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Factors affecting repeated influenza vaccination among older people in Taiwan

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ABSTRACT

Objective: This study identifies factors that influence repeated influenza vaccination among people aged 65 years and older in Taiwan.
Methods: Data of this retrospective cohort study were drawn from the 2005 National Health Interview Survey and the 2005–2007 National Health Insurance claims data; a sample of 1384 older people was analyzed. The pattern of repeated influenza vaccination was divided into 3 groups: unvaccinated all 3 years, vaccinated 1–2 times over 3 years, and vaccinated all 3 years. Multinomial logistic regression analyses were performed.
Results: Only 20.6% of older people were vaccinated all 3 years. Those 70–74 years of age (odds ratio [OR] = 1.81), living in rural areas (OR = 2.47), having one (OR = 2.07) or more (OR = 2.41) chronic conditions, frequent outpatient visits (OR = 1.48), and undergoing preventive health examinations (OR = 2.22) were more likely to have repeated vaccinations. However, those with difficulties performing one or more activities of daily living (ADL difficulty) (OR = 0.41) and seeking care from alternative medicine (OR = 0.48) were less likely to undergo regular vaccinations.
Conclusion: The repeated influenza vaccination rates in our Taiwan sample were far from optimal. Factors identified in this analysis may help to improving influenza vaccination programs.

1. Introduction

Prophylactic influenza vaccination has been documented to be safe and effective in preventing and controlling infection among older people in many countries [1–3]. Study findings support the hypothesis that influenza vaccination significantly reduces the risk of death and hospitalization in older people [4–8].

Repeated annual immunization against influenza is recommended for older people because of frequent changes in the antigenic drift of the virus and the decline of post-vaccination antibody titers over the course of a year [3,9]. Repeated annual vaccination does not decrease serologic responses [10] and contributes to enhanced antibody-response in older people [11]. Studies indicate that people with annual vaccination were associated with a substantial reduction in influenza infection and viral shedding than those who received only a single vaccination over several years [12]. Annual influenza vaccination is associated with a reduced all-cause mortality risk in high-risk populations such as older people [13] and people with underlying chronic disease [14,15].

Although annual influenza vaccination has been well documented to be beneficial to older people, the proportion who are annually vaccinated remains low [3]. Despite previous studies examining the characteristics associated with incident influenza vaccination [16–19], little is known of factors associated with annual repeated influenza vaccinations [20]. Therefore, this study identifies determinants that may influence the regular uptake of annual influenza vaccination among people aged 65 years and older in Taiwan.

2. Materials and methods

2.1. Background information

The National Health Insurance (NHI) is a single-payer universal and comprehensive health insurance program implemented in Taiwan on March 1, 1995 [21]. More than 99% of Taiwanese citizens are enrolled in the NHI program [21]. Since 2001, the Taiwan government has implemented an annual free influenza vaccination policy for all people aged 65 years and older.

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2.2. Data sources and subjects

Data from this retrospective cohort study were drawn from 2 sources: the 2005 National Health Interview Survey (NHIS) in Taiwan, and the 2005–2007 NHI claims data. The NHIS is conducted by multiple agencies within Department of Health, Taiwan. It was a face-to-face interview survey conducted by well-trained interviewers. The study sample was selected using a multistage stratified systematic sampling design, providing it to be nationally representative. Details of the study design and sampling method have been previously reported [22,23]. The NHI claims data includes registration files, outpatient claims, inpatient claims, prescription drug information, and scrambled identification numbers. The NHIS data were linked with the NHI claims data if the NHIS interviewee signed informed consent form allowing information linked from both data sources. All individual IDs were scrambled before public release to ensure the privacy of the study subjects.

In the 2005 NHIS, 24,726 persons completed the survey. Among them, 2727 were 65 years and older [24]. We excluded 967 (35.5%) subjects who did not sign the informed consent. To avoid potential bias from varying follow-up time, we then excluded 173 (6.3%) subjects who did not have any health care use in 2007, who were presumed dead during the study period. We also excluded 203 subjects with incomplete or missing data such as those related to education, household monthly income, and self-rated health alcohol drinking. The final sample consisted of 1384 older people living in Taiwan.

2.3. Outcome measure

The cumulative number of influenza vaccinations was determined as the status of study participants who received influenza vaccination over 3 years (2005–2006, 2006–2007, and 2007–2008). The vaccination date was defined as the date recorded on the NHI outpatient claims. If the study participant received the influenza vaccination from October 1 to December 31, he or she was defined as having received the influenza vaccination that year. According to the cumulative number of influenza vaccinations, the pattern of repeated influenza vaccination was divided into 3 groups: unvaccinated all 3 years (the unvaccinated group), vaccinated 1 to 2 times over 3 years (the occasional group), and vaccinated all 3 years (the regular group).

