individual/social group influences'; and 3. 'Vaccine and vaccination-specific issues' [2]. All three domains include the influence of others on vaccine hesitancy: Domain (1) 'Contextual influences' includes influential leaders and individuals; domain, (2) 'Individual/social group influences' includes personal experience with and trust in health system and provider; and domain, (3) 'Vaccine and vaccination-specific issues' includes the role of healthcare professionals.

Given the documented importance of HCPs' influence in the decision of their patients to be vaccinated, the aim of this literature review is to explore existing research specifically on vaccine hesitancy among HCPs, and consider the influences of HCPs' own vaccine confidence and behaviours on their vaccination recommendations to others.

2. Methods

2.1. Search strategy and selection criteria

The search strategy was developed in Medline and then adapted as required by differential indexing across several multidisciplinary mainstream databases including Embase Classic & Embase, and PschInfo. The strategy included an extensive list of keywords (Table 1). The search was run across all databases on 26th October 2015.

Once retrieved, articles were first screened by title and then screened by title and abstract, according to a set of inclusion and exclusion criteria. Articles were included if they were: (1) peer-reviewed articles; and (2) focused on the role of the HCP in immunisation, their own vaccination behaviour, including hesitancy, and/or how they address vaccine hesitancy and questioning. We used a combination of the SAGE group's definition of VH for the VH of HCPs and also considered HCPs' role of recommending vaccination and addressing VH in their patients and adapted the definition to this context.

Articles were excluded if they were not about human vaccines, were not about HCPs, were solely about vaccination coverage, efficacy, or vaccine delivery, or were non-peer reviewed research papers.

All countries were included. All foreign language articles were included if the abstract was available in English. The year of publication was not an exclusion criteria.

Table 1
Keywords used in the search strategy.

Title		Title		Keyword
Immun*	AND	Healthcare worker*	AND	Hesitan*
		Midwi*		Question*
		Nurse*		Trust
				Refusal
Vaccin*		Doctor*		Role
				Recommend*
		GP*		Address*
				Confidence

Note: The * denotes truncation. E.g., 'vaccin*' will request the search engine for all words that start with 'vaccin' such as vaccine, vaccines, and vaccination.

3. Results

A total of 1928 articles were retrieved through the database search (Fig. 1). After deleting duplicates and screening by title there were a total of 310 articles. After screening by abstract and full text, a total of 185 articles were included in the literature review.

3.1. Summary descriptive analyses

Of the 185 articles analysed, the majority (66%) studied the vaccine hesitancy among HCPs themselves, 17% of the articles analysed concerns, attitudes and/or behaviour of HCPs towards vaccinating others, and 9% were about evaluating intervention(s) to increase vaccine uptake by HCPs.

3.2. Vaccine hesitancy amongst healthcare providers

The articles focusing on vaccine hesitancy amongst HCPs specifically included research on 33 countries (Fig. 2).

The majority (84%) of articles focusing on vaccine hesitancy amongst HCPs were related to influenza vaccines, followed by Hepatitis B (6%), pertussis (3%), smallpox (2%), HPV (1%) and varicella (1%). The remaining 3% discussed vaccines generally. Of the 84% of articles that were about influenza vaccines, 65% of these were about seasonal influenza, 18% of these were about pandemic influenza vaccine, and 17% about both. The high percentage of articles on influenza is partly related to the fact that it is one of the vaccines encouraged or required for HCPs.

3.3. Vaccinated healthcare providers are more likely to recommend vaccination to others

Among the publications on HCPs' vaccination behaviour (n = 140), several studies identified that HCPs were more likely to recommend vaccination if they were themselves vaccinated. A study in the United Kingdom (UK) showed that nurses who were vaccinated were more likely

to recommend vaccination to their patients [9]. A Nigerian study similarly reported that female nurses were more likely to recommend HPV vaccination, when they expressed a willingness to be vaccinated themselves [10]. In Israel, research found that physicians were more likely to recommend vaccinations to patients if they accepted the influenza vaccine for themselves [11]. A Canadian study also found that midwives who reported being immunised themselves were more likely to trust in the safety and efficacy of influenza vaccine, and subsequently recommended vaccination to their patients [12].

