Intention to Accept Pandemic H1N1 Vaccine and the Actual Vaccination Coverage in Nurses at a Chinese Children's Hospital

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Abstract

Objective: Factors associated with the intention of H1N1 influenza vaccination before a vaccination campaign among the paediatric nurses were studied and the actual vaccination coverage investigated. *Methods:* An anonymous questionnaire was designed and distributed to the nurses in the children's hospital. Survey questions were based on related literatures including: demographics, history of seasonal influenza vaccination, history of contact with diagnosed or suspected H1N1 patients, perception of risk and seriousness of the pandemic H1N1 influenza and current measures for preventing H1N1 influenza infection, intention to accept the H1N1 vaccines for themselves and for their children and reasons, intention to accept pandemic vaccination with H1N1 vaccine when pregnant and reasons. *Results:* A total of 402 questionnaires were distributed, and 278 were completed with a response rate of 68.9%. Among the respondents, 205 nurses intended to accept the H1N1 vaccine with a rate of 73.7%. The actual coverage was 46.7%. The frequent reason for the H1N1 vaccine uptake was hoping to get protection from vaccination. Concern of safety and quality of the H1N1 vaccines was the most common reason for refusal of the vaccine. Among the respondents who had a child, only 55.8% would like to let their children accept the vaccine. 88.5% of the respondents said they would not accept H1N1 vaccines when pregnant. Safety and quality of the vaccines was the primary concern. Multivariate analysis showed nurses aged 31-40 years were more likely to accept the H1N1 vaccine (OR=0.009, 95% CI: 0.003-0.026, P<0.001). *Conclusions:* Vaccine safety concern is the primary reason for nurses' unwillingness to accept the vaccine. Free provision and convenience of taking vaccination may increase the influenza vaccine coverage among the nurses. Proper information provision by the media on the safety and efficacy of the vaccines are needed before the vaccination campaign.

Key words H1N1 influenza; Paediatric nurses; Vaccination

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Introduction

Since the first case was reported in Mexico in March, novel influenza A (H1N1) became a global pandemic in 2009. The World Health Organization (WHO) and US Centers for Disease Control (CDC) declared the outbreak to be a pandemic in June, 2009.[1] In China, infections pandemic increased rapidly since September, 2009. On August 10, 2010, WHO declared that the world was no longer in influenza pandemic alert and now moving into the post-pandemic period.[2] Approximately 20,000 H1N1 deaths worldwide due to this pandemic were reported up to August, 2010.[3]

Vaccination is proved to be the best measure for prevention from H1N1 infection. The free large scale vaccination campaign was initiated since late September, 2009 in China when H1N1 virus spread quickly around the country. In every country's preparedness plan for influenza pandemic, healthcare workers and emergency responders with direct patient contact is the target group who will firstly receive the vaccines to protect from infection and reduce nosocomial transmission.[4-6] Beijing city firstly initiated the vaccination project in the target groups including healthcare workers. Subsequently, the other provinces and cities also carried out the vaccination project. Such large scale of voluntary pandemic influenza vaccination had never been implemented in healthcare workers in China before.

Before the voluntary H1N1 vaccination start in Zhejiang province, we conducted this study to investigate intention to accept H1N1 influenza vaccination and factors associated with vaccination intention among the paediatric nurses in a tertiary children's hospital in China. The real vaccination coverage in the nurses in our hospital was also reported.

Methods

Between October 8 and October 22, 2009, we conducted a cross-sectional survey in this tertiary children's hospital. The hospital serves 8.45 million children in Zhejiang Province and neighboring provinces, which has a capacity of 850 beds with an average of 1.41 million outpatients and 32 000 admissions annually. The nurses at direct patient contact positions in the following departments were included: general outpatient department, outpatient department for children with fever, emergency department and 18 inpatient departments including 3 intensive care units, 10 internal departments, and 5 surgery departments.

Based on the information reported by Chor et al,[7] we designed an anonymous one-page questionnaire. Brief information about current pandemic H1N1 influenza worldwide as well as in China was included in the questionnaire. The information on the free-charge voluntary H1N1 vaccination project was also described briefly. The questionnaire collected data on 5 sections including 19 questions: (1) demographics, department of work, years of work as nurses, job title, current position, educational background, number of patients contact per day; (2) history of seasonal influenza vaccination, history of contact with diagnosed or suspected H1N1 patients, knowledge on the pandemic H1N1 influenza, perception of risk and seriousness of the pandemic H1N1 influenza and current measures for preventing H1N1 influenza infection; (3) intention to accept pandemic vaccination with H1N1 vaccine and reasons; (4) intention to let their children accept pandemic vaccination with H1N1 vaccine and reasons; (5) intention to accept pandemic vaccination with H1N1 vaccine when pregnant and reasons. This survey was approved by the Institutional Review Board of Children's Hospital, Zhejiang University School of Medicine.

