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Influenza and Pneumococcal Vaccination Rates of Elderly and Eligible Adult Inpatients in a Tertiary Care Hospital in Oman

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Abstract

Our institution, Sultan Qaboos University Hospital, has set a protocol for vaccinating elderly > 65 years and eligible adult groups of patients against seasonal influenza and *Streptococcus pneumoniae* when admitted as inpatients or seen at outpatient clinics. Here, I assess the compliance of various medical teams with this policy. **Background: Methods:** electronic records of admitted patients in adult general medical words were reviewed for vaccination from 28 January 2024 until 28 February 2024. **Results:** Among 203 patients at presentation, 45 patients were new with unknown immunization status. At presentation, only seven and eleven of 158 patients (4.4% and 7%) had been vaccinated in the previous admission for influenza and *Pneumococcus* respectively. Upon discharge only four and six patients (2.12% and 3.24%) were given seasonal influenza and pneumococcal vaccines respectively. Discharge summaries and referral letters mentioned vaccination status of patients in two cases only. **Conclusion:** Rates of vaccination against influenza and *S pneumoniae* are very low in the elderly and adult patients with chronic medical conditions. A surveillance system needs to be set in place to monitor this.

Keywords

Influenza, *Streptococcus Pneumoniae*, Vaccines, Elderly, Adults with Chronic Medical Conditions, Vaccination Rates, Oman, Inpatients

1. Introduction

People over 65 years of age and immunocompromised under 65 years are at higher risk of severe complications of influenza and pneumococcal infections. A French study covering a period from 2010-2018 showed that 75% of the costs of influenza-

associated hospitalisation was attributed to elderly patients. Influenza complications in this group include myocardial infarction and ischaemic stroke, increased rates of superimposed bacterial infections in addition to the respiratory complications such as acute respiratory distress syndrome (ARDS). [1] [2] Risk of severe influenza infection related-hospitalization was reported to be higher in adults with chronic medical conditions than in healthy people. [3] *Streptococcus pneumoniae* (*Spn*), on the other hand, is the most common etiological agent of community-acquired pneumonia (CAP), bacteraemia, and sepsis. [4] Invasive complications from pneumococcal infection such as bacteraemia and meningitis are greatest among elderly in addition to the very young. In adults with chronic medical conditions, it was found that the rates of *Spn* infections were higher than their healthy counterparts and that the risk was directly proportional to the accumulative at-risk conditions they had. [5] [6] Moreover, mortality from pneumococcal infection may reach 20% despite appropriate antibiotics. [7] and previously hospitalised for invasive pneumococcal disease typically die sooner than would be expected based on census data; with nearly a decade of mean years of life lost. [8] Influenza and pneumococcal vaccination is, therefore, recommended for those over 65 years of age and those under 65 years with any chronic medical conditions such as (cardiac conditions, chronic kidney disease, diabetes mellitus, liver disease, chronic respiratory diseases), or those on immunosuppressive meds. In Oman this policy was included in our Expanded Programme of Immunozation (EPI) in 2005 and is in the policy of our institution at the Sultan Qaboos University Hospital (SQUH). The aim of this study is to assess the adherence to the vaccination protocol and propose recommendations for improvement.

2. Methods

This is an observational prospective study. Electronic notes of patients admitted in the general medical wards over a month period from 28 Jan to 28 Feb 2024 were examined for compliance with vaccination policy for the aforementioned groups. Discharge summaries and referral letters (DS/RL) to the primary health care institutes given to the patients upon discharge were also examined for any mention of their vaccination status.

Data was entered into the EXcel sheet which was used to calculate the numbers.

Ethical approval MREC # 3367.

3. Results

A total of 235 patients were admitted to the two main male and female adult general medical wards over the study period. There were 112 and 123 patients over 65 and under 65 years of age respectively. Among those under 65 years, ninety-one patients (74%) were eligible for the vaccines. Thus, at presentation a total of 203 were eligible for vaccination. However, forty-five patients were new and had unknown vaccination status. For the rest of the eligible patients (158) that should have been vaccinated from previous recent admissions only seven (4.4%) had

received up-to-date seasonal influenza vaccine, one of which had been given the same seasonal influenza vaccine twice in the same season. On the other hand, one patient had been given *Haemophilus influenza* vaccine instead of influenza vaccine.

