

## Factors Influencing H1N1 Vaccination Among Primary Health Care Workers: A Cross-Sectional Study

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### ABSTRACT

**Background:** Primary health care workers (PHCW) are the front-liners in any infectious disease outbreaks. The recent outbreak of H1N1 influenza demonstrated that uptake of H1N1 vaccination remained low amongst PCHW despite its proven effectiveness. This trend is worrying as PHCW are the first point of contact in any emerging outbreak of future influenza epidemic. To investigate factors influencing willingness of H1N1 vaccination amongst PHCW.

**Methods:** A cross-sectional survey using self-reported questionnaire assessing perception and practice towards H1N1 Influenza A vaccination. A score of 34/50 was used as a cut-off score that divide good and poor perception. Logistic regression analysis used to explore the association between acceptance to be vaccinated and chosen variables.

**Results:** The mean age was 33.91 (SD: 8.20) with mean year of service of 9.23 (SD: 8.0). Acceptance of H1N1 vaccination was 86.3%. A total of 85.9% perceived the vaccination can prevent serious disease. Willingness to be vaccinated influenced by perception at risk of having illness (OR: 10.182, CI: 1.64-63.23, *P* 0.013) and need for vaccination (OR: 11.35, CI: 4.67-27.56, *P* < 0.0001).

**Conclusions:** PCHW were generally willing to be vaccinated should H1N1 Influenza epidemic emerges in the future. However, acceptance of vaccination was influenced by factors of benefit to prevent illness and reduction of spread of the illness. Fear of side-effects remained a barrier toward acceptance which should be taken into account in planning of preparation for future wave of outbreak.

**Keywords:** Influenza A (H1N1) vaccination, practice, primary health care workers

### INTRODUCTION

Since the emergence of a new H1N1 influenza virus in 2009, the pandemic has caused significant clinical and socioeconomic

burden worldwide.<sup>[1]</sup> The first case in Malaysia was reported in May 2009, with the first fatality reported one month later.<sup>[2]</sup> Together with 40 other countries, Malaysia has embarked on a national H1N1 pandemic vaccination campaign to mitigate the transmission with initial action involving providing free vaccination access to the frontliners of the Malaysian health services.

The frontline health care workers (HCW), which include the primary health care workers (PHCW), emergency personnel, and those working in laboratories are known to be at a higher risk of contracting H1N1 influenza because of their direct exposure with the patients or through contact with blood or other bodily fluids.<sup>[3,4]</sup> Thus, in many occasions, the HCW themselves are the efficient transmitters of the virus to potential contacts.<sup>[1,2]</sup> Hence, it is mandatory for HCWs to understand their roles and be protected in case of any emerging pandemic.

As in any infectious disease outbreaks, the PHCW remains vulnerable during the initial stage of H1N1 influenza illness. This is because the infected patients are often asymptomatic during this stage and are most likely to seek treatment in the nearby community health services.<sup>[5]</sup> This puts the PHCW in an unusual position of being both the provider of health services and also the possible vector for transmission.<sup>[6]</sup> Realizing this, H1N1 vaccination has been identified as the most effective strategy in reducing the transmission of the disease, with the added threefold benefit of personal protection, protection of patients, and reduction of absenteeism.<sup>[7]</sup>

Despite the proven effectiveness of this vaccination, the uptake of H1N1 vaccination among HCWs remained low. Studies done among HCWs in hospitals demonstrated vaccination uptake ranged only from 12.7% to 36.5%.<sup>[8-11]</sup> Notable factors identified with the lower uptake include side effects of the vaccine, negative news regarding the vaccine, and lack of understanding about the illness itself. Previous studies on knowledge of H1N1 vaccination performed among nurses demonstrated that level of knowledge influenced the decision for vaccination, with those working in primary care were the highest in terms of knowledge score.<sup>[11,12]</sup>

In Malaysia, as in many other developing countries, PHCW remains the integral part of

the health care system. The primary health care services would be the first point of contact between public and the health care providers during any infectious disease outbreak. Controlling the next outbreak of H1N1 pandemic depends on a combination of the ability in limiting its spread in the community and the effective campaign of H1N1 vaccination.<sup>[3]</sup> Previous studies on H1N1 vaccination mainly concerned the HCWs in hospital set-up, with minimal information about the actual knowledge and practices of this topic amongst those working in primary care setting. Given these observations, the aim of this study was to investigate factors influencing perception and practices of H1N1 vaccination amongst PHCW in Malaysia.

