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Brief Report

Psychosocial determinants of influenza vaccination intention: A cross-sectional study on inpatient nurses in Singapore



Dwee Wee Lim MD^a, Lay Tin Lee MBBS, MSc, FAMS^b, Win Mar Kyaw MBBS, MPH^a, Angela Chow MBBS, MMed, MS, PhD^{a,*}

^a Department of Clinical Epidemiology, Institute of Infectious Diseases and Epidemiology, Tan Tock Seng Hospital, Singapore, Singapore

^b Occupational Health Services, Tan Tock Seng Hospital, Singapore, Singapore

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Nurses have the closest interaction with inpatients and could transmit influenza to patients. From a self-administered questionnaire survey among inpatient nurses at a tertiary hospital, we observed that the strongest factors associated with intention for future vaccination were perceived benefits of and motivations for vaccination (adjusted odds ratio [aOR], 3.30; 95% confidence interval [CI], 2.55–4.27), and perceived nonsusceptibility to influenza and preference for vaccination alternatives (aOR, 0.26; 95% CI, 0.20–0.34). These factors need to be addressed to increase vaccination uptake and prevent nosocomial transmission.

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BACKGROUND

Influenza can be transmitted in health care settings by infected health care workers (HCWs), causing nosocomial outbreaks.¹ The U.S. Advisory Committee on Immunization Practices recommends annual influenza vaccination for HCWs for transmission prevention and reduction in work absenteeism.² However, influenza vaccination in HCWs has remained suboptimal.³ Determinants of influenza vaccination intention differ across countries, hospitals, and occupational groups.⁴

Nurses make up most of HCWs in hospitals and have the closest interaction with patients in inpatient settings. It is crucial to understand the psychosocial factors associated with the intention for vaccination uptake among inpatient nurses to tailor effective vaccination promotion interventions.

MATERIALS AND METHODS

We conducted a cross-sectional study of inpatient nurses in a 1,600-bed adult tertiary hospital in Singapore, from October–November 2012, prior to the hospital's annual seasonal influenza vaccination program, which provides vaccination free-of-charge to HCWs via a mobile clinic.

We developed a 41-item (5-point Likert scale), self-administered questionnaire covering content on personal knowledge, attitudes, and beliefs toward influenza vaccination, and the barriers and facilitators of vaccination in the hospital. We also collected data on sociodemographics, vaccination uptake in the last influenza season, and intention for future influenza vaccination. Ethical approval was obtained from the Domain Specific Research Board, National Healthcare Group (Singapore).

Principal component analysis with varimax rotation was performed to derive the latent factor structure. Internal consistency of each factor was measured using Cronbach α coefficient. The χ^2 test was used to compare differences in proportions. Stepwise multiple logistic regression analysis was performed to assess for independent factors.

RESULTS

A total of 1,042 out of 2,231 inpatient nurses responded to the survey. There were 268 nurses with incomplete data who were excluded from analysis, resulting in a total of 774 subjects in the study. Half (51.7%) of the nurses had received influenza vaccination in the previous season (year 2011). Approximately 71% of the participants intended to receive influenza vaccine in the next influenza season (Table 1).

Principal component analysis revealed 8 latent factors on influenza vaccine, including (1) perceived benefits of and motivations for influenza vaccination, (2) global threat of emerging infectious diseases, (3) effectiveness of hospital's influenza vaccination promotional efforts, (4) personal nonsusceptibility to influenza and

* Address correspondence to Angela Chow, MBBS, MMed, MS, PhD, Institute of Infectious Disease and Epidemiology, Tan Tock Seng Hospital, 11 Jalan Tan Tock Seng, Singapore 308433, Singapore.

E-mail address: Angela_Chow@tsh.com.sg (A. Chow).

Conflicts of interest: None to report.

Table 1
Characteristics of respondents to the influenza questionnaire survey and outcome variables

Characteristics	Nursing assistant or aide (n = 221)	Registered Nurse (n = 553)	P value*	Total (N = 774)
Age, y				
<30	144 (65.16)	314 (56.78)	.032†	458 (59.17)
≥30	77 (34.84)	239 (43.22)		316 (40.83)
Sex				
Female	217 (98.19)	507 (91.68)	.001†	724 (93.54)
Male	4 (1.81)	46 (8.32)		50 (6.46)
Ethnicity				
Chinese	23 (10.41)	247 (44.67)	<.001†	270 (34.88)
Indian	30 (13.57)	83 (15.01)		113 (14.60)
Malay	56 (25.34)	85 (15.37)		141 (18.22)
Others	112 (50.68)	138 (24.95)		250 (32.30)
Country				
Non-Singaporean	136 (61.54)	302 (54.61)	.079	438 (56.59)
Singaporean	85 (38.46)	251 (45.39)		336 (43.41)
Duration of service, y				
≤5	173 (78.28)	355 (64.2)	<.001†	528 (68.22)
>5	48 (21.72)	198 (35.8)		246 (31.78)
Workplace			.133	
Medical	141 (63.8)	328 (59.31)		469 (60.59)
Surgical	50 (22.62)	116 (20.98)		166 (21.45)
ICU	30 (13.57)	109 (19.71)		139 (17.96)
Vaccination in 2011			.609	
No	110 (49.77)	264 (47.74)		374 (48.32)
Yes	111 (50.23)	289 (52.26)		400 (51.68)
Intention to get influenza vaccination at the next vaccination exercise				
No	51 (23.08)	174 (31.46)	.020†	225 (29.07)
Yes	170 (76.92)	379 (68.54)		549 (70.93)

NOTE. Values are n (%) or as otherwise indicated.

