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The impact of personal coaching on influenza vaccination among healthcare workers before and during COVID-19 pandemic



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ABSTRACT

Background: Without the implementation of mandatory vaccination, it was difficult to increase the influenza vaccination rate among healthcare workers. We described the strategy of personal coaching and assess its impact in increasing the influenza vaccination rate among healthcare workers in Hong Kong. **Methods:** Personal coaching of individual staff led by the infection control officer (ICO) and senior nursing officer (SNO) from infection control team could overcome barriers and promote on-site vaccination. The influenza vaccination rates among different categories of staff in 2016/2017 (year 1, baseline), 2017/2018 (year 2, promotion using social media), and 2018/2019 to 2020/2021 (year 3–5, promotion using personal coaching) were analysed in a healthcare region with 8490 ± 206 staff during the study period.

Results: With the implementation of personal coaching, the influenza vaccination rates increased significantly among medical (65.0% vs 57.0%, $p = 0.048$), nursing (30.6% vs 21.1%, $p < 0.001$), allied health (37.0% vs 27.4%, $p < 0.001$), care-related supporting staff (37.7% vs 27.3%, $p < 0.001$), and non-professional staff (27.3% vs 22.3%, $p < 0.001$) in year 3 compared with year 2, and also significantly increased among all staff in year 4 (38.0% vs 34.7%, $p < 0.001$) and year 5 (45.2% vs 38.0%, $p < 0.001$) when compared with the preceding year. The increase in vaccination rate was not apparent with social media promotion alone (26.4%, year 2 vs 25.6%, year 1, $p = 0.305$).

Conclusion: Personal coaching led by ICO and SNO significantly increased the vaccination rates among healthcare workers in 3 consecutive years. This model could be promulgated to unit heads to establish a hospital culture conducive to vaccination.

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1. Introduction

Before the onset of the coronavirus disease 2019 (COVID-19) pandemic, influenza was the most devastating infectious disease leading to four pandemics since 1918 [1–2]. It is estimated that influenza viruses are associated with over 5 million hospitalizations [3] and an average of 389,000 respiratory deaths worldwide each year [4]. In the United States, the Centers for Disease Control and Prevention estimates that influenza has resulted in 9–41 million illnesses, 140,000 – 710,000 hospitalizations and 12,000 – 52,000 deaths annually between 2010 and 2020 [5]. The burden

of influenza infection and its complications is highest among the elderly population, whereas the effectiveness of influenza vaccine is lowest in this group due to immunosenescence [6,7]. On the other hand, influenza vaccination in children and young adults may induce herd immunity against influenza which works in favour of the elderly [8,9]. More importantly, influenza vaccination of healthcare workers was associated with a substantial decrease in mortality among elderly patients in long term care facilities [10]. Therefore, the World Health Organization recommends prioritizing healthcare workers for influenza vaccination, especially during the COVID-19 pandemic, in addition to other at-risk populations [11]. However, influenza vaccination rates among healthcare workers were lower than 40% in Europe and Asia [12,13]. Given the potential barriers to influenza vaccination among healthcare workers [14–16], multi-component influenza vaccination pro-

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grams targeting behavioural, organizational, and administrative barriers with particular focus on education and provision of on-site vaccination may not increase the vaccination rate to more than 40% [17,18]. Mandatory vaccination policy appears to be an important strategy to increase the influenza vaccination rate in healthcare workers to over 90% in the United States [19,20]. In 2010, the Society for Healthcare Epidemiology issued a revised position paper on influenza vaccination of healthcare personnel to recommend adding annual influenza vaccination as a condition of employment for healthcare workers [21]. Although universal or mandatory influenza vaccination among healthcare workers remains debatable from the scientific perspective [22,23], the pooled proportion of healthcare workers accepting the policy of mandatory vaccination was 61% in a recent systematic review and meta-analysis [24]. Correspondingly, the proportion of respondent hospitals requiring influenza vaccination for healthcare workers increased from 37% (2013) to 61% (2017) in a survey of US hospitals [25].

