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Barriers to pneumococcal conjugate 13 vaccination recommendations among physicians in Lagos

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Abstract
Objective: Vaccination rates among risk groups vary between different countries. There are gaps in the implementation of the acceptable recommended guidelines on adult pneumococcal immunization in Nigeria. This study aims to evaluate the barriers for physicians in recommending pneumococcal vaccines.
Methods: This was a descriptive cross-sectional survey involving 97 physicians. Self-administered questionnaires were sent electronically to the physicians to understand the barriers to adult pneumococcal vaccine recommendations among adult physicians in Lagos. The sample size was based on estimation using the Cochrane formula.
Results: Ninety-seven (97) physicians completed the questionnaire with a male to female ratio of 1:1.3. The mean age of the responders was 39.54±6.2 years. About 73(81.1%) of physicians recommended the pneumococcal vaccine and most physicians recommended the vaccine for patients with chronic lung diseases. The common barriers for vaccine recommendation include: unavailability (53; 54.6%), poor reminder systems (43; 44.3%), inadequate insurance coverage (33; 34%), and Vaccine shortage (31; 32%).
Conclusions: This study suggests that the majority of physicians recommend pneumococcal conjugate vaccines. The major barriers to vaccination include poor access, availability, and cost. There is a need to increase access, cost, and availability of pneumococcal vaccine if the narrative must change.

Keywords: Adult immunization, pneumococcal, respiratory vaccination, and vaccine barriers

Plain English Summary

Pneumococcal vaccines are vaccines against the bacterium Streptococcus pneumonia. Pneumococcal conjugate 13 vaccines are recommended for adults with chronic diseases or compromised immune status at risk of respiratory infections. There are gaps in implementing the acceptable recommended guidelines on adult pneumococcal immunization in Nigeria.

In this study, we evaluated the barriers for physicians in recommending pneumococcal conjugate 13 vaccines. This study indicates that most physicians recommended pneumococcal conjugate 13 vaccines, especially for patients with chronic lung diseases. The common barriers to vaccine recommendation include unavailability, poor reminder systems, inadequate insurance coverage, and Vaccine shortage. The findings from this study inspire more interventions from all stakeholders to improve access, cost, and availability of the pneumococcal conjugate 13 vaccine.

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Background

Pneumococcal vaccines are vaccines against the bacterium Streptococcus pneumonia. Their use can prevent some cases of pneumonia, meningitis, and sepsis. There are two types of pneumococcal vaccines: conjugate vaccines and polysaccharide vaccines (1, 2). PCV13 has efficacy to prevent nonbacteremic pneumonia and invasive pneumococcal disease caused by vaccine serotypes in adults aged ≥65 years (3). Adults with chronic diseases or compromised immune status are at increased risk of respiratory infections, with pneumonia being the most common serious presentation and a significant cause of morbidity and mortality (4, 5). Most European countries as well as North American Countries have well-established recommendations for adult pneumococcal vaccination for reducing the risk of pneumococcal infections in vulnerable individuals (5). However, there is no National guideline for adult pneumococcal vaccine recommendations in Nigeria. Currently, the recommendation is based on international guidelines and experts' opinions locally (6, 7). There is also no existing policy mandating adult pneumococcal vaccine intake for the risk group.

Childhood vaccination coverage in Nigeria has significantly improved in the past two decades, averting millions of deaths per year (8, 9). However, adult vaccination coverage remains poorly recorded and substandard.

Many factors may affect adult vaccine coverage. A review of barriers to pneumococcal and influenza coverage in low and middle-income countries reported economic burden, poor health systems, and vaccine policies as major problems (10). Vaccine coverage may also be affected by the recommendations of the healthcare providers, even in patients with a negative attitude toward vaccination (11, 12, 13). There are gaps inadequate recommendations and coverage of adult pneumococcal immunization in Nigeria. We hypothesize that the barriers to adult pneumococcal vaccination in Nigeria are multifactorial and these include access, availability, high cost, and lack of adequate recommendations by the health care professionals.

This study aims to evaluate the barriers for physicians in recommending adult vaccines. This will help to highlight some of the major challenges affecting adult pneumococcal vaccine coverage and will be useful in guiding policy discussions at the state and national levels on how best to improve the adult pneumococcal vaccine coverage.

