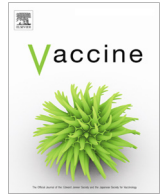




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# A formative research-guided educational intervention to improve the knowledge and attitudes of seniors towards influenza and pneumococcal vaccinations

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## ABSTRACT

**Background:** Adult influenza and pneumococcal vaccination rates in Singapore are low, and factors influencing knowledge and attitudes of seniors towards influenza, pneumonia and their respective vaccines are not well-known. Our study aims to understand the barriers and facilitators towards getting influenza and pneumococcal vaccinations among seniors in Singapore, and subsequently inform the conduct of a relevant community-based educational intervention, as well as evaluate the intervention outcomes.

**Methods:** We performed a mixed methods study with two components: Firstly, formative research was conducted among community-dwelling seniors, using focus group discussions (FGDs), to understand their knowledge and attitudes towards influenza, pneumonia and their respective vaccines. Next, a quantitative study was conducted to evaluate knowledge of seniors and the effectiveness of an educational intervention.

**Results:** Four FGDs were organised with 32 participants, who were predominantly female, of lower educational background, and residing in government rental flats. Participants had varying levels of knowledge and many misconceptions about influenza, pneumonia and their respective vaccinations, with concerns about side effects and vaccine effectiveness. The formative research results were used to inform a community-based educational intervention for seniors. Our subsequent evaluation included 604 elderly participants, mainly from lower educational and socio-economic strata, who initially demonstrated poor knowledge scores (median score 5 out of 9, IQR 4–5). Following our intervention, median knowledge score improved to 7 (IQR 6–8) ( $p < .0001$ ). Significant improvements in knowledge scores were observed across genders, age strata, education levels, and housing types.

**Discussion:** Our formative research identified knowledge gaps among community-dwelling seniors which affected their attitudes towards vaccination uptake. Key findings were taken into consideration when implementing the educational intervention. Our community-based intervention was effective in improving knowledge and attitudes, and could be used as a cue to action for short-term behaviour changes.

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## 1. Introduction

Influenza and pneumococcal disease contribute considerably to the burden of disease in Singapore. Located in the tropics, Singapore experiences the circulation of influenza viruses all year round with a bimodal increase in disease incidence annually from November to January and April to July [1]. The risk of mortality

and hospitalisation has been shown to be highest in older age groups [1,2].

Pneumococcal disease is also an important cause of hospitalisation and mortality. In 2016, pneumonia was the top cause of death in Singapore among seniors aged 65 years and above [3], and *Streptococcus pneumoniae* is known to be a common cause of community-acquired pneumonia. From 1995 to 2004, hospitalisation and case fatality rates for pneumococcal disease (including invasive forms such as bacteremia and meningitis) were again highest in senior age groups [4].

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However, influenza and pneumococcal vaccination rates among seniors remain low in Singapore, despite national recommendations for these vaccinations for all seniors 65 years and above by the Singapore Ministry of Health (MOH) [5,6], as well as widespread availability of vaccines and a supportive financial framework. The influenza vaccination rate among adults aged 50–69 years old was 8.7% [2], while the pneumococcal vaccination rate among adults aged 65 years and above was 6.1% (National Health Surveillance Survey, 2013).

A previous systematic review reported that structural, intermediate and healthcare-related social determinants influenced the uptake of seasonal influenza vaccination in the elderly [7]. In particular, provider and healthcare system factors, such as the providers' recommendations and advice, accessibility and affordability of vaccinations influenced the elderly's uptake of vaccination. Similarly, elderly who believed that their physicians recommended pneumococcal vaccination were more likely to get vaccinated, and those who knew the symptoms of pneumonia believed that vaccination was the best means of prevention [8–10]. Further, positive attitudes towards influenza and pneumococcal vaccination increased the likelihood of vaccination uptake. (10, 12–14)

In spite of these known determinants of vaccination, vaccination uptake in the elderly remains a complex and multi-factorial process for behavioural change to take place, especially with the emergence of vaccine-hesitant individuals whose behaviours range widely between accepting and refusing selected vaccines, voluntarily or with reluctance and uncertainty [11]. Vaccine hesitancy is an understudied concept among the elderly and is defined by the Strategic Advisory Group of Experts (SAGE) on Immunisation as behaviour towards vaccination that is influenced by issues of confidence (mistrust in vaccine or provider), complacency (perception that vaccines are not necessary) and convenience.