Without the implementation of mandatory influenza vaccination, the vaccination rate among healthcare workers in Hong Kong progressively declined after the severe acute respiratory syndrome (SARS) outbreak ended, especially the vaccination rate among nurses, which fell from 57% in 2005 to 24% in 2012 [26]. Here, we described our strategy of personal coaching of individual staff to significantly increase influenza vaccination coverage among all categories of healthcare workers in Hong Kong.

2. Materials and methods

2.1. Setting

The study was conducted in a healthcare region which included a University affiliated tertiary referral hospital (Queen Mary Hospital) of 1700 beds, and 5 extended care hospitals (Hospital A to E) with another 1400 beds in Hong Kong. The groups of staff included both professional and non-professional staff. Professional staff were further divided into medical staff, nursing staff, allied health staff (physiotherapists, occupational therapists, speech therapists, dietitians, clinical psychologists, laboratory technicians, and pharmacists), and care-related supporting staff. Non-professional staff included non-care-related supporting staff, clerical staff, administrative staff, and management staff. All healthcare workers were entitled to receive free annual influenza vaccine on a voluntary basis in the staff clinic of the hospitals or during promotion campaign as described below. The vaccination records of all staff were entered into the electronic platform, namely the clinical management system, which can facilitate data retrieval for analysis. The ratio of vaccinated healthcare workers in each staff group was calculated based on the total number of healthcare workers in that group as of 31 August of each year, which is the beginning of each influenza campaign.

2.2. Promotion strategies for influenza vaccination in relation to the vaccination rate

In Hong Kong, there is a distinct pattern of seasonal influenza, demonstrating winter and summer peaks. The winter influenza season usually occurs from January to March/April. To facilitate the administration of influenza vaccine to healthcare workers, education and promotion talks were organized in staff forum or through department visits in October to December each year after the new formulation of influenza vaccine for the Northern Hemi-

sphere was available. Healthcare workers were encouraged to receive influenza vaccine in the staff clinic during office hours. In addition, vaccination booth was set up in the hot zone of the hospital during lunch hour (12:00 pm to 3:00 pm), and visits to both clinical and non-clinical areas were arranged to provide on-site influenza vaccination service by part-time nurses and infection control nurses (ICNs). Gifts and souvenirs were given to healthcare workers who received influenza vaccine. These were the baseline measures implemented all along in our healthcare region. The data collected during the influenza season of 2016/2017 (year 1) was used for baseline analysis.

During the influenza season of 2017/2018 (year 2), promotion of influenza vaccination using social media, including YouTube and Facebook, was adopted, in addition to the baseline measures. A song was produced for promoting influenza vaccination targeting both healthcare workers and the public. The background music was adopted from a famous song in Chinese pop culture, whereas the lyric was rewritten by the infection control team (ICT), in order to motivate our healthcare workers to receive influenza vaccines. To support this innovative idea, the song was played by our hospital chief executive, along with members of senior stakeholders, the ICT, and patient representatives. It was recorded in a professional studio. The musical video was disseminated via social media and performed in the hospital concert as part of the influenza vaccination campaign.

Starting from the influenza season of 2018/2019 (year 3), a new strategy of personal coaching was adopted to promote influenza vaccination among healthcare workers, on top of the above measures. Personal coaching was led by the infection control officer (ICO) and senior nursing officer (SNO) from the ICT. The ICO, SNO, and ICNs would visit the clinical and non-clinical areas to promote influenza vaccination for healthcare workers who were still indecisive for vaccination. If any questions or concerns related to influenza vaccination were raised, regardless of whether they were of medical or psychological nature, the ICO and SNO would respond and resolve these barriers immediately so that the SNO and ICNs could administrate the vaccine on-site. The personal coaching and on-site vaccination took about 10 min for each staff. More than one round of personal coaching was arranged in each clinical and non-clinical area, depending on the response of the healthcare workers. The personal coaching approach was also implemented in the influenza season of 2019/2020 (year 4) and 2020/2021 (year 5), during the latter year education on COVID-19 vaccination was also included.

