Factors affecting the willingness of nursing students to receive annual seasonal influenza vaccination: A large-scale cross-sectional study

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ABSTRACT

Nursing students are at high risk of exposure to vaccine-preventable diseases such as seasonal influenza. However, due to the limited number of studies conducted in this area, the prevalence and factors affecting annual seasonal influenza vaccination (ASIV) uptake remain unclear. This was a large-scale cross-sectional survey study conducted among 902 nursing students in different years of study. The questionnaire was developed based on the Health Belief Model (HBM), and logistic regression was used to determine the predictors of ASIV uptake. The results of our study reveal that only 15.2% of nursing students declared having the vaccine in the previous year, and that ASIV uptake was self-reported. ASIV uptake was associated with perceived susceptibility (odds ratio = 2.76), perceived seriousness (odds ratio = 2.06) and perceived barriers (odds ratio = 0.50). The odds of receiving ASIV were 17.96 times higher for those participants having had ASIV at least once than those who had not received ASIV in the previous five years. In addition, the odds of receiving ASIV were 4.01 times higher for master's than undergraduate students. Our study concludes that the ASIV uptake among nursing students is low. In order to increase vaccination uptake in subsequent years, future studies should promote vaccination based on HBM, focusing on nursing students in undergraduate studies by emphasizing not only vaccination knowledge, but also their social responsibility to protect patients. Influenza vaccination can be viewed as an ethical professional responsibility and a patient safety issue, as well as being an infection control strategy.

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1. Introduction

Nursing students are healthcare workers (HCWs), who are at high risk of exposure to vaccine-preventable diseases such as seasonal influenza while providing direct patient care during their clinical placement [1,2]. Seasonal influenza is an acute illness of the respiratory tract, caused by influenza viruses and affecting all age groups [3]. The virus is transmitted easily from person to person through droplet and direct contact [3,4]. It is significantly associated with hospital admissions and hundreds of deaths annually [4–6]. When seasonal influenza spreads to a global level and develops into a new virus by undergoing genetic changes, it can result in an influenza pandemic against which humans lack immunity [7]. Influenza infection outbreaks occurring in hospitals can have far more serious consequences than in the community, because an increasing proportion of hospital patients are elderly and/or immunocompromised [8]. Proactively, annual seasonal influenza

vaccination (ASIV) is the most effective way to prevent the disease and its severe complications [4]. HCWs are considered a high-risk group recommended for ASIV [3,4]. This recommendation has two purposes: one is to protect HCWs from the infection, and the other is to prevent the transmission of acquired infection to patients or other staff, thereby reducing institutional outbreaks [9].

Despite the recommendation for ASIV by the CDCs (2016), WHO [4] and many countries [10], fewer than 60% of HCWs in various countries, such as France [11], the United Kingdom (UK) [12], Iran [13] and Hong Kong [14] are vaccinated. Among various health professions, nurses are persistently low in ASIV uptake [8,15–19], although their risk for influenza infection should be the highest since they provide direct care to patients with known or even unknown infection status [2].

Among nursing personnel, nursing students might be the most vulnerable group because they are required to provide direct patient care as learners. On the other hand, they are college students who already experience a high prevalence of influenza-like illness [20]. Additionally, nursing students are the future healthcare workforce, yet they are uniquely positioned in the college environment where education can be delivered and attitudes

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shaped early regarding future vaccination behaviours. Early education on ASIV might change the vaccination uptake among nurses. However, literature on the coverage of ASIV shows that the target participants in most studies were nurses and physicians; studies on nursing students remain limited. Only four such studies have been conducted, in the UK [16,21], Israel [19] and the United States (USA) [22], where the ASIV is recommended, but not mandatory, for nursing students. The ASIV uptake varied from 21% to 79% depending on the sample size, type of nursing students, and country of the study. The ASIV uptake in a USA study was 79% [22], but might not be generalizable due to the small sample size of 58. The other three studies, with sample sizes from 131 to 430, found that the ASIV uptake was from 21% to 34.1%, or lower than that of nurses. In Israel [19], with a sample size of 299, the uptake was 34.1%. This may have been country-specific, in addition to the fact that more than 90% of the nursing students in the study were female, so this might not represent the uptake of male students. Additionally, only two studies used regression analyses to identify the predictors; one used the Health Belief Model (HBM) [19] and the other used the Theory of Planned Behaviour to guide the study [16].

