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Promotion of seasonal influenza vaccination among staff in residential care homes for elderly in Hong Kong

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Abstract. Annual influenza epidemics continue to cause worldwide morbidity, mortality and societal disruption, especially among the aged residents of residential care homes for the elderly (RCHEs). Vaccination remains the most effective measure to prevent influenza and its associated complications. The seasonal influenza vaccine uptake rates among RCHE staff were much lower than that among residents. In order to increase uptake of influenza vaccination among RCHE staff in Hong Kong, this study developed and evaluated a multimodal vaccine promotion program (VPP) based on identified factors affecting vaccination acceptance or refusal within the Hong Kong Chinese context. Vaccine acceptance was found to be significantly associated with belief in vaccine efficacy, duration of service, staff group and providing direct care to residents. The focus group study revealed that RCHE staff's belief in the efficacy and safety of the vaccine played a major role in vaccine acceptance. VPP effectiveness was evaluated with a cluster randomised controlled trial among RCHEs with staff vaccination rates below 50%. Compared with 2008/09, the 2009/10 mean staff vaccination rates increased significantly in both the intervention (39.4% to 59.6% ($P < 0.001$)) and control groups (36.3% to 47.6% ($P = 0.008$)). RCHE staff in the intervention group had a higher vaccination rate than in the control group (59.6% versus 47.6%, $P = 0.072$). This program reinforces the importance of a comprehensive and culturally sensitive approach to promote influenza vaccination for RCHE staff.

Introduction

Annual influenza epidemics continue to cause worldwide morbidity, mortality and societal disruption, especially among the elderly.¹ There are 760 residential care homes for the elderly (RCHEs) in Hong Kong accommodating over 63 000 residents. With both winter (January–March) and Summer

(July–August) influenza peaks,² influenza outbreaks in RCHEs can have significant consequences.³ Healthcare workers (HCWs) are often exposed to influenza infection in both the general community (household contacts, public transport etc.) and the workplace, and therefore play an important role in healthcare-associated influenza outbreaks.⁴ Efforts to reduce

the impact of influenza include targeted vaccination of those at high risk of complications from influenza infection and their contacts.⁵

Influenza vaccine is recommended to protect HCWs² from influenza (RR 0.20, 95% CI=0.09–0.44) and influenza-like illness (RR 0.70, 95% CI=0.59–0.83)^{6,7} and is also effective in protecting residents when they are also vaccinated (RR 0.14, 95% CI=0.03–0.60).^{8,9} However, compared with the elderly, HCWs who work with them have lower rates of influenza vaccination.¹⁰ Empirical research has identified a variety of reasons for the lower rates of vaccine acceptance among HCWs, including perceptions that neither they nor their patients are at risk, concerns over vaccine efficacy, and side effects resulting from vaccination.^{4,10–12} The annual survey conducted by the Elderly Health Service (EHS) of the Hong Kong Department of Health showed that although the overall influenza vaccination rates among RCHE residents exceeds 90%, rates for RCHE staff deteriorated from 79.3% in 2005/06 to 70.5% in 2008/09. Out of 760 RCHEs in Hong Kong, in 2008/09 nearly 90 had staff vaccination rates \leq 50%.

Vaccination has been shown to result in reduced absenteeism among staff^{6,7} as well as being cost-effective and probably cost-saving.¹³ Although numerous international vaccination programs have encouraged HCWs to be vaccinated, there remains surprising resistance.¹⁰ In order to increase uptake of influenza vaccination among RCHE staff in Hong Kong, this study developed and evaluated a multimodal vaccine promotion program (VPP) based on identified factors affecting vaccination acceptance or refusal within the Hong Kong Chinese context.

Materials and methods

This study adopted a sequential three-phase design. Participants, data collection and data analysis were introduced respectively in each phase. The Department of Health of Hong Kong Ethics Committee approved the study.

Phase I – Qualitative exploration

A total of 36 HCWs (7 nurses from EHS and 29 staff from RCHEs) participated in this phase for focus group interviews aiming at exploration of factors affecting the acceptance or refusal of vaccination among staff of RCHEs. Participating nurses were familiar with RCHE operations and were responsible for introducing, distributing and administering influenza vaccine injections to RCHE residents and staff. Participating RCHE staff had varying levels of influenza vaccine acceptance.

