Original Article

Survey of Healthcare Workers' Attitudes, Beliefs and Willingness to Receive the 2009 Pandemic Influenza A (H1N1) Vaccine and the Impact of Educational Campaigns

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Abstract

Introduction: Vaccination against the 2009 pandemic influenza A (H1N1) represents the best method of controlling spread, morbidity and mortality due to the pandemic. While this has been recommended for all healthcare-workers locally, it is unclear if they are willing to accept the vaccination. Materials and Methods: A cross-sectional survey was conducted before and after an educational talk on pandemic influenza and vaccines to ascertain responses and stated reasons, as well as identify associated factors. Results: For 235 returned forms prior to the talk, 182 (77.4%) responded positively, while 161 of 192 (83.8%) who returned forms after the talk responded positively. Importantly, 12 of 47 (25.5%) initially negative responses turned positive after education. The desire to protect family, self and patients were the 3 most important reasons for staff wanting to receive the vaccine, while the concern regarding potential side effects was the most important reason for refusal. Conclusions: A high rate of willingness to receive pandemic influenza vaccine was found, which was in contrast to acceptance rates elsewhere and during previous influenza seasons. Education can play an important role in altering vaccine acceptance behaviour, with an emphasis on addressing concerns with regard to potential side effects.

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Key words: Education, Health knowledge, Practices, Vaccination rates

Introduction

Since the first positive 2009 pandemic influenza A (H1N1) case was reported in Singapore on 26 May 2009,[1] the country saw an exponential rise in numbers of infected cases despite initial containment followed by mitigation efforts. Local incidence for acute upper respiratory infections (which was a reasonable surrogate for pandemic influenza activity ever since individual case counting was stopped[2,3]) peaked in early to mid-August 2009 and have since declined[4]; by late September 2009 the pandemic virus accounted for 21% of all influenza-like illnesses in the community.[5] The scenario was similar in other countries that have also experienced a similar epidemiologic curve. Although the number of cases have dwindled, global efforts have not relaxed but instead have shifted towards research and production of pandemic vaccines to prevent a potentially more lethal "second wave" of infections due to the 2009 pandemic influenza A (H1N1), based on its similarity to and lessons learnt from the 1918 to 1919 Spanish flu pandemic that killed an estimated 40 million people worldwide.[6-9] While such efforts were underway, reports have emerged that healthcare workers (HCW) may not be inclined to receive pandemic vaccines despite being urged to do so, even though they were at a high-risk of being infected and potentially acting as amplifiers of infection, citing safety and efficacy concerns.[10,11] As part of KK Women's and Children's Hospital's (KKH) Pandemic Preparedness Plan, a request for acquisition of pandemic vaccines from the Ministry of Health was made and an estimate of interest in receiving the vaccine was needed to facilitate this; part of the concern was that historically the hospital's influenza vaccination campaigns have had progressively more lukewarm responses and there might be significant wastage [participation in influenza vaccination was not mandatory and had no bearing on the individual's performance appraisal in this hospital, and vaccination uptake rates have been decreasing from a peak of 77.4%

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in 2003 post-severe acute respiratory syndrome (SARS) to 46.6% in 2005, then 38.9% in 2007 and recently only 21.2% in April to May this year even as the World Health Organization (WHO) declared that the pandemic had begun (Fig. 1)].[12] We also decided to take the opportunity to ascertain attitudes and beliefs amongst HCW toward the pandemic vaccine and identify factors that might predict receipt or refusal of the vaccine.

Materials and Methods

KKH employs nearly 3500 staff[12] (both front-line HCW as well as allied health, ancillary and administrative staff), and is the largest maternity and children's hospital in Singapore. KKH holds monthly CEO-CMB (Chief Executive Officer-Chairman Medical Board) forums to provide an avenue for senior administration to disseminate information to all staff. In early September 2009, at one of the hospital's Pandemic Influenza Taskforce meetings, it was decided that an update by an Infectious Disease physician should be provided to all staff on pandemic influenza vaccines at the upcoming forum, and ascertain willingness to receive the vaccine. We would also take the opportunity to ascertain HCW attitudes and beliefs towards pandemic influenza vaccines. This would be accomplished by asking all staff attending the forum to fill up pre-forum and post-forum survey forms on willingness to receive the vaccine, as well as provide reasons for their decision, and if agreeable, to provide identifying personal details to enable baseline demographic and immunisation details to be obtained from Human Resource (see Figure 2 for post-forum survey; the pre-forum survey is similar except it does not contain a request for demographic/vaccination data).

