Vaccine xxx (2016) xxx–xxx

Contents lists available at ScienceDirect

Vaccine

journal homepage: www.elsevier.com/locate/vaccine

Comparison of influenza vaccination coverage between immigrant and Australian-born adults

Surendra Karki BSc, MSc, MScIH, PhD [a,*], Amalie Dyda PhD, Candidate [a], Anthony Newall MPH, PhD [a], Anita Heywood B.Sc (Biomed), MPH, PhD [a], C. Raina MacIntyre FRACP, FAFPHM, PhD [a,b], Peter McIntyre FRACP, FAFPHM, PhD [b], Emily Banks MBBS (Hons), FAFPHM, PhD [c,d], Bette Liu MBBS, MPH, DPhil [a]

[a] School of Public Health and Community Medicine, University of New South Wales (UNSW), Australia
[b] National Centre for Immunisation Research and Surveillance of Vaccine Preventable Diseases, The Children's Hospital Network, Westmead, NSW, Australia
[c] National Centre for Epidemiology and Population Health, Australian National University, Canberra, ACT, Australia
[d] The Sax Institute, Sydney, Australia

ARTICLE INFO

Article history:
Received 20 July 2016
Received in revised form 29 September 2016
Accepted 3 October 2016
Available online xxxx

Keywords:
Vaccine
Coverage
Influenza
Australia
Immigrants
Country of birth

ABSTRACT

Australia has a large immigrant population but there are few data regarding whether influenza vaccine coverage in adults varies according to country of birth. We quantified and compared self-reported influenza vaccination coverage between Australian-born and immigrant residents aged ⩾49 years enrolled in a large cohort (the 45 and Up Study), surveyed in 2012 and 2013. Estimated vaccine coverage was adjusted for age, sex and other factors known to be associated with vaccine uptake. Among 76,040 participants included in the analyses (mean age 66.2 years), 21.6% were immigrants. In Australian-born adults aged 49–64 and 65+ years the age- and sex-adjusted estimates for influenza vaccination within the year prior to survey was 39.5% (95% CI 38.9–40.0) and 70.9% (70.4–71.5) respectively. The corresponding estimates in immigrants were significantly lower at 34.8% (33.7–35.8) and 64.4% (63.4–65.4) respectively. Among immigrants, coverage varied by region of birth, and was slightly lower among those who spoke a language other than English at home compared to those who only spoke English. Among immigrants there was no significant difference in coverage comparing those who migrated when they were children to those who migrated as adults and coverage did not differ significantly according to years lived in Australia. Programs to increase adult vaccination coverage should consider the needs of immigrants.

1. Introduction

Vaccine preventable diseases (VPDs) such as influenza cause substantial morbidity and mortality in adults, particularly the elderly [1,2]. Under Australia's National Immunisation Program (NIP), annual influenza vaccine has been fully funded for adults ⩾65 years since 1997 and since 2010 for adults <65 years who are considered to be at increased risk of infection, including those with specific medical conditions, pregnant women, and Aboriginal and Torres Strait Islander adults [3].

Previous studies among Australian immigrants have shown that while many are at higher risk of engaging in behaviours such as smoking that may lead to poorer health [4], there are significant disparities and barriers in access to hospital services, primary care and public health prevention programs such as cancer screening [5–8]. Studies have also shown that immigrants are less likely than those who are Australian-born to seek preventative health activities such as pre-travel heath advice [9].

Few Australian studies have specifically examined immunisation uptake in immigrants. One ecological study demonstrated lower or incomplete childhood immunisation coverage in areas with high proportions of immigrants [10] while another study among adults attending the Hajj pilgrimage from Australia, that would likely include a significant proportion of immigrants, reported influenza vaccination coverage of 65% in 2011 and 89% in 2012 [11]. Given the limited information, in this report, we quantify and compare annual influenza vaccine coverage between Australian-born and immigrant adults using data from a large cohort (the Sax Institute's 45 and Up Study) [12].

* Corresponding author at: School of Public Health and Community Medicine, UNSW, NSW 2052, Australia.
E-mail addresses: s.karki@unsw.edu.au, Surendra.karki@gmail.com (S. Karki).

http://dx.doi.org/10.1016/j.vaccine.2016.10.012
0264-410X/

2. Methods

2.1. Study population

The Sax Institute's 45 and Up Study is a prospective cohort of 267,153 adults aged 45 years and older and residing in the state of New South Wales (NSW), Australia at the time of recruitment. Recruitment procedures and a description of the cohort have been published elsewhere [12]. In brief, randomly selected adults aged 45 years and older from the Australian Medicare enrolment database, residing in NSW, were invited to participate in the cohort with 18% joining the study between 2006 and 2009. The study includes approximately 10% of all adults living in NSW within the age range. Study participants completed a baseline postal questionnaire at recruitment providing information on socio-demographic, behavioural and health related information. Questions included participant's country of birth and year of first migration to Australia as well as whether they spoke a language other than English at home.