Informed consent was obtained verbally before the focus group interview, which was anonymous and lasted from 1.5 to 2 h. Fifteen questions were posed regarding personal influenza vaccination history, attitudes toward vaccination, influential effects of pandemic and vaccination promotion programs/policies. Discussion within the focus group was conducted until saturation was reached. All focus group interviews were audio-recorded and transcribed by an external party and cross-

checked by either two of the doctors, the registered nurse or the research officer who led the focus group discussion.

Content analysis was performed by the research officer and coded under five main themes: reasons for vaccine acceptance, reasons for vaccine refusal, barriers for vaccination, misconceptions and most effective vaccine promotion methods.

Phase II – Development of VPP

Responding to the main reasons for acceptance or refusal of influenza vaccination, as well as the promotion methods from the findings of phase I, a four-component VPP was designed to address the major concerns held by RCHE staff, ameliorate their misconceptions, and improve knowledge of vaccines in general. Emphasis was placed on the benefits of influenza vaccine on protecting the staff themselves as well as their families.

Developed in collaboration with a psychologist, the four distinct components of the VPP were: (1) an interactive health talk; (2) reminders of the vaccination promotion program; (3) a telephone consultation service; and (4) vaccine promotion visits.

The interactive health talk (60–90 min), including a 5-minute VPP-produced video, adopted a personal and culturally sensitive approach to deliver general information on vaccine development, vaccine-preventable diseases, protection of residents, staff/families with seasonal influenza vaccine, as well as possible physical reactions to vaccination. Daily use items (i.e. mugs, hand-towels, environmentally friendly bags) were used as reminders of the VPP and were distributed to RCHE staff during the interactive health talk. These items were printed in Chinese with the slogan ‘be aware of influenza and get vaccinated’. A telephone consultation service was established for RCHE staff/families to contact members of the VPP team. For RCHEs in the intervention group with poor consent rates, vaccine promotion visits were arranged 1–2 weeks before the scheduled vaccine day. On these visits, misconceptions and questions regarding the vaccine were addressed. Information on vaccine effectiveness was provided specifically to RCHE staff that expressed ambivalence toward the influenza vaccine.

Phase III – Evaluation of VPP

A two-arm cluster randomised controlled trial with RCHEs as units of randomisation were conducted. The VPP developed in phase II was applied to the intervention group, whereas the control group remained within their usual practice. In this phase, we evaluated the effectiveness of the VPP by comparing the knowledge and attitudes of vaccination before and after the VPP in the intervention groups.

In stratified cluster random sampling, with an average cluster size being 36, the intra-class correlation coefficient was 0.16 (2007 data) with a design effect of 6.6. To achieve 80% power and detect significant effects, the expected minimum sample size would be 550 in the intervention and control groups. A total of 41 RCHEs (21: intervention group; 20:

control group) participated in this phase, which included 683 participants in the intervention group and 736 in the control group.

A cross-sectional, self-administered questionnaire modified from the Centres for Disease Prevention and Control (CDC) was used in a pre- and post-test among RCHES with staff influenza vaccine acceptance rates $\leq 50\%$. Questionnaire items included knowledge and attitudes about seasonal influenza vaccination, reasons for accepting or refusing vaccination and demographic data.

The statistical analysis was done using paired *t*-tests to determine the significant changes in pre- and post-intervention. The odds ratio in logistic regression was used to identify the strength of relationship between intervention components and intervention effect. Statistical analysis was performed with SPSS (Version 16; SPSS Inc., Chicago, IL, US). A two-tailed *P*-value < 0.05 was considered statistically significant.

Results

During phase I (April–May 2009), six focus groups were conducted with seven nurses from EHS and 29 staff from 16 RCHES. The first focus group interview involved seven nurses from EHS. For the subsequent five focus groups, 29 HCWs from 16 RCHES throughout the territory participated. The participating RCHES had varying staff vaccination rates ranging from 36.7% to 92.3%. Among the 29 RCHE staff, six (20.6%) were persons in charge, 11 (38.0%) were nurses (registered nurses or enrolled nurses), six (20.7%) were HCWs,^A five (17.3%) were care workers^B and one (3.4%) was supporting staff not providing direct care to residents.