ICU, intensive care unit.

*The χ^2 test.

†Significant findings with $P < .05$.

preference for alternatives to influenza vaccination, (5) local threat of emerging infectious diseases, (6) reinforcement and cues to action, (7) fear of adverse effects, and (8) accessibility. The Cronbach α coefficient ranged from 0.36 to 0.87 (Table A1). One item was removed from factor 7 (fear of adverse effects), and the Cronbach α improved to 0.64. A composite score for the remaining items for factor 7 was calculated. For factors 6 (reinforcement and cues to action) and 8 (accessibility), with poor internal consistency, individual items were included in the final multiple logistic regression model, along with the composite score for factor 7 and the 5 factors with good internal consistency.

On univariate analysis, age, ethnicity, workplace, job title, past vaccination uptake, and 6 psychosocial factors were significantly associated with future vaccination intention. In the multivariate model, the strongest predictor for vaccination intention was perceived benefits of and motivations for vaccination (adjusted odds ratio [aOR], 3.30; 95% confidence interval [CI], 2.55-4.27) (Table 2). This was followed by awareness of easy access to influenza vaccination at the occupational health clinic (aOR, 1.80; 95% CI, 1.32-2.45), knowledge that vaccination was provided free-of-charge, (aOR, 1.80; 95% CI, 1.23-2.61), the perceived effectiveness of the hospital's influenza vaccination promotional efforts (aOR, 1.79; 95% CI, 1.37-2.33), and the perceived global threat of emerging infectious diseases (aOR, 1.79; 95% CI, 1.39-2.31). Perceived local threat of emerging infectious diseases was also associated with vaccination intention (aOR, 1.28; 95% CI, 1.01-1.64). Nurses who perceived themselves to be nonsusceptible to influenza and who preferred alternatives to vaccination (aOR, 0.26; 95% CI, 0.20-0.34), and those who feared the adverse effects of vaccination (aOR, 0.84; 95% CI, 0.72-0.99), were

Table 2
Multivariate analysis of factors associated with intention for future influenza vaccination

Variables	OR (95% CI)	P value
Factor 1: benefits of and motivations for influenza vaccination	3.30 (2.55-4.27)	<.001*
Factor 2: global threat of emerging infectious diseases	1.79 (1.39-2.31)	<.001*
Factor 3: effectiveness of hospital's influenza vaccination promotional efforts	1.79 (1.37-2.33)	<.001*
Factor 4: personal nonsusceptibility to influenza and preference for alternatives to influenza vaccination	0.26 (0.2-0.34)	<.001*
Factor 5: local threat of emerging infectious diseases	1.28 (1.01-1.62)	.040*
Composite of "fear of vaccine adverse effects"	0.84 (0.72-0.99)	.034*
Question: "I prefer my colleagues to administer the vaccine for me."	1.39 (1.02-1.9)	.035*
Question: "The influenza vaccination promotion program did not affect my decision."	1.37 (0.99-1.89)	.058
Question: "I know that I can get the influenza vaccine from the occupational health clinic anytime."	1.8 (1.32-2.45)	<.001*
Question: "I know that the hospital absorbs the cost of the influenza vaccine."	1.8 (1.23-2.61)	.002*
Age	1 (0.97-1.03)	.979
Workplace		
Medical	Reference	
Surgical	0.90 (0.54-1.49)	.679
ICU	1.01 (0.58-1.77)	.976
Job title		
Registered Nurse (vs nursing assistant or aide)	0.95 (0.59-1.54)	.849
Vaccination in 2011		
Yes (vs no)	1.2 (0.78-1.84)	.401

CI, confidence interval; ICU, intensive care unit; OR, odds ratio.

*Significant findings with $P < .05$.

74% and 16% less likely to express the intention for future influenza vaccination (Table 2).

DISCUSSION

The strongest determinants for future influenza vaccination intention among inpatient nurses were perceived benefits of and motivation for vaccination, awareness of easy access to vaccination at the occupational health clinic, and knowledge that the vaccine was free-of-charge. Our findings corroborate with findings from other local and international studies.⁴⁻⁷ In addition, our study found that the perception of global threat of emerging infectious diseases also positively influenced nurses' intention for future influenza vaccination. This could explain the behaviors of Hong Kong nurses whose influenza vaccination uptake declined after the severe acute respiratory syndrome outbreak in 2003 until the avian influenza outbreak in neighboring China in 2005 and the influenza pandemic in 2009.³

On the other hand, nurses who perceived themselves to be nonsusceptible to influenza and who preferred alternatives to vaccination were less likely to intend to be vaccinated in the future. This is of concern, because HCWs often perceived themselves to be healthy and not at risk of influenza infection.^{4,8} Furthermore, Singapore is a multiracial country where the use of complementary and alternative medicine is prevalent.⁹ These beliefs, which could greatly reduce the uptake of vaccination, would need to be addressed. Despite the demonstration of vaccine safety, HCWs continue to be concerned about the adverse effects.^{2,3,5,8} Our study found that nurses who feared the adverse effects of influenza vaccination were less likely to intend to receive future vaccination. More targeted interventions would have to be implemented to address these fears.

