Med & Health Dec 2017; 12(2): 275-285 https://doi.org/10.17576/MH.2017.1202.11

ORIGINAL ARTICLE

Knowledge, Belief and Barriers to Adult Influenza and Pneumococcal Vaccination among Primary Care Doctors in Sarawak

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ABSTRAK

Vaksinasi influenza dan pneumokokal dewasa tidak digunakan sepenuhnya walaupun jelas manfaatnya dari segi pengurangan kematian dan morbiditi di kalangan yang berisiko. Matlamat kajian ini adalah untuk meneliti pengetahuan doktor berkaitan dengan vaksinasi influenza dan pneumokokal, kepercayaan mereka dan halangan terhadap vaksinasi tersebut. Kajian keratan rentas ini dijalankan dengan menggunakan soal selidik bertulis di lapan klinik kesihatan di Bandar Kuching, Sarawak. Sejumlah 108 doktor telah menyertai kajian ini. Umur median peserta ialah 29 tahun (Nisbah antara kuartil 4.0). Median markah pengetahuan vakinasi influenza ialah 9 (Nisbah antara kuartil 3) manakala untuk pneumokokal adalah 8 (Nisbah antara kuartil 4). Peserta perempuan telah mendapat markah yang lebih tinggi untuk kedua-dua vaksin berbanding dengn peserta lelaki (P=0.005 & 0.007). Peratusan tertinggi untuk jawapan betul untuk vaksinasi influenza adalah untuk kesan sampingan (75.3%) manakala yang terendah adalah untuk kontraindikasi (9.3%). Peratusan tertinggi bagi jawapan betul bagi vaksinasi pneumokokal adalah untuk kesan sampingan (69.1%) manakala yang terendah adalah untuk indikasi kumpulan sasaran (6.2%). Kebanyakan peserta percaya bahawa vaksin pneumokokal dan influenza adalah selamat (92.8 & 99%) dan berfaedah (89.7 & 93.8%). Kos vaksin untuk influenza dan pneumokokal (94.8 & 96.9%) dan ketiadaan bekalan (86.6 & 89.7) adalah halangan utama untuk penggunaanya. Doktor penjagaan primer di sektor awam memiliki pengetahuan secara sederhana tentang kedua-dua vaksinasi untuk pesakit dewasa. Adalah

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dicadangkan supaya kekurangan pengetahuan yang telah dikenalpasti diatasi dengan penambahan ilmu dan halangan perlu diatasi supaya rawatan kesihatan yang lebih komprehensif dapat disampaikan kepada penduduk Malaysia yang semakin berumur.

Kata kunci: dewasa, kepercayaan, vaksin influenza, ilmu, vaksin pneumokokal

ABSTRACT

Adult influenza and pneumococcal vaccinations are grossly underutilized although there is clear benefit in reducing mortality and morbidity among those at risk. The aim of the study was to assess primary care physician's knowledge on adult influenza and pneumococcal vaccinations, their beliefs and barriers to vaccination. A cross-sectional study using self-administered questionnaires was conducted at eight primary care centres in Kuching, Sarawak. A total of 108 primary care physicians participated in this study. Median age of participants was 29 years (IQR 4.0). The median knowledge score for influenza vaccine was 9 (IQR 3) and for pneumococcal vaccine was 8 (IQR 4). Female participants scored higher compared to their male counterparts for influenza and pneumococcal vaccines (P = 0.005 & 0.007). The highest percentage of correct responses for influenza vaccination was for side effects (75.3%) while the lowest was for contraindications (9.3%). The highest percentage of correct responses for pneumococcal vaccination was for side effects (69.1%) while the lowest was for advocated target groups (6.2%). Most participants believed that pneumococcal and influenza vaccines were safe (92.8 & 99%) and beneficial for patients (89.7 & 93.8%). Cost of influenza and pneumococcal vaccines (94.8% & 96.9%) and their availability (86.6% & 89.7%) were the main barriers to prescribing them. Primary care physicians in the public sector have moderate knowledge of both adult vaccinations. Areas of knowledge paucity and barriers need to be addressed to ensure a more comprehensive health care delivery to the aging Malaysian population.