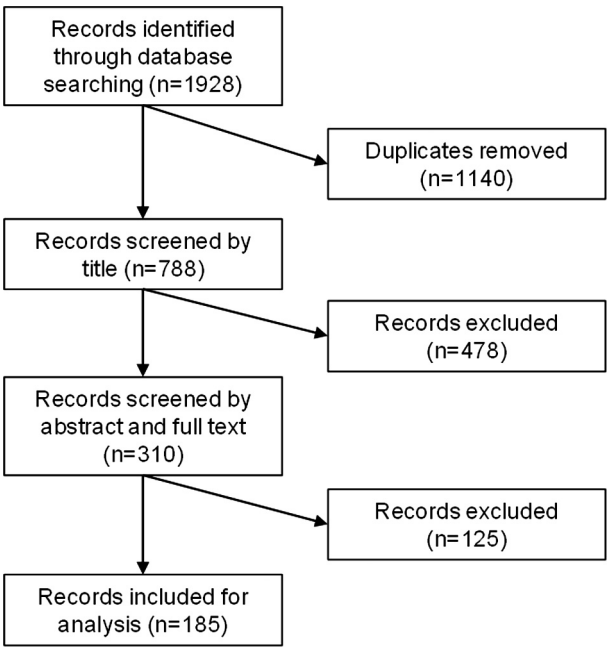

Fig. 1. Flow diagram of literature review search process.

In a US study, recommending the influenza vaccine to co-workers, patients, or patients' families, was also associated with HCPs themselves being vaccinated [13]. HCPs in Iran who intended to be vaccinated in the next season were 4.6 times more likely to recommend vaccination to their patients than those who did not intend to be vaccinated [14].

3.4. Positive attitudes about vaccination

Aside from the influence of HCP vaccination behaviour on others, the attitudes of HCPs towards vaccination have a powerful influence. A study about doctors' attitudes towards MMR vaccination in Denmark illustrated that the average vaccination rate in practices with unreservedly positive attitudes about vaccination was 85%, compared with 69% in practices with more guarded attitudes [15].

3.5. Autonomy vs. public health

Although the data indicates that self-vaccination among HCPs is clearly related to their willingness to recommend vaccination to others, some HCPs expressed a clear view that their own vaccination behaviour is their own choice, as is the choice of their patient. In a study conducted in Israel, nurses reported that they did not see the importance of being role models regarding pertussis vaccination and instead felt their autonomy to decide whether or not to be vaccinated was of greater concern [16]. In the UK, while non-vaccinated HCPs were more likely to regard patients' vaccination decision as their own choice, vaccinated HCPs were more likely to see influenza as a public health issue and believed they should recommend the vaccine [17]. The non-vaccinated HCPs emphasised that they would not allow their personal choices to influence

