


How Do Experts and Nonexperts Want to Promote Vaccines? Hepatitis E Vaccine as Example

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ABSTRACT: Low- and middle-income countries receive limited guidance from external entities about how to introduce vaccines. This is especially true for the Hepatitis E (HepE) vaccine, which is currently only commercially available in China. The aims of this qualitative study are to identify which attributes of the HepE disease and vaccine are considered important, and to compare desired promotion methods between different stakeholders. Stakeholders included experts (Centers for Disease Control and Prevention staff, health care providers, and researchers), and nonexperts included members of high-risk populations, HepE cases, and vaccinees. Participants' thoughts were coded and broadly summarized. We contacted 63 persons—35 experts and 28 nonexperts. Safety and effectiveness (but not price) of the vaccine, along with severity of disease and transmission route of infection, were all listed as important attributes. Emphasizing the importance of sharing stories from cases, relying on personal experiences, staying away from statistical explanations, and using the government as a source of promotion were other points repeatedly raised by the participants. Qualitative interviews with experts and nonexperts has revealed that focusing on attributes of disease severity and susceptibility to infection, as well as vaccine safety and effectiveness within stories of cases, are preferred ways to promote the vaccine.

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Background

Immunization efforts that primarily benefit children in low- and middle-income countries (LMICs) are continually improving. However, vaccination of adults has only been introduced more recently in LMICs. For example, in China, nationwide vaccination of newborns against hepatitis B to block mother-to-child transmission has been implemented since 2002.¹ Only in recent years have local governments, including Shanghai, explored ways to provide free hepatitis B vaccinations to a larger age range and free pneumonia vaccinations to people older than 65 years. There are some measures that need to be improved in the formulation and implementation of new vaccine immunization strategies, particularly for adult vaccines.

Makinen et al² indicate LMICs receive limited guidance from external entities about how to best introduce vaccines. Although the World Health Organization (WHO) Tailoring Immunizations Program provides a framework for improving coverage of vaccines already on the market or in the routine immunization schedule of a country,³ it is not specifically

designed for vaccines that have not yet been implemented. Guignard et al⁴ provide a summary of challenges faced by LMICs in introducing new vaccines, including limited health care infrastructure. The summary from Guignard et al⁴ also indicates that having a purposeful plan to introduce vaccines is necessary. The introduction of a vaccine into a country's health care system is a sensitive time to attune the public to the significance of the disease and the benefits of the vaccine.

Relaying a concise set of details about the vaccine and disease to the public is particularly important for health conditions which are little known in the general population. What details are emphasized or withheld could affect coverage later on; this is perhaps best exemplified with the introduction of human papillomavirus (HPV) vaccine in the United States, which has had low uptake a decade after it was first recommended—in part because of parents' concerns about how the infection is spread⁵—an attribute of the disease which was emphasized in early vaccine messaging. Moreover, when developing educational materials, there could be a conflict between what an expert—eg, health department official, medical doctor, vaccination provider—thinks is important to emphasize and what a member of the general population wants. Understanding

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the mental models held by members of the target vaccination group can guide education efforts.⁶

The hepatitis E (HepE) vaccine was developed by a Chinese company and was licensed for use in the country in December 2011 for individuals aged ≥ 16 years.⁷ The vaccine is still only available in China and is available at some community health centers for a cost of around 170 RMB (US\$25) per dose with 3 doses in the full series. Worldwide, the HepE virus results in more than 19.4 million cases of disease⁸—predominantly viral hepatitis—although the disease can be more serious in people who have chronic hepatitis B, are immunodeficient, or are pregnant. Within China, HepE surpasses hepatitis A as the largest etiology of acute viral hepatitis in 2012, and there were more than 27.9 thousand reported cases of HepE in 2014; the annual number of deaths attributable to the condition ranged from 15 to 44 between 2005 and 2014.⁹

The availability and cost of the HepE vaccine contrasts with many other vaccines—like those for diphtheria-tetanus-pertussis, polio, measles, and hepatitis A and B—which are freely available. In general, uptake of these free pediatric vaccines is quite high in China. Many of these free vaccines have more than 96% coverage in estimates reported to the WHO,¹⁰ although coverage in Western provinces is lower than that in the East.¹¹

The HepE vaccine has only recently been developed and still has little recognition in the one country where it is on the market, China. Efforts to promote its uptake, likely in certain target populations, will require informing the public about the attributes of HepE and its vaccine. What attributes are important, and what institutions should be used to publicize these attributes, is unknown. Given that health departments are responsible for educating individuals about a wide range of health conditions and preventive behaviors, and given that members of the general populace may have low science literacy and little time to familiarize themselves in depth with a vaccine, it is important to develop promotion materials which can concisely convey a limited amount of information.

