Determinants of Influenza and Pneumococcal Vaccine Uptake among General Population, Patients, and Healthcare Workers in Northwest Singapore

Zhao Dan[1], Jeff Huang Yi-Fu[1], Lily Ng[1], Asannachiyaar D/O Chinnathamby[1], Lim Kai Teng[1], Aravamudan Veeraraghavan Meyyur[1], Kian Hwa Lew[2], Jeremiah Chng[1]

1. Woodlands Health Campus, Singapore 2. Republic Polytechnic, Singapore

Woodlands Health
National Healthcare Group

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Background

Influenza and pneumococcal diseases present significant vaccine-preventable causes of morbidity and mortality. Despite national recommendations, subsidies and easy access, vaccine uptake in Singapore remains low. The National Population Health Survey (NPHS) 2022 reported only 18.0% of individuals aged 18-74 years received the influenza vaccine and 26.5% received the pneumococcal vaccine.[1]

Reasons for vaccine refusal or delayed acceptance ("vaccine hesitancy") are complex, involving socio-demographic, contextual, physical, and psychosocial factors. Existing research focuses on individual groups, such as the elderly, adults with chronic conditions, healthcare workers (HCWs), or children. Adopting a multi-group approach is essential for identifying opportunities for cross-pollination of successful strategies. This study aims to estimate vaccine uptake rates, assess knowledge and attitudes, and identify determinants of vaccine uptake among the three groups in Northwestern Singapore.

Methodology

Study Setting and Design

A cross-sectional, self-administered, anonymous online survey was conducted to understand the knowledge, attitudes and uptake of influenza and pneumococcal vaccine among general population, inpatients and HCWs in Woodlands Health in Northwest Singapore, a region characterised by high percentage of minority ethnicities.

Sample Size

The required sample size was calculated to estimate the influenza and pneumococcal vaccine uptake rate with a 5% margin of error and a 95% confidence interval.

Residents (R):
- Stratified random sampling method based on age groups (<65 years old and >=65 years)
- Sample size = 420

Inpatients (I):
- Simple random sampling method was employed
- Sample size = 132

HCWs (H):
- Simple random sampling method
- Sample size = 160

Study Questionnaire

The questionnaire was developed using the Health Belief Model (HBM) as the guiding theoretical framework.[2] Items were adapted from existing literature and tailored to the Singapore context through discussions with local experts. Both questionnaires contained 4 main sections:

1. Socio-demographics
2. Vaccination history & intention to take vaccine in future
3. Knowledge about influenza and pneumococcal vaccines
4. Attitude towards influenza and pneumococcal vaccines

Statistical analysis

Descriptive analysis was performed to summarise participant characteristics. Chi-square tests or Fisher's exact tests were used to compare categorical variables, while t-tests or Mann-Whitney U tests were used for continuous variables, as appropriate. Multivariable logistic regression was performed for two outcomes of interest: 1) Receiving at least one dose of the vaccine in the past two years; and 2) Intent to take the vaccine in the next season or future.

References

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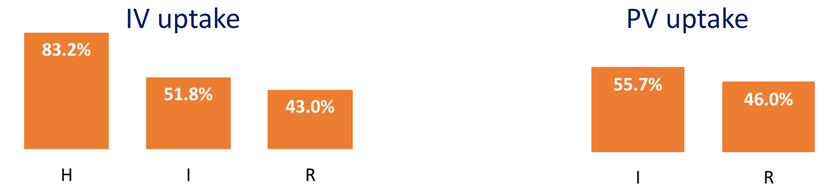
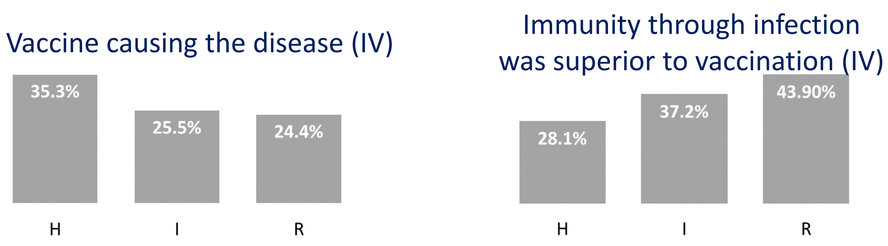
Results

A total of 730 participants completed the survey, comprising 426 residents, 137 inpatients, and 167 HCWs. The majority of participants across all groups were Singapore residents (97.7% of residents, 97.1% of inpatients, and 89.8% of HCWs). The mean age varied among the groups, with residents averaging 53.3 years (SD: 15.9), inpatients 61.0 years (SD: 15.8), and HCWs 36.5 years (SD: 8.9).



- Reasons for vaccination: **self-protection** and **belief in vaccine effectiveness**. **Free vaccines** were a significant motivator for HCWs.
- Barriers: **side effects** and **costs**. HCWs also cited **lack of time** as a significant barrier for influenza vaccination.



- **Misconceptions about vaccines** was prevalent across all groups.
- **Uncertainty about PV** was common across all groups.
- Inpatients were the most concerned grp about vaccines.
- Residents showed the least confidence in vaccine effectiveness.
- Perceived low personal risk among all, especially HCWs.

Predicators of vaccine uptake:
- Residents and inpatients: **Prior information exposure**
- **HCWs: Willingness to pay**
- All groups: **Prior vaccine uptake**

Discussion

This study highlights the complex factors influencing vaccine uptake among different population groups in Northwest Singapore.

Prior vaccine uptake was a strong predictor of future vaccination intentions across all groups, consistent with HBM.
→ Positive past vaccination experience leads to continued adherence.

Prior information exposure was significant predictors of vaccine uptake, highlighting the importance of education campaigns. This aligns with findings from other Asian countries[3].
→ Residents: workplace engagement initiatives; use of social media platforms to dispel misconceptions.
→ Inpatients: a key information source is HCWs → Empower HCWs with up-to-date information on vaccines and effective communication skills for vaccination promotion.
→ **Manage vaccine** fatigue by diversity communication strategies.

Willingness to pay uniquely predicted vaccine uptake and intention for HCWs, suggesting financial considerations play a crucial role in their decisions, possibly due to their younger demographic or different risk perceptions.
→ Include vaccination in the on-boarding process of new hirers

Implementing targeted strategies that address group-specific barriers and leverage facilitators can improve vaccination rates and public health. Future efforts should focus on continuously evaluating and refining these strategies amid evolving public health challenges, considering the unique demographics of this diverse region.

Acknowledgement

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