Our findings have several implications. First, influenza vaccination promotional efforts for nurses should address both the positive

and negative determinants of vaccination intention. Local epidemiology of influenza and HCWs' risk of infection, benefits and safety of influenza vaccination, and precautions against potential adverse effect should be clearly communicated to support vaccination uptake. Second, early dissemination of information on impending international and local outbreaks can increase influenza vaccination uptake among nurses ahead of epidemics. Finally, accessibility to vaccination should be increased. This could include extension of vaccination clinic hours and encouragement of peer administration of vaccination.¹⁰

CONCLUSIONS

This study has shown that personal psychosocial and organizational factors are determinants of nurses' intention for influenza vaccination. Promotional efforts should include disseminating information on infection risk and vaccination benefits, addressing fear of adverse effects, and increasing vaccination accessibility.

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APPENDIX

Table A1

Factors loadings and Cronbach α coefficient for psychosocial factors generated from principal component analysis

Components	Questionnaire items	Factor loadings	Cronbach α
1. Perceived benefits and motivations for influenza vaccination	The flu vaccine is effective in preventing flu.	0.752	0.858
	Even if the current prevailing flu strain is the same as last year's we still need to be revaccinate this year.	0.606	
	My chances of developing flu-like symptoms after vaccination is very low.	0.707	
	If I do not get my flu vaccine, I am putting my children and family at risk.	0.663	
	By getting my flu vaccine, I can protect older adults and at-risk patients in the clinic and wards	0.709	
	I know what is herd immunity.	0.395	
	The flu vaccine protects me from most of the prevailing strains of flu virus in Singapore.	0.704	
	I will feel left out if all my colleagues get the vaccine but not me.	0.377	
	My family gets vaccinated yearly together from polyclinic or GPs.	0.313	
	Flu vaccine reduces my MC consumption.	0.606	
	I prefer a compulsory vaccination exercise.	0.424	
	I will get the next seasonal flu vaccine even if it is the same strain as the previous season.	0.446	
	2. Perceived global threat of emerging infectious diseases	I got my flu vaccine because of potential H7N9 infection in China.	
I got my flu vaccine because of potential novel coronavirus outbreak in the Middle East.		0.845	
I believe the flu vaccine can prevent H7N9 infection in China.		0.763	
I believe the flu vaccine can prevent novel coronavirus infection in the Middle East.		0.755	
3. Effectiveness of the hospital's influenza vaccination promotional efforts	The promotion is effective.	0.569	0.782
	The promotion videos are effective.	0.702	
	I prefer more medical information in the videos rather than just being entertaining.	0.572	
	The promotion posters are effective.	0.720	
4. Perceived personal nonsusceptibility and preference for alternatives to influenza vaccination	The year-end health competition package is effective.	0.648	0.738
	I am healthy and hardly get the flu so I do not need protection.	0.630	
	I already had the flu or cold this year so I do not need the vaccine this year.	0.688	
	I prefer traditional and alternative medicine to having vaccinations.	0.5581	
5. Perceived local threat of emerging infectious diseases	I prefer to catch the flu than getting the vaccine.	0.683	0.763
	I know the prevalent strain of flu in Singapore now is H3N2.	0.415	
	I believe the H7N9 outbreak will spread to Singapore.	0.919	
6. Reinforcement and cues to action	I believe the novel coronavirus will spread to Singapore.	0.917	0.510
	I have a fear of injections and needles.	0.365	
	I get my flu vaccination because of the promotion.	0.504	
	I got my flu vaccination because of peer pressure.	0.595	
	I prefer painless (microneedle) vaccination next year even if I have to pay \$5.	0.291	
	I got my flu vaccine because my supervisor told me to.	0.543	
7. Fear of influenza vaccination adverse effects	I feel that I am at risk of the side effects of flu vaccination.	0.657	0.457
	I believe the flu vaccine can cause flu.	0.643	
	Pregnancy and breastfeeding is a contraindication of getting the flu vaccine.*	0.500	
8. Perceived accessibility of influenza vaccination	I know that I can get the flu vaccine from OHC anytime.	0.502	0.360
	I prefer my colleagues to administer the vaccine for me.	0.394	
	I know that the hospital absorbs the cost of the flu vaccine.	0.405	
	The flu promotion program did not affect my decision.	0.595	
	The mobile flu vaccinated team saved me time to go to OHC for vaccination.	0.445	

GP, general practitioner; MC, medical certificate; OHC, occupational health clinic.

*Item removed from factor 7 on fear of influenza vaccination adverse effects.

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