

# INFLUENZA VACCINATION UPTAKE AMONG HEALTHCARE WORKERS AT A MALAYSIAN TEACHING HOSPITAL

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**Abstract.** Annual influenza vaccination is the most important preventive strategy against influenza illness in healthcare workers (HCWs), who could acquire influenza from and transmit influenza to patients and other HCWs. Despite the well established benefits and strong recommendations for influenza vaccination for all HCWs, influenza vaccination uptake at the Universiti Kebangsaan Malaysia Medical Centre (UKMMC) for the past 3 years has been low and is decreasing. We aimed to determine the factors associated with influenza vaccination uptake among HCWs at UKMMC. We conducted a cross sectional study via questionnaire among 211 randomly selected HCWs, consisting of 106 HCWs who were vaccinated in 2011 and 105 HCWs who were not vaccinated in 2010 or 2011. We had a 100% response rate. Influenza vaccination uptake was significantly associated with age and previous vaccination history, with older HCWs being more likely to be vaccinated (adjusted OR=12.494; 95% CI:6.278-24.863;  $p<0.001$ ) and HCWs with previous vaccination history being more likely to be vaccinated (adjusted OR=1.038; 95% CI:1.001-1.077;  $p=0.045$ ). Influenza vaccination uptake was not associated with gender ( $p=0.926$ ) or job category ( $p=0.220$ ). Publicity at the workplace was the main source of information about the vaccine (51.2% of respondents), followed by colleagues (29.9%). Despite the low uptake, 85.3% of respondents believed influenza vaccination was important for disease prevention. The most common reason given for vaccination was protection against influenza infection (73.6%). The most common reason for not having the vaccine was time constraints (56.2%). An evidenced-based strategy needs to be developed to improve vaccine uptake or having mandatory vaccination.

**Keywords:** influenza, vaccination, healthcare, workers, factors, coverage, uptake, rates

## INTRODUCTION

Annual influenza vaccination is the most important preventive strategy against influenza illness in healthcare workers (HCWs), who could acquire influenza from and transmit influenza to patients and other HCWs. For the elderly, infants,

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children, and those with certain chronic diseases, influenza can be life-threatening.

The trivalent inactivated influenza vaccine prevents influenza in 70%-90% of healthy adults aged less than 65 years old (Wilde *et al*, 1999, Bridges *et al*, 2000). The influenza vaccine prevents secondary complications and reduces the risk for influenza-related hospitalization and death among adults aged 65 years and older (Nordin *et al*, 2001). The World Health Organization recommend vaccine coverage rate of 50%-90% for the elderly and 60% for high-risk adults (World Health Assembly, 2005). Annual influenza vaccination was first recommended for HCWs by the Advisory Committee on Immunization Practice (ACIP) in 1984 (CDC, 1984). The influenza vaccination uptake goal for HCWs is annual vaccination of all HCWs who do not have medical contraindications (CDC, 2006; 2011a). In Canada, it is recommended that all HCWs receive the seasonal influenza vaccine (National Advisory Committee on Immunization, 2008).

HCWs often work even when they have symptoms of influenza-like illness (ILI), further increasing the risk of transmission to vulnerable patients (Jena *et al*, 2010). One study (Wilde *et al*, 1999) found 23% of HCWs had serological evidence of influenza infection, but 59% could not recall having influenza, suggesting a high proportion had asymptomatic illness.

Influenza vaccination of HCWs reduces employee illnesses and absenteeism (Bridges *et al*, 2000), and reduces the rate of transmission to patients decreasing morbidity and mortality among hospitalized patients (Hayward *et al*, 2006). Higher vaccination levels among HCWs have been associated with a lower incidence of nosocomial influenza cases and

all-cause mortality (Carman *et al*, 2000). HCW vaccination is associated with a 43% decrease in the incidence of ILI and a 44% decrease in overall mortality among facility residents (Potter *et al*, 1997). Poor uptake of influenza vaccination among HCWs results in nosocomial infections with influenza which could involve immunocompromised patients, such as children and patients with co-morbidities (Maltezou and Drancourt, 2003).