## METHODS

### Study population and design

We conducted a cross-sectional survey involving 261 PHCW working in eight primary health care clinics in the state of Selangor and one teaching primary health care clinic in Kuala Lumpur between March and June 2011. These primary health care clinics were all affiliated to the Ministry of Health and were involved in the free vaccination campaign during the 2009-2010 outbreaks. These clinics with a total number of 400 staff served a population of approximately 750,000, which is one of the densely populated areas in this country. All clinics provide general medical care to the population including health care campaigns during any infectious disease outbreaks.

All 400 PHCW age 18 years and above who were eligible were invited to participate in the survey. These included doctors, nurses, pharmacists, and health assistants. We excluded those who did not have direct contact with patients, that is, clerks, drivers, and clinic's cleaners. All eligible PHCW were given a set of questionnaire together with a consent form and study information sheet. We assigned a study coordinator, also the chief of staff in each clinic, who was made responsible for collecting the questionnaires at the end of the study period. The sample size for this study was calculated based on similar study<sup>[8]</sup> using Pocock's formula that yielded a total sample size of 261 subjects.

### Questionnaire and its administration

This study used a self-administered number-coded questionnaire, developed iteratively by experts in primary care, infectious disease, and public health specialists.

It contained 43 close-ended questions in three domains, consisting of (1) demographic and clinical background of the respondents, (2) PHCW perception, and (3) practices toward H1N1 Influenza A vaccination. Questions were to be answered either using the 4-points answer (“yes”, “no” or “not sure/do not know” options) or 5-point Likert scale answer (from “strongly disagree” to “strongly disagree” options). Each domain was scored individually; the ‘perception’ domain has 10 for minimum score and 50 for maximum score with 34/50 as the cut-off score for good and poor perception, which was based from the mean score of the study. The ‘practice’ domain was measured using multiple answers of possible causes for the willingness and unwillingness to be vaccinated, which was presented in percentage. The questionnaire was translated forward and backwards in English to Bahasa Malaysia for external validation and was then pre-tested on 50 subjects before it was finalized. These measures were taken as to ensure clarity and ease of administration.

Four investigators were involved in this study; distributing the questionnaire sets that contained information sheet, consent form, and a numbered questionnaire to all eligible respondents in the respective clinics. A period of two weeks was given for the respondents to return the questionnaire to their own respective clinic’s collection center. Another set of questionnaire was later sent to those who failed to return the first time, which the investigators previously cross-checked with the main list in the university. Another period of two weeks was given to return the questionnaire, failing which it was considered as a non-respondent.

The study was reviewed and approved by the Research Ethical Committee of the University Hospital and the Selangor State Health Director. All respondents were ensured of confidentiality and anonymity; they were informed clearly of the purpose of the study, the right to participate or withdraw from the study, and the available help should they require any assistance to complete the questionnaire.

### Statistical analysis

All data were analyzed using statistical package for social science (SPSS) version 19.0. Descriptive analysis and cross-tabulation were used for demographic and clinical characteristics and the practice of vaccination among respondents. Chi-squared and logistic regressions were used to analyze the association between the acceptance to be vaccinated and chosen independent variables. The *P* value of 0.05 or less was considered significant.

## RESULTS

Of 400 questionnaires distributed, 283 were returned giving the overall response rate of 70.6%. A total of 21 questionnaires were excluded from final analysis because of incompleteness of data thus leaving 262 questionnaires left for final analysis.