The focus group data revealed that acceptance or refusal of influenza vaccination was determined by beliefs about efficacy and safety, as well as misconceptions about the vaccine. Lack of accessibility for night-shift staff was found to be an important obstacle for vaccine uptake. Self-protection was more important than protection of residents in determining accepting attitudes toward vaccination. The data also revealed that the top three preferred vaccine programs were education talks, media publicity and information pamphlets/posters or reminders. These findings informed the development of the VPP in phase II.

In phase III, 1419 staff from the intervention and control groups returned the questionnaire (pre-test), providing a response rate of 82.7%. For sample description, see Table 1. Logistic regression showed that vaccine acceptance was significantly associated with beliefs about vaccine efficacy ($P < 0.001$), years of service in RCHE (more likely for those with $> 1-5$ years, $P = 0.001$), staff position (more likely for those in charge, $P < 0.001$) and providing direct resident care ($P < 0.001$) (see Table 2). Among those who would receive vaccination, 95.1% believed in its effectiveness for self-

Table 1. Staff characteristics among intervention and control groups

	Intervention	Control	Total
No. of RCHES	21	20	41
No. of staff	683	736	1419
Women (%)	88.5	90.7	89.7
Age group (%)			
≤ 25 years	3.0	2.6	2.8
26–35	11.5	10.3	10.9
36–45	29.3	33.0	31.2
46–55	42.0	44.4	43.3
≤ 56	14.1	9.6	11.8
Staff group (%)			
In charge	3.4	3.1	3.3
Registered nurse	3.1	3.0	3.1
Enrolled nurse	7.7	10.2	9.2
Healthcare worker	10.8	7.7	9.4
Care worker	43.3	43.1	44.0
Others ^A	31.7	32.9	30.9
Years of service in RCHES (%)			
≤ 1	16.0	17.2	16.6
$> 1-5$	28.9	32.7	30.9
$> 5-10$	19.5	23.7	21.7
> 10	35.6	26.4	30.8
Believe on effectiveness of vaccination (%)			
Very effective	7.2	8.9	8.1
Effective	63.8	58.0	60.7
Not sure about the effectiveness	25.1	28.9	27.1
Ineffective	3.9	4.2	4.0
Need for providing direct residents' care (%)	75.6	74.9	75.2

^AOthers: miscellaneous group of staff including social workers, clerical staff, cook, drivers and manual workers etc.

Table 2. Factors influencing acceptance of influenza vaccination

Factors	OR	95% CI	<i>P</i> -value
Believe on effectiveness of vaccination			< 0.001
Very effective	16.8	10.0–28.1	
Effective	6.56	4.72–9.11	
Ineffective/Absolutely ineffective	1	–	
Years of service in RCHES			0.001
≤ 1	1	–	
$> 1-5$	1.85	1.31–2.62	
$> 5-10$	1.46	1.01–2.12	
> 10	1.17	0.82–1.66	
Staff group			< 0.001
In-charge	1	–	
Registered nurse	0.41	0.18–0.95	
Enrolled nurse	0.33	0.17–0.66	
Health worker	0.49	0.27–0.89	
Care worker	0.44	0.23–0.87	
Others	0.28	0.15–0.51	
Need for providing direct residents' care	1.76	1.35–2.29	< 0.001

protection while 47.3% believed in protection for others. Among those who declined vaccination, the common demotivators were fear of side effects (53.4%), beliefs that no

^AHealthcare worker provides health care services for residents including routine health check, wound dressing, drug administration after completing the training course approved by the Director of Social Welfare and registered by the Social Welfare Department.

^BCare worker provides personal care to residents such as bathing and feeding.

self-protection was provided by influenza vaccination (29.1%), unfit physical condition (17.8%) and fear of injection (17.1%).

Out of 683 staff in the intervention group who have been invited to participate in the interactive talk, 462 actually joined the talk and completed the questionnaire (post-test) with a response rate of 67.6%. Their knowledge and attitudes scores toward influenza vaccination improved significantly from 5.8 to 7.9 ($P=0.001$). Compared with 2008/2009 data, the actual mean staff vaccination rates in 2009/2010 increased significantly in both the intervention (from 39.4% to 59.6%; $P<0.001$) and control groups (from 36.3% to 47.6%; $P=0.008$) while the overall staff vaccination rates in local RCHEs remained stable. Staff from RCHEs in the intervention group had a higher vaccination rate than the control group (59.6% versus 47.6%, $P=0.072$) which was marginally statistically significant.