The educational talk was held at one CEO-CMB forum on 9 September 2009. Forms were distributed and collected, the responses tallied, and a request sent to Human Resources to collect the following information for staff who consented to releasing their biodata: age, sex, race, number of years employed by KKH, job classification (Medical; Nursing; Allied Health – such as dieticians, therapists, radiographers or healthcare technologists; Ancillary – mainly support staff such as clerks, clinic assistants and librarians; and Administrative – such as accounting/human resource officers, information technologists and secretaries), amount of medical sick leave taken within the last calendar year (from August 2008 to August 2009), and receipt of influenza vaccination within the last year (as a policy, personal vaccination records longer than a year were routinely destroyed by Human Resources). With regard to reasons offered for willingness or non-willingness to receive pandemic vaccine, a percentage was calculated for each reason based on the number of participants stating the reason as a cause for the response, divided by the total number of respondents with the same response (e.g., for the reason "I don't want to miss work" listed under the causes for positive responses, the percentage refers to the number of people stating it as a reason if they were willing to receive the vaccine, over the total number of people willing to receive the vaccine).

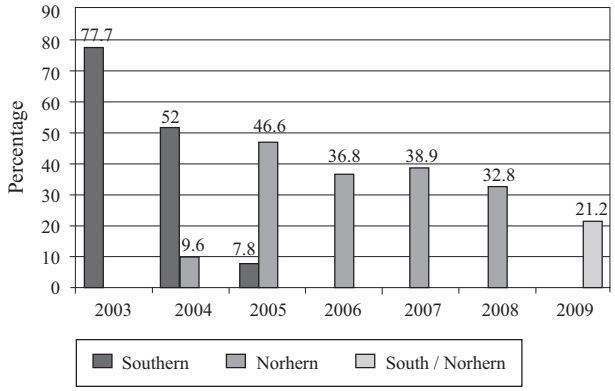

Fig. 1. Influenza vaccine uptake rate since influenza vaccination campaign started in 2002.

AFTER FORUM

Dear staff,

Kindly complete the survey below and deposit at the box at the registration counter.

1. Would you take the H1N1 vaccine if available? Yes / No

If Yes, why? (check all that may apply)

- ☐ I don't want to get sick from Influenza
- ☐ I want to protect my patients
- ☐ I want to protect my family
- ☐ The vaccine is freely available
- ☐ I don't want to miss work because of Influenza
- ☐ I believe the vaccine works
- ☐ The vaccine is free
- ☐ I want to comply witn infection control / hospital recommendations
- ☐ I want to set a good example for my patients by being vaccinated

If No, why? (check all that may apply)

- ☐ Influenza is not a serious illness
- ☐ I don't think I can fall sick from influenza
- ☐ I don't think the vaccine works
- ☐ I'm worried about side effects of the vaccine
- ☐ I have an allergy or medical condition(s) that prevents me from getting the vaccine
- ☐ I do not like / fear needles
- ☐ I avoid medicine (including vaccines) if I can
- ☐ The vaccine will not be freely available
- ☐ I don't have time to get the vaccine*

Do you mind if we obtain demographic / immunization details about yourself

1. For this study? Yes / No
2. To register for the upcoming vaccine? Yes / No

If you answer yes to any of the above, kindly enter your employee/MCR/Nursing/NRIC No.: _____

Thank you for participating in our survey.

Fig. 2. Post-forum survey form.

Descriptive statistics were applied to continuous data. The Mann-Whitney test was applied to comparisons of non-parametric data such as age, number of years

Table 1. Demographic and Immunisation Details for Consenting Healthcare Workers

Factor	Overall group (n = 106)	Pre-forum positive group (n = 94)	Pre-forum negative group (n = 12)	*P*
Age (mean, range)	44 (22-70)	43 (22-70)	45 (24-62)	0.74
Gender (Male: Female)	9: 97	9: 85	0: 12	0.59
Race (Chinese:Malay:Indian:Other)	72:13:10:11	61:12:10:11	11:1:0:0	0.26
No. of years employed in KKH (mean, range)	8.6 (0.1-19.5)	8.7 (0.1-19.5)	7.2 (0.1-19.5)	0.54
Job Classification (Medical:Nursing: Allied Health:Ancillary: Administrative)	9:47:15:21:14	9:41:12:20:12	0:6:3:1:2	0.49
No. of days of medical sick leave taken in the last year (mean, range)	3.6 (0-20)	3.5 (0-20)	4 (0-10)	0.68
Recent receipt of Influenza vaccine in the last year (Yes:No)	14:92	13:81	1:11	0.6