Despite well established benefits and recommendations for all HCWs to be vaccinated, influenza vaccination uptake at the Universiti Kebangsaan Malaysia Medical Centre (UKMMC) is low and has a decreasing trend. Only 1,188 (23.8%) were vaccinated in year 2009, 940 (18.8%) in 2010 and 362 (7.2%) in year 2011. We aimed to determine the factors associated with influenza vaccination uptake among HCWs at UKMMC, to make an influenza vaccine program sustainable and successful.

## MATERIALS AND METHODS

### Study location

UKMMC is an 880-bed tertiary teaching hospital located in Cheras, Kuala Lumpur. This hospital has pre-clinical and clinical departments, clinical support departments, administrative departments and a centre of excellence. The total number of staff is about 5,000.

### Research design and population

We conducted this cross sectional study from February to April 2012 in collaboration with the Infection Control Unit and Human Resources Department of UKMMC. The participants in this study were HCWs or staff of UKMMC. A HCW was defined as anyone whose focus or activity was to improve health. This includes providers such as doctors, nurses

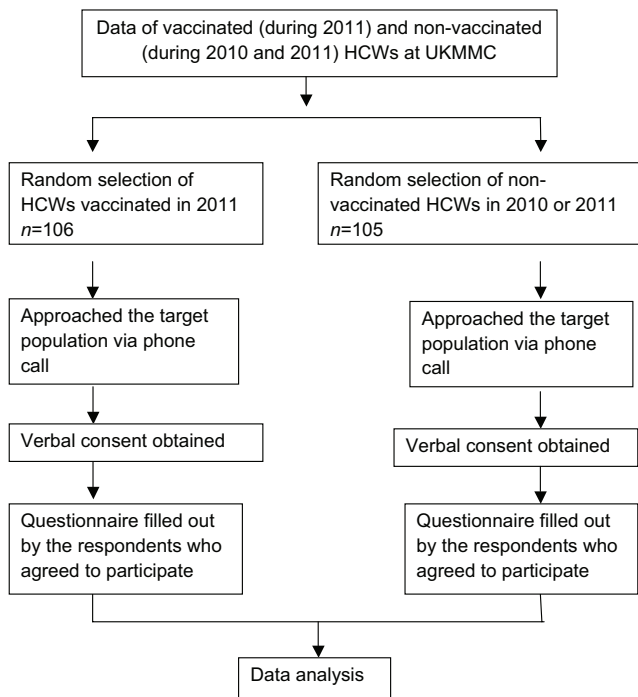


Fig 1—Research design and population.

and midwives, pharmacists, laboratory personnel, community health workers, paramedical professionals, other health-care providers, administrative staff, support staff and non-clinical ancillary staff.

The participants were either those who had received the influenza vaccine in 2011 (list from the Infection Control Unit), or those who had not received the influenza vaccine during 2010 or 2011 (list from the Human Resources Department and Infection Control Unit), and who consented to participate in the study. A total of 211 questionnaires were distributed to the 106 HCWs who had been vaccinated and the 105 HCWs who had not been vaccinated. The response rate to the questionnaires was 100% (Fig 1). The vaccinated HCWs and non-vaccinated HCWs were randomly selected to obtain the required sample size. This study was approved by UKMMC Research and Ethics Committee.

### Statistical analysis

The Mann-Whitney test was used to assess possible differences in age between vaccinated and non-vaccinated HCWs. Categorical variables (gender, job category and past vaccination history) were analyzed using the chi-square test. All variables that differed significantly ( $p < 0.05$ ) between the groups were entered into a logistic regression model in order to check for confounding effects. The data were analyzed using SPSS, version 20 (IBM, Armonk, NY).

### RESULTS

Table 1 shows vaccinated and non-vaccinated HCWs by age, gender, nationality, and job category. The median age of the vaccinated respondents (median= 33.5, IQR= 14) was older than the median age of non-vaccinated respondents (median= 29.0, IQR= 10).