The aims of this qualitative study are to identify which attributes of the HepE disease and vaccine are considered important and to compare desired promotion methods between different stakeholders (specifically experts and nonexperts), to develop a recommendation for how best to promote the vaccine.

Methods

Data

Stakeholders from Shanghai and other parts of China participated in in-depth qualitative interviews between October 2017 and August 2018. Several different groups of stakeholders were identified, based in part on past literature,¹² and were broadly divided into “expert” and “nonexpert” groups. Experts included staff at various levels (provincial, municipality, prefecture, and district) of the Centers for Disease Control and Prevention (CDC), vaccination providers, infectious disease

doctors, vaccine researchers, and vaccine company employees. Nonexperts included members of high-risk populations (pregnant women, slaughterhouse workers, and family caregivers of HepE cases), HepE cases, and individuals who have previously received the vaccine. Experts were selected either through the professional networks of the authors or by snowball sampling, whereby initial contacts provided information on other potential participants. Nonexperts were identified based on databases held by the Shanghai CDC. Most interviews were in person, although some interviews with participants outside of the municipality were conducted by phone.

There was no predetermined sample size. In accordance with standard practice for qualitative questionnaires, we stopped obtaining new interviews after sampling individuals in each of our stakeholder groups and after we had reached saturation, ie, we did not get substantively new information after 3 interviews.

Measures

The questions asked were based on previous research¹² and on guidelines for conducting stakeholder analyses.¹³ Broadly speaking, participants were asked about their knowledge of HepE and the HepE vaccine, about what attributes of the disease and vaccine were most important for vaccine promotion, and about their perception of the HepE vaccine roll-out. Certain groups were asked additional questions targeted to their professional or personal experiences; for instance, HepE cases described their disease and clinical history. The full questionnaire is available on figshare: <https://figshare.com/s/b5ec02d8cc48649fa5cf>.

Analysis strategy

In-depth qualitative interviews were conducted in Mandarin Chinese, and a native speaker produced transcripts. Two native Mandarin speakers coded the interview transcripts, broadly using a thematic analysis approach.¹⁴ Codes were initially based on the structure of the questionnaire (ie, the base set of questions and various attributes that were asked). Afterward, quotes within a code were thoroughly examined developed into themes. The themes are further described in the “Results” section. Quotes have been translated into English. The participants’ coded transcripts have been anonymized and are available at <https://doi.org/10.6084/m9.figshare.8309243.v1>. NVivo 10 (QSR International, Melbourne, Australia) was used for coding. The data were coded between September 2018 and February 2019. Another analysis—limited to the experts and with a separate set of aims—has previously been published.¹⁵

Ethical approval

The protocol for this study was reviewed and approved by the University of Michigan Health Sciences and Behavioral Sciences Institutional Review Board (HUM00134336) and

the Fudan University ethics review committee (2018-01-0658). All participants were adults. Participants were shown an informed consent form and gave verbal consent prior to the start of the interview. The Institutional Review Board approved the use of verbal consent, and this was used to minimize the number of documents we had that contained the participants' names. The interviewers took written notes about each interview and wrote down that the participant gave informed consent.

Results

In total, we contacted 63 persons to participate in an interview, and all agreed to participate. The participant totals include 35 experts: 3 individuals working in a province-level CDC, 10 individuals at municipal-level CDCs, 1 from a prefecture-level CDC, 5 from district-level CDCs, 6 vaccination providers, 1 from the Ministry of Health, 4 from a public university, and 2 from vaccine companies. We also interviewed 28 nonexperts: 13 members of the general population, 4 members of high-risk groups, 5 HepE cases, and 6 vaccinees. In the quotes below, the interviewer is designated by "I," experts have a respondent number with the prefix "E," and nonexperts "N."

Below, we outline the participants' knowledge of HepE and discuss the different themes that arose as a result of conflicts and consistencies in how experts and nonexperts viewed the attributes of HepE disease, the attributes of the HepE vaccine, and best ways to communicate information about attributes of HepE disease and vaccination.