Post-hoc chi-square analysis of the job classifications of staff for the entire hospital (medical:nursing:allied health:ancillary:administrative ratios of 228: 1595: 597: 833: 273) versus survey participants who consented to release demographic data (corresponding ratios of 9: 47: 15: 21: 14) did not show any significant differences ($P = 0.226$).

employed, and amount of medical sick leave taken between different populations. For categorical or nominal data (such as sex, race, job classification and recent receipt of influenza vaccine, and including continuous data lumped into scaled groups), 2-tailed chi-square tests (with Yate's correction for items with less than 5 data points) were performed to assess for significant associations with pre-forum professed willingness to receive or refuse pandemic vaccine. Multivariate binary logistic regression analysis was performed for all independent variables that were found to be significantly associated by univariate analyses. Results were considered significant when *P* values were less than 0.05. Data analysis was performed using SPSS for Windows, v14 (Chicago, IL, USA). The study was reviewed by Singhealth Centralised Institutional Review Board (CIRB), and approval was obtained for waiver of informed consent from participants, although this was still sought in the survey forms.

Results

Distribution of Survey Responses

A total of 319 staff were logged to have attended the forum (9% of the hospital's total staff strength of 3526 people). Two hundred and ninety-seven survey forms were distributed before and after the forum, and 229 pre-forum survey forms (response rate of 77.1%) and 192 post-forum survey forms (response rate of 64.6%; 6 of participants did not submit a pre-forum survey form) were returned (Fig. 3). Of the pre-forum survey forms, 182 (79.5%) responded positively to the pandemic vaccine while 47 (20.5%) declined. For the 182 participants who were willing to receive the vaccine prior to the forum, 36 (20%) did not return post-forum survey forms, but of those who did return the forms, 98.6% (144 of 146) would still be willing to receive the vaccine after the forum, while 2 (1.4%) changed their minds. For the 47 participants who were unwilling to receive the vaccine prior to the forum, 7 (14.9%) did not return post-forum survey forms; of those who did return forms, 70% (28 of 40) remained unwilling to receive the vaccine, 30% (12 of 40) changed their minds and opted to receive the vaccine after the talk. Thus, of the 186 participants who returned complete data (both pre- and post-forum forms), 83.9% (156 of 186) were willing to receive the pandemic vaccine, including 12 who changed their minds.

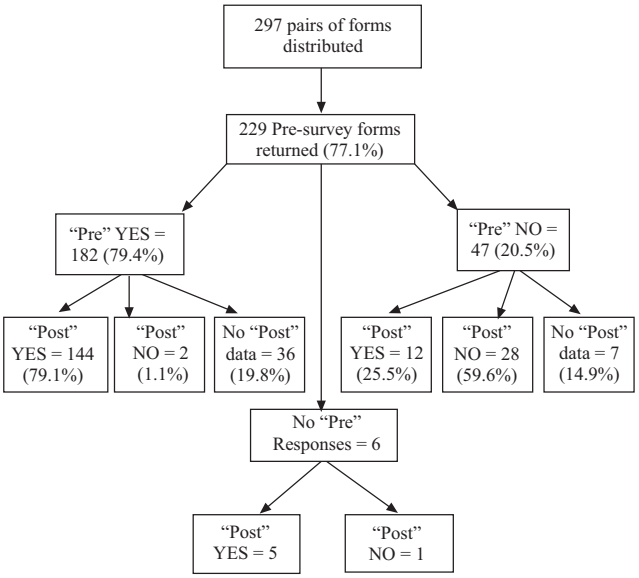

Fig. 3. Distribution of survey responses.

Reasons for Willingness or Non-willingness to Receive Pandemic Influenza Vaccine

The top 3 reasons for willingness to receive pandemic vaccines were a desire to protect one's family (79.3%), oneself (73.5%) and one's patients (65.6%), while the fourth most common reason was a desire to comply with infection control or hospital recommendations (54%, Fig. 4). The most common reason given for refusing the vaccine was concern of potential side effects (70.5%), with all other reasons being less than 26% (Fig. 5).