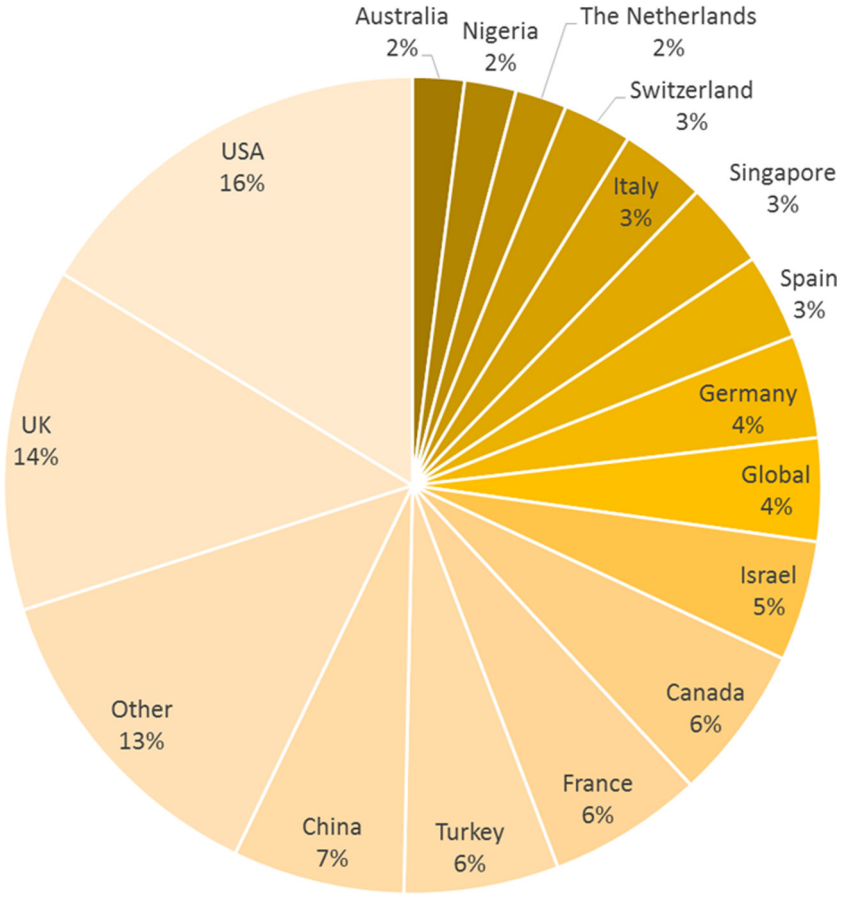

Fig. 2. Articles focusing on vaccine hesitancy amongst HCPs (n = 147 by country of focus Note: 'Other' includes Georgia, Greece, India, Iran, Japan, Kenya, Kuwait, Morocco, New Zealand, Oman, Pakistan, Puerto Rico, Qatar, Saudi Arabia, South Korea, and United Arab Emirates.

the advice they gave to patients, whereas some vaccinated HCPs believed that by getting vaccinated themselves they could provide a reassuring example to patients, particularly for those patients who expressed concerns about influenza vaccination [17].

3.6. Vaccine recommendations by HCPs

Awareness and knowledge were also found to increase a HCPs' willingness to recommend vaccination. One study in the UK reported that nurses with high knowledge scores were more likely to recommend influenza vaccine to their patients, and be willing to recommend vaccination to patients in the future [18]. In Israel, knowledge about influenza vaccine was associated with high vaccination rates among pediatric HCPs and their willingness to recommend vaccination for children [11]. In a study about HPV vaccination in Cameroon, the most important factors considered amongst nurses when deciding to recommend the vaccine included understanding the effectiveness and safety of the vaccine [19]. In another example, a study on HCPs in the USA found that those who were not confident in the vaccine's efficacy and protective value were less likely to recommend it to patients [13].

Knowledge, societal and colleague support were all found to be important factors contributing to HCP confidence and willingness to recommend HPV vaccination in a study in Canada [20]. Another study in Canada also found that nurses' willingness to recommend a new vaccine was consistently associated with the perceived safety of the vaccine as well as the perceived professional support for the vaccine [21].

One study with GPs in France revealed that another area where self-confidence was low was around discussing the role of adjuvants. They found that 11.1% of the study participants (n = 1712) reported they were "very unconfident" about discussing the role of adjuvants with patients, while 45.7% reported being "somewhat unconfident" [28]. The same study found that GPs vaccine recommendations were more frequent when they felt comfortable with explaining risks and benefits of the vaccine, than when they were less confident. Similarly, when they had concerns about a particular vaccine's safety or efficacy, they were less likely to recommend it.

Overall, knowledge about particular vaccines, their efficacy and safety, helped to build HCPs own confidence in vaccines and their willingness to recommend them to others. Knowledge alone though is not enough, as indicated in the study that also identified the importance of societal endorsement and support from colleagues. The willingness of the patient or caregiver of potential vaccinees, also played a role in the HCPs confidence to recommend vaccination. A study in South Africa, for example, found that nurses who felt that adolescents and young adults were willing to accept HPV vaccination were more likely to recommend it [22].

3.7. Feeling unprepared

The level of vaccine knowledge among HCPs was not the only aspect of feeling prepared –or unprepared – to recommend vaccination and/or address vaccine hesitancy. In a UK study with midwives, 76% agreed that they should routinely advise pregnant women on vaccination, but only 25% felt adequately prepared for this role [23]. In another study, 43% took the influenza vaccine but only 28% wished to be vaccinators due to concerns about increased workload and inadequate training [17]. In a study in Norway, nurses were reluctant to search for online information issued by the National Institute of Public Health. This was explained by perceptions about their own role, limited critical appraisal skills, limited capacity and time constraints [24]. HCPs in a study in Bosnia and Herzegovina judged their knowledge of immunisation programmes to be satisfactory, but emphasised the need for additional education to address vaccine hesitancy [25]. In a study about HPV vaccination in the UK, school nurses complained of work overload and described the difficulties of establishing good relationships with some of their schools regarding vaccination [26]. Nurses expected schools to take some responsibility for ensuring good uptake and were frustrated when help was not forthcoming [26].