Knowledge of HepE

Knowledge of HepE was low among the general population and even among the experts. Experts mentioned how professionals work in very specific departments and will not be familiar with topics that are not directly related to their department's purposes:

For the doctors in other departments around you are not specializing in infectious diseases, do they have some understanding of hepatitis E? (I)

Not really. (E01)

Members of the general population knew about hepatitis in general as a result of category 1 vaccines and outbreaks reported in the news but, except for cases and vaccinees, did not know about HepE.

I mainly know about hepatitis B, and it's more frequently heard because I was vaccinated as a child. (N01)

Including me and including those who are here for vaccination, everyone is not familiar at all with hepatitis E. Hepatitis A is frequently heard of because of past outbreaks of hepatitis A in China. Hepatitis E has never had an outbreak. In fact, the incidence of hepatitis E is still a considerable number. [. . .] but it has not been reported, so everyone does not know about it. (E21)

Attributes of HepE disease

Disease severity. Disease severity was the number one disease attribute that experts and nonexperts considered when making vaccine decisions. One expert mentioned how a vaccine would be particularly important for a disease that is difficult to treat.

What harm does the disease bring? For example, most people think flu is not a big deal, because it's not going to cause anything other than a flu. It is not a fatal disease. After HPV was introduced into China, people may be very motivated because it helps prevent cancer. Or if the HIV vaccine is available one day in China, people may think that this disease is important. For diseases like flu or chickenpox, people won't think this disease causes a heavy burden. (E01)

The general population was more likely to be influenced by personal experiences with the disease than by knowledge about its severity in general.

I think that the general population will not pay attention to the treatment of the general population. They think that other people's experience with the disease have nothing to do with themselves. Only if their relatives or friends get it, do they begin to consider this disease as a more important disease. (E09)

Transmission route. Transmission route was the second most important attribute according to all participants. But for experts, it was thought that the general population, especially less educated individuals, would not think this attribute to be so important.

Do you think the general population will care about the transmission route of the disease? (I)

Less educated individuals will not understand this. (E01)

However, several nonexperts discussed how route of transmission was important. For many nonexperts, transmission route was related to how easy the infection would be to prevent or whether there was a high exposure risk in the individual's life.

For example, I may consider to be vaccinated for diseases that spread through water and food, but if it is transmitted through blood, I probably won't. (N01)

Could you please tell me which attribute mentioned by the vaccination provider make you think that Hepatitis E vaccine is necessary for you? (I)

Its prevalence and its transmission route, which is through food. (N01)

If a disease can be carried and transmitted by animals, I will definitely get vaccinated. (N02)

For example, one butcher mentioned how vaccines would not be as important if other types of prevention mechanisms were available.

If the disease's transmission route is narrow, it's not relevant to me. (N02)

Disease burden/societal costs. Disease burden encompasses money and time costs—but many individuals also related it back to measures of disease severity like physical and mental health costs or quality of life.

In addition, we should tell him the hazard or burden of the disease from a relatively simple and easy-to-understand way. When it comes to disease burdens, it may be money costs on the one hand. On the other hand, many people are worried about being suspended from school. The temporary suspension is small, but long-time suspension is a big deal. A lot of things will affect their decision. He knows the potential harm of this diseases and this disease is not far from him. And there is disease burden. Then if he think he have no way to protect himself from expose to the disease, he have to use the vaccine if possible. (E22)

Treatment of this disease costs a lot, but I can prevent it with a relatively small amount of money. (E23)

Other diseases like chickenpox and influenza were given as examples of conditions which had costs which could influence individuals to get (or not get) the vaccine.

Chickenpox is not very severe, but it tends to cluster, especially in school. If an outbreak of chickenpox happened in school, the range and the negative influence of this disease will be relatively large. (E23)

Why the uptake rate of influenza vaccine is relatively low? That's because the general population think they'll recover quickly even if they don't take any medication. The cost of treatment is very low. (E01)

Disease incidence/importance. Disease importance, according to experts, referred to the incidence or prevalence of disease in the population. Experts listed this attribute as not being as influential as other attributes. Experts were concerned that they were able to understand the burden of disease in terms of statistics, but the general population would not understand these numbers.

