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Impact of influenza A (H3N2) seasonal outbreak on the pattern of vaccination uptake in healthcare workers



Sir,

In the northern hemisphere, the 2014/15 influenza season has caused considerably higher disease burden compared to the previous years.¹ The grave situation was attributed to the rapid dissemination of influenza A (H3N2) virus that has drifted antigenically from A/Texas/50/2012 (component of the recommended vaccines) to A/Switzerland/9715293/2013, which most people were not protected from.¹ In Hong Kong, the foregone influenza season emerged relatively early in January 2015, at a time when some healthcare workers had not yet received their seasonal vaccine. Our previous studies have shown that healthcare workers' vaccination uptake may be affected by the prevailing epidemic situation.² In an effort to understand the impacts of a severe influenza season on vaccination uptake patterns in healthcare workers, we conducted an online survey targeting members of the 20,000-strong nursing body in Hong Kong. The results were compared with unpublished data from a similar survey administered one year earlier, following approval of the Survey and Behavioral Ethics Committee of the Chinese University of Hong Kong.

Over a 30-day period in February/March 2015, 865 valid returns were received from nurses following invitation e-mails, representing a response rate of 11–18% after exclusion of incorrect addresses and presumably spammed emails. Median age of the respondents was 32 years (interquartile range: 26–43), with 77% reporting to be in frequent contacts with patients. Their demographics and professional profile were similar to those ($N = 826$) participating in a similar survey in March 2014 (Table I). Overall, the vaccination uptake rates were 28% and 32% in preparation for the 2014/15 season and 2013/14 season respectively. At the time of the 2015 survey, 114 (29%) of the unvaccinated nurses indicated that they would receive vaccination soon, in wake of the emergence of the H3N2 seasonal outbreak. Assuming that these latter

respondents did get vaccinated, the uptake rate for the 2014/15 season would become considerably higher at 41%.

Respondents were asked to indicate their intention to receive vaccination in the following year. In the 2014 survey, 28% replied that they would get vaccinated before the 2014/15 season, a proportion identical with the actual rate recorded at the time of the 2015 survey. However, in preparation for the 2015/16 winter influenza season, 36% responded that they would get vaccinated, which is much higher than the preceding year, but closer to the 41% expected to have been vaccinated in anticipation of the 2014/15 season. During the 2014/15 season, there were suggestions that a mop-up campaign with an influenza vaccine composing of A/Switzerland/9715293/2013 should be considered by the government. Some 28% responded that they would accept this 'inter-seasonal' vaccine if it became available, of which 76% have been or were going to be vaccinated for the 2014/15 season.

Our results revealed some paradoxical phenomena. Whereas the vaccination uptake of nurses was low pre-seasonally, the ultimate rate could in fact be higher, as more than one-quarter of those unvaccinated in early 2015 were planning to receive vaccination following the onset of a severe influenza season. This was surprising, as the effectiveness of the year's vaccine has been proven to be low at <20%.¹ Here, undecided nurses were apparently strongly influenced by their perceptions of the prevailing situation. Despite the widely broadcasted message that the vaccine was not sufficiently effective, its uptake had increased. Previously we have demonstrated that those refusing vaccination were fearful of vaccine-associated adverse effects.³ In 2009, some 13.3% of nurses refused to receive a new monovalent vaccine against influenza A (H1N1) pdm09 virus because of safety concerns.⁴ Unexpectedly, the proposed 'inter-seasonal' vaccine for 2015 was better accepted by 28%, perhaps reflecting their perception of the new initiative as another dose of the regularly administered instead of a new vaccine.

In recent years, the vaccination rate of nurses in Hong Kong has been on a declining trend.⁵ It was high at about 60% in 2006, when the city was recovering from the 2003 severe acute respiratory syndrome (SARS) outbreak and in the midst of the anticipated arrival of avian influenza, but fell subsequently when influenza appeared to be under better control. The

Table I

Comparison of respondents' characteristics in the 2014 ($N = 826$) and 2015 ($N = 865$) surveys

Characteristics	2014 survey			2015 survey			OR	95% CI	P-value
	Count	%	N	Count	%	N			
Female	705	85%	826	727	84%	865	0.9	0.69–1.18	0.46
Age >45 years	207	25%	826	185	21%	865	0.81	0.65–1.02	0.07
Frequent clinical contact with patients	646	78%	826	665	77%	865	0.93	0.74–1.16	0.51
Vaccination uptake rate									
Last season one year ago	259	31%	826	258	30%	865	0.93	0.76–1.14	0.5
Current season									
Vaccinated as of the time of survey	265	32%	826	239	28%	865	0.81	0.66–1	0.046
Prepared to have vaccination for 2014/2015 season	–	–	–	114	29%	399	–	–	–
Overall prediction for 2014/2015 season	–	–	–	353	41%	865	–	–	–
Next season a year later	233	28%	826	310	36%	865	1.42	1.16–1.75	0.001
Mop-up inter-seasonal vaccination	–	–	–	241	28%	857	–	–	–