Methods

Study design

This was a descriptive cross-sectional study. We designed an anonymous, self-administered survey to understand the barriers to pneumococcal vaccine recommendations among adult physicians in Lagos.

Study setting

This study was conducted among physicians practicing in government and private hospitals in Lagos. Lagos is a metropolitan city of about 25,000,000 people with 2 Teaching hospitals (Lagos university teaching Hospital, and Lagos state university teaching hospital), one Federal Medical Center(FMC Ebute-Metta), and about 26 general hospitals, and several private hospitals (14, 15).

Study population

Physicians are more likely involved with the provision of adult pneumococcal vaccinations. Hence, family physicians, community health physicians, and internal medicine physicians comprising of consultants and residents were selected using convenient sampling from the registers of the Nigerian Medical Association-Lagos branch, Medical and Dental Council of Nigeria (LUTH, LASUTH, and FMC Ebute-Metta branch), and Association of resident doctors (LUTH, LASUTH, and FMC Ebute-Meta branch). The total number of physicians is 788. The contacts of the physicians were retrieved.

Inclusion criteria

Eligible participants included Consultant Physicians in internal medicine, community medicine, and family medicine. Also, resident doctors in internal medicine, community medicine, and family medicine. These physicians practice in Lagos state.

Sample size

The minimum sample size of 90 for this study was calculated using the formula for finite population size. The significant level was set to 0.05, the standard normal variate of 1.96 (at 95% confidence level), the precision of 5%, and prevalence were taken as 69% of physicians with good knowledge of vaccine from a previous study (16). The targeted sample size was achieved between December 2021 and January 2022 using the purposive sampling technique.

Bias was minimized by making the survey anonymous, avoiding leading questions in the questionnaire, including multiple questions to assess each domain, and including specific questions in the questionnaire.

Data collection

We developed a questionnaire with CDC recommendations and documents on experts' opinions about pneumococcal vaccination in Nigeria from previous studies (7, 17, 18). The questionnaire was divided into 3 sections to assess the following: Socio-demographics, pneumococcal vaccine recommendations, and barriers to recommending the vaccine. There were 25 questions asked to assess different barriers. These barrier responses assessed issues around access, availability, cost, safety, efficacy, education, and other factors with about 2-4 questions asked on each category. House officers in Lagos State University Teaching Hospital (LASUTH) were pretested for the survey.

The questionnaire was developed with Google form and sent to the participating doctors by WhatsApp. The message was sent up to three times to serve as a reminder

Data analysis

The obtained data on goggle form was extracted on Microsoft excel 2013 and transferred to SPSS version 26 for descriptive statistics analysis. Categorical variables were presented with frequencies and percentages and numerical variables were presented with mean and standard deviations. Association between categorical variables was assessed with chi-square. P< 0.05 was assumed as the level of significance at a 95% confidence interval.

Results

The sociodemographic characteristics of the participants are shown in Table 1. Ninety-seven (97) physicians completed the questionnaire. The male to female ratio was 1:1.3. Most of the respondents were consultants 54 (55.7%). The mean age of the responders was 39.54±6.2 years. Most physicians work in tertiary public hospitals and have practiced for 10-14 years.

Table 1: Socio-demographic characteristics of participants

Variable	Frequency (n=97)	Percentage
Age group (Years)		
≤35	24	24.7
36-45	59	60.8
>45	14	14.4
Mean ± SD	39.54±6.2	
Gender		
Male	42	43.3
Female	55	56.7
Duration of practice as a medical practitioner (Years)		
<10		
10-14	23	23.7
15-19	37	38.1
≥20	24	24.7
	13	13.4
Any specialist training		
Yes	96	99.0
No	1	1.0
Type of specialist training (n=96)		
Fellow	54	56.3
Resident	42	43.4
Area of specialization (n=96)		
Family medicine	27	28.1
Internal medicine	58	60.4
Public health	11	11.5
Type of practice		
Military	5	5.2
Public	75	77.3
Private	14	144

NGO	3	3.1
Level of healthcare service		
Primary	5	5.2
Secondary	8	8.2
Tertiary	84	86.8

Majority of physicians recommended pneumococcal vaccine (73; 81.1%). Physicians recommend pneumococcal vaccines for the following conditions: chronic lung diseases (84; 86.6%), ages>65 (81; 83.5%), close contact with someone at high risk (59; 60.8%), COPD (80; 82.5%), Asthma (55; 56.7%), and asplenia (76; 78.4%).

