

## Original Research Article

# Health-care professional's attitude, beliefs and perceived potential barriers for recommended adult immunization practices in patients with type-2 diabetes mellitus

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### ABSTRACT

**Background:** Immunization coverage remains very low among adults. Vaccine preventable diseases (VPDs) may have an unpredictable course in diabetes mellitus (DM) owing to their altered immune functions. The objective of the study was to analyse the knowledge, attitude, practices and behaviour of the healthcare professionals (HCPs) regarding the pneumococcal, influenza and hepatitis B vaccination in patients of type-2 DM.

**Methods:** This was a community based, cross-sectional study focusing on HCPs who were involved in diabetic care and were aware about recommended guidelines of adult immunization program. 100 HCPs completed this survey which embraced various parameters involved in vaccine uptake.

**Results:** Females constituted 34% of the participating HCPs. The HCPs with qualification of MBBS and MD were 51% and 49% respectively. MD HCPs were routinely vaccinating DM patient more than MBBS ones which was statistically significant. Difficulty in identifying patients eligible for vaccination was perceived by 53% of HCPs. Vaccination was believed to be more important in children than adults by 63% HCPs and 93% agreed that vaccination provided protection against VPDs. Perceived as barriers for vaccination were: urgent concerns of the patients (79%), lack of time for explaining (49%), vaccine safety (60%), cost of vaccine (58%), lack of records (65%), lack of recall system (62%), lack of educational material for patients (83%), lack of training for HCPs (75%) and lack of 'standing orders' (84%).

**Conclusions:** Despite recommendations for adult immunization, there are many substantial lacunae in knowledge and practice among HCPs resulting in low immunization coverage. A structured approach encompassing education and training, identification and elimination of potential barriers and improving infrastructure and leadership is the need to curb the mortality and morbidity associated with VPDs in diabetics.

**Keywords:** Diabetes mellitus, Healthcare professionals, Hepatitis B, Immunization, Influenza, Pneumococcal

### INTRODUCTION

There has been a sizeable burden of vaccine-preventable diseases (VPDs) accounting for significant morbidity and premature mortality in adults.<sup>1</sup> The hyperglycemic environment in Diabetes Mellitus (DM) effectuates abnormalities in cell-mediated immunity, chemotaxis, phagocytosis, bactericidal activity and microcirculation.<sup>2</sup>

Hence, diabetics are more susceptible for hospitalization and risk of death due to any infection-related complications as compared to general population. Comprehensive diabetic care includes both glycemic target and multi-causative risk-reduction interventions to reduce associated morbidity, mortality and hospitalization. Prophylactic immunization is one such

recommended cost-effective preventive diabetic care service.<sup>3,4</sup>

Pneumococcal and influenza infections have unpredictable aggressive clinical course in diabetics.<sup>5</sup> Also, they are at risk for hepatitis-B due to exposure to assisted blood glucose monitoring devices and diabetic care equipment.<sup>6</sup> Vaccination in diabetics has potential to enhance herd immunity, interrupt disease transmission, boost infection control, and lessen the rate of hospitalization and mortality. Both pneumococcal and influenza vaccination has been associated with lower rates of pneumonia and mortality.<sup>7</sup> Despite recommendations, poor vaccine uptake for influenza and pneumococcus has been observed in diabetics.<sup>8-10</sup> Successful immunization coverage requires forefront, interest and commitment by healthcare professionals (HCPs) whose recommendations can instigate awareness and demand for vaccination in diabetics for better health outcomes.<sup>9</sup> Sensitization towards evidence-based vaccination practices amongst HCPs may help to achieve targeted vaccine uptake.

There exists paucity of substantial published data quantifying VPDs and vaccine uptake in diabetics in India. Rapidly changing epidemiology of DM and present constellation of potential VPD-associated morbidity and mortality necessitate effective education, communication and surveillance regarding vaccine uptake and its determinants in both patients and HCPs.<sup>11,12</sup> Adult immunization in immunologically vulnerable diabetics still remains a need to be addressed.<sup>13</sup> As HCPs play a key role in ensuring continuity of care, the study aimed to analyse the knowledge and practices of adult immunization practices in diabetics by HCPs and the potential barriers faced by them.