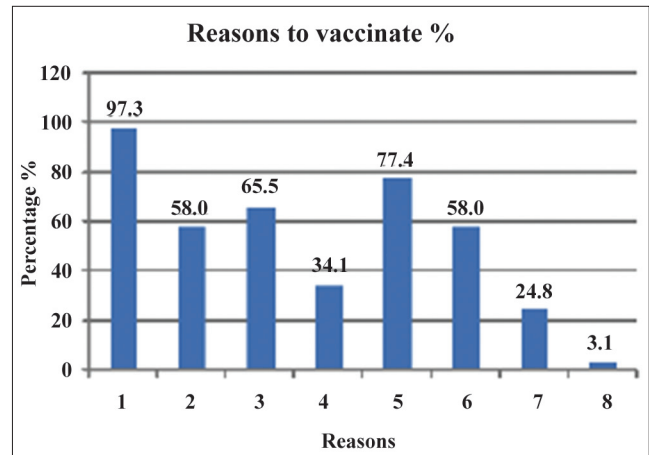
Table 1 shows the demographic characteristics of the respondents. The average age of the respondents was 33.91 (SD 8.20) and 84.7% were women. Malay was the major ethnicity of this cohort (90.8%). Regarding job categories, 61.8% belonged to the nurses/medical assistants group, 21.8% were doctors, and 16.8% were allied health workers. Mean years of service was 9.23 (SD 8.0) with 87.8% of respondents having worked in outpatient set-up, leaving only 9.5% working in laboratories, and 2.7% in emergency room of the clinics.

Only eight PHCW (3.1%) had ever experienced Influenza A H1N1 illness prior to the study; however, only two of them had been admitted for the illness. The proportion of respondents who had received H1N1 Influenza vaccination was high (67.2%) with further 19.1% of those who were not vaccinated willing to be vaccinated in future, giving the acceptance of 86.3% for Influenza A H1N1 vaccination in this study. Of the respondents surveyed, 13.7% refused to receive any form of vaccination should future outbreaks occur. The primary reason (s) for accepting and not accepting the Influenza A H1N1 vaccination are as in Figures 1 and 2. The most common reasons for accepting vaccination were protection of oneself (97.3%) and family members (77.4%) and reducing the risk of getting the infection (65.5%). Whereas, the most common reason for not

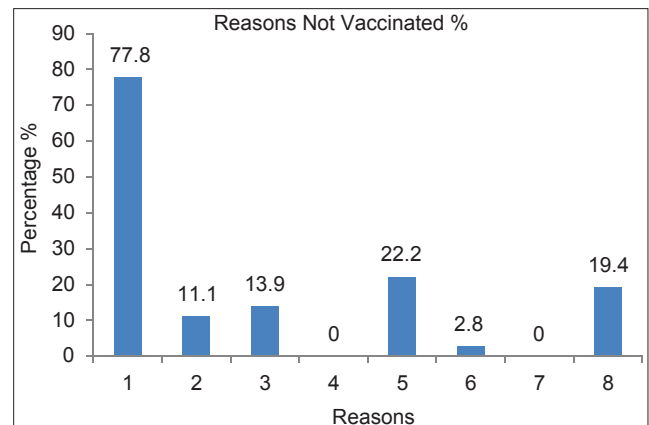
**Table 1:** Sociodemographics characteristics of HCWs

Characteristics	Numbers (n)	Percentage
Gender		
Male	40	15.3
Female	222	84.7
Age (year)		
Mean (SD)	33.9	8.195
20-29	82	31.3
30-39	128	48.9
40-49	33	12.6
50-59	19	7.3
Race		
Malay	238	90.8
Chinese	9	3.4
Indian	9	3.4
Others	6	2.3
Job categories		
Nurses/medical assistants	162	61.8
Doctors	57	21.8
Allied health workers	20	7.6
Attendants	23	8.8
Years of service (years)		
Mean (SD)	9.259	7.950
Place of service		
Emergency room	7	2.7
Outpatient clinics	230	87.8
Pharmacy/laboratory	25	9.5
Smoking		
Yes	16	5.7
No	247	94.3
Asthma		
Yes	29	11.1
No	233	88.9
Chronic illness		
Yes	25	9.5
No	237	90.5
Ever experience Influenza A H1N1		
Yes	8	3.1
No	242	92.4
Ever admitted to hospital for Influenza A H1N1		
Yes	2	0.8
No	260	99.2
Family members ever been infected H1N1		
Yes	10	3.8
No	247	94.3

HCWs: Health care workers, SD: Standard deviation



**Figure 1:** Frequency of the reasons for accepting H1N1 vaccination (n: 226) 1. To protect myself from being infected H1N1 influenza, 2. To protect my patients from being infected H1N1 influenza, 3. I am at risk of getting H1N1 influenza, 4. I was asked by my superiors, 5. To protect the family members, 6. Because the vaccine is free, 7. Because the vaccine is easily available, 8. Others