The influenza vaccination rates among different categories of healthcare workers each year in our healthcare region were analysed. The overall influenza vaccination rates among all healthcare workers throughout the study period were also compared.

2.3. Statistical analysis

The influenza vaccination rates were calculated by dividing the number of staff who had received influenza vaccination by the total number of staff in the corresponding categories each year. Chi-square test was used to compare the influenza vaccination rates across different years and categories of healthcare workers during the study period. Logistic regression was used to compare the vaccination rates of medical staff with that of other categories of healthcare workers in the whole study period. Odds ratios and their 95% confidence intervals were obtained, where an odds ratio above 1 indicates increased chance of vaccination and below 1 indicates decreased chance. SPSS version 23 was used for analysis and a 5% level of significance was adopted.

3. Results

3.1. Setting

During the study period of 5 years (from 2016/2017 to 2020/2021), the mean ± standard deviation, SD, of the number of healthcare workers in different categories in our healthcare region were as follows: medical staff (756 ± 8), nursing staff (2963 ± 72), allied health staff (982 ± 18), care-related supporting staff (1421 ± 25), and non-professional staff (2367 ± 175). Among all healthcare workers, 73.2% ± 0.2% were serving in Queen Mary Hospital while the remaining staff were working in the extended care hospitals (A to E).

3.2. Promotion strategies for influenza vaccination in relation to the vaccination rate

Despite the provision of educational talk, department visit, on-site vaccination in both clinical and non-clinical areas, and the provision of gifts and souvenirs to vaccinated staff, the baseline influenza vaccination rate in 2016/2017 (year 1) among all categories of healthcare workers was only 25.6% (2131 vaccinated staff / 8315 staff) in our healthcare region. In 2017/2018 (year 2), innovative ideas including the production of a song for influenza vaccination campaign, and organizing a musical concert for vaccine promotion were proposed and implemented. The song was professionally recorded and uploaded to social media for further dissemination