I think prevalence is more important for government, not for individuals in the general population. The general population doesn't have a basic sense about prevalence because they have no idea about the prevalence of other diseases. (E08)

Experts thought that the general population would conceive of a disease's importance by the number of cases that they personally knew.

As for prevalence, the general population may have a feeling about it, for example, how many cases they know around them. So you don't need to describe it specifically. (E10)

As for the importance, are you going to be vaccinated for disease like influenza that is not very severe but have a high prevalence? (I)

This depends on my personal status. I haven't been infected with influenza before, so I'm not going to get the vaccine. (N02)

It's more persuasive if cases are introduced into the promotion process. (N03)

According to the experts, hearing about outbreaks in the media could also increase the general population's understanding of importance/incidence.

For example, if there is a pandemic or outbreak of hepatitis E in Shanghai or somewhere, we must take this event as an opportunity. When everyone is staring at this incident, we should quickly carry out a propaganda at that time. (E05)

During the outbreak of Hepatitis A in Shanghai in 1988, if there was a vaccine available, people would go crazy for the vaccine . . . People were very scared when they talk about Hepatitis A. (E23)

They are also sensitive to news reports. They will pay more attention when there's more reports, and will be more likely to get vaccinated. (E05)

Attributes of HepE vaccine

Safety. Vaccine safety was important to all interviewees and was ranked as the most important vaccine attribute among experts and nonexperts. Experts emphasized that safety information should be included in promotion materials and believed that the best type of safety information was data from clinical trials and other statistics.

What does a safe vaccine mean for the general population? (I)

You should say that clinical trials were carried out, the rate of negative effects, and was there any severe negative effect. (E03)

As for the safety of vaccine, there are statistics from clinical trials about the rate of adverse events. Also if anybody developed adverse events after they receive any vaccine, the data will be reported by the immunization clinics to the CDC system. We have data about this. (E10)

One expert also mentioned how safety of the vaccine incorporated quality of service and transportation:

Safety is very important, because there were many scandals about vaccine safety. I don't know if you pay attention to this, but there seemed to be some criminals that trafficked vaccines, which led to critical news reports. So the general population care about safety the most. (E08)

The general population also was highly concerned about safety, but they framed their concerns negatively, as in they had a gut feeling that vaccines might not be safe.

Previously there were rumors about HPV vaccination lead to disability. (E21)

Effectiveness. Effectiveness was the second most important attribute to interviewees. Similar to their thoughts on effectiveness, experts believed that statistics were important to evaluate the effectiveness of a vaccine.

However, as a new vaccine on market, you need to prove that Hepatitis E vaccine was tested previously and effective. If you want

them to accept a new vaccine that was not tested, people will think that they are treated as guinea pigs. You need to present statistics to show the vaccine's effectiveness, the antibody level, etc. (E08)

Experts thought of effectiveness across several dimensions, including duration of protection and the length of time that individuals are protected after vaccination.

I think information about the duration of protection should be provided. We know the expiration date or shelf life for many other things. How long I'm going to be protected by the vaccine after being vaccinated? (E08)

Can this vaccine really prevent the corresponding disease? Of course, we can't be 100% sure. But if there is a high probability of preventing this disease, it is still considered to be effective. (E07)

Many experts believed that, for the HepE vaccine in particular, additional follow-up studies were needed to better understand long-term effectiveness of the vaccine.

There are two ways of finding the duration of protection. One is to simulate using mathematical models, so that we can say the duration of protection even if it's newly introduced to the market. However, if we want to figure out the duration of protection according to evidence-based vaccinology, you can't say the exact duration of protection unless the vaccine is used for a long time and have many related data and cases available. There aren't many vaccine that can provide this kind of duration of protection. (E22)

In contrast to experts, nonexperts had a more vague understanding of effectiveness.

What's the ideal level of protection rate for you? (I)

It should be above 60%. [...] And a life-long protection is the best because I have no idea about my antibody level. It would be nice if life-long protection can be provided by just being vaccinated once. If the protection duration is 5 to 10 years, I have no idea when I should get re-vaccinated without notifications. The longer, the better. (N02)

Experts also thought that the general population would have a vague understanding of vaccine effectiveness which does not rely on statistics.

People will try to understand the effectiveness of the vaccine, but are they going to come up with a scientific and objective conclusion based on papers about clinical experience, or will they just believe the vaccine to be effective based on its reputation? Papers are hard to understand for many people unless they spend a lot of time trying. As a result, they can only base their judgement on the judgement of others. As for protection duration, some people will ask about this. One of the problem is that vaccines can't provide 100% protection. Many of the general population can't understand this. (E22)

Reputation of the vaccine was another shade of "effectiveness" which was mentioned.