Formative research is a key step towards vaccine introduction [12], and has been used in many settings to gather information on the beliefs, values, knowledge and attitudes towards vaccination [13]. Key factors that influence decision-making among seniors include trust or mistrust in modern medicine, prior experience of vaccination, concerns about vaccine safety, side effects, fear of pain and costs, and perceived risk of influenza [14]. Furthermore, community-dwelling seniors, though aware of the risks of influenza, may not perceive themselves as being vulnerable if they are able to maintain their independence and social activities [15,16]. However, efforts to integrate formative research findings into public health education and communication strategies have been relatively limited, including for vaccination [7].

In Singapore, the factors influencing knowledge and attitudes of seniors towards vaccination and vaccine-preventable diseases, such as influenza and pneumonia, are not well studied. A good understanding of these factors can guide the development of effective interventions to improve knowledge and attitudes among the elderly. While modalities such as postcards, posters and videos have demonstrated effectiveness in this regard and thereby increased vaccination uptake [17–19], such interventions may not maximise their effectiveness if they do not take into account the complex socio-cultural backgrounds of seniors that influence their decision-making on vaccination.

This study used formative research to elucidate the individual, social, and vaccine-related factors that influence the perception and uptake of vaccination among the community-dwelling elderly. Findings were used to inform the implementation of a community-based educational intervention, which focused on improving the knowledge of seniors towards influenza, pneumonia and vaccinations to prevent these respiratory illnesses.

## 2. Materials and methods

### 2.1. Study design

This study consists of two components. First, we conducted formative research using focus group discussions (FGDs) with community-dwelling seniors residing in a government public housing estate in Singapore, to gain a deeper understanding of the knowledge, perception and beliefs of this group of seniors towards influenza, pneumonia and their respective vaccinations. Focus groups were used as the elderly were comfortable interacting in a group setting, and this also allowed them to respond to and discuss their views with other group members. The second component involved the design and conduct of an educational intervention for the seniors, based on key findings from the FGDs. We then evaluated the effectiveness of this intervention using pre- and post-intervention surveys.

### 2.2. Formative research

#### 2.2.1. Focus group discussion question guide

A semi-structured question guide (Table 1) guided by the Health Belief Model (HBM), was developed by the study team to facilitate the conduct of the FGDs. The HBM, represented mainly by the constructs of perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action and self-efficacy, has been adopted for previous studies on influenza vaccination uptake in the elderly [20–22]. In a multi-national study, Kwong et al. also applied this behavioural theory in focus groups settings to gain an in-depth understanding of vaccination behaviour among the elderly [23]. Other questions pertaining to knowledge and perception of influenza, pneumonia and vaccinations, and history and experience of influenza or pneumococcal vaccination, were also asked.

The question guide was translated into Mandarin Chinese and Malay languages by the study team, and was piloted with elderly non-healthcare staff within our institution who were of similar demographic backgrounds as our participants, to ensure that they were suitable and appropriate for use among the elderly.

#### 2.2.2. Participants and setting

Four FGDs (n = 32) were held in September 2015, with participants aged 60 years and above recruited by care coordinators working at the Seniors Activity Centre (SAC) involved in the study. SACs are drop-in centres which provide social support and host activities for needy and vulnerable seniors living in public housing rental flats [24].

Prior to the conduct of the FGDs, study team members explained the study objectives to the participants and invited them to be part of the FGDs. Agreeable participants (who gave verbal consent) were then asked to complete a demographic questionnaire comprising non-identifiable information, such as age, gender, education level, housing type and vaccination history. The four FGDs were held in the SAC and were each conducted using a different language - English, Mandarin Chinese, Malay, and Hokkien (a Chinese dialect which many Chinese seniors in Singapore are accustomed to speaking). Each FGD had a facilitator trained in qualitative research and fluent in the language used, and a note-taker who took notes and recorded non-verbal cues during the discussion. Each FGD consisted of five to 13 participants, took approximately 45–90 min to complete, and was audio-recorded with permission from the participants. No honorarium was given to participants, although they were provided with refreshments in appreciation of their time taken to participate in the FGDs.

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