Head nurses in every department were contacted and the questionnaires were delivered to them by the investigators. Head nurses then distributed the questionnaires to the frontline nurses in their department. Consents were obtained from all the participated nurses. The questionnaires were completed in two weeks, and just before the vaccination project began in the hospital. Completed questionnaires were later collected from the departments by the investigators.

Statistical Analysis

Descriptive statistics were performed. A univariate analysis with X^2 tests was performed to assess the associations between intention to accept the vaccine and the following variables: age (25-30, 31-40, ≥41 years), department of work, years of work as nurses, job title, educational background, number of patients contact per day, history of contact with diagnosed or suspected H1N1 patients, how likely they thought they were to get influenza if there was a pandemic, and how seriously they thought a pandemic would affect their lives. Significant variables were selected into a multivariate logistic regression model to determine which factors are associated with acceptance of pandemic H1N1 vaccination. All data analysis was conducted using SPSS 13.0. $P<0.05$ was considered to be statistically significant.

Results

A total of 402 questionnaires were distributed, and 278 were completed with a response rate of 69.2%. All the targeted 21 departments participated. All the nurses in our hospital are female. Of the 278 respondents, only 9 (3.2%) had previously received the seasonal influenza vaccination in 2008-2009. All these 9 nurses were in the emergency department with a very high number of patients contact every day. Characteristics of the respondents are listed in Table 1.

The percentage of the nurses to accept the pandemic H1N1 influenza vaccination was 73.7% (205/278). The actual H1N1 influenza vaccination coverage rate was 46.7% in the nurses in our hospital. The most frequent reasons for accepting the vaccination were: wanting to prevent infection and be better protected from influenza (161, 78.5%), healthcare workers is the priority group of vaccination (24, 11.7%) and worrying about contracting infection (6, 2.9 %) (Table 2). The common reasons for being unwilling to accept vaccination were: worrying about the safety and quality of the H1N1 vaccine (32, 42.8%), not concerned to be infected (12, 16.4%), thinking that the vaccines will not work (10, 13.7%) and other reasons such as worrying about the side effects (6, 8.2%) (Table 2). About 90% of the respondents took some measures for preventing H1N1 infection. Most commonly used by them were "washing hands frequently", "don't go to the public places with dense population", "respiratory protection", "more exercise and have a balanced diet", "room ventilation" and so on. A total of 238 respondents had children and 55.8% of them intended to let their children take the vaccination. The intention of allowing children accepting vaccines was significantly lower than for themselves (P<0.001). Among the respondents who were willing to accept vaccination for themselves, 72 refused to let their children accept vaccination. The common reasons for refusal of vaccination for their children were "worrying about the safety and quality of the vaccine" and "worrying about the side effects". 88.5% of the respondents said they would not like to take vaccinations if being pregnant. The most frequent reason for refusal was worrying about the safety and quality of the vaccines.

Univariate analysis showed that respondents aged 31-40 years were more likely to take the vaccination and the rate of intention to accept the vaccination in the age group of more than 40 years old were the lowest (X^2=6.607, P=0.037) (Table 1). Those who perceived risk of contracting pandemic influenza and severity of effect of influenza on own life were more likely to accept the vaccination than those who didn't (X^2=6.628, P=0.036; X^2=6.161, P=0.046). Multiple logistic regression models showed only age was significantly associated with the intention to accept the vaccine (OR=0.009, 95% CI: 0.003-0.026, P<0.001).

Discussion

Nurses and other healthcare workers who are infected with the influenza virus will be a vector of infection to the patients they care for. The healthcare workers are the target groups to be vaccinated against the pandemic influenza. This study investigated the willingness of the paediatric nurses to accept the H1N1 influenza vaccines before the vaccination campaign and the associated factors. The actual vaccination coverage in the studied population was also examined.

Our survey was conducted when Chinese CDC declared a second run of the influenza and much severe H1N1 pandemic in China. Healthcare workers were among the first groups to take the vaccination in Zhejiang province. The overall willingness for H1N1 influenza vaccination in the nurses was 73.7% which was higher than reported by a survey in the healthcare workers in Hong Kong (less than 50% at WHO alert phase 5).[7] The actual vaccination coverage was much lower than the data obtained from the survey before the vaccination, which was similar to that in Hong Kong[7] and Korea.[8] The difference between the intention before the vaccination and the actual vaccination coverage in the studied population is significantly different. We assumed the associated factors were the news of adverse events following immunisation reported by media from other cities and provinces and the distrust of the efficacy of the vaccines. The overrated vaccination intention may also be associated with the method of questionnaire survey we adopted but not direct interviewing.