**Figure 2:** Frequency of the reasons for not accepting H1N1 vaccination (36 respondents) 1. I am worry about the side effect of vaccine, 2. I am not at risk of getting the H1N1 influenza 3. I do not belief with the benefits of the vaccination, 4. The vaccine is not available, 5. I do not like injection, 6. I am too busy, 7. I forget to take the vaccine, 8. Others

accepting vaccination was the worry of the side effects (77.8%).

Table 2 shows the perceptions of PHCWs toward H1N1 Influenza A vaccination. A total of 74.8% respondents scored above 34/50, demonstrating good perception toward the vaccination. Majority of the respondents had the correct perception that H1N1 Influenza vaccination was able to reduce

disease spread (85.9%) and preventing serious disease (80.1%). Our findings also demonstrated that 80.1% perceived that this vaccination should be given every year with 85.9% disagreeing that H1N1 vaccination should be included in National Immunization Schedule.

Willingness toward vaccination was not affected by age ( $P=0.583$ ), job categories ( $P=0.128$ ), years of service ( $P=0.359$ ), and place of service ( $P=0.682$ ). However, willingness to be vaccinated was greatly influenced by perception at risk of having illness (OR: 10.182, CI 1.64-63.23,  $P=0.013$ ), perception that PHCWs were in need for vaccination (OR: 11.35, CI 4.67-27.56,  $P < 0.0001$ ), and good perception toward H1N1 vaccination itself (OR: 5.63, CI: 1.64-63.23,  $P < 0.0001$ ). Our analyses showed that willingness toward vaccination was not influenced by past exposure to H1N1 ( $P=0.311$ ) and perception that H1N1 was a serious illness ( $P=0.234$ ).

## DISCUSSIONS

This study demonstrated high acceptance of H1N1 vaccination among HCWs working in primary care, with more than 80% of respondents willing to be vaccinated if there is a future outbreak of H1N1 influenza virus. Although the virus now moves into post-pandemic stage, a future pandemic wave is possible, because of the nature of the virus that is capable of adapting and replicating itself consequently increasing its virulence in the future

should another pandemic resurface. Thus, it is equally important the HCWs working as front-liners should always be alert to the impending outbreak and constantly be protected from cross-infection during any outbreak. The availability of the H1N1 Influenza vaccine has significantly reduced the transmission of this virus across the community; the World Health Organization (WHO) has recommended that vaccination should be given to high risk groups including the front-liners should the outbreak occur.<sup>[1]</sup>

The high rate of acceptance in this study signified a high level of awareness toward the seriousness of this pandemic and importance of vaccination as a mode of individual protection. The rate of acceptance of HCWs toward H1N1 vaccination varied between studies. A survey in Mexico demonstrated a high acceptance rate of 80% amongst HCW in hospital-based setting, with factors of vaccine safety and the perception that they were the high-risk group influencing the results.<sup>[13]</sup> Conversely, studies done in Europe demonstrated much lower level of acceptance of this vaccination among HCWs with acceptance ranging from 12.7% to 36.5%.<sup>[8,10,14]</sup> Among common factors associated with low acceptance were fear of side effects and previous negative news about the vaccine. As our study was performed after the actual pandemic had passed, it was likely that the proven efficacy and safety of the vaccine during the pandemic had influenced our respondents' toward a more positive perception to the vaccine.