Keywords: adult, belief, influenza vaccines, knowledge, pneumococcal vaccines

INTRODUCTION

Influenza and pneumococcal vaccinations in Malaysia are still not widely used although the Ministry of Health had advocated it in the national guidelines for Adult Immunization. Currently, meningococcal vaccination is compulsory for Malaysian Muslims travelling to Saudi Arabia to perform Haj pilgrimage while both influenza and pneumococcal vaccinations are recommended especially in those with chronic debilitating diseases, immunosuppressed or elderly (Malaysian Society of Infectious

Diseases and Chemotherapy 2014). In general, compared to pediatric vaccinations, there is poor uptake for both these adult vaccines (Isahak 2000). Even in developed countries such as USA, adult influenza and pneumococcal vaccinations covers only about 71.5% and 61.3% of those aged 65 and above (Williams et al. 2015). Influenza and pneumococcal infections in adults are responsible for a high morbidity and mortality in Asia. A study from Singapore identified influenza as the predominant cause for pneumonia with an all-cause excess mortality rate of 14.8/100,000 person-years for all ages (Chow et al. 2006). In Malaysia, *Streptococcal pneumoniae* was the major cause of hospital admission particularly in the elderly and those with significant underlying comorbid diseases (Liam 2005).

The Malaysian population of those age 65 years and above is projected to increase to 2.2 million by the year 2020 (Department of Statistics Malaysia 2013). With the growing geriatric population, advancing health-care technology as well as a higher standard of living, the average life expectancy is expected to increase (Jaafar et al. 2013). The combination of these factors will further increase the disease burden from influenza and pneumococcus in the future. Therefore, physicians need to be aware of preventive aspects of these diseases. Currently, there is insufficient data regarding knowledge and barriers to influenza and pneumococcal vaccination among primary care doctors who are the main advocates for adult vaccination in the community. The aim of this study is to assess the knowledge, belief and barriers to adult influenza and pneumococcal vaccination among primary care physicians.

MATERIALS AND METHODS

This was a cross-sectional study conducted at 8 government primary care centres in Sarawak, East Malaysia. All doctors from these health clinics, including family medicine specialists, trainees and medical officers were invited to participate. General practitioners from private clinics, paramedics and support staff were excluded.

Knowledge regarding the vaccine was assessed using the adapted version of the original questionnaire (Romani et al. 2011). Additional questions for knowledge based on the Malaysian Adult Immunisation Guidelines (MOH & MSIDC 2003) and the latest CDC recommendations (Williams et. al 2015) were added. The final questionnaire for knowledge consists of 28 items which covered knowledge for both influenza and pneumococcal vaccinations. The score range for the influenza vaccination knowledge section was 0 to 14 points while that for pneumococcal vaccination was 0-15 points. Higher points would reflect better knowledge.

Participant's perceived barriers to prescribing these vaccines were assessed using the adapted version of the questionnaire authored by Romani et al (Romani et al. 2011). A single open-ended question was provided for participants to write barriers that were not stated in the options.

Participant's belief regarding the vaccines, in particular vaccines' safety and benefit, was assessed using adapted questionnaire developed from literature search and an expert panel review (Khoury and Salameh 2015). This section had 4 statements to which there were three answer options in a nominal Likert scale (Yes, No, Unsure). A pilot test was done among primary care doctors at an outpatient clinic of a similar setting. Test-retest for knowledge on influenza and pneumococcal vaccinations showed a Pearson reliability coefficient of 0.81 for influenza vaccine knowledge and 0.84 for pneumococcal vaccine knowledge [Correlation for both were significant at 0.01 levels (2-tailed)].

The questionnaires were distributed to participants during their weekly continuous medical education session. They were given protected time to answer the questionnaires which were collected upon completion. They then were given a brief introduction on the current guidelines recommendations for the two vaccines. Incomplete questionnaires were excluded from analysis.

Statistical analysis was done using the SPSS (Version 23) statistical package. Descriptive statistics were used for demography, beliefs and perceived barriers while the non-parametric Mann-Whitney U test and Kruskal-Wallis tests were used to compare the knowledge with the doctor's characteristics. This study received ethical approval from the Medical Research Ethics Committee of the National University of Malaysia and permission from the Sarawak State Health Department.

RESULTS

A total of 119 doctors were approached and 108 consented to participate, out of which 97 questionnaires were complete and were subjected for analysis. The median age of participants was 29 years (IQR 4.0) with the youngest being 26 and the oldest, 54 years of age. Majority of the participants were females (70%) and about half of them belong to the Malay ethnic group (49.4%). Most of them had 10 years or less working experience (90.7%) and had a basic degree in medicine (94.8%) (Table 1).