3.8. Interventions to increase vaccine uptake by HCPs

Of the 17 studies exploring interventions to increase vaccine uptake by HCPs, 15 of the studies were focused on influenza vaccine [27–41], one was focused on hepatitis B vaccine [42] and one study was non-vaccine specific [43]. Two of the influenza vaccine focused studies were reviews [31,38]. The review by Stuart in 2012 explored the seasonal influenza immunisation uptake rates of HCPs in Australia, the determinants of these rates, and strategies to improve them, and found little high quality evidence to support specific strategies and interventions to increase uptake of immunisation in HCPs [38]. Hollmeyer and colleagues reviewed studies of interventions aimed to increase the uptake of influenza vaccination among hospital HCPs globally and identified the following elements used in intervention programmes that increased vaccine uptake: "provision of free vaccine, easy access to the vaccine (e.g. through mobile carts or on-site vaccination), knowledge and behaviour modification through educational activities and/or reminders and/or incentives, management or organizational changes, such as the assignment of personnel dedicated to the intervention programme, long-term implementation of the strategy, requiring active declination and mandatory immunization policies" [31]. Two of the papers we identified were included in the review by Hollmeyer et al. and so we do not discuss these in further detail here [30,35]. The interventions evaluated in the other studies were either a decision aid, which was found to be helpful [34], information campaigns [27,37,40,41], or a combination of interventions [28,29,32,33,36,39],

The information campaigns evaluated varied from education courses, talks or meetings, to posters, individual letters or e-mails or hospital webpages [27,37,40,41]. Two studies found that HCPs that attended a course or educational talk on influenza vaccination were more likely to get vaccinated after the course [37,40]. An extensive information campaign in another study achieved an increase in the influenza vaccination rate in HCPs in a hospital, although only to 25.8% [41]. One study found that use of a declination form for HCPs, to document vaccination consent, medical contraindication(s) for vaccination, or vaccination declination, contributed to an increase in influenza vaccination by HCPs [36].

One multi-intervention study found that both educational DVDs and peer vaccination increased uptake [28]. A 20 year survey on HCPs in Switzerland found an increase in vaccination coverage of HCPs with information campaigns, lectures about influenza and the influenza vaccine, access to on-site vaccination and compulsory mask wearing for non-vaccinated HCPs [33]. A multi-hospital, multi-intervention study identified that hospitals that required a signed declination or imposed consequences (most commonly wearing a mask on patient contact) had higher influenza vaccination rates among HCPs [29].

Honda and colleagues illustrate the success of a multifaceted intervention on HCPs in a medical center in Japan which increased vaccine uptake among HCPs [32]. The interventions included use of a declination form, free vaccination, hospital-wide announcements during the vaccination period, audit and telephone interviews with HCPs that did not receive the vaccine, a medical interview with the hospital executive for noncompliant (no vaccine, no declination form) HCPs during the vaccination period, and the mandatory submission of a vaccination document for HCPs vaccinated outside of the medical center [32]. Another multi-hospital,

multi-intervention study identified the following factors to be associated with higher vaccination rates of HCPs: weekend provision of vaccine, train-the-trainer programmes, report of vaccination rates to administrators or to the board of trustees, a letter sent to employees emphasizing the importance of vaccination, and any form of visible leadership support [39].

We have summarised our findings from this review, in an adaptation of the SAGE Working Group "Model of determinants of vaccine hesitancy" [2] for HCPs, encompassing their hesitancy as well as HCP's capacity, confidence and willingness to recommend vaccination or address vaccine hesitancy (Fig. 3).

4. Discussion

This paper reviews studies on vaccine hesitancy among HCPs, the reasons for their reluctance, and the influences of their own vaccine confidence and vaccination behaviours on their vaccination recommendations to others.

Several studies found that HCPs who were vaccinated themselves (or who intended to be vaccinated) were more likely to recommend vaccination to their patients. Some vaccinated HCPs believed that by getting vaccinated themselves they could provide a reassuring example to patients, particularly those who have concerns. In comparison, some of the non-vaccinated HCPs distinguished between their personal choices and the advice they gave to patients.