Subgroup Analysis of Background Factors for Willingness or Non-willingness to Receive Pandemic Vaccine

Of the 192 participants who returned post-forum forms, 110 consented to release demographic/recent vaccination data, but relevant data were obtained only for 106 (3 participants supplied erroneous identifying information and could not be matched with hospital Human Resource databases, while 1 was a duplicate). Table 1 shows the demographic profile of HCW. Of these, only 14 (of 106, or 13.2%) had a history of recent influenza vaccination within the past year, which was even lower than the uptake rate during the last 2 influenza vaccination campaigns. Neither univariate nor multivariate analyses of demographic factors or recent vaccination status between the 2 groups of respondents revealed any significant associations (Table 1).

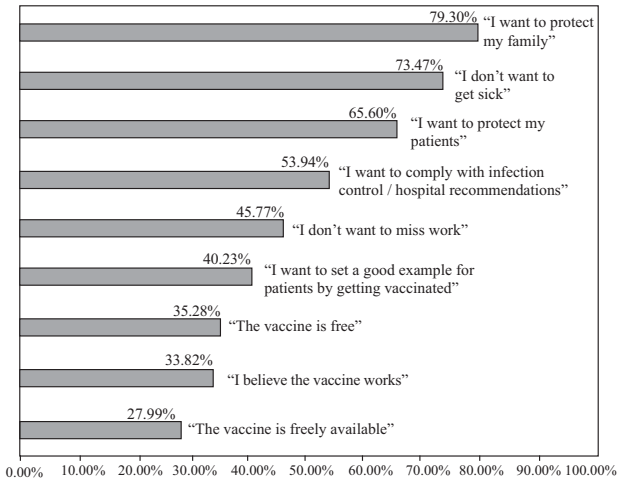

Fig. 4. Reasons for willingness to receive pandemic vaccine.

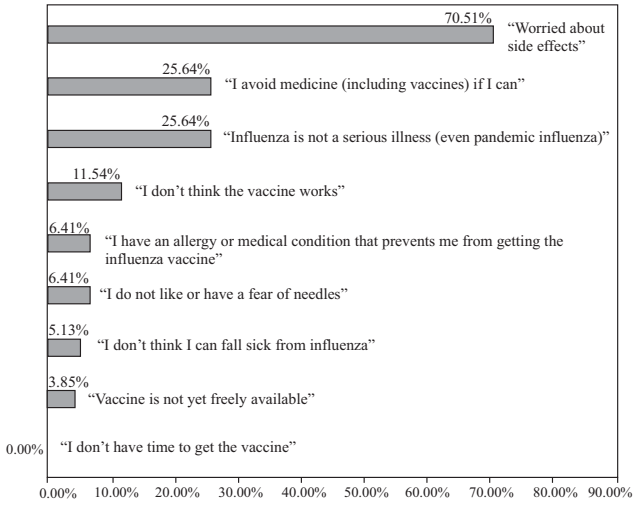

Fig. 5. Reasons for non-willingness to receive pandemic vaccine.

Discussion

The high rate of willingness to receive pandemic vaccine amongst our HCW (around 80% overall) was a surprise, especially since historical rates of influenza vaccine uptake in KKH had been declining (Fig. 1). This also contrasted with studies done elsewhere. In a recent review by Hofmann et al,[13,14] 32 studies had vaccination rates between 2.1% and 82%, but only 7 had rates of more than 50%, and 12 had vaccination rates of less than 20%. A recent survey done by Chor et al[11] noted that only 47.9% of HCW in Hong Kong were willing to receive pandemic vaccine, although the study was done in May 2009 at WHO alert phase 5. One possible reason for our high positive response could have been that since the survey was done well after the peak of the initial wave of the pandemic, HCW had sufficient time to learn of the potential risks and complications of infection from the 2009 pandemic influenza A (H1N1) as well as a potentially more lethal "second wave", and hence were made aware of their perceived personal, family and community vulnerability and level of protection. This is supported by our observation of the reasons given by participants who responded positively. Another possibility was that HCW in Singapore generally have a greater awareness of the threat posed by pandemic influenza and respond more positively.[15] Yet another reason could be that the patient population in KKH consisted of paediatric and obstetric patients, who were by themselves at higher risk for influenza complications; this could have made HCW more aware that getting vaccinated reflected a duty of care.[16] Furthermore, although 20.5% of participants who returned forms initially refused the vaccine, around a quarter (12 of 47, or 25.5%) changed their minds after a single educational talk. Thus, more opportunities could be created for staff education regarding pandemic vaccines and potentially maintaining or even increasing uptake rates.