Discussion

Phase I of this study revealed that acceptance of influenza vaccination was determined by beliefs about efficacy and safety. The strength of the relationship between these factors and attitudes toward vaccination were also confirmed in phase III. The VPP developed based on these factors was found effective in the intervention group.

Our focus group and cross-sectional survey findings are consistent with other studies on factors affecting influenza vaccine uptake.^{14–25} In our study, the strongest factor for vaccine acceptance among staff of RCHEs were beliefs about influenza vaccine efficacy, which parallels findings among Hong Kong nurses where perceived vaccine effectiveness was a strong predictor (OR 8.47, 95% CI=6.13–11.70) for rates of vaccination.²⁴ Consistent with the literature,¹⁸ beliefs regarding vaccine efficacy for self-protection rather than protection of patients was found to be more common among staff of RCHEs who would receive influenza vaccination. Misconceptions about vaccine efficacy, on the other hand, were also found to be the common demotivator as indicated in studies in the West.²⁶

Aside from subjective perceptions, staff's years of service and job responsibilities (i.e. in charge, providing direct residents' care) were found to be associated significantly with vaccine acceptance. Those who had been serving between 1 and 10 years compared with new and those serving for more than a decade were more likely to hold positive attitudes towards vaccination. Staff who had been serving between 1 and 10 years accounted for more than half of the sample, which means that interventions should be focussed on newly hired and long-serving staff.

The focus group interviews also revealed that increasing the convenience of influenza vaccination was a common theme believed to potentially increase uptake rates among staff, especially for nightshift staff that found it convenient to receive vaccination. This finding is also confirmed by other studies where increasing convenience was believed to be the

key for vaccine uptake.²⁷ In future vaccination programs in Hong Kong, special attention should be paid to nightshift staff.

Compared with the control group, the intervention group had a higher vaccination rate, although the difference was marginally significant. There was also a significant increase in knowledge of and attitudes toward influenza vaccine as evidenced by the pre- and post-tests in the intervention group. This indicates that there is some value to the VPP developed in this study, but the program could be improved further by considering the following suggestions.

First, the multimodal components within the vaccine promotion program ought to be integrated and delivered in a more coherent and systematic way. The health promotion message needs to be consistent and complementary across multiple components, all of which need to function independently and collectively to deliver the message across time and context. For instance, the video and printed educational/promotional materials need to be available to target RCHEs before the vaccination season(s). The interactive talk on the intervention day should reinforce the critical messages contained in the video and educational/promotional materials. The reminders (e.g. promotional gifts) distributed during the interactive talk should be able to extend the message of 'be aware of influenza and get vaccinated' beyond the workspace to other contexts (e.g. families). The telephone hotline and promotion visits should also be user-friendly and focussed on individualised concerns and needs, especially targeting staff with ambivalent attitudes toward seasonal influenza vaccine. Second, in order to enhance the unbiased assimilation of the message, the video and educational/promotional materials should integrate a known and trusted source for delivering accurate information about seasonal influenza vaccine. Common concerns and misconceptions related to seasonal influenza vaccine need to be contextualised and addressed in a culturally sensitive manner.

One limitation of this study was that human swine flu (H1N1) was first seen in Hong Kong in April 2009. With the World Health Organisation announcement of the H1N1 pandemic and the subsequent introduction of the H1N1 vaccination, some members of the public may have been confused over seasonal influenza vaccine and the H1N1 vaccine. On the other hand, the emergence of the H1N1 pandemic may have influenced people's decisions regarding whether or not to receive the seasonal influenza vaccination. During the VPP, we spent considerable time explaining the difference between the two vaccines and ensured that participants understood that we were focussing on the seasonal influenza vaccine. An additional concern was that we focussed the VPP on RCHEs with vaccine uptake rates $\leq 50\%$. This limited the number of RCHEs we can approach for inclusion in this study. This resulted in our sample not having adequate power to detect the difference between RCHEs supported by government and those funded privately. An additional limitation was that since the questionnaire was anonymous, we were unable to conduct an analysis at the

individual level. Therefore, we were unable to find the association between change in knowledge of and attitudes toward influenza vaccination and subsequent vaccine uptake. To study the sustainability of the VPP, we intend to monitor vaccine uptake during the upcoming influenza season.

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