Barriers

The common barriers in recommending adult vaccines include: unavailability (53; 54.6%), poor reminder systems (43; 44.3%), high cost for patients (43; 44.3%), inadequate insurance coverage (33; 34%), Vaccine shortage (31; 32%), and side effects concerns (27; 27.8%) as shown in table 2.

Table 2: Barriers and limitations encountered by the physician in recommending the vaccines

Variable	Frequency	Percentage
Vaccines are usually not easily available	53	54.6
No effective reminder system	43	44.3
Costly and not affordable to most patient	43	44.3
Inadequate insurance coverage	33	34.0
Vaccine too expensive	33	34.0
Vaccine shortage	31	32.0
Concern about side effects	27	27.8
Not enough time in-office visit to discuss it	22	22.7
Unaware of the vaccination schedule	16	16.5
Don't know where a patient can access them since my practice doesn't have them	15	15.5
Limited information about the benefit	12	12.4
Not going to the same physician regularly	11	
Not receiving a physician's recommendation	10	10.3
not aware of the need	7	7.2
Could worsen current conditions	7	7.2
Confused about the recommended vaccination schedule	7	7.2
Think won't work if sick	4	4.1
Think only of elderly	4	4.1
Could interact with current medications	3	3.1
Fear of needles by patients	1	1.0
Think healthy people don't need it	1	1.0
Believe lifetime protection from childhood vaccines	1	1.0
Think it's ineffective	1	1.0
Lack of knowledge about illness prevention	0	0.0

Association between vaccine recommendations and socio-demographics

There is a significant association between the area of practice and pneumococcal vaccine recommendation. Physicians in the public sector recommended the pneumococcal vaccine more. (X=9.912, p=0.019). Similarly, there is a significant association between the level of health care practice and pneumococcal recommendation. Physicians practicing in secondary and tertiary health facilities are recommended more than those in primary health care facilities. (X=8.695, P=0.013) as shown in table 3.

Table 3: Association of prescribing patterns and socio-demographic characteristics

Variables	Yes (n=73)	No (n=24)	χ^2	p-value
Age group (Years)				
≤35	18(75.0)	6(25.0)	0.144	0.931
36-45	45(76.3)	14(23.7)		
>45	10(71.4)	4(28.6)		
Gender				
Male	44(80.0)	11(20.0)	1.534	0.215
Female	29(69.0)	13(31.0)		
Duration of practice as a medical practitioner (Years)				
<10	18(78.3)	5(21.7)	1.620	0.655
10-14	29(78.4)	8(21.6)		
15-19	18(75.0)	6(25.0)		
≥20	8(61.5)	5(38.5)		
Type of specialist training				
Fellow	40(74.1)	14(25.9)	0.092	0.762
Resident	33(76.7)	10(23.3)		
Area of specialization				
Family medicine	19(70.4)	8(29.6)	2.121	0.346
Internal medicine	43(74.1)	15(25.9)		
Public health	11(91.7)	1(8.3)		
Type of practice				
Private	9(52.9)	8(47.1)	4.912	**0.019***
Public	64(80.0)	16(20.0)		
Level of healthcare service				
Primary	1(20.0)	4(80.0)	8.695	**0.013***
Secondary	6(75.0)	2(25.0)		
Tertiary	66(78.6)	18(21.4)		

YES and NO indicate Prescribing pattern. *Significant at p< 0.05, Public (Public and Military) and private (Private and NGO)

Discussion

The Centers for Disease Control and Prevention (CDC) recommends pneumococcal vaccination schedules for children, adolescents, and adults (19). The recommendations are available to both healthcare professionals and the general public. Although the Nigerian childhood immunization program has been very successful, the same level of success has not been achieved in adults (20, 21, 22). This study evaluated the barriers to physicians recommending adult pneumococcal vaccines. We found that majority of physicians recommended the pneumococcal vaccine and most physicians recommended the vaccine for patients with chronic lung diseases. The common barriers in recommending vaccines reported were unavailability, poor reminder systems, high cost of vaccines, inadequate insurance coverage, vaccine shortage, and side effects concerns.