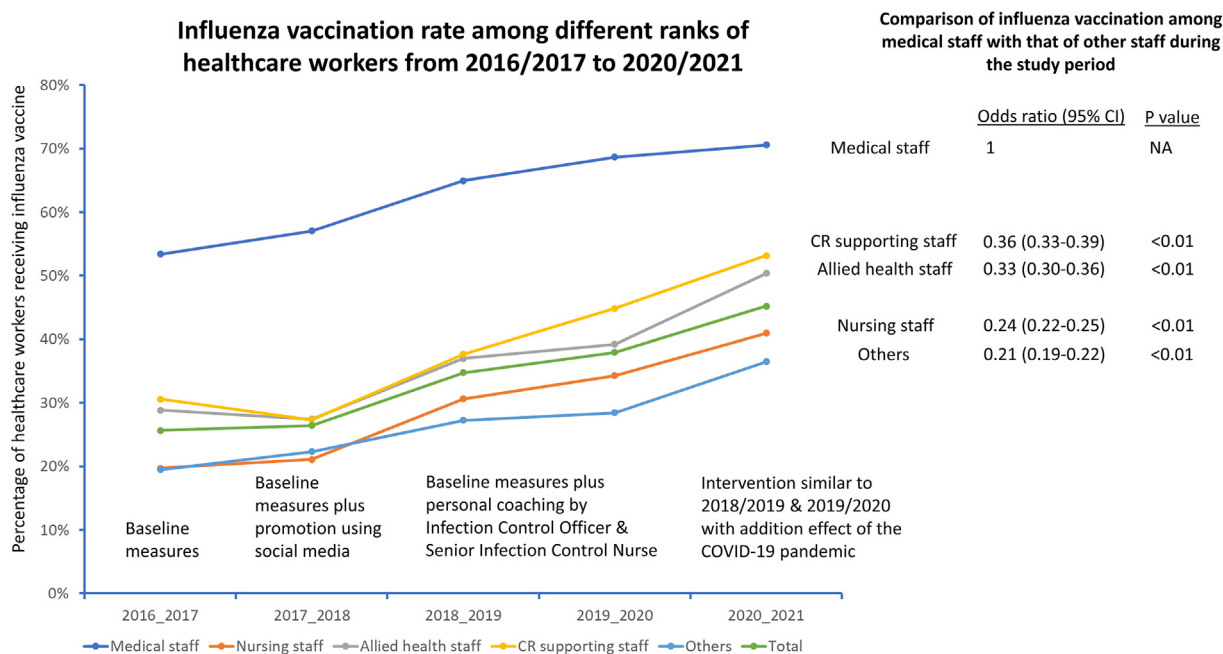


Fig. 1. Influenza vaccination rate among different categories of healthcare workers from 2016/2017 to 2020/2021. Note. CI, confident Interval; NA, not applicable.

Table 1 Significant change of influenza vaccination rate among different categories of healthcare workers in response to different interventions before and during COVID-19.

	Year 1	Year 2	P value	Year 3	P value	Year 4	P value	Year 5	P value
Intervention	2016/2017 Baseline measures ^a	2017/2018 Using social media ^b	Year 2 vs 1 Using social media ^b	2018/2019 Personal coaching ^c	Year 3 vs 2 Personal coaching ^c	2019/2020 Personal coaching ^c	Year 4 vs 3 Personal coaching ^c	2020/2021 Coaching in COVID-19 ^d	Year 5 vs 4 Coaching in COVID-19 ^d
Medical staff	53.4% (399/747)	57.0% (430/754)	0.346	65.0% (488/751)	0.048	68.6% (523/762)	0.385	70.6% (542/768)	0.650
Nursing staff	19.7% (584/2964)	21.1% (639/3033)	0.242	30.6% (866/2829)	<0.001	34.3% (1018/2969)	0.014	40.1% (1238/3021)	<0.001
Allied health staff	28.9% (275/953)	27.4% (269/981)	0.552	37.0% (363/981)	<0.001	39.2% (388/989)	0.423	50.4% (508/1008)	<0.001
Care-related supporting staff	30.6% (445/1455)	27.3% (394/1442)	0.103	37.7% (534/1417)	<0.001	44.9% (621/1384)	0.003	53.2% (748/1407)	0.002
Non-professional staff ^e	19.5% (428/2196)	22.3% (489/2191)	0.041	27.3% (637/2336)	<0.001	28.4% (697/2452)	0.448	36.5% (970/2658)	<0.001
Total	25.6% (2131/8315)	26.4% (2221/8401)	0.305	34.7% (2888/8314)	<0.001	38.0% (3247/8556)	<0.001	45.2% (4006/8862)	<0.001

^a Educational talk, department visit, provision of on-site vaccination in both clinical and non-clinical areas during baseline period.

^b In addition to the baseline measures, a song was produced, which was uploaded to social media (YouTube and Facebook) for dissemination and concert was organized for promoting influenza vaccination.

^c In addition to the baseline measures, personal coaching was performed during on-site visit to the clinical and non-clinical areas by the infection control officer and senior nursing officer of the infection control team to persuade the individual healthcare worker to receive influenza vaccination. Any questions or concerns related to influenza vaccination could be immediately solved by the infection control officer and senior nursing officer of the infection control team. Influenza vaccination could be administered by senior nursing officer of the infection control team on-site.

^d In addition to the baseline measures and personal coaching, the COVID-19 pandemic may enhance the willingness to receive influenza vaccination among healthcare workers.