If a vaccine is used for are long time in the general population, people may recognize this vaccine as a brand with history, or being

tested on the market for a long time, which makes them more confident about the safety and effectiveness. If it's a new product, the general population may not recognize it. (E01)

Other vaccine attributes. Both experts and nonexperts mentioned that price was important to consider when making vaccine decisions, but it was secondary to effectiveness and safety.

In areas that are more developed, price will not be the primary attribute people take into consideration when making decisions. They may give priority to the burden of the disease, then the safety and effectiveness. As for the price, it ranked towards the end. (E01)

I don't really care about the price. Effectiveness is the major attribute for me. (N02)

Most interviewees stated that 100 to 300 RMB (US\$15-US\$45) was a reasonable price per vaccine dose. Some participants believed that a higher price could be given for vaccines against more serious diseases.

Price may be an influential factors, but if the disease is severe enough, the general population will ignore the price. HPV vaccines are in short supply even given its high price. (E23)

What's a reasonable price per vaccine dose for general population? (I)

It definitely based on the severity. It's hard to say, but I think below 500. It may be easier to accept if the price is around 200-300. (E20)

The HPV vaccine is not considered to be very expensive even if it costs 800 RMB (\$120). (E21)

Convenience of vaccination was discussed by some participants but was secondary to effectiveness and safety. Convenience was thought of time and place. Experts mentioned how vaccination clinics' schedules are not convenient for working adults and that clinics targeted for high-risk populations may be necessary. Because the HepE vaccine requires several doses, there could also be attrition in series completion.

Adults have jobs and families. Can they squeeze some time to go to a convenient place to get the vaccine? Vaccinations are usually provided by community clinics and other healthcare institutions, but vaccination service is usually provided during weekdays, rarely during weekends. (E04)

About the convenience of vaccination, are you going to refuse vaccination if it's not convenient? (I)

This will influence my decision, for example, in terms of time and distance. (N02)

For me, one of the major influencing factors is that 3 doses are too troublesome if I consider myself unlikely to be exposed. (E20)

At present, the vaccination sites in Shanghai are mainly in community clinics. This policy is mainly designed for children's vaccination, but for adult vaccination, especially those for high-risk population, convenience is required. For example, medical staff

hope to be able to be vaccinated in the hospital. It may not be convenient for them if they are required to go to community clinics. The vaccination site in the current vaccination strategy is relatively rigid. (E09)

Presenting attributes

Experts, particularly government public health workers, believed the general population would trust the government as a source of information about attributes.

Promotion carried out by government is the most trustworthy. (N02)

What organization should participate in the promotion process? (I)

Hospitals and healthcare sectors of the government. (N04)

However, it was also thought that personal anecdotes about the vaccine or cases of disease from acquaintances could be powerful ways to disseminate information.

I think they may pay more attention to successful cases around them. For example, if I have a colleague, friend or relative that are vaccinated, there will be an obvious effect. [. . .] Also, if one of my friends is a hepatitis E case, I would go look for ways to protect myself. If a vaccine is available, I'll go get vaccinated. (E09)

For example, I had my family vaccinated for pneumonia when it's not free. My family felt like they coughed less, especially my parents. And they will tell other people about this. (E23)

The public has a herd mentality! If other people are all vaccinated, I'd better be vaccinated. (N02)

Social media, like WeChat (an app similar to Facebook in China), was an important source for news and could be a way for members of the general population to learn about attributes of the HepE vaccine or disease.

We used to consider television and newspapers as a nice way to convey information. But now, there may be fewer and fewer people reading newspapers. Advertisements can be skipped when watching TVs. In turn, some active searches may be made. Baidu or other professional searches can be used. Moreover, the transmission of information on the mobile phone may be very powerful recently, and we are still underestimating its power. (E22)

How do you get access to healthcare-related information in school? (I)

From school promotions and WeChat posts. (N04)

Discussion

Although HepE is a notifiable disease in China, with just under 30 000 cases in China annually⁹ (including 500 cases a year in Shanghai),¹⁶ vaccination uptake is extremely low—with only a couple hundred individuals in Shanghai having received the vaccine since it was licensed in 2011. We contacted experts

and nonexperts and asked them in qualitative interviews to identify what attributes are important when promoting the vaccine. Safety and effectiveness (but not price) of the vaccine, along with severity of disease and transmission route of infection, were all listed as important attributes. Emphasizing the importance of sharing stories from cases, relying on personal experiences, staying away from statistical explanations, and using the government as a source of promotion were other points repeatedly raised by the participants.