For *Spn* vaccine upon presentation, 11 patients (7%) had been given *Spn* vaccine, two of whom had received only pneumococcal 13 valent (PCV13) vaccine.

Upon discharge there were seven fewer patients eligible for vaccination as five had expired and two had gone LAMA leaving a number of 151 excluding those that had been vaccinated before (seven patients for influenza and eleven patients for *Spn*). In addition, there were forty-five new patients with unknown vaccination status which would usually be vaccinated before discharge. Four patients (2.12%) received influenza vaccine and six patients (3.24%) were given *Spn* vaccine, two of whom received PCV13 only. Regarding vaccine allergy, twenty-five boxes were left empty without information and the rest of the patients were documented as having no allergies. In the DS/RL, vaccination status was mentioned only for two patients both of which had errors (one stating patient had received pneumococcal vaccine although only received 13 and the other stating the patient had received PCV13 and should receive PCV13 in 8 weeks. For the rest, vaccine status was not mentioned at all, even if it is up-to-date. (**Figure 1**)

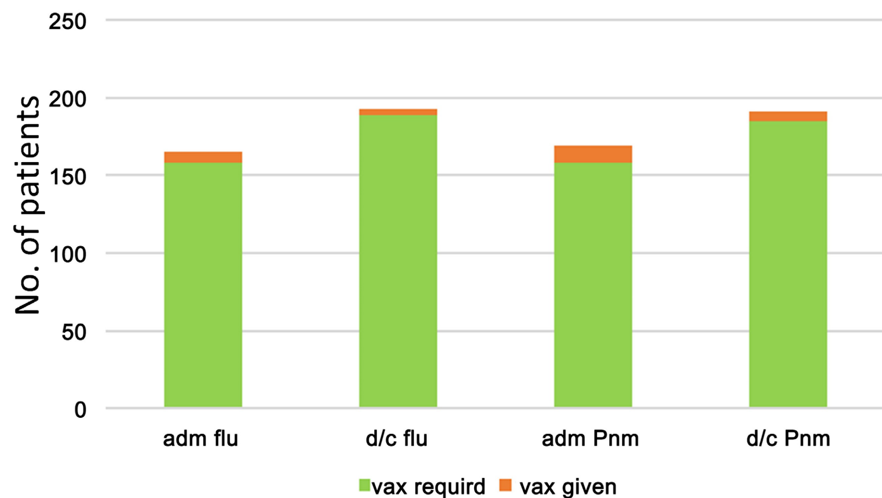

Figure 1. Rates of influenza and pneumococcal vaccination administration to eligible adults and elderly inpatients at times of admission and of discharge. Adm: at admission, d/c at discharge. flu: influenza, Pnm: *Spn*. vax: vaccine.

4. Discussion

It is estimated that one billion cases of seasonal influenza occur annually globally with 3 - 5 million cases of severe disease and 290 - 650,000 deaths. [9] Much higher figures may occur during times of genetic drifts of the virus. *Streptococcus pneumoniae* (*Spn*), on the other hand, is the most common etiological agent of community-acquired pneumonia (CAP), bacteraemia, and sepsis. [4]. People over 65 years of age and those under 65 years with chronic diseases are at higher risk of

severe complications of influenza and *Spn* infections.

Annual vaccination against seasonal influenza is the most effective measure to prevent influenza and its complications. [9] Vaccinating this population has also been shown to be beneficial in reducing the rate of hospitalization in patients with chronic obstructive pulmonary disease (COPD). [10] [11]

In Oman, it was estimated that influenza resulted in 3253 hospitalizations and 142 deaths in 2015 making up to 27.5 (95% CI: 25.9 - 29.1) per 100,000 hospitalizations and 1.2 (95% CI: 0.9 - 1.5) deaths per 100,000 population. The highest incidence of influenza-associated death was among those aged ≥ 65 years. [12] For the *Spn* infection, the worst outcome was in >65 yr due to *Spn* vaccination of paediatric population since 2008. [13]

Multiple bodies such as the WHO, the CDC and The Advisory Committee on Immunization Practices (ACIP) have recommended vaccination of elderly ≥ 65 years and adults 19 - 64 yrs with underlying medical conditions.