Table 2 shows the previous history of influenza vaccination in vaccinated and non-vaccinated HCWs. Table 3 shows bivariate analysis of factors influencing influenza vaccination by age, gender, job category and previous vaccination history. For job category, doctors, nurses, pharmacists, laboratory personnel, community health workers, and other health-care providers were grouped as clinical staff and support and administrative staff were grouped as non-clinical staff. On bivariate analysis, a history of previous influenza vaccination and older age were significantly associated with vaccination status ( $p < 0.05$ ). No significant associations were seen for gender or job category and vaccination status. Multivariate analysis with logistic regression revealed age and

Table 1  
Demographic characteristics of vaccinated and non-vaccinated HCWs.

Demographic characteristics	Vaccinated, <i>n</i> =106 (%)	Non- vaccinated, <i>n</i> =105 (%)	Total, <i>n</i> =211 (%)
Age	Median=33.5 IQR=14	Median=29.0 IQR=10	
Gender			
Male	38 (35.8)	37 (35.2)	75 (35.5)
Female	68 (64.2)	68 (64.8)	136 (64.5)
Nationality			
Malaysian	105 (99.1)	105 (100.0)	210 (99.5)
Non-Malaysian	1 (0.9)	0 (0.0)	1 (0.5)
Job category			
Physician	13 (12.3)	10 (9.5)	23 (10.9)
Nurse/midwife	23 (21.7)	25 (23.8)	48 (22.8)
Pharmacist	2 (1.9)	1 (1.0)	3 (1.4)
Laboratory worker	22 (20.8)	3 (2.9)	25 (11.9)
Community health worker	1 (0.9)	6 (5.7)	7 (3.3)
Other healthcare providers	12 (11.3)	21 (20.0)	33 (15.6)
Support and administration	33 (31.1)	39 (37.1)	72 (34.1)

Table 2  
Past influenza vaccination for vaccinated and non-vaccinated HCWs.

	Vaccinated, <i>n</i> =106 (%)	Non- vaccinated, <i>n</i> =105 (%)	Total, <i>n</i> =211 (%)
Past influenza vaccination			
Yes	76 (71.7)	16 (15.2)	92 (43.6)
No	29 (27.4)	81 (77.2)	110 (52.1)
Not sure	1 (0.9)	8 (7.6)	9 (4.3)
Total	106 (100)	105 (100)	211 (100)

previous influenza vaccination were significantly associated influenza vaccination uptake (Table 4).

Fig 2 shows the sources of information the respondents received about influenza vaccination. The most commonly mentioned source (51.2%) was publicity in the workplace at UKMMC. The least mentioned source was the internet (11.4%). Publicity in the workplace at UKMMC was mentioned by 53.8% in the vaccinated

group and 48.6% in the non-vaccinated group.

Table 5 shows perceptions about the importance of influenza vaccination. The majority (85.3%) of respondents believed that influenza vaccination was important for disease prevention. Ninety-five point three percent of vaccinated respondents felt that influenza vaccination was important, compared to 75.2% of the non-vaccinated group.

Table 3  
Bivariate analysis of factors influencing influenza vaccination uptake.

	Vaccinated, <i>n</i> =106 (%)	Non- vaccinated, <i>n</i> =105 (%)	Total, <i>n</i> =211 (%)	<i>p</i> -value
Age	Median= 33.5 IQR=14	Median= 29.0 IQR=10		<i>p</i> <0.001
Gender				
Male	38 (50.7)	37 (49.3)	75 (35.5)	<i>p</i> =0.926
Female	68 (50.0)	68 (50.0)	136 (64.5)	
Job category				
Clinical	76 (53.1)	67 (46.9)	143 (67.8)	<i>p</i> =0.220
Non-clinical	30 (44.1)	38 (55.9)	68 (32.2)	
Past vaccination				
Yes	76 (82.6)	16 (17.4)	92 (43.6)	<i>p</i> <0.001
No	29 (26.4)	81 (73.6)	110 (52.1)	

Table 4  
Multivariate analysis of age and previous influenza vaccination on influenza vaccination uptake.

