

Pneumococcal and Influenza vaccination amongst diabetics in the GCC: Exploring barriers and strategies for improvement

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Abstract

The alarming rise in the prevalence of diabetes mellitus (DM) within the Gulf Co-operation Council (GCC) has become a major public health concern. Respiratory infections in diabetics can result in a high morbidity and mortality rate, hence all the Arab states recommend pneumococcal and influenza vaccination for patients with diabetes. The few studies that have measured the rate of vaccination of within the GCC have consistently reported it to be poor. This is a cause for concern given the exponential rate at which diabetes is increasing within the region. The aim of this article is to highlight the importance of vaccination in diabetic patients, elaborate on the barriers faced in their promotion and propose strategies to improve vaccination rates.

Key words: pneumococcal and influenza vaccination, diabetics, GCC, barriers, strategies

Introduction

The prevalence of diabetes mellitus (DM) in those aged 20-79 years, in each of the Gulf Co-operation Council (GCC) countries is higher than the global prevalence of 9.3% (1). The highest is in the United Arab Emirates (UAE) at 16.3% followed by Saudi Arabia at 15.8%, Qatar at 15.6%, Kuwait at 12.2% and lastly Oman at 10.1%. The International Diabetes Federation (IDF) has reported that as of 2019, within the Middle East and North Africa (MENA) region 55 million individuals suffer from diabetes; this is expected rise to 105 million by 2045 which indicates an alarming increase of 96%, the second highest globally(2).

Respiratory infections, especially those caused by Influenza and *Streptococcus Pneumoniae* can make patients with DM six times more likely to be hospitalized and increases mortality rate by three-fold (3-5). Since these infections are vaccine-preventable, organizations such as the American Diabetes Association (ADA), National Institute of Clinical Excellency (NICE), and Centre of Disease Control (CDC) recommend annual Influenza vaccination and pneumococcal vaccination for diabetic patients (6-9). The GCC states have also adopted similar immunization policies for diabetic patients. Despite this, studies measuring vaccination uptake within the GCC are scarce and have consistently reported inadequate uptake (10,11).

Importance of vaccination

Pneumococcal vaccine

Pneumococcal infection is one of the most common causes of vaccine preventable deaths (12,13). Diabetics are 20 times more likely to suffer from an invasive pneumococcal infection and the mortality rate can be as high as 50% (14,15).

A population-based retrospective cohort study of 66,790 diabetic elderly patients investigated the risk of pneumococcal infection in pneumococcal polysaccharide vaccine 23 (PPSV23) vaccinated and unvaccinated patients. This study found that vaccine recipients suffered from a lower incidence of invasive pneumococcal disease, respiratory failure and had a shorter duration of hospitalization (16). Similarly, a Cochrane review of 18 randomized controlled trials (RCT) and 7 non-RCT with a total of 127,146 participants found consistently strong evidence regarding the efficacy of PPSV23 vaccine in reducing the risk of invasive pneumococcal disease (17).

Influenza vaccine

Influenza affects all countries, communities and individuals (18). There are 1 billion cases of Influenza yearly which results in nearly 3-6 million Influenza-related deaths especially in high-risk individuals (19).

Regarding the efficacy of influenza vaccine amongst diabetics, a comprehensive systematic review of 15 studies reported that its immunogenicity was similar to that of healthy individuals, with the sero-conversion rate and sero-protection rate of more than 40% and 70%, respectively, which indicates that the vaccine is effective in this high-risk group (23). Most importantly, five of the studies reported a decrease in all-cause mortality and all-cause hospitalization particularly in vaccinated patients, and particularly in those aged more than 65 years.

Renschmidt et al. (24) conducted a meta-analysis of 11 observational studies, consisting of a total of 170,924 participants, on the use of influenza vaccine to prevent seasonal influenza in diabetic patients. The study reported a reduction in all-cause hospitalization with a pooled vaccine effectiveness (VE) of 58% whereas hospitalization due to pneumonia and influenza was reduced by 43%.