## METHODS

This was a community based, cross-sectional study among the HCPs involved in treatment and management of patients with type-2 DM. The survey was conducted between May 2019 to June 2019 by Department of General Medicine, Gayatri Vidya Parishad Institute of Healthcare and Medical Technology in the city of Visakhapatnam. The approval of the study protocol was obtained from the Institutional Ethical Committee. The required study participants were randomly selected across various clinics, hospitals and healthcare centres of the city. Participation in the survey was voluntary. After acquainting them with the purpose of the study, informed written consent was obtained, assuring them confidentiality. No incentive or rewards was offered for participation in this study.

### *Inclusion criteria*

The inclusion criteria for the HCPs were (a) minimum qualification of MBBS (b) minimum duration of practice of one year (c) active involvement in initiation,

intensification and optimization of treatment in patients with type-2 DM and (d) minimum visits of 10 diabetic patients/month. HCPs with practice period of less than one year, not involved in treatment or management of type-2 DM patients and refusal for participation were excluded from the study. Initial screening of HCPs was done to determine their participation in the study.

### *Exclusion criteria*

Those who didn't meet inclusion criteria were excluded from the study.

In view of dearth of substantial data about vaccination practices in Indian scenario, the sample size for this study was restricted to 100 participants.

Each of the participants was asked to fill the survey questionnaire which obtained the following information: 1) demographics details 2) knowledge about adult vaccination in DM 3) his/her vaccination practices 4) beliefs and attitudes towards vaccination 5) barriers encountered for vaccinating diabetic patients. They were also requested to provide any suggestions to improve vaccination rates in diabetic population. The demographic details comprised of information about age, gender, education qualification and duration of practice in management of type-2 DM patients.

The survey questionnaire comprised of questions for HCPs which embraced the knowledge, practices and barriers for pneumococcal, influenza and hepatitis-B vaccination in adults with type-2 DM based on previous studies.<sup>11,12</sup> The questions were designed based on logic framework for vaccine preventable diseases, provided by Centres for Disease Control and Prevention (CDC)-based "The Guide to Community Preventive Services", developed under the leadership of Task Force on Community Preventive Services.<sup>14,15</sup> The design had taken into consideration the following aspects: (a) provider-based Perception (e.g. vaccine efficacy, vaccine safety), (b) provider-based barriers (e.g. lack of time, tracking of vaccine status, patient's refusal), (c) improved access to vaccination services (e.g. cost efficacy, reimbursement, maintenance of adequate vaccine stock), (d) provider-based interventions (e.g. training, education, reminder system) and (e) enhancing community demand for vaccination (e.g. patient education, patient recall system, patient-held medical records).

It took approximately 10-15 minutes to complete the survey questionnaire. It was ensured that the participant answered each question before moving on to the next. Any queries regarding survey questions were assisted.

### *Data analysis*

The data collected was organised in Microsoft Excel worksheet and statistical analysis was done with the help of Statistical Package for Social Sciences (SPSS) version-

24. Categorical variables were computed as frequencies (N) and percentages (%) and were analysed by Fisher Exact test to determine statistical significance. Quantitative variables were expressed as mean and standard deviation (SD). P value less than 0.05 was set as level of statistical significance.

## RESULTS

In the present study, females constituted 34% of the participating HCPs (Table 1). The youngest age of the participant was 27 years and the eldest one was of 64 years with the mean age being 45.23±12.23 years. The HCPs with qualification of MBBS and MD were 51% and 49% respectively.