(<https://www.youtube.com/watch?v=X5mcYtpGCf8>). The video can be browsed in Google or YouTube. The English translation of the lyrics was shown in [Supplementary File 1](#). The influenza vaccination rate among all non-professional staff, including non-care-related supporting staff, clerical staff, administrative staff, and management staff significantly increased in year 2 compared with year 1 (22.3%, 489/2191 vs 19.5%, 428/2196, $p = 0.041$). However, the overall vaccination rate among all staff in our healthcare region did not increase significantly compared with year 1 (26.4%, 2221/8401 vs 25.6%, 2131/8315, $p = 0.305$).

With the implementation of personal coaching by ICO and SNO in both clinical and non-clinical areas in 2018/2019 (year 3), there was a significant increase in influenza vaccination rates among all categories of healthcare workers (medical, nursing, allied health, care-related supporting staff, and non-professional staff) in year 3 compared with year 2 ([Table 1](#)). Continuation of personal coaching approach in 2019/2020 (year 4) further increased the influenza vaccination rates in nursing and care-related supporting staff significantly, while there was a non-significant increase in the vaccination rates among medical, allied health, and non-professional staff groups compared the corresponding figures in year 3. The number of healthcare workers who received influenza vaccination increased by 667 from year 2 to year 3, and further increased by 359 from year 3 to year 4. Since 405 and 214 staff received influenza vaccination via personal coaching during the corresponding period, personal coaching contributed to 60.7% (405/667) and 59.6% (214/359) increase in influenza vaccination among healthcare workers in the first and second year of implementation, respectively.

With the emerging of COVID-19 pandemic in 2020/2021 (year 5), personal coaching was continued together with the promotion of COVID-19 vaccination. Compared with the corresponding figures in year 4, the influenza vaccination rates increased in all categories of healthcare workers except for medical staff ([Table 1](#)). Since the implementation of personal coaching, the overall influenza vaccination rate among all staff significantly increased each year for 3 consecutive years (2018/2019, 2019/2020, and 2020/2021). The overall vaccination rate increased from 25.6% (2131/8315) at the start of the study period (year 1) to 45.2% (4006/8862) in year 5 ($p < 0.001$) in our healthcare region ([Fig. 1](#)).

Among all categories of healthcare workers, medical staff had the highest influenza vaccination rates throughout the study period. The vaccination rates among nursing staff, allied health staff, care-related supporting staff, and non-professional staff were significantly lower than medical staff ([Fig. 1](#)).

4. Discussion

We described an innovative approach of personal coaching to promote influenza vaccination, which resulted in an improvement of vaccination rate from 26% to 45% in 3 years. Our finding was consistent with the literature review that campaigns solely based on education and promotion or on-site vaccination did not regularly exceed an absolute vaccination coverage of 40% [18]. Personal coaching led by the ICO and SNO could tackle the barriers to vaccination among healthcare workers, including fear of adverse reactions, failure to recognize themselves at risk, and doubts about vaccine efficacy, as reported previously [14–16]. With enhanced engagement of individual staff during face-to-face interactions, we could establish rapport by building trust, listening to and understanding their concerns, communicating risks and disseminating messages to the staff directly, in order to improve their understanding and acceptance of influenza vaccination. We believe this is the reason behind the significant increase in vaccination rate

among all categories of healthcare workers after its first implementation in 2018/2019, and the effect was apparent among nursing staff and care-related supporting staff in 2019/2020 as well.

The personal coaching approach was conducted by the key members of the ICT, the ICO and SNO, instead of other senior members in the hospital in the initial phase of implementation. This is because the duty of ICT is to lead the multidisciplinary collaboration in the hospital to promote infection control culture such as the practice of hand hygiene [27–30] and the control of multidrug-resistant organisms [31,32], to conduct outbreak investigations [33,34], and to prepare for emerging infectious diseases such as COVID-19 [35–38]. Therefore, a good working relationship with mutual trust has been built between the ICT and other professional and non-professional staff. Personal coaching for the promotion of influenza vaccination can be carried out upon the existing working relationship. Through personal coaching led by the ICO and SNO, a culture conducive to vaccination was progressively built over 3 consecutive years of implementation. In fact, this model of personal coaching can be further promoted at the departmental level, with the unit heads being the role model for other staff, provided that the coacher is committed and confident in doing so. A similar model has been applied for the promotion of hand hygiene to achieve 100% compliance during the COVID-19 pandemic [30]. The COVID-19 pandemic may be an additional factor in enhancing influenza vaccination, since the influenza vaccination rate among nursing staff reached a highest level of 57% following the SARS outbreak in Hong Kong [26]. The fear of emerging infectious diseases may increase the likelihood of receiving vaccination against preventable infectious diseases such as influenza.