In compliance with these recommendations, the influenza vaccine in Oman was introduced in the national Extended Programme of Immunization (EPI) for 4 categories in 2005. These included pregnant women, older adults, health workers, and people with chronic conditions – in addition to hajj travellers. A WHO report from EMRO mentioned that a number of integrated steps have been introduced in order to strengthen influenza vaccination systems, which has led to coverage rates of 70% - 100%. [14]

On the other hand, the first *Spn* conjugate vaccine that was introduced to the EPI was PCV7 in 2008 replaced by PCV13 in 2012 given at 2, 4 and 6 months of age while for adults at high risk and elderly PVC 23 is recommended. [13] Our institute has set a protocol to vaccinate the two groups of elderly and adults with chronic medical conditions (whether seen in OPD or admitted) annually against seasonal influenza and five yearly with PCV23 following the initial PCV13 valent vaccines for *Spn*. The protocol has been incorporated into the discharge DS/RL of the electronic files of the patients to avoid missing any patients. The protocol also has a section on recommendations for the primary care provider to give PCV23 valent vaccine 8 weeks after the initial PCV 13 is received at the hospital.

Nevertheless, the immunization rates of inpatients were extremely low of 2-4.4% for seasonal influenza and 3% - 7% for *Spn* infections, much lower than reported by others of 57 and 17.6 % for influenza and *Spn* respectively. [15] They were similar to those reported by Erby from Türkiye (12.3% and 3% for Influenza and *Spn* respectively) and He from China in COPD patients (2.72% and 1.25% for influenza and *Spn* respectively). [16] [17] These low rates cannot be attributable to cofactors like unavailability of the vaccines or patients' refusal. We receive our seasonal influenza vaccine supply in October each year and the eligible patients should be given the vaccine. Usually, patients are asked about any allergy to vaccines or some food items by the nurse administrating the vaccine. If they have any allergy concerns or patient refusal, then it is mentioned in their notes. None of this, however, was mentioned.

A recent study showed rates of vaccination with a very wide range from 2.5% - 97% for influenza and 20% - 84.6% for *Spn*. This probably reflects the variable adherence of medical staff to remembering to vaccinate such patients. [18]

The success rates of 70% - 100% mentioned in the EMRO report for influenza vaccination in Oman might be referring to the surveillance of the vaccination rates of HCW. It is unlikely, however, that these rates represent vaccination coverage for the elderly and adults with chronic medical conditions as the figures disagree with the rates determined by this study. Moreover, there is no LHC-based surveillance system for vaccination and not all discharged patients are expected to be visiting LHC to get their vaccines. Furthermore, there is no direct link between the tertiary health care hospitals and the doctors in the primary health care institutes and patients do not usually attend their LHC to submit their discharge summaries to the primary health care post discharge from the hospital. In addition, in the DS/RL, the vaccination box was left empty, and vaccination status was mentioned only for two patients, even with the wrong information.

The primary health care in Oman consists of the local health centers and all the institutes of the Ministry of Health (MoH) including local health centers, operate through *AL Shifa* software, which is not accessible by our staff as our hospital uses a different software.

Currently, there is an MoH application that all citizens can download that shows the medical records including their vaccination status, of all patients attending MoH health institutes. Not all citizens, however, are aware of this application, nor do they have it on their mobile phones. Moreover, the medical staff admitting patients clearly did not make an effort to check the vaccination status of the patients for those who had the application on their phones. Asking patients themselves about the vaccine status is not fruitful as many mix it with COVID-19 vaccine, or some think the question is about heparin injections.

In order to improve the vaccination status of the elderly > 65 years and adults with chronic medical conditions, it is essential to constantly remind doctors at all levels about the importance of vaccinating these groups of patients and documenting vaccination status in the DS/RL. One way would be to present the current data to them. It might be required to modify the DS/RL in a way that prevents doctors from final authorisation without filling in the vaccination status and recommendation box first. It is also essential to educate the patients and their relatives about downloading the MoH application on their mobile phones. This could be done through hanging posters in the hospital about vaccine importance and the MoH application. Presenting to the hospital board might prove very beneficial in adopting steps to monitor vaccination rates. Finally, it is crucial to establish a direct link between tertiary institutes and primary care physicians.

5. Conclusion

Compliance rates of doctors to vaccinate elderly and adults with chronic medical conditions inpatients against seasonal influenza and *Spn* infections are very low

and not attributable to other co-factors like unavailability of vaccinas or refusal of the patients. A number of steps could be taken to improve these rates.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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