The practices of HCPs regarding pneumococcal, influenza and hepatitis vaccination as per recommended guidelines in patients with type-2 DM are displayed in Table 2. MD HCPs recommendations and encouragement for diabetics for pneumococcal and hepatitis vaccination were statistically significantly higher than MBBS ones. There was no statistical difference in recommendations and encouragement for diabetics for influenza vaccination. Adult patients were routinely vaccinated more by MD professionals as compared to MBBS which was statistically significant. However, vaccination at patient's request was almost same by both groups.

**Table 1: Demographic features of the HCPs participated in the study.**

Variable	Percentages
<b>Gender</b>	
Males	66%
Females	34%
<b>Qualification of HCPs</b>	
MBBS	51%
MD	49%
<b>Age (in years)</b>	45.23±12.23*
<b>Duration of practice (in years)</b>	12.42±5.35*

\*expressed as Mean±SD.

The attitudes and beliefs of HCPs regarding pneumococcal, influenza and hepatitis vaccination as per recommended guidelines in patients with type-2 DM was represented in Table 3. 52% HCPs found difficulty in identifying eligible patients for vaccination. 63% believed vaccination was more important for children than adults. However, 93% confirmed that vaccination in diabetics would offer protection against VPDs. Only 23% supported involvement of nurse for vaccination without direct instructions from doctors to save time and improve vaccine uptake.

**Table 2: Practices of HCPs regarding pneumococcal, influenza and hepatitis vaccination as per recommended guidelines in patients with type-2 DM.**

Variable	MBBS HCPs, N (%)	MD HCPs, N (%)	P value #
<b>HCPs recommending DM patients for</b>			
Pneumococcal vaccination	34 (66.66)	46 (93.87)	0.0009*
Influenza vaccination	42 (82.35)	46 (93.87)	0.1222
Hepatitis vaccination	34 (66.66)	40 (81.63)	0.0196*
<b>During the visit, HCPs encouraging DM patients for</b>			
Pneumococcal vaccination	29 (56.86)	43 (87.75)	0.0007*
Influenza vaccination	40 (78.43)	45 (91.83)	0.0916
Hepatitis vaccination	30 (58.82)	40 (81.63)	0.0165*
<b>HCPs routinely vaccinating</b>			
<b>1. All patients ≥ 65 years with</b>			
Pneumococcal vaccination	2 (3.92)	15 (30.61)	0.0004*
Influenza vaccination	2 (3.92)	16 (32.65)	0.0002*
Hepatitis vaccination	1 (1.96)	13 (26.53)	0.0003*
<b>2. Adult patients &lt;65 years with DM</b>			
Pneumococcal vaccination	1 (1.96)	12 (24.49)	0.0008*
Influenza vaccination	1 (1.96)	14 (28.57)	0.0002*
Hepatitis vaccination	1 (1.96)	10 (20.40)	0.0035*
<b>3. At patient's request</b>			
Pneumococcal vaccination	50 (98.03)	48 (97.96)	1
Influenza vaccination	50 (98.03)	48 (97.96)	1
Hepatitis vaccination	50 (98.03)	48 (97.96)	1

#- p value is estimated using Fisher Exact test, \*- p<0.05, statistically significant.

**Table 3: Attitudes and beliefs of HCPs regarding pneumococcal, influenza and hepatitis vaccination as per recommended guidelines in patients with type-2 DM.**

Variable	Agreed	Nor agreed/ nor disagreed	Disagreed
It is difficult to identify eligible patients for vaccination	52%	37%	11%
Vaccination in more important for children than adults	63%	17%	20%
Healthy individuals don't need any vaccine inspite of recommended guidelines	7%	74%	19%
Recommended vaccination schedule would offer protection from vaccine preventable diseases in diabetics	91%	0	9%
Pneumococcal, influenza and hepatitis vaccination in DM patients won't be effective	4%	80%	16%
Pneumococcal, influenza and hepatitis vaccination in DM patients might interfere with current medication	9%	59%	32%
Pneumococcal, influenza and hepatitis vaccination in DM patients might worsen existing health condition	6%	75%	19%
Allowing nurses to provide the vaccine to patients without direct physician involvement at the time of vaccination would be effective to save time and help in vaccine uptake	23%	59%	18%