Participants mostly received information regarding adult influenza and pneumococcal vaccinations from the internet (66%, 64.9%), from colleagues (49.5%, 51.5%) and from meetings or conferences (49.5%, 45.4%), respectively (Table 2).

The median knowledge score on adult influenza vaccine was 9 (IQR 3) while that for pneumococcal vaccine was 8 (IQR 4). The highest percentage of correct responses for influenza vaccination was for side effects (75.3%) while the lowest was for contraindications (9.3%). As for pneumococcal vaccination, the highest percentage of correct responses also was for side effects (69.1%) and the lowest was for advocated target groups (6.2%) (Table 3).

Overall, female participants had significantly higher scores compared to their male counterparts for the knowledge on adult influenza and pneumococcal vaccines (P=0.005 and

Table 1: Demographic characteristics of participants (n = 97)

Characteristics	n (%)
Median Age (IQR)	29 (4.0)
Age Groups	
25 to 34 years	86 (88.7)
35 to 44 years	10 (10.3)
45 to 54 years	1 (1.0)
Gender	
Male	29 (30.0)
Female	68 (70.0)
Ethnicity	
Malay	48 (49.4)
Chinese	25 (25.7)
Local Bumiputera	11 (11.4)
Indian	11 (11.4)
Others	2 (2.1)
Years of Practice	
10 years	88 (90.7)
>10 years	9 (9.3)
Highest Qualification	
MBBS/M.D.	92 (94.8)
Masters of Family Medicine or Equivalent	5 (5.2%)

MBBS = Bachelor of Medicine/Bachelor of Surgery, MD = Doctor of Medicine

Table 2: Sources of information on adult influenza and pneumococcal vaccination

Source	Influenza Vaccine n (%)	Pneumococcal Vaccine n (%)
Medical Journals/Websites	64 (66.0)	63 (64.9)
Colleagues	48 (49.5)	50 (51.5)
Meetings/Conferences	48 (49.5)	44 (45.4)
Clinical Practice Guidelines	46 (47.4)	41 (42.3)
Pharmaceutical Representatives	33 (34.0)	31 (32.0)
Others	3 (3.1)	7 (7.2)

0.007, respectively). Participants with a master's degree in family medicine or its equivalent *(P*=0.023) scored higher on knowledge of pneumococcal vaccine compared to with those with a degree qualification. However, there is no significant association between the knowledge on both vaccinations' with their age or years of practice (Table 4). Majority of the participants believed that pneumococcal and influenza vaccines were safe (92.8 and 99%) and beneficial (89.7 and 93.8%) (Table 5).

Common barriers towards

Table 3: Percentage of correct responses for influenza and pneumococcal vaccination in different domains

Domains	Influenza Vaccination n (%)	Pneumococcal Vaccination n (%)
Age Indication	50 (51.5)	64 (66.0)
Advocated target groups	32 (33.0)	6 (6.2)
Contraindications	9 (9.3)	12 (12.4)
Frequency of vaccination	52 (53.6)	14 (14.4)
Mode of administration	66 (68.0)	8 (8.2)
Side effects	73 (75.3)	67 (69.1)
Vaccine type (Live/Attenuated)	47 (48.5)	48 (49.5)

Table 4: Association between knowledge scores and demographic characteristics

Participant's Demography	Influenza Median (IQR)	Test P value	Pneumococcal Median (IQR)	Test P value
Overall	9 (3.00)	-	8 (4.00)	-
Gender				
Male	8 (3.00)	Mann-Whitney U	6 (3, 50)	Mann-Whitney U
Female	10 (2.75)	***P* = 0.005**	9 (3.75)	***P* = 0.007**
Age				
25 to 34 years	9 (3.00)	x^2	8 (3.00)	x^2
35 to 44 years	10 (5.00)	*P* = 0.526	10 (5.00)	*P* = 0.071
45 to 54 years	10 (0.00)		11 (0.00)	
Qualification				
Degree	9 (3.00)	Mann-Whitney U	8 (4.00)	Mann-Whitney U
Masters	10 (3.00)	*P* = 0.299	10 (2.00)	***P* = 0.023**
Experience				
10 years	9 (3.00)	Mann-Whitney U	8 (4.00)	Mann-Whitney U
>10 years	10 (6.00)	*P* = 0.369	10 (6.00)	*P* = 0.112