The declaration of pandemic Influenza A H1N1

**Table 2:** Perception toward H1N1 vaccination

Variable	Strongly disagree		Disagree		Not sure/ Don't know		Agree		Strongly agree	
	n	%	n	%	n	%	n	%	n	%
Prevent serious disease	4	1.5	28	10.7	20	7.6	167	63.7	43	16.4
Prevent disease that usually occur without vaccination	15	5.7	61	23.3	36	13.7	132	50.4	18	6.9
Prevent disease that generate significant economic burden	8	3.1	31	11.8	35	13.4	145	55.3	43	16.4
Is safe	4	1.5	12	4.6	52	19.8	155	59.2	39	14.9
Is effective	1	0.4	5	1.9	78	29.8	146	55.7	32	12.2
Is well accepted by the public	4	1.5	20	7.6	50	19.1	158	60.3	30	11.5
Is well accepted by the vaccine providers	2	0.3	9	3.4	70	26.7	142	54.2	39	14.9
Reduce the spread of H1N1	1	0.4	12	4.6	24	9.2	147	56.1	78	29.8
HCWs should get H1N1 vaccination every year	4	1.5	26	9.9	19	7.3	138	52.7	75	28.6
H1N1 is in National Immunization Schedule	35	13.4	72	27.5	68	26	59	22.5	28	10.7

HCWs: Health care workers

by the government in 2010 had demonstrated the gravity of the illness. The provision of free vaccination to the HCWs during the pandemic had further increased the awareness toward the need and importance of H1N1 vaccination in this country. Nonetheless, fear of side effects remained the main barrier toward future vaccination among our HCWs. This perception could be the consequence of the negative news of the vaccine itself or previous experience with other vaccination, notably the measles, mumps, and rubella (MMR) vaccination.<sup>[15,16]</sup> Naing *et al.*, has emphasized that public acceptability of a vaccine depended on two factors, namely fear of the disease especially when perceived as rampant or dangerous and fear of vaccine-associated adverse effects.<sup>[17]</sup> However, this present positive trend could be because of directives from the government for the HCWs to be vaccinated, hence the perception of its safety. These perceptions were not without foundation, as data has shown that the Influenza A H1N1 vaccination is immunogenic and safe.<sup>[18]</sup> Most importantly, a study in China has further vouched the safety of this vaccination, with reported low adverse events in all age groups with no reported cases of Guillain-Barre syndrome.<sup>[19]</sup>

The influence of mass media reporting possible side effects of the vaccination was also reported as barriers to acceptance of H1N1 vaccination in other studies.<sup>[12,20]</sup> Given that there is the possibility of future outbreak of this illness, it is important for the health care policy makers to take into account these barriers in designing future health campaign for H1N1 vaccination. The use of mass media could be to the policy makers' advantage, provided that it is used to correctly inform about the illness, safety, and the need of the H1N1 Influenza A vaccination in reducing the spread of the disease.

This study demonstrated that willingness toward vaccination was not affected by age, job categories, and past exposure of H1N1. This showed a universal acceptance among the HCWs toward the concept of vaccination. These findings were contrary to a previous study done in Italy<sup>[9]</sup> in which older age groups were found to be associated with higher acceptance of vaccination. Literature review suggested that higher compliance with immunization with age could be because of an increased feeling of personal susceptibility toward a disease.<sup>[21]</sup> We hypothesized that the reason for high acceptance among our cohort was because H1N1 Influenza

being a new disease, it garnered massive media coverage, and hence the readiness among HCWs to accept a relatively new vaccination. Although this high acceptance is important in preparing the HCWs for any future outbreak, the actual practice remains a concern. Therefore, continuous education on H1N1 Influenza and its vaccination in the form of teaching/learning modules or workshops should be arranged. This will prepare the HCWs in primary care clinics for any future outbreak. Focused health education to targeted groups has also been suggested in improving understanding of the needs and importance of this vaccination.<sup>[22-26]</sup>

There were limitations to our study. This study only targeted the HCWs in a local district, hence was not a direct representative of PHCWs in Malaysia. However, as this study covered one of the biggest and busiest districts in this country, it might give a snapshot of the opinion among our HCWs. This study used a questionnaire as its study tool; hence some information could not be obtained. We believe that a study using a qualitative method would be useful in future to gain an in-depth insight of HCWs toward the illness and its vaccination.

In conclusion, we found a high acceptance toward H1N1 Influenza A vaccination among PHCWs in eight different clinics in Malaysia. The acceptance was not influenced by age groups, job categories, and previous exposure; this demonstrated a general willingness toward the idea of vaccination. On the other hand, the fear of side effects remained an important barrier toward acceptance among our cohort. This should be taken into account in planning any health care module for the HCWs in preparation for future outbreak. This study is important, as it gave the health care policy makers the parameters of HCWs perceptions toward H1N1 Influenza vaccination.

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