Among the nurses who were willing to accept the H1N1 vaccine, the frequent reason was hoping to get protection from vaccination. Worrying about the safety and quality of the new H1N1 vaccine was the most common reason for non-uptake of the vaccine. Unlike other similar surveys on the willingness of the vaccine uptake,[6,7,9,10] side effects concern was not a significant reason for non-uptake of H1N1 vaccine in this survey. Intention to accept the H1N1 vaccination and the actual vaccination were higher than reported. Comparing to the really low uptake of the seasonal influenza vaccination in the studied nurses, free provision of the vaccination in this H1N1 vaccination campaign

Table 1   Characteristics of the respondents and their intention to accept the H1N1 vaccine

Variables	Respondents number (N, %)	Respondents willing to accept vaccination (N, %)	X²	P value of difference
Age (years)				
25-30	181 (65.1)	131 (72.3)	**6.607**	**0.037**
31-40	62 (22.3)	53 (85.5)		
≥41	35 (12.6)	20 (57.1)		
Education				
Nursing high schools	31 (11.2)	22 (70.9)	1.494	0.474
College	109 (39.2)	79 (72.4)		
University or higher	138 (49.6)	103 (74.6)		
Position				
Nurses	259 (93.2)	191 (73.7)	0.000	0.995
Head nurses	19 (6.8)	14 (73.7)		
Department of work				
General outpatient department	19 (6.8)	14 (73.6)	7.055	0.217
Emergency department	31 (11.2)	28 (90.3)		
Intensive care units	63 (22.7)	43 (68.2)		
Internal departments	116 (41.7)	84 (72.4)		
Surgery departments	49 (17.6)	36 (73.4)		
Years of work as nurses				
≤5	121 (43.5)	94 (77.7)	1.766	0.622
6-10	75 (27.0)	53 (70.7)		
11-20	56 (20.1)	40 (71.4)		
>20	26 (9.4)	18 (69.2)		
Number of patients contact per day				
0-20	158 (56.8)	116 (69.2)	3.118	0.210
21-50	61 (21.9)	41 (67.2)		
>50	59 (21.2)	48 (81.3)		
Seasonal influenza vaccination in 2008-2009				
Yes	9 (3.2)	8 (88.9)	1.102	0.294
No	269 (96.8)	197 (73.2)		
History of diagnosed or suspected H1N1 patients contact				
Yes	50 (17.9)	36 (72.0)	0.095	0.757
No	228 (81.1)	169 (74.1)		
Knowledge about the pandemic H1N1 influenza				
Know well	52 (18.7)	39 (75.0)	1.063	0.588
Know	213 (76.6)	158 (74.2)		
Not know	13 (4.7)	8 (61.5)		
Perceived risk of contracting pandemic influenza				
Very likely	57 (20.5)	49 (85.9)	**6.628**	**0.036**
Likely	212 (76.3)	151 (71.2)		
Unlikely	9 (3.2)	5 (55.6)		
Perceived severity of effect of influenza on own life				
Very serious	64 (23.0)	53 (82.8)	**6.161**	**0.046**
Serious	179 (64.4)	131 (73.2)		
Not serious	35 (12.6)	21 (60.0)		

Table 2   Reasons for intention to accept and refuse the H1N1 vaccine

	Respondents (N, %)
Reasons for refusing the H1N1 vaccine	N=73
worrying about the safety and quality of the vaccine	32 (43.8)
not concerned to be infected	12 (16.4)
thinking the vaccine will not work	10 (13.7)
worrying about the side effects of the vaccine	6 (8.2)
simply not wanting the vaccine	13 (17.8)
Reasons for intending to accept the H1N1 vaccine	N=205
preventing from infection and being better protected	161 (78.5)
we are the priority group for vaccination	24 (11.7)
worrying about contracting infection	6 (2.9)
in case of the H1N1 epidemic	7 (3.4)
others	7 (3.4)

maybe a valuable factor on the vaccination taking in this campaign. The other factor is that the convenience of taking the vaccination. The vaccination was taken in the hospital instead of in local Centers for Disease Prevention and Control.