Table 5: Participants' belief regarding adult influenza and pneumococcal vaccination

	Yes n (%)	No n (%)	Unsure n (%)
Influenza Vaccination			
Perceived safe	96 (99.0%)	0 (0%)	1 (1%)
Perceived beneficial	91 (93.8%)	3 (3.1%)	3 (3.1%)
Pneumococcal Vaccination			
Perceived safe	90 (92.8%)	2 (2.1%)	5 (5.1%)
Perceived beneficial	87 (89.7%)	4 (4.1%)	6 (6.2%)

prescribing both influenza and pneumococcal vaccines include cost (94.8% and 96.9%), vaccines' availability (86.6% and 89.7%) and

Table 6: Barriers to prescribing influenza and pneumococcal vaccines

Barriers		Influenza n (%)	Pneumococcal n (%)
1. Cost	Yes	92 (94.8)	94 (96.9)
	No	5 (5.2)	3 (3.1)
2. Availability	Yes	84 (86.6)	87 (89.7)
	No	13 (13.4)	10 (10.3)
3. Not knowing immunization status	Yes	70 (72.2)	70 (72.2)
	No	27 (27.8)	27 (27.8)
4. Not sure of guidelines	Yes	60 (61.9)	55 (56.7)
	No	37 (38.1)	41 (43.3)
5. Patient refusal	Yes	57 (58.8)	57 (58.8)
	No	40 (41.2)	40 (41.2)
6. Shortage of time & not attending wellness visits	Yes	56 (57.7)	60 (61.9)
	No	41 (42.3)	37 (38.1)
7. Concern about efficacy	Yes	34 (35.1)	35 (36.1)
	No	63 (64.9)	62 (63.9)
8. Concern about safety	Yes	32 (33.0)	35 (36.1)
	No	65 (67.0)	62 (63.9)

lack of knowledge regarding patient's immunization status (72.2% for both). More than half (61.9% and 56.7%) of the participants were not sure of the guidelines for influenza and pneumococcal vaccinations (Table 6). A single respondent identified that the lack of awareness and promotion for the use of these vaccines was another barrier towards prescribing these two vaccines.

DISCUSSION

Influenza and pneumococcal infections have significant impact on disease burden among adults and elderly population worldwide. A meta-analysis study has shown that seasonal influenza vaccine was significantly effective against influenza during epidemic seasons in elderly people (Darvishian et al. 2014). Similarly, pneumococcal vaccine is effective against invasive pneumococcal disease among immunocompetent adults and preventing all–cause pneumonia in low-income countries hence its current recommendations in many countries (Moberley et al. 2013). A case-control study in Spain among the elderly who were vaccinated in the five previous years with the 23-valent polysaccharide pneumococcal vaccine also demonstrated a reduced risk for all cause community-acquired pneumonia hospitalization (Domínguez et al. 2017).

The current study suggests that the main source of information regarding vaccination obtained by participants is through the internet which depicts that most doctors are internet savvy and had fast access to the internet

through smart phones and computers. Most participants in this study had a moderate level of knowledge regarding both influenza and pneumococcal vaccines. This is comparable with the knowledge accuracy of between 53 to 58% for the same two vaccines among Lebanese family physicians (Romani et al. 2011).

High scores for knowledge regarding both vaccines' side effects show that participants are aware of their side effect profiles. However, knowledge regarding contraindications and the advocated target groups for vaccination were poor which may act as a potential barrier towards prescribing these vaccines. A large proportion (93.8%) of participants were not aware of the correct target groups indicated for pneumococcal vaccination and for about two-thirds (67%) for influenza vaccine target groups. Regarding vaccine type, only half of the participants (48.5%, 49.5%) knew that both influenza and pneumococcal vaccines were not live vaccines (Table 3). This is a cause for concern as knowledge on the vaccine type is important for making a decision on whether or not to advocate them particularly for immunosuppressed populations. This group may get excluded from vaccine recommendation if it were thought to be live vaccines. This study also found that almost one third of the participants had concerns on the safety of influenza and pneumococcal vaccinations which could reflect inadequate vaccine knowledge (Table 6). This is a large number when compared to Western data (11.5% and 6.8%, respectively) (Klett-Tammen et al. 2016).