There are a growing number of studies investigating the vaccination decision-outcomes of different HCP approaches to discussing vaccination with their patients. One study in the US, for example, found that how providers initiate the vaccine recommendation is an important determinant of vaccine acceptance [44]. Parents had significantly higher odds of accepting a vaccine if the provider initiated a consultation using a presumptive approach (e.g., "Today we're going to be vaccinating your child with ...") which projected more confidence about vaccination than when they opened the conversation with a statement that was aiming to be engaging (e.g., "how do you feel about vaccination?"), but suggested that the provider was uncertain [44]. The presumptive approach did not exclude the opportunity for a dialogue with the patient, but started the conversation with a more positive tone about vaccination. More studies such as this are needed in other settings to validate this finding. Another study in the US, that surveyed 627 paediatricians in 2013 that participate directly in patient care, identified that 11.7% of them had dismissed patients for continued vaccine refusal and of these 79.9% did so due to lack of trust between the physician and patient [45].

In terms of confidence, HCPs with more knowledge about the vaccine were also more likely to recommend vaccination, although more support is needed, especially for managing difficult conversations with a vaccine reluctant patient or parent. Studies with different HCP groups in multiple settings identified a lack of preparedness for advising patients about vaccination and a lack of training as inhibiting factors for recommending the vaccine. Finally, concerns about increased workload and limited resources were seen as obstacles to engaging patients on vaccine hesitancy. We appreciate that there are various trust relationships that can influence vaccine acceptance, such as trust or distrust in the vaccine industry or government [45], however this particular review focused on trust in HCPs, and these trust relationships were not highlighted in the papers included in this review.

One limitation of this review is that we did not specifically search for the term healthcare provider, and so may have missed a few articles that referred to the term healthcare provider but not to the terms that were searched for: healthcare worker(s),