	<i>p</i> -value	Adjusted OR
Age	<i>p</i> <0.001	OR=12.494; 95% CI: 6.278-24.863
Previous vaccination	<i>p</i> =0.045	OR=1.038; 95% CI: 1.001-1.077

Table 5  
Perceptions of importance of influenza vaccination among vaccinated and non-vaccinated HCWs.

	Vaccinated, <i>n</i> (%)	Non- vaccinated, <i>n</i> (%)	Total, <i>n</i> (%)
Importance of influenza vaccination			
Important	101 (95.3)	79 (75.2)	180 (85.3)
Not important	5 (4.7)	4 (3.8)	9 (4.3)
Not sure	0 (0.0)	22 (21.0)	22 (10.4)
Total	106 (100.0)	105 (100.0)	211 (100.0)

HCWs, health care workers.

Table 6 shows reasons mentioned for and against vaccination. The commonest reasons mentioned to receive vaccination were: vaccination provides effective protection against influenza (73.6%) and

concerns about contracting the infection (70.8%). Concerns about spreading the infection to patients was cited by 15.1%, and to family members (15.1%). Other reasons (18.9%) included peer influence and

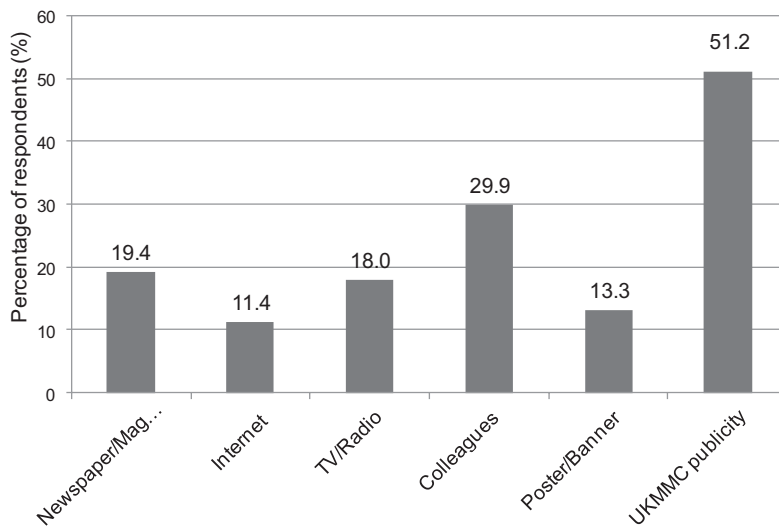


Fig 2—Sources of information about influenza and the influenza vaccine for vaccinated and non-vaccinated HCWs.

need for protection for overseas travel. Of those who did not receive influenza vaccination, the commonest reasons given were: forgetting to have it done or no time to have it done (56.2%), and the perception that safety precautions such as hand hygiene and face masks provide sufficient protection (36.2%).

## DISCUSSION

Influenza vaccination is a preventive strategy against influenza illness among HCWs. Our results show age and history of previous vaccination significantly influenced influenza vaccination uptake. The mean age in the vaccinated group was significantly older than the non-vaccinated group. In a study from the United States, those who were older were also more likely to have received the influenza vaccine (King *et al*, 2006; Takayama *et al*, 2012). In one study, HCWs aged  $\geq 60$  years had a higher percentage (75.7%) of vaccine

uptake than other age groups (CDC, 2012). This could be because of a greater concern about health and awareness of personal susceptibility. In a study of nurses caring for the elderly, those who previously had received influenza vaccination were more likely to get vaccinated during the current year (47% versus 17%,  $p < 0.001$ ) (O'Reilly *et al*, 2005), similar to our findings. This could be due to overcoming reservations about the vaccine after being vaccinated the first time.