Time management is an important element for personal coaching. We spent two hours per working day to promote influenza vaccination by personal coaching. We started with a small group of unvaccinated staff, starting with a brief introduction, followed by a quick dialogue with them to understand their willingness or concerns toward influenza vaccination. We would then focus on the healthcare workers who were indecisive instead of those who were strongly reluctant to receive influenza vaccination. In this way we could successfully persuade 405 healthcare workers in 34 working days during the first year of implementation. The importance does not only lie upon the number of vaccinated healthcare workers, the change in their attitude toward vaccination is substantial in sustaining the influenza vaccination campaign in the long run. In addition, we also invited the senior staff of the respective department or unit to join the brief introduction and quick dialogue, to ensure their continuous support in the promotion in the subsequent years.

The influenza vaccination rate among medical staff was two times higher than the overall rate among all staff at baseline (2016/2017, year 1), and remained significantly higher than the rate among other professional and non-professional staff throughout the study period. The higher influenza vaccination rate among medical staff is speculated to be due to various reasons including more professional education and deeper understanding of vaccine efficacy and adverse reactions. Upon the implementation of personal coaching, the vaccination rate among medical staff increased significantly from 57% (year 2) to 65% (year 3). Thereafter, the vaccination rate among medical staff continued on an increasing trend from year 3 to year 5, though not reaching statistical significance. The influenza vaccination rate among nursing staff was consistently <30% since 2010 in Hong Kong [26], and was also lower than the vaccination rate among allied health and care-related supporting staff as illustrated in this study. Given their high frequency of patient contact in clinical areas, nursing staff pose a risk of nosocomial transmission of influenza virus once there is a lapse in

infection control measures. Therefore, the vaccination campaign should give particular focus to nursing staff. In addition to the baseline promotional activities including ward visits, provision of on-site vaccination, and provision of incentives such as gifts and souvenirs, personal coaching led by the ICO and SNO, and supported by the respective unit heads resulted in a significant increase in vaccination rate over 3 consecutive years (2018/2019 to 2020/2021, year 3 to year 5), reaching a level of 40% in year 5.

The use of social media, a powerful tool for promoting awareness of infection control and prevention, is increasingly recognized as a valuable strategy for education and training [39]. We attempted to promote influenza vaccination by producing a song for dissemination in YouTube and Facebook, which only resulted in a significant increase in vaccination rate among non-professional staff but not professional staff. This further suggests that, for professional staff, personal coaching with face-to-face communication, trust building, and instant problem solving is a more important strategy to promote influenza vaccination.

There are several limitations in this study. First, besides the categories of staff, we did not obtain epidemiological information from the healthcare workers who had or had not received influenza vaccination. However, the predictive factors and barriers to vaccination had been well illustrated in previous publications [14–16]. In this study, we investigated the effect of personal coaching by key members of the ICT on the improvement in influenza vaccination rate, which appears to have a positive outcome. Second, the study was completed before the end of the COVID-19 pandemic, so we could not assess if the effect of personal coaching would be sustained after the pandemic. We believe that the influenza vaccination rate will decline after the COVID-19 pandemic, similar to the progressive decrease in influenza vaccination rate after the SARS outbreak in 2003 [26]. This is why we have to build a culture conducive to influenza vaccination among our healthcare workers and maintain the momentum by promoting personal coaching, both from key members of the ICT and team heads of clinical and non-clinical units in the hospitals.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary material

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.vaccine.2022.06.067>.

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