This survey study was designed using the HBM to explain and predict health-protecting or disease-preventing behaviours [23]. It proposed that the likelihood of an individual performing a specific preventive behaviour is affected by their weighing of perceived benefits of and barriers to that preventive behaviour, namely their perceived threat of a specific illness, which is interactively influenced by their perceived susceptibility to and the severity of the illness, as well as cues to actions. Given the limited studies available, the prevalence and factors affecting ASIV uptake among nursing students remain unclear. Thus, the aim of this study was to fill these research gaps, and to investigate the prevalence of ASIV among nursing students and the predictors of their ASIV uptake using HBM to guide the study.

2. Methods

2.1. Design and subjects

This was a cross-sectional self-administered survey study. A convenience sampling method was used to recruit nursing students from the Hong Kong Polytechnic University from September to November 2011. It has been a routine practice to encourage nursing students to receive ASIV through email distributed by the university health clinic. Health care students including nursing students who are required to provide patient care in healthcare institutions are free of charge to receive ASIV at the university health clinic. But mandatory vaccination programmes particularly for nursing students are not available in Hong Kong.

Nursing students from pre-registration higher diploma, bachelor's and master's programmes were invited to complete the study questionnaire in classroom settings in a voluntary basis. Nursing students from higher diploma and bachelor's programmes were admitted based on their high school study results, while those from master's programmes were based mainly on their non-nursing degrees. Nursing students with local registered nurse licenses were excluded from the study. Ethical approval for the study procedures was obtained from the Hong Kong Polytechnic University to conduct the study.

2.2. Instrument

The study questionnaire was developed based on the literature review and questionnaires from [24,19], with the guidance of the HBM [23]. Permission to use and modify the original questionnaire was sought from the authors. The study questionnaire was also modified based on a panel of four experts in the area of infection control and relevant research, and on the two-week test-retest reliability among ten nursing students. The results showed that the questionnaire was valid and reliable, with a content validity index of 0.96 and reliability of 0.94. The Cronbach's alphas of the study subscales were reliable, ranging from 0.55 to 0.84 with an overall Cronbach's alpha of 0.82.

The survey questionnaire had three sections. First, nine items asked about participants' personal information: programmes, years of study, age, gender, marital status (single or married), ASIV in last flu season (yes or no), number of times receiving ASIV in the last five years, intention to get ASIV in the coming year (yes, no, or not sure), and reasonable cost of ASIV.

Second, participants were asked about their perceptions of ASIV. This section was developed based on the HBM and consisted of 56 items with seven subscales. They were all measured on a four-point Likert scale (1 = strongly disagree to 4 = strongly agree). Perceived susceptibility was measured by four items (e.g. "I am likely to get the flu if I do not get a yearly flu shot"). Perceived seriousness was assessed by seven items (e.g. "Flu can cause serious complications"). Perceived benefits were evaluated by eight items (e.g. "Flu shots can prevent me from getting the flu"). Perceived barriers were measured by nine items (e.g. "Flu shots are painful"). Cue to action was assessed by eight items (e.g. "I got the flu shot because my family encouraged me to do so"). Knowledge was evaluated by 13 items (e.g. "People aged 65 and older who do not get a flu shot can get a more severe case of the flu"). Health motivation was measured by seven items (e.g. "I have consistently had a physical examination at least once a year for the past 5 years"). The average score of each subscale was calculated, higher scores representing greater agreement with the respective subscale.

The last section consisted of four items asking participants for their health information. Those items included rating their health status on a four-point Likert scale (0 = poor to 3 = excellent), number of times visiting a physician in the previous 12 months, suffering from any chronic illnesses (such as asthma, hypertension, etc.) with yes or no answers, and number of times suffering from flu or flu-like symptoms in the previous six months.

2.3. Data analysis

The Statistical Products and Services Solutions (SPSS) for Windows 22.0 (SPSS, Inc, Chicago, IL), was used for analysing all collected data. Descriptive statistics such as means, standard deviations, and percentages were used to describe all the variables under study. Parametric statistics were used for analyses because the data were assumed to be normally distributed since the sample size was far greater than 100 [25]. The dependent variable of receiving ASIV or not in the last influenza season was dichotomous. Bivariate analyses such as the chi-square test and independent t-test, would be performed to determine the relationship between the independent variables and the ASIV uptake. Those independent variables with significant relationship with the ASIV uptake were checked for mulitcollinearity, and then were entered in the logistic regression to determine the predictors of ASIV uptake. The level of statistical significance was set at $p < 0.05$.

3. Results

Of 1200 eligible participants invited, 903 returned questionnaires. One questionnaire was considered invalid because the