In contrast to our findings, several studies have found males were significantly more likely to be vaccinated (Aguilar *et al*, 2012; O'Reilly *et al*, 2005). In a study done in Italy, a generally higher coverage was seen in males than females, and this finding was statistically significant in 2005-2006 ( $p < 0.01$ ) and 2006-2007 ( $p = 0.02$ ) (Amodio *et al*, 2010).

In our study, 53.1% of clinical staff and 44.1% of non-clinical staff studied received influenza vaccination; this difference was not significant. Maltezos *et al* (2008) found that physicians and nurses were more likely to be vaccinated to protect their patients than other professions ( $p < 0.001$ ). Another study found that the proportion of medical and nursing staff vaccinated was significantly lower than the other groups ( $p < 0.01$ ) (Bull *et al*, 2007). King *et al* (2006) reported that of 5 occupational categories of HCWs, health aids had the lowest odds ratio for being vaccinated against influenza.



Table 6  
Encouraging and hindering factors for vaccination uptake.

Factors	Total, n (%)
<b>Encouraging factors (vaccinated respondents)</b>	
1. Effective protection from influenza infection	78 (73.6)
2. Being at risk for getting influenza infection	75 (70.8)
3. Influenza is a serious disease	48 (45.3)
4. Vaccination is free	28 (26.4)
5. Vaccination is safe	20 (18.9)
6. Other reasons	20 (18.9)
7. Influenza is a threat to health of patients around	17 (16.0)
8. Vaccination will protect patients	16 (15.1)
9. Responsibility to protect family	16 (15.1)
10. Influenced by mass media	2 (1.9)
<b>Hindering factors (non-vaccinated respondents)</b>	
1. Forgot to get or no time to get the vaccine	59 (56.2)
2. Safety precautions are sufficient for protection	38 (36.2)
3. Not sure about the effectiveness of the vaccine	28 (26.7)
4. Worried about side effects of the vaccine	24 (22.9)
5. Perceived to not be at risk for getting influenza	18 (17.1)
6. Other reasons	15 (14.3)
7. Had not heard about the vaccine	12 (11.4)
8. Fear of becoming infected because of the vaccine	12 (11.4)
9. Cost/expensive	12 (11.4)
10. Fear of needles	12 (11.4)

The most commonly given reason for being immunized is the effectiveness of the influenza vaccine (Takayanagi *et al*, 2007; Fernandez *et al*, 2009; Khazaeipour *et al*, 2010). Other reasons include the believe that the vaccine is safe, worth the time and expense, gives adequate protection to them and people around them, the belief that influenza is a serious disease (Khazaeipour *et al*, 2010; CDC, 2011b), the vaccine was recommended by their family doctor or nurse (Blank *et al*, 2008), they are at risk for contracting influenza because of the nature of the work (Khazaeipour *et al*, 2010), they heard about the vaccine in the media (Takayanagi *et al*, 2007; Khazaeipour *et al*, 2010) and they needed to protect their own health or that of others

(Trivalle *et al*, 2006; Maltezou *et al*, 2008; Al-Tawfiq *et al*, 2009). Some HCWs may be vaccinated as a requirement by their employers.

The main reasons given by HCWs to receive vaccination in our study were that the vaccine provides effective protection against influenza infection and the belief they were at risk of getting influenza infection and to prevent transmission to patients. O'Reilly *et al* (2005) found the commonest reason given (96% of vaccine recipients) was to protect themselves against influenza infection. This result differed from another study where the subjects had the vaccine to protect patients, rather than themselves or family members (Seale *et al*, 2010).