Contents of educational and motivational materials must be tailored to the needs of the target audience. Hollmeyer et al[17] published a recent review examining reasons for HCW acceptance or refusal of influenza vaccines in hospitals and found that of 15 studies, self-protection was the most important reason for acceptance (a distant second being protection of patients), while in 21 studies, fear of adverse

reactions and a lack of concern were the 2 most common reasons for refusal. However, significant heterogeneity was present, and none of the reasons in any study in the review was mentioned by more than 60% of participants. In Hong Kong, the top 2 reasons for intending to receive pandemic vaccines were a desire to follow the health authority's advice followed by self-protection, while the reasons for refusal were evenly spread out between worry of side effects, a perception that the "timing" is not right, that the vaccine might not work, or just plain refusal without a rational explanation.[11] Yet for HCW in KKH, a strong desire to protect family, self and patients as well as a fear of side effects were the most common reasons for accepting or refusing the pandemic vaccine respectively. Our focus for future educational materials should thus emphasise the importance of clinical and social responsibility in protecting these groups of patients while accurately and sensitively address HCW concerns on potential adverse reactions. While such an approach may be appropriate for KKH, this may not be generalisable to other hospitals in Singapore or elsewhere, and underscores the need for each individual hospital to ascertain reasons for receipt or refusal of influenza vaccines for their own staff.

We were unable to identify predictive factors for receipt or refusal of the pandemic vaccine in our survey, despite described predictive factors in literature for accepting seasonal influenza vaccines such as older age,[18] male[19] (or female sex[20]), being a physician, longer duration of employment, little absenteeism[21] and previous receipt of influenza vaccination.[22] In fact, receipt of previous influenza vaccine strongly predicts receipt of future influenza vaccine in most studies, and can be said to reflect personal conviction.[11,17,18,22,23] One likely explanation was that only 13.2% of our participants had received influenza vaccination within the past year. While a significant association could have been found if we had used a history of influenza vaccination longer than a year, we no longer had access to earlier records, and we felt that recent receipt of vaccine at low uptake rates was more likely to suggest a consistent attitude in HCW of getting immunised. Another possibility was that HCW were vaccinated but records not retained, although this was less likely. HCW could also have been vaccinated outside KKH but this was also unlikely as influenza vaccines were given free in KKH.

Several other limitations of the study should be noted. Less than 10% of hospital staff attended the forum, and there may be staff that attended but did not have their attendance captured or did not receive a survey form. Hence, the response rate could be lower than that reported and bias could have resulted from misrepresentation (although comparison of job classifications between survey participants and for the entire hospital was not significantly different). Also, the attitudes and behaviour of HCW who attend such meetings could be very different from those who do not, and greatly change the level of willingness and non-willingness (and reasons offered) to receive pandemic vaccines. Less than half of the participants agreed to release demographic and influenza vaccination data, again potentially resulting in bias. While we used the rate of prior absenteeism as a surrogate for individual health status (with the hypothesis being those who are absent more often may be more inclined to receive vaccination), it may not be so and may instead be an attitudinal indicator.

Further surveys would be needed to validate the results of the current study. Other strategies, besides educational campaigns, may be necessary to maintain or even increase HCW willingness to receive pandemic vaccines.[24,25] However, the high response rate in our study bodes well in terms of national and hospital planning for the upcoming pandemic vaccination campaign, as only high rates of vaccine uptake would reduce occupational risk of infection and prevent transmission of pandemic influenza, especially to patients at high-risk of secondary complications and death.[13,26]

(Note: The hospital received its pandemic influenza vaccine in late November 2009, and began vaccination of HCW in the first week of December. As of 18 December 2009, 2020 staff were vaccinated against the 2009 pandemic influenza A (H1N1), which was 52.3% of the total hospital staff (the number of staff had risen to 3826 during this period). This was more than double the response rates for the vaccination campaign in April this year, and was the second highest rate recorded since SARS in 2003.)

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