Overall, the vaccine decision-making process among the general population can be visually described by Figure 1. Individuals would first evaluate their exposure risk based on the transmission route and the importance (prevalence) of the disease. If they considered themselves as having a substantial risk of being infected, they would perform a simplified cost-benefit analysis based on their perceptions of disease severity and disease burden (ie, social and economic costs).

These inputs correspond well to constructs in the Health Belief Model.¹⁷ The Health Belief Model posits that behavioral changes, such as obtaining a vaccine, can be described by perceived susceptibility and perceived severity of the health condition, along with perceived benefits minus perceived barriers of the behavior.¹⁸ The Health Belief Model is widely used throughout the world and in Asian settings like China¹⁹ and Malaysia.²⁰ However, it should be recognized that the specific ways that individuals conceive of these constructs could vary across vaccines and not every construct significantly impacts vaccination decisions in every situation. For example, we found that people talk about susceptibility of infection transmission, and they may be more willing to accept a vaccine if they think the disease cannot be prevented by another mechanism. A quantitative study of measles and pneumococcus vaccines in Shanghai related susceptibility to prevalence of disease in the population and found no significant relationship between perceived prevalence and vaccine necessity.¹⁹

Previous qualitative studies of vaccination in China have also contributed to the discussion on how to best present and promote vaccines in the country. A previous qualitative study in Shanghai on vaccinations in general found that parent's severity was conceived of on at least 2 different dimensions—one being whether the disease resulted in hospitalization and the other being whether the disease resulted in long-term disabilities; susceptibility was also often couched in ease of transmission and contagiousness.²¹ Similar to our findings of preventability, a study of a hypothetical Shigella vaccine also found that participants were focused on preventability and if a vaccine added protection beyond water and sanitation treatment.²²

Price was not mentioned as an important attribute in this study, although societal costs associated with disease—like missing school—were described by participants. We note that at the time of the study, the vaccine costs 170 RMB (US\$25) per dose, but, as of April 2019, the manufacturer has inflated this price to 860 RMB (US\$125) per dose, and the vaccine was

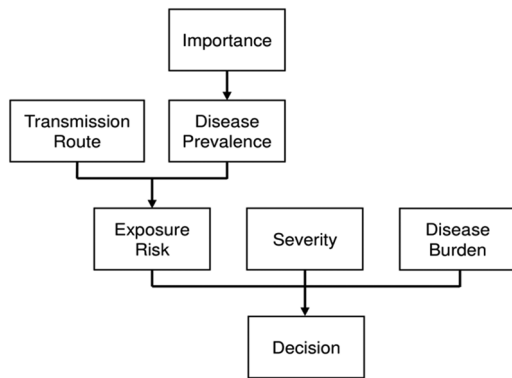


Figure 1. Diagram of decision-making inputs related to hepatitis E vaccination in the general population of Shanghai, China.

withdrawn from the procurement platform through which district CDCs purchase vaccines and distribute them to vaccination clinics. Although the initial cost of the vaccine (170 RMB) was well within the range of vaccine costs that most participants indicated they were willing to bear, the newest cost is not, and would likely have influenced uptake, regardless of the decision to remove the vaccine from the procurement platform.

Recommendations for promoting the vaccine

There is little guidance from official sources on how best to introduce vaccine. This is likely due to the distributed nature of vaccine development. In the United States, for example, basic research related to immunology and vaccinology may be undertaken at academic centers through funding from the National Institutes of Health, whereas the shift to phase III clinical trials often necessitates oversight and funding from pharmaceutical manufacturers. The Food and Drug Administration will then license the vaccine based on its safety profile and after undergoing a full risk-benefit analysis. Finally, the Advisory Committee on Immunization Practices may issue a recommendation for its use, divided into 2 categories as follows: Category A represents a broad recommendation for a specific age range and Category B recommendations are for selected subpopulations and with more clinical input into decision-making.²³ The China Experts Advisory Committee on Immunization Program was started in 1982 and has issued guidance on government funding for vaccines at a national level based on scientific evidence,¹ although individual provinces may choose to support additional vaccines. Similarly, the WHO²⁴ will issue a tiered set of recommendations for the Expanded Program on Immunization in its position papers, which include recommendations for a vaccine to be used in all populations, in countries with high-functioning immunization programs or in settings with high burden of disease. Notably, these organizations assume that a recommendation means that all individuals with access to these vaccines will get these vaccines. A basic understanding of how target populations view a particular disease or vaccine can better inform, and could possibly, in the future, be part of various governmental