2.4. Independent variables

To better understand the risk factors associated with the pattern of repeated influenza vaccination, we constructed an analytic framework modified from the Andersen (1995) model [25]. Four factor domains potentially associated with the patterns of repeated influenza vaccination were (Fig. 1): predisposing, enabling, need, and health behavior factors [23].

The predisposing factors included five variables: age, gender, educational status, marital status, living arrangement, and ethnic group. Age was categorized as 65–69 years, 70–74 years, and 75 years and above. Education status was categorized as low (no education), middle (≦6 years), and high (≦7 years). Marital status was classified as with and without a spouse. Living arrangement was classified as living alone and living with others.

The enabling factors consisted of 6 variables: employment status, household monthly income, urbanization of the residential area, social support score, ADL difficulty, and IADL difficulty. Employment status was classified as employed or unemployed. Household monthly income was divided into 3 categories: <NT$30,000, $30,000–$49,999, and $50,000. Urbanization of the residential area was stratified into 3 levels: urban, suburban, and rural. The social support score was measured using 8 questions in the social resource section of the Older Americans Resources and Services (OARS) Multidimensional Functional Assessment Questionnaire [26]. Eight questions estimated the frequency of meetings with children, siblings, and other relatives, social contact with friends and neighbors, and attendance at clubs, church, and other organizations. For each question, 0 points means no social support resources, 1 point means rarely having support, and 2 points means frequent or regular social support. The total score ranges from 0 to 16, with a higher score showing a higher degree of social support [23]. The scores were further divided into 2 categories: low (0–7) and high (8–16). ADL difficulty was measured using 6 items of Activities of Daily Living (ADLs) published by Katz (1963), including eating, bathing, dressing, using the toilet, getting in or out of bed, and walking around indoors [27]. IADL difficulty was measured using 8 items of Instrumental Activities of Daily Living (IADLs) published by Lawton and Brody (1969), including food preparation, shopping, using telephone, handling medications, light housekeeping (such as washing dishes), laundry, heavy housekeeping (such as clean the floor), and handling finances [28]. Study subjects were considered to have ADL difficulty or IADL difficulty when they with difficulties performing at least one ADL or IADL item.

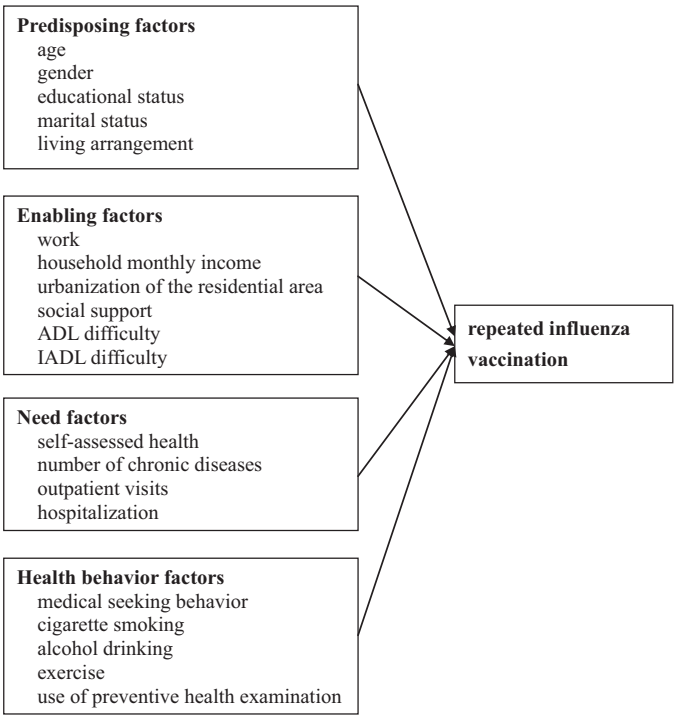

Fig. 1. Conceptual framework of factors affecting repeated influenza vaccination.

The need factors included 4 variables: self-assessed health status, number of chronic diseases, number of outpatient visits (OPD) and hospitalization during the preceding year. Self-assessed health status was categorized as good, fair, and poor. The number of chronic diseases was calculated as the total count of the following 8 diseases/conditions diagnosed by physicians: hypertension, diabetes, stroke, asthma, kidney disease, heart disease, liver disease, and chronic respiratory disease. The number of OPDs and any hospitalization during the preceding year prior to October 2005 were identified from the NHI claims data. The number of OPDs during the preceding year was divided into 2 groups according to the median of the number of OPDs (<25 visits vs ≧25 visits). Hospitalization during the preceding year was classified as *yes* or *no*.

The health behavior factors comprised 5 variables: medical seeking behavior, cigarette smoking status, alcohol drinking status, exercise during the preceding 2 weeks, and use of preventive health