Nurses aged 31 to 40 years were more willing to accept the vaccines which was significantly higher than those aged younger or older. However, other literatures[6,9] showed that persons of older age were more likely to take the influenza vaccines than those of younger age. Our results are different from those reported, however, we are not certain about the underlying reasons. Many nurses in the age group of 31-40 years in this hospital are chief nurses in their departments. Multivariate logistic analysis also showed age was a predictor for the intention of accepting the vaccine. More educated medical staff are more likely to be vaccinated by the reports.[7] In this study neither the level of education nor the level of knowledge about the H1N1 pandemic had any bearing on the number of nurses declaring that they would like to be vaccinated. However, the percentage of nurses willing to accept the vaccination was higher in nurses with high-level education than those with low-level education, though without statistical significance. It may be due to the education level staging was not clear enough in our study. Using the years of education as the staging may be more appropriate for the studied population.

Like in other countries,[6,11,12] healthcare workers in China have a very low rate of seasonal influenza vaccination. In our study, only 3% of the nurses population had a history of seasonal influenza vaccination in the previous year. The main reasons may be the self-paid vaccination fee, inconvenience of vaccine administration (the vaccination is provided only in the CDC of the local regions on working days, it is inconvenient to spend time from the busy schedule for the healthcare workers), disbelief of the protective effect

of the influenza vaccines, etc. As reported, a belief among healthcare workers that seasonal influenza is a minor condition, poor awareness of vaccination campaigns are also the factors of the low uptake of the vaccines.[6] There are findings suggesting that a previous history of seasonal vaccine is strongly associated with a willingness to accept stockpiled pandemic vaccine.[6,7,9] A majority of healthcare workers in our country are not willing to receive pre-pandemic or pandemic seasonal influenza vaccines. Such kind of health belief model has not been established yet. So previous history of seasonal vaccine is not a factor to affect H1N1 vaccination in the studied population.

About half of the nurses who had a child were not willing to allow their children to accept H1N1 vaccines in worrying about the safety and quality of the H1N1 vaccine. Among the respondents who were willing to accept the vaccine, 35.1% refused to let their children take the vaccine. The primary reason was concern of the safety and quality of the vaccine. Meanwhile, a survey by China Daily and website portal sohu.com showed that more than 54 percent of the 2000 respondents did not plan to be vaccinated because they did not trust the safety and quality of the vaccine.[13] The second reason was thinking that their children may have much lower risk to contact infection than themselves. A total of 88.5% of nurses in this study said they were not willing to accept H1N1 vaccine if being pregnant. The primary reason that resulted from the survey was worrying about the negative effect on the fetus and no evidence-based results of the vaccines on the pregnant women.

In conclusion, free charge and convenient vaccination taking will improve the vaccination rate. The actual coverage rate is lower than the expected, however the experience will benefit the influenza pandemic in the future. Continuing medical education about influenza disease burden, vaccine safety and herd protection may change the

intention and acceptance of the vaccination. Proper information provision by the media on the safety and efficacy of the vaccines are also needed before the vaccination campaign.

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Appendix. H1N1 Influenza Vaccine Questionnaire

Dear nurses:

Vaccination is proved to be the best measure for prevention from H1N1 infection. In every country's preparedness plan for flu pandemic, healthcare workers is the target group who will firstly receive the vaccines to protect from infection and reduce nosocomial transmission. H1N1 is now spreading quickly in our country and voluntary free-charge vaccination will be initiated two or three weeks later for healthcare workers in our hospital. We are now carrying out this anonymous voluntary questionnaire survey to know your vaccination intentions and related factors.

1. What's your age?
2. Your education background: a: Nursing high schools   b: College   c: University or higher
3. What's your position?
4. What's workplace are you in?
5. How long have you worked as a nurse?   a: ≤5 years   b: 6-10 years   c: 11-20 years   d: >20 years
6. Number of patients contact per day: a: 0-20   b: 21-50   c: >50
7. Seasonal flu vaccination in 2008-2009:   a: Yes   b: No
8. If Yes, what are the reasons?
    If No, what are the reasons?
9. History of diagnosed or   a: Yes   b: No
    suspected H1N1 patients contact:
10. Do you have Knowledge about   a: Know well   b: Know   c: Not know
    the pandemic H1N1 influenza:
11. Perceived risk of contracting pandemic flu: a: Very likely to contact   b: Likely   c: Unlikely
12. Perceived severity of effect of flu on own life: a: Very serious   b: Serious   c: Not serious
13. Would you accept the H1N1 vaccines?   a: Yes   b: No
14. If Yes, what are the reasons?
    If No, what are the reasons?
15. Do you have a child?   a: Yes   b: No
16. If Yes, would you like to let your children accept the vaccine?
17. If Yes, what are the reasons?
    If No, what are the reasons?
18. If you are pregnant, would you like to accept the vaccine? Why?
19. If Yes, what are the reasons?
    If No, what are the reasons?