OR, odds ratio; CI, confidence interval.

observations then and now confirmed that the prevailing epidemic condition has an important impact on the decision of healthcare workers concerning their own vaccination, amidst a whole range of factors associated with attitudes and perceptions.⁶ Vaccination hesitancy reflects also the continued competition between egoism and altruism.⁷ Whereas influenza vaccination of healthcare workers constitutes an infection control practice, many perceive this as a self-protection measure alone.⁸ To enhance protection, mandatory vaccination is probably the only feasible strategy to boost vaccination coverage to the 75% level advocated internationally.⁸ However, the impact of near-universal staff immunization on clinical outcomes has yet to be ascertained. Whereas the vaccination coverage of healthcare workers in places such as Hong Kong has remained low, health authorities should be mindful of the possible impact of influenza epidemics, which may stimulate demand for vaccination mid-season, even when the vaccine may not provide good cover.

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Conflict of interest statement

None declared.

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References

1. D'Mello T, Brammer L, Blanton L, *et al.* Update: influenza activity – United States, September 28, 2014–February 21, 2015. *Morb Mortal Wkly Rep* 2015;**64**:206–212.
2. Lee SS, Wong NS, Lee S. Falling trend of influenza vaccination coverage in healthcare workers in Hong Kong. *Emerg Infect Dis* 2013;**19**:1660–1663.
3. Poon CM, Lee SS, Lee S. Early uptake of seasonal influenza vaccines incorporated with pH1N1 strain among regularly vaccinated healthcare workers. *J Infect Prevent* 2012;**13**:200–205.
4. To KW, Lee S, Chan TO, Lee SS. Exploring determinants of acceptance of pandemic influenza A (H1N1) 2009 vaccination in nurses. *Am J Infect Control* 2010;**38**:623–630.
5. Tam DKP, Lee SS, Lee S. The impact of SARS and perceived avian influenza outbreak on the uptake of influenza vaccination among healthcare workers in Hong Kong. *Infect Control Hosp Epidemiol* 2008;**29**:256–261.
6. Vasilevska M, Ku J, Fisman DN. Factors associated with healthcare worker acceptance of vaccination: a systematic review and meta-analysis. *Infect Control Hosp Epidemiol* 2014;**35**:699–708.
7. Betsch C. Overcoming healthcare workers' vaccine refusal – competition between egoism and altruism. *Euro Surveill* 2014;**19**:20979.
8. Ahmed F, Lindley MC, Allred N, Weinbaum CM, Grohskopf L. Effect of influenza vaccination of healthcare personnel on morbidity and mortality among patients: systematic review and grading of evidence. *Clin Infect Dis* 2014;**58**:50–57.

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Prevention of nosocomial transmission of influenza A (H7N9) in Hong Kong



Sir,

Influenza A (H7N9) emerged as a human pathogen in China in early 2013. Although there is no evidence of local transmission of H7N9 in Hong Kong, human cases imported from China are sporadically encountered. Person-to-person transmission of H7N9 has been reported among household contacts of infected patients.¹ To protect healthcare workers (HCWs) and hospital inpatients, an infection control preparedness strategy was established in our public health system, which includes active disease surveillance, early isolation of suspected cases, rapid molecular diagnostic testing, use of appropriate personal protective equipment (PPE) during patient care, and contact tracing for HCWs and hospitalized patients with unprotected exposure.² During influenza season HCWs are required to wear surgical masks during patient care, and N95 respirators and face shields when aerosol-generating procedures (AGPs) such as non-invasive positive pressure ventilation (BiPAP) and endotracheal intubation are performed.

On February 2015, we prospectively followed 82 HCWs who were involved in managing an H7N9-confirmed patient, a 61-year-old male who had travelled to Dong Guan, China, within three days of presentation. Since the patient denied visiting wet markets or poultry contact, he received care in an open cubicle of five patients, with six air changes per hour. Eighty-two HCWs including 16 (20%) doctors, 40 (49%) nurses, seven (8%) allied health staff, and 19 (23%) supporting staff, working in the emergency room, medical ward, and intensive care unit, were exposed to the index case for 42 h before the diagnosis of H7N9 infection was confirmed. The infection control team