Follow-up of the cohort with a postal questionnaire including an item on influenza vaccination commenced in September 2012 and is on-going. Specifically, participants were asked 'Have you ever had the flu vaccine?', and 'If yes, when did you last have the flu vaccine?' Both baseline and follow-up questionnaires are available to view at https://www.saxinstitute.org.au/our-work/45-up-study/questionnaires/. By the end of 2014, 127,635 participants had been invited to complete the follow-up questionnaire. Of these 77,239, (60.5%) had returned their questionnaire and had data processed and available for analysis in this report. Response rates were lower in: people aged >70 years at baseline, those from a non-English speaking country of birth, and those who were current smokers [13].

For this study, all information used came from the follow-up questionnaire except for data on country of birth, years since migration, education level, body mass index, language spoken at home and area of residence which were from the baseline questionnaire.

2.2. Statistical analyses

Annual influenza vaccination coverage was estimated as the proportion of participants who self-reported that they had been vaccinated within the year prior to survey completion. Participants with missing data on both influenza vaccination and the date, or with missing year of vaccination alone, were considered as having missing data and excluded from annual coverage estimates. For participants with data on year of vaccination but missing month, the month was imputed.

Influenza vaccine coverage was estimated according the country of birth, years since migration to Australia, age at migration, language other than English spoken at home and whether the participant had a medical indication for influenza vaccination. Country of birth was initially classified as Australia versus other and then among the immigrants by major source countries or regions of migration according to the Australian Bureau of Statistics classifications [14]. These included New Zealand, United Kingdom/Ireland, Northern and Western Europe; Southern and Eastern Europe; North America; South, Central America and Caribbean; Southeast Asia; North and East Asia; South and Central Asia; Oceania other than Australia and New Zealand; Middle East and North Africa; and Sub-Saharan Africa. Immigrant participants were further categorised according to the number of years since migration to Australia (0–44, 45+) and age in years at migration (0–19, 20+). The number of years since migration was calculated by subtracting the date of first migration to Australia from the date of survey completion. Similarly, age at migration was determined by subtracting the date of birth of the participant from the date of first migration to Australia. Both Australian born and immigrant participants had information on whether a language other than English was spoken at home (yes, no). Presence of a medical indication for influenza vaccination (yes, no) was determined if the participant reported a history of stroke, asthma, diabetes, heart disease, Parkinson's disease and previous cancer.

The associations between classifications of each variable of interest and uptake of influenza vaccination were estimated using a modified Poisson model with robust variance adjusted for individual years of age and sex. The predictive marginals were then used to estimate vaccination coverage and the age- and sex-adjusted coverage estimates are presented in the results.

Further adjustment for other a priori factors potentially associated with immunisation was made [13]. These factors included: region of residence (major city, inner regional, outer regional, or remote based on the Accessibility/Remoteness Index of Australia (ARIA)) [15]; smoking (never, past, current); body mass index (BMI in three categories: <25 kg/m^2, 25 to <30 kg/m^2, ⩾30 kg/m^2); education (university, no university); annual household income (<$AUD50,000, ⩾$50,000 annually); carer status (yes, no); self-reported health (excellent, very good, good, fair/poor).

The main results were shown for all participants, and also stratified according to age groups (49–64 years and ⩾65 years) as all adults ⩾65 years are recommended and funded to receive free influenza vaccination. A p-value of <0.05 was considered statistically significant. All analyses were performed in STATA 12 software (StataCorp, College Station, Texas, USA).

The conduct of the 45 and Up Study was approved by the University of New South Wales Human Research Ethics Committee (HREC). This specific study was approved by the NSW Population Health Research Ethics Committee (2010/12/292), and the University of New South Wales Human Research Ethics Committee (HREC/10/CIPHS/97).

3. Results

After excluding those with missing information on influenza vaccination status (n = 872) and year of vaccination (n = 327), 76,040 participants were included in the final analyses. The characteristics of Australian-born and immigrant participants are shown in Table 1. Of the total 76,040 participants, 77.8% (n = 59,166) were born in Australia, 21.6% (n = 16,738) were born overseas, and 0.6% (n = 465) had missing data on country of birth. Among the overseas born participants, 46.3% were born in the United Kingdom or Ireland, 12.2% were born in Northern and Western Europe and 9.2% were born in New Zealand (Fig. 1). The mean age of participants born in Australia and overseas was 66.0 (standard deviation (sd), 9.8) and 66.9 (sd, 9.9) years, respectively.

3.1. Proportion vaccinated for influenza

Fig. 1 shows the age- and sex-adjusted estimates for annual influenza vaccination coverage for all participants in the cohort by region of birth.

The age- and sex-adjusted estimates for annual influenza vaccination in Australian-born adults aged 49–64 years and 65 years and older were 39.5% (95% CI 38.9–40.0) and 70.9% (95% CI 70.4–71.5), respectively. The corresponding estimates in immigrant adults were significantly lower at 34.8% (95% CI 33.7–35.8%) and 64.4% (95% CI 63.4–65.4%), respectively (comparing vaccination coverage in immigrant to Australian-born adults in both 49–64 and 65+ years p < 0.001).

Please cite this article in press as: Karki S et al. Comparison of influenza vaccination coverage between immigrant and Australian-born adults. Vaccine (2016), http://dx.doi.org/10.1016/j.vaccine.2016.10.012