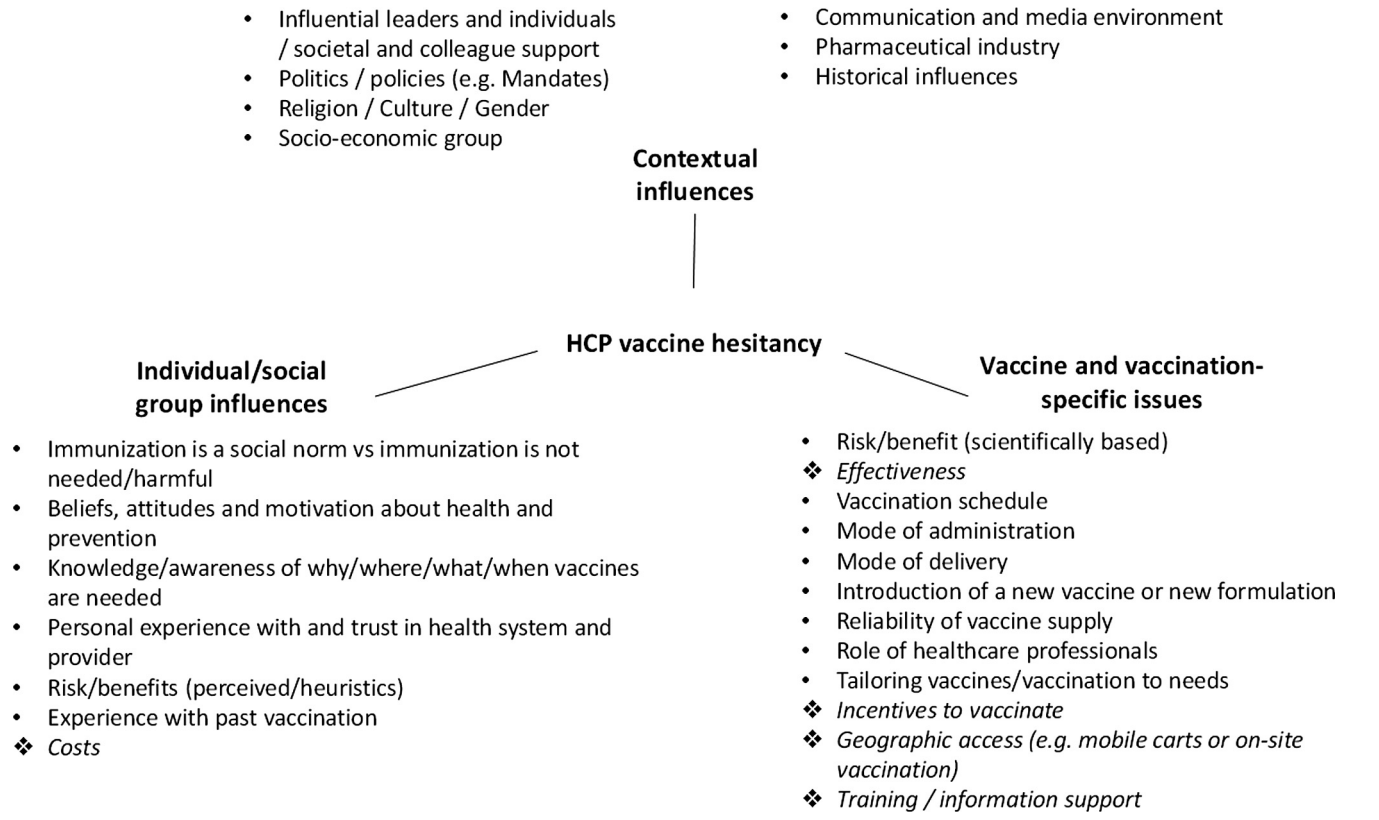

Fig. 3. HCP vaccine hesitancy and HCP capacity, confidence and willingness to recommend vaccination or address vaccine hesitancy. Note: Adapted from the SAGE Working Group "Model of determinants of vaccine hesitancy" [2]. The bullet point • denotes that the determinant was included in the domain in the original model. The bullet point ❖ denotes that the determinant is new in the domain.

midwife/midwives, nurse(s), doctor(s) or GP(s). Another limitation of the review was that there was no quality criteria applied to the included papers, which could affect the validity of some of the conclusions, although all included papers have been peer-reviewed.

5. Conclusions

HCPs remain the most trusted advisor and influencer of vaccination decisions. The capacity and confidence of HCPs, though, is stretched as they are faced with time constraints to cope with growing numbers of vaccine hesitant patients, inadequate information and/or training to address vaccines questions and discussing the risks and benefits. Overall, HCPs need more support to manage the changing public as well as quickly evolving vaccine environment.

Verger et al. [46] outlined some key actions needed to support HCPs that are worth highlighting. In addition to identifying the need for more training or information support on vaccine risks and benefits, as noted above, they underline the importance of designing and evaluating communication tools for HCPs, so they are able to engage in difficult discussions with patients reluctant about vaccination. One important key point which emerged in their proposed actions, and was less evident in the papers identified in this review, is the importance of strengthening trust between the HCPs and the health authorities. One step towards this would be more involvement by HCPs in some of the decision-making around the vaccination recommendations and policies that they are in the front lines to deliver on. In another paper by Yaqub and colleagues, they too reiterate the importance of building trust in – and within – institutions, particularly pointing to the critical trust and support relationship needed between the policymakers and the HCPs, to ultimately build the trust of the public [47]. In addition, they propose a sentinel network to pick up emerging vaccine concerns and trends in order to help HCPs have better advance information on the types of questions that they might face. In short, not only work on re-building or sustaining trust, but be more anticipatory and looking ahead to pre-empt breakdowns in trust.

While the findings of the literature review reported on in this paper were largely specific to HCPs' individual vaccine hesitancy or confidence and its influence on patient recommendations, that dyadic relationship is one small, albeit critical link in a much larger trust chain that needs attention and support.

6. Contributorship

HL and PP drafted the initial manuscript. PP conducted the literature review. SLR contributed to the conception/design of the review. All authors contributed to multiple reviews and feedback on the manuscript and gave final approval before submission.

7. Disclosures

PP and HL's institutions have received grants from Novartis, unrelated to the submitted work. PP received travel, accommodation, and registration support from GSK as an ESPID 2015 symposium panel member, outside the submitted work. HL is a consultant to GSK on vaccine hesitancy, is a member of the Merck Vaccines Strategic Advisory Board, and is a PI on an EU Innovative Medicines Initiative (IMI) grant leading the acceptance and compliance research on an Ebola Vaccine trial in collaboration with Janssen Pharmaceuticals. FM and SG are employees of the GSK group of companies and report ownership of stock/restricted shares/shares in the GSK group of companies. LRS reports consulting fees from Vical, Genocea, and Janssen Pharmaceuticals, and is a member of the scientific advisory board of Abivax. SLR reports no conflict of interest.

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Appendix A. Supplementary material

Supplementary data associated with this article can be found, in the online version, at http://dx.doi.org/10.1016/j.vaccine.2016.10.042.

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