**Table 4: The barriers perceived by HCPs for pneumococcal, influenza and hepatitis B vaccination practices as per recommended guidelines in patients with type-2 DM.**

Variable	Agreed	Nor agreed/nor disagreed	Disagreed
Urgent concerns of the patient dominate the visit	79%	14%	7%
Lack of time to discuss about vaccination with patients	49%	22%	29%
Complexity of vaccination guidelines	38%	25%	37%
Concern about vaccine efficacy	16%	70%	14%
Concern about vaccine safety	33%	35%	32%
Cost of vaccine	60%	19%	21%
Lack of reimbursement, incentives or insurance coverage	58%	34%	8%
Patient's fear of needles or shots	44%	36%	20%
Refusal of patients inspite of counselling	64%	21%	15%
Tracking vaccination status in DM patients	56%	29%	15%
Lack of maintenance of vaccination record by patient	65%	33%	2%
Lack of effective reminder or recall system	62%	34%	4%
Lack of National Electronic Vaccine Registry	67%	23%	10%
Lack of educational materials for patients	83%	10%	7%
Lack of educational materials for HCPs	63%	28%	9%
Lack of training in HCPs	75%	20%	5%
Lack of trained technical staff to support vaccine administration	55%	30%	15%
Inadequate stock of vaccines for adults	17%	31%	52%
Inadequate storage and handling facilities for adult vaccines	17%	31%	52%
Lack of "standing orders" for vaccination in DM patients in clinics and hospitals.	84%	5%	11%

As barriers for vaccine uptake, urgent concerns of the patient and lack of time to explain were perceived by 79% and 49% of HCPs respectively. 60% and 58% agreed that concern about vaccine safety and cost of vaccine was affecting vaccine uptake. Lack of vaccination record, recall system and national electronic vaccine registry were perceived as barriers for vaccine uptake by 65%, 62% and 67% respectively. 83% and 75% of HCPs confirmed for lack of educational materials for patients and training in HCPs respectively. 84% were

affirmative for lack of standing orders for adult vaccination programme, which if implemented would improve overall vaccine uptake among diabetics.

## DISCUSSION

Diabetics often have compromised immunity which increases their vulnerability to infections.<sup>2</sup> Vaccines are recommended for diabetics as a part of preventive measure by ADA 2019.<sup>3</sup> This study aimed to determine

various factors hindering immunization programs from prospective of HCPs involved in diabetic care.

In the present study, MBBS professionals accounted for almost 50% of HCPs involved in diabetic care, thus reflecting their substantial contribution in diabetic care. They need to be aware about comprehensive diabetic care which include recommended immunizations.<sup>3</sup> MD HCPs were more involved in recommendations, encouragement and routine vaccinations in diabetics as compared to MBBS. Almost 50% of HCPs agreed that they lacked time to discuss and educate patients about issues pertaining to adult immunization. HCPs are the forefront for improving immunization rates as their recommendation is the greatest motivation.<sup>11,16</sup> It works equally effective as compared to the time and efforts spent on counselling and other preventive services.

The present study revealed that almost 50% of HCPs faced challenges in identifying immunization status of the patient. Though almost 90% felt that immunizations would offer protection against VPDs in diabetics, still nearly 60% felt that immunizations were more important in children than adults. These findings thus reflect lack of knowledge and ignorance about scientific facts regarding immunization programme. False assumptions like healthy individuals don't need immunizations or immunization might interfere with current medications or existing medical conditions, may prevent patient from receiving vaccines inspite of counselling and recommendations.<sup>17</sup> Thus, it is important to recognise that the counselling and convincing diabetics for vaccinations still remains an achievable target to catalyse a healthy aging program.