Of those who did not receive influenza vaccination, the commonest reason given was forgetting to have the vaccine or time constraint. In a study from the Middle East 31.8% of respondents stated lack of time as the reason for not getting the vaccine (Abu-Gharbieh *et al*, 2010). Common factors mentioned for not getting influenza vaccination are worry about the side effects of the vaccine (Maltezou *et al*, 2008; Raftopoulos, 2008; Fernandez *et al*, 2009; Khazaeipour *et al*, 2010; CDC, 2012), concern about the effectiveness of the vaccine (Maltezou *et al*, 2008; Khazaeipour *et al*, 2010; CDC, 2012), the perception they are not at risk of acquiring influenza (Willis and Wortley, 2007; Maltezou *et al*, 2008; Raftopoulos, 2008), concern that the influenza vaccine can cause influenza (Willis and Wortley, 2007; Ribner *et al*, 2008). Less common reasons given for not getting the influenza vaccine include being unaware of the influenza vaccine (Khazaeipour *et al*, 2010), belief that the vaccine is not needed relying on other preventive measures such as hand hygiene and wearing face masks to prevent influenza (Willis and Wortley, 2007; Khazaeipour *et al*, 2010).

A multifaceted, evidence-based approach to improve vaccine uptake should include measures such as educational campaigns to allay misconceptions about influenza and the influenza vaccine, improving access to vaccines, remove administrative and financial barriers to vaccination, role modelling and monitor vaccination coverage (CDC, 2006). People should also be educated about how the vaccine can prevent transmission to vulnerable populations. Since having a time constraint was a major barrier to influenza vaccination uptake, increasing the frequency and extending the hours of vaccination clinics and providing the

influenza vaccine at the worksite (Flore *et al*, 2009) could improve vaccination uptake. Other studies have found providing free vaccinations, and making the vaccine available at the worksite led to vaccination uptake rates of 40%-60% among HCWs (Bryant *et al*, 2004; Sartor *et al*, 2004).

In a review of intervention programs, it was found programs using more intervention measures had higher vaccine uptake rates and the most effective measure was mandatory vaccination (Hollmeyer *et al*, 2013). A 10-year influenza vaccination study carried out at one center in the United States found the highest vaccination rate was 72% (Ajenjo *et al*, 2010). A web-based nationwide survey conducted in the United States found a greater vaccination uptake was associated with healthcare providers offering the vaccine onsite, free of charge and for multiple days (CDC, 2011b; 2012). The overall influenza vaccination coverage among HCWs in the United States was 63.5% for the 2010-2011 influenza season (CDC, 2011b), and 66.9% for the 2011-2012 season (CDC, 2012). The vaccination uptake rates were 98.1% in 2011 (CDC, 2011b) and 95.2% in 2012 (CDC, 2012) for HCWs who were required to have the vaccine.

Numerous professional organizations have recommended mandatory annual HCW influenza vaccination as a core patient-safety practice (Poland *et al*, 2010; Johnson and Talbot, 2011). These include the American Academy of Pediatrics (Bernstein and Starke, 2010), the American College of Physicians and the Society for Healthcare Epidemiology of America (SHEA) (Talbot *et al*, 2010). Several healthcare facilities in the United States have implemented mandatory vaccination programs as a condition for employment, achieving vaccination rates greater than 95% (Babcock *et al*, 2010; Johnson and Tal-



bot, 2011). Reasons for non-vaccination in the mandatory programs include medical and religious exemptions. Septimus *et al* (2011) described the experience for implementing mandatory influenza vaccination at the Hospital Corporation of America where the vaccination rate achieved was 96%. Vaccination rates were significantly higher in institutions that required signed declination statements ( $p=0.004$ ) (Polgreen *et al*, 2008).

The results of this study provide valuable information for hospitals to plan influenza vaccination programs and make recommendations for the national level. Even though the most common source of information about influenza vaccination in our study was publicity at workplace, and 85.3% of respondents stated influenza vaccination is important for disease prevention, the vaccination uptake rate in our study was low among these HCWs. A multifaceted and evidenced-based approach toward increasing influenza vaccination uptake is needed. A mandatory vaccination program should be considered if the voluntary vaccination programs fail to achieve adequate uptake. The benefits of vaccination for HCWs and patients, and the low risk of adverse reactions are important factors to support mandatory vaccination. Healthcare administrators should include influenza vaccination coverage as a measure of quality of care as part of a patient safety program (CDC, 2006). Vaccination uptake rates should be regularly recorded and monitored, and feedback given to promote compliance with vaccine policies.

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