Vaccination uptake within the GCC

There is insufficient published data with regards to the rate of vaccination amongst the diabetic population in the GCC.

Alqahtani et al. (10) conducted a cross sectional study to determine the influenza and pneumococcal vaccination uptake rate amongst the general population in the GCC. The study was conducted through a smartphone application in order to improve accessibility across the region. Out of the 1,812 respondents, most were from Saudi Arabia (n=1105). Within all the diabetic participants across the GCC only 20% (n=32/152) received the pneumococcal vaccine and 21% (n=31/152) received the

influenza vaccine. Unfortunately, this study is susceptible to recall bias as it is a self-reported survey.

In a family medicine clinic in the Security forces hospital in Saudi Arabia, the pneumococcal and influenza vaccination status was investigated for 360 diabetic patients (11). The study reported that only 47.8% were vaccinated against Influenza and only half of the respondents were aware that it was necessary in DM. Investigation of the pneumococcal vaccination status revealed alarming results; only 7.1% of diabetic patients had received the vaccine while 88.9% of the respondents were unaware of its importance. One of the limitations of this study was the small sample size of 360 participants and lack of data from multiple health centres therefore their results may not be a true representation of the overall Saudi population, however it is able to provide insight into the possibility of a generally poor uptake rate.

Barriers influencing vaccination uptake

Understanding the barriers that influence vaccination uptake is key to designing and tailoring interventions to improve vaccination rates and there are a wide range of factors involved.

Patient- related barriers

Luger (27) has aptly described how Rosenstock's health belief model can be utilized to gain insight into the reasons that can influence a patient's decision to accept preventive services such as vaccinations. It consists of the five domains: perceived susceptibility, perceived threat, perceived severity, perceived benefit and perceived barriers.

Diabetics are more likely to accept vaccination if they believe that they are susceptible to infection. In AIMusalam et al. (11) study, 83.8% of those vaccinated against influenza were aware that it was important for DM and therefore had a higher vaccination rate whereas those who believed that pneumococcal vaccine was not important had a much lower vaccination rate. A meta-analysis of 34 studies investigating the impact of perception of threat on vaccination behaviour concluded that it is significantly related to vaccination behaviour (28).

With regards to perceived barriers, in a survey of vaccine access and drivers in MENA region, AlAwaidy et al. (29) reported that some of the barriers included low perceived vaccine effectiveness, fear of side effects and lack of recommendation by physicians.

Cost of vaccination is likely to be a key barrier for vaccination uptake within the GCC as these countries consist of a large expatriate population as compared to their own citizens. Even though diabetes is common in both population groups, expatriates are more like to pay out-of-pocket for vaccinations compared to citizens, for whom healthcare services are subsidized or free. This may influence the health economics within the country and could potentially lower overall vaccination rates (30).

Healthcare provider (HCP) related barriers

A cross sectional study on the attitudes and barriers towards influenza vaccination amongst HCPs in 6 major hospitals in Saudi Arabia by AlShammari et al. (31) reported that 75% (n = 184) of the 242 respondents were unaware of the Advisory Committee on Immunization Practices (ACIP) or CDC guidelines on influenza immunization, while almost one third of the HCPs did not educate their patients about the importance of influenza vaccination. This could potentially be related to their finding that 80% of the respondents reported lack of training with regards to the importance and benefit of influenza vaccination in the preceding 12 months (31). Abu-Gharbieh et al. (32) study of 1,500 HCPs across UAE, Kuwait and Oman also reported that 49% of the participants were unaware of the CDC guidelines on influenza vaccination.

Physicians also may prioritize the main purpose of the clinic visit such as acute or chronic medical illness over preventive services such as vaccine promotion. Szilagyi et al. (33) noted that one of the most important barriers to vaccination uptake was when the primary reason of the clinic visit took over the consultation, providing inadequate time for education. In an electronic survey of 1,121 family physicians in Los Angeles, the number one physician reported challenge with regards to vaccine administration was the lack of time (34).