Most of the physicians recommended the pneumococcal vaccine. The recommendation is more significant among physicians practicing in public and tertiary facilities. This is similar to the findings of a study in Turkey that reported physicians' recommendations of pneumococcal vaccinations is up to 83.4% of patients at risk seen. However, the lack of recommendations from physicians for half of the unvaccinated elderly patients was noted in another study in the US (23). This implies that the recommendations of vaccines by physicians are one of the key areas affecting adequate adult vaccine coverage. This is a potential target area to address to improve adult vaccine coverage. This can be addressed by ensuring the development of local guidelines for adult pneumococcal vaccination that will be made available to all physicians. There is also the need for a National Policy that will mandate adult pneumococcal vaccine coverage for the individuals at risk irrespective of the health care facility where a patient is being seen.

Most physicians recommend pneumococcal vaccines for patients with chronic lung diseases, ages>65, close contact with someone at high risk, asplenia, and weak immune system. A National Survey in the US assessing the knowledge and practice of physicians on pneumococcal vaccination revealed that most

physicians recommend pneumococcal vaccines for their high-risk and elderly patients (24). The CDC recommended pneumococcal conjugate vaccination for adults, particularly those aged ≥65 years and under 65 years with certain medical conditions such as asthma, heart disease, and diabetes (25, 26). CDC also recommends routine administration of pneumococcal polysaccharide vaccine (PPSV23) for all adults 65 years or older (27). The vaccine is safe and effective in people with various conditions that are associated with an increased risk of severe (28). This calls for the attention of physicians to routinely identify patients who will benefit from the recommended vaccines.

The common barriers in recommending pneumococcal vaccine reported are high cost of the vaccine, Vaccine shortage, inadequate insurance coverage, side effects concerns, and poor reminder systems. A study analyzing the use and impact of various key vaccination policy elements that may influence vaccine uptake rates in European countries reported that one of the main barriers towards optimal adult vaccination coverage includes a lack of physicians recommendations for different reasons ranging from cost, access, availability, level of awareness to perceptions (29). Another report from the US revealed the main drivers of physicians not recommending vaccination to include vaccination concerns about efficacy and safety, the physician's mindset, and lack of availability of the vaccine (30). This implies that specific strategies that are targeted at increasing access, availability, and reducing vaccine costs are needed to increase adult pneumococcal coverage in Nigeria.

Limitations of the study

This study has some limitations. The data used in the analysis of this study were self-reported, and this might have given room for reporting bias. Future research might employ methods to address this issue. Additionally, random sampling surveys were not feasible during this period. As such, the majority of the respondents practiced in the public sector and were Internal Medicine physicians. There may be a need for further research to address this limitation.

Conclusions

This study evaluated barriers to adult pneumococcal vaccines among physicians in Lagos. Our findings suggest that majority recommends pneumococcal conjugate. The major barriers to pneumococcal vaccination include availability, cost, and fear of side effects. The results of this study suggest that more emphasis should be placed on improving the access, cost, and availability of pneumococcal vaccines by policymakers. Also, there should be an improvement in vaccine education for physicians to address the concerns on this vaccine.

List of abbreviations

PCV: Pneumococcal conjugate vaccine
FMC: Federal Medical Center
LASUTH: Lagos State University Teaching Hospital
LUTH: Lagos University Teaching Hospital
CDC: Center for disease control
SPSS: Statistical package for the social sciences
COPD: Chronic obstructive pulmonary disease
US: United States
NGO: Non-governmental organization
PPSV: Pneumococcal polysaccharide vaccine

Declarations

Ethical approval and consent to participate

The study proposal was reviewed by the ethical board of Lagos State University Teaching with approval number-LREC/06/10/1728. All the physicians recruited gave their consent to participate in the study. The survey contains an informative introduction explaining the purpose of the study and an acceptance to proceed with answering the questions anonymously. Only participants who picked 'yes' to continue were able to complete the survey. Confidentiality was maintained as participants' names were not included in the questionnaire.

Consent for publication

Availability of data and materials

The data are available in the manuscript. The data sets used and analyzed during the current study are available from the corresponding author on a reasonable request.

Competing interests

There is no potential competing or conflicting interest.

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