The present study revealed that one of the most significant practice barriers for immunization was the urgent concerns of the patient that dominated the visit, as reported by 79% of HCPs, similar to a study by Szilagyi et al.<sup>12</sup> Egede et al had observed that repeated physician visits were associated with only modest increase in vaccination coverage.<sup>18</sup> HCPs also pointed out that patient's refusal inspite of counselling, patient's fear for needle shot, concern about vaccine safety and efficacy were few reasons for less vaccination rates similar to observation by David et al.<sup>17</sup> Thus, it calls for ownership by HCPs to educate and motivate patients about immunization.

In the present study, almost 60% HCPs felt need of educational materials and proper training to improve vaccine uptake. 38% felt that complexity of immunizations guidelines was one of the barriers in implementation of immunization. David et al in his study had observed confirmation of the official guidelines about adult immunizations to be their personal sources of information by almost 50% of the physicians.<sup>17</sup> Almost 50% of HCPs pointed out lack of trained technical staff to support vaccine administration. Zimmerman et al had suggested that HCPs and healthcare workers should be

educated about the importance and implementation of vaccination programmes in their clinical practices.<sup>18</sup>

The present study also showed that lack of educational material for patients was one of the barriers for immunization. Inclusion of display materials like posters, fact sheets in clinics would prompt patients to enquire about vaccination. Easy access to accurate information would help to overcome the fears and concerns about vaccines. Once the concept of vaccination is accepted, the individual himself would seek for opportunity for vaccination. In the present study more than 50% HCPs were concerned about the cost of the vaccine and perceived lack of incentives, reimbursement and insurance coverage to be potential barriers. Vaccination is not mere a measure of protection, but also a social responsibility. Hence, it demands strong leadership, setting immunisation goals, establishing infrastructure and co-ordination of the healthcare policy makers and pharmaceutical companies to make immunization affordable and accessible to patients.

In the present study, 84% HCPs perceived lack of standing orders to be one of the strongest barriers for implementation of immunization. Standing orders to the healthcare workers in the clinics and hospitals would facilitate immunization.<sup>20</sup> Other barriers include tracking vaccination status, owing either to lack of record or National electronic Vaccine Registry, similar to findings by MacDougall et al in a study done in HCPs responsible for immunization delivery to adults and/or consultation regarding vaccines.<sup>21</sup> In a review of 41 studies, Szilagyi et al had observed patient reminder/recall interventions was an effective strategy to improve immunization.<sup>22</sup> Better documentation can facilitate patient identification, tracking status and thus increase immunization coverage.

Unlike the success story of childhood immunization in India, adult vaccination still remains sub-optimal and under-appreciated. This calls for an action, initiation and co-ordination by HCPs along with healthcare delivery system and policymakers to identify potential roadblocks. Provider's education, reorientation of intellections, efforts and expenditure and follow-up assessment of the knowledge and behaviours of providers and the public in response to these interventions are required to formulate receptive and evidence-based immunization programs.<sup>16</sup> More the proportion of vaccinated individuals, greater the protection from infections.

The study has some limitations. A convenient sample size was adopted with no formal sample size calculation. The nature of the study was cross-sectional. The findings in the study have been derived from self-reported information which has potential for reporting bias. Increase in size of cohort and longitudinal follow-up with interventions over a period of time shall help in establishing temporal relationships with the factors associated with information and implementation of adult immunization programmes. However, this study can be

taken as an initiative to delve with the knowledge and perceived barriers of HCPs towards adult immunization in type-2 DM patients.

## CONCLUSION

The present study showed the existence of substantial lacunae in knowledge and practice among HCPs, despite recommendations for adult immunization as a part of comprehensive management in type-2 DM. Tracking immunization status, concern about vaccine cost and safety, patient's refusal, lack of educational materials and training about adult immunization and lack of standing orders were perceived as potential barriers by HCPs. As HCPs are the primary drivers of vaccinations programmes, their communication and recommendations to patients play a key role in vaccine uptake. When supported with consistent vaccination tracking system, strong political will and interventions for improving public perceptions about VPDs and vaccination, HCPs can facilitate vaccine uptake and reduce VPD-associated mortality and morbidity.

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