Clinic-related barriers

Clinic policies mandating physician consultation and examination pre-vaccination and appointment-only vaccination services can lead to long waiting times which can deter patients from accessing vaccination services (35).

Lack of adequate vaccinations storage and administration equipment can present as a logistical barrier for the clinic. In a study by AlShammari et al. (31) 43% of the HCPs reported the non-availability of vaccine as the reason for not providing it to patients.

Strategies for improvement

Keeping the barriers in mind, a multicomponent intervention can be implemented at a patient, provider and clinic level in order to increase vaccination rates. The following recommendations are based on an analysis of the literature.

Patient level

Utilizing the health belief model when educating patients about vaccination importance can motivate them to take the vaccine. This increases their awareness of the importance of vaccination and the process of exploring their perceptions and alleviating their fears is an integral part of the shared decision making and increases the likelihood of vaccination acceptance.

Healthcare Provider level:

AlShammari et al (31) reported that 69% of the HCPs were keen on receiving continuing education courses relating to the importance of influenza vaccination suggesting

that education and training programs for immunisation providers should be provided as part of HCPs continuing professional development.

Healthcare providers can facilitate vaccination uptake by offering it during routine visits. Time constraints during consultations can be managed by offering leaflets to patients, setting up a vaccination appointment at a future date or by designating the nursing staff to provide vaccine education after the consultation.

Reminder systems have been noted to be one of the strongest methods to improve immunization rates. A review of 34 studies by Shefer et al. (36) reported that utilization of reminder/recall systems improved the likelihood of immunization from 9% to 55%. Incorporating vaccine reminders in the form of flagging the patient file electronically can ensure that healthcare providers are inclined to offer the vaccine during routine visits. In addition, reminders can be issued to patients who are due or overdue for a vaccine through various modes of communication such as telephone calls, email, text or post cards.

Clinic level:

The implementation of Standing Order Programs (SOP) enables non-physician medical staff such as nurses, diabetic educators or physician assistants to educate the patient and administer the vaccine will allow for faster and more efficient vaccination delivery (37). This can eliminate long waiting times and make the vaccination process more efficient.

Improving access to immunization services can be achieved by providing it weekends or evening hours. Clinics that lack immunization services can refer the patient to nearby clinics that provide such a service.

In order to sustain improvements, regular assessment of the immunization levels within the patient population of primary healthcare centres is required. This can be achieved through audits which will include a retrospective analysis of patient files, provider performance, missed opportunities and immunization rates (38).

A vaccine coordinator can be designated with the responsibility of overseeing vaccine storage and handling services as they would be required to ensure that vaccines are ordered in a timely manner and as per demand in order to reduce wastage and added clinic costs.

Conclusion

There is no question that immunization can prevent adverse outcomes from influenza and pneumococcal infection in diabetic patients. The alarming rise in the prevalence of diabetes within the GCC region accompanied with poor vaccination rates has highlighted the importance of ensuring that the immunization policies are implemented at a primary healthcare level. Awareness of barriers to vaccination services at a patient, provider and clinic level

is the first step in creating change. This would ideally be followed by adopting a multicomponent intervention as depicted above in order to increase vaccination rates. However, future research is required to analyse their outcome so that such interventions can be successfully replicated across all the Gulf states.

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Abbreviations

DM	Diabetes Mellitus
GCC	Gulf Cooperation Council
IDF	International Diabetes Federation
MENA	Middle East and North Africa
ADA	American Diabetes Association
NICE	National Institute of Clinical Excellency
CDC	Centre of Disease Control
RCT	Randomized controlled trial
PPSV23	Pneumococcal polysaccharide vaccine 23
HCP	Healthcare provider
ACIP	Advisory Committee on Immunization Practices
SOP	Standing Order Programs

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