As for pneumococcal vaccine knowledge domains, only 8.2% knew the correct mode of vaccine administration which can be either via intramuscular or subcutaneous routes. Knowledge on the frequency of vaccination of the same vaccine was also poor with only 14.4% correctly answering that it should be given once after 65 years of age or once every five years if given prior to 65 years of age. These shortcomings need to be addressed as vaccination schedules get updated from time to time due to emerging new evidences. It is important that primary care doctors keep themselves abreast with the latest vaccine recommendations by sharing information through regular Continuous Medical Education (CME). All in all, they who are equipped with accurate knowledge on influenza and pneumococcal vaccines would competently utilize both vaccines in preventive health services for the adult community.

Female doctors seem to have fairly better knowledge regarding adult influenza and pneumococcal vaccinations compared to their male counterparts. This could be due to their diligent nature to keep up with medical developments (Ismail 2014). However this finding may not be generalized as another study found no significant differences in knowledge between genders (Khazaeipour et al. 2010). Those with a master's degree in family medicine or its equivalent had higher scores as they have more training, experience and exposure; hence their higher likelihood to have better

levels of knowledge on both vaccines. Although doctor's age and experience were not significant variables for determining vaccination knowledge in this study, an Italian study showed otherwise. Using multiple logistic regression analysis, they showed older general practitioners and those with fewer years of professional activity significantly had greater knowledge that influenza and pneumococcal vaccinations were recommended to the elderly (Pavia et. al 2003).

A large majority of participants are confident regarding the safety profile and benefits of both influenza and pneumococcal vaccines. This is an important finding as these positive beliefs would encourage them to advise both vaccines' uptake to patients especially those in the vulnerable group (Nichol & Zimmerman 2001), (MacDougall et al. 2015).

Participants in this study identified that cost and the non-availability are the main barriers towards prescribing these vaccines. In Malaysia, only the basic and essential childhood vaccines are provided at no cost by the government primary care clinics. Adult influenza and pneumococcal vaccines are not provided or subsidized by the government at the primary health care level. There is however a small quota for free influenza and pneumococcal vaccines only at tertiary government hospitals, reserved for patients at high risk. The current market price for a dose of influenza vaccine ranges between RM100 to RM150 per dose while a dose for pneumococcal vaccine is even costlier which can range between RM200 to RM250. Although this may seem burdensome to self-paying patients especially for the latter vaccine, vaccinating those at high risk of pneumococcal infections had in fact been shown to be more cost-effective in preventing hospital admissions and morbidity (Ament et al. 2000). Therefore, vaccination advice should be encouraged at primary care level given its benefits in the long term management of patients who are at risk.

The participants also identified that not knowing their patient's current vaccination status was itself a barrier towards prescribing influenza and pneumococcal vaccines. One solution to overcome this barrier is to attach a summary sheet of each patient's health status onto the first page of their health record. This can be periodically updated by medical staff and easily accessed by doctors. Automated electronic patient reminders and standing orders are other options and may be beneficial in clinics with teleprimary care (TPC) facilities (Nichol & Zimmerman 2001).

Since more than half of the participants did not know the guidelines for influenza and pneumococcal vaccinations, it is suggested that the latest Malaysian Adult Immunization Guidelines be revisited from time to time at all primary care clinics during their regular CME sessions with periodical updates regarding availability, indications and benefits of both adult vaccinations along with other relevant adult vaccines. Family physicians and tertiary centre physicians need to join forces to facilitate adult vaccination. Co-ordinating care and sharing

regular updates on adult vaccinations could help reduce the morbidity and mortality from these diseases and eventually reduce the overall burden on health cost.

Limitations in this study include those due to cross sectional nature of the data. This study was done at primary care centers in Sarawak hence these findings are not generalisable to the entire Malaysia.

CONCLUSION

The findings from this study suggest that primary care physicians have a moderate level of knowledge regarding influenza and pneumococcal vaccinations. However, there are areas of knowledge such as contraindications, vaccine type and the advocated target groups requiring vaccination, which are lacking and need to be addressed.

ACKNOWLEDGEMENT

The authors would like to thank Dr Romani for permission to use the original questionnaire, Sarawak State Health Department for permission to conduct this study, all participants and Dr Mohamad Rashidi for his initial contribution in this study. The authors also thank Universiti Kebangsaan Malaysia for providing the research grant and to the Director General of Health Malaysia, for granting permission for publication.

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Received: 15 March 2017
Accepted: 24 August 2017