vaccination recommendation processes. Guignard et al⁴ expand on these issues in information, communication, and partnerships in the roll-out of vaccines in LMICs. For example, the roll-out of the meningococcal A vaccine in Burkina Faso relied on celebrity endorsement and an address from the national president.

For the HepE vaccine, the content of these recommendations could include a focus on attributes frequently emphasized by the participants, such as severity, transmissibility, and the safety and effectiveness of vaccine. Government sources were thought to be particularly reliable, and presenting information about the vaccine during an outbreak would be one way to tie information about the disease to the availability of a vaccine. Social media could also be a convenient route for promoting the vaccine.¹⁵ Participants valued hearing from others in the community and from those with experience with the disease, and so showcasing the experience of HepE cases would be valuable. In a similar manner, parents in Peru indicated that hearing from individuals with cervical cancer increased their willingness to accept the HPV vaccine for their daughters.²⁵ Relying on experiences of cases would be more of a reactive strategy, however, and one modeling study has estimated that a pre-emptive vaccination approach is more effective at controlling outbreaks.²⁶

Our qualitative interviews also suggest that an overreliance on statistics (related to effectiveness, for example) may be unable to persuade members of the general population about the importance of vaccination. This is probably more of a concern in groups with less numeracy—who are less influenced by statistics and numbers.²⁷ Imparting individuals with a memorable idea (a “gist”) and using emotions can have long-term impacts on vaccine decision-making and can guard against false beliefs.²⁸ Such a clear communication about vaccination probably would also include anecdotes from a case.

However, there are also limitations in how the HepE vaccine can be promoted. It currently is only being manufactured by one company in China. Moreover, the vaccine requires the individual to pay instead of being funded by the government. For these reasons, the Chinese government can only take an indirect role in promoting the vaccine through educating the public about the disease. In addition, China’s government-run immunization program currently focuses primarily on infants, with limited vaccines, like pneumococcal and hepatitis B vaccines, given to certain high-risk groups depending on provincial-level policies.

We note that, with current promotion methods, distribution and uptake of the vaccine is limited. Among all cases interviewed in this study, none had a family member who was vaccinated after the case tested positive for HepE.

Strengths and limitations

As a qualitative study, there exists a number of strengths and limitations in the analysis and interpretation of the results. Qualitative studies are best at identifying the full distribution

of ideas within a population, but they cannot estimate the proportion of individuals who believe in those ideas. A strength of our study was the large number of individuals from various fields who contributed to the study in their interviews. However, our study primarily focused on Shanghai, with most participants located within the city; thus, our results may not represent ideas held by those outside this city, particularly as there are strong rural-urban disparities on a number of fronts in China, and individuals outside of relatively wealthy urban settings may have different preferences for a for-fee vaccine. Our methods of selection certainly could have biased us toward individuals with more positive views toward health care, and we may have included more affluent individuals in the participant pool, for whom price would not be as important of an attribute. We also note that the experts were notified about the interview topic prior to the interview, and so they were able to review material about HepE before being interviewed. In this way, we were unable to objectively assess their knowledge.

Conclusions

Hepatitis E is a vaccine-preventable food- and water-borne disease in China. Knowledge of the disease and uptake of the vaccine are quite low in Shanghai. Qualitative interviews with experts and nonexperts have revealed that focusing on attributes of disease severity and susceptibility to infection, as well as vaccine safety and effectiveness within stories of cases, are preferred ways to promote the vaccine.

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Author Contributions

HR, ALW, YHL, and MLB conceived of the study. HR, ALW, JYX, KYC, and XXC performed data collection. HR, ALW, JYX, and TH performed qualitative data analysis. HR and ALW drafted manuscript. KYC, YHL, XBZ, MLB, and XXC revised manuscript.

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