



EFFECTIVENESS OF PNEUMOCOCCAL VACCINATION AGAINST PNEUMONIA IN AN ELDERLY HAJJ PILGRIM: AN EVIDENCE-BASED CASE REPORT

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Abstract: Respiratory tract infections are among the most common health problems encountered during the Hajj pilgrimage, particularly among older adults and individuals with chronic medical conditions. A 60-year-old Indonesian male pilgrim with diabetes mellitus and hypertension presented with fever, headache, cough, chest pain, and myalgia during Hajj, with no history of pneumococcal vaccination. This evidence-based case report aimed to evaluate whether pneumococcal vaccination reduces the risk of pneumonia in elderly pilgrims with comorbidities. A literature search was conducted in ProQuest, PubMed, Scopus/ScienceDirect, and Cochrane databases using PICO-derived keywords, followed by critical appraisal using Oxford CEBM tools. Ten studies were identified as the best available evidence. A systematic review reported that pneumococcal vaccination reduced pneumonia-related hospitalization (OR 0.54; 95% CI 0.38–0.77; NNT = 46). Additionally, an RCT found that combined influenza and PPSV23 vaccination significantly reduced the risk of acute respiratory symptoms (RR 0.71; 95% CI 0.55–0.92). The best available evidence supports pneumococcal vaccination as an effective and safe preventive strategy for elderly pilgrims with chronic medical conditions. For this 60-year-old pilgrim with diabetes mellitus and hypertension, PPSV23 vaccination should be considered as part of pre-Hajj health preparation to reduce the risk of pneumonia and other respiratory complications.

Keywords: Pneumococcal vaccination; Hajj; Umrah; Effectiveness; Pneumonia

Abstrak: Infeksi saluran pernapasan merupakan salah satu masalah kesehatan yang paling sering dijumpai selama pelaksanaan ibadah haji, terutama pada lansia dan individu dengan penyakit kronis. Seorang jamaah haji laki-laki Indonesia berusia 60 tahun dengan diabetes melitus dan hipertensi mengalami demam, sakit kepala, batuk, nyeri dada, dan mialgia selama menjalankan ibadah haji. Ia belum pernah menerima vaksinasi pneumokokus dan menanyakan apakah vaksin tersebut dapat mencegah pneumonia selama perjalanan ibadah haji. Penelitian ini bertujuan mengevaluasi apakah vaksinasi pneumokokus dapat menurunkan resiko pneumonia pada jamaah haji lanjut usia dengan

penyakit penyerta. Pendekatan *evidence-based case report* (EBCR) digunakan dalam laporan kasus ini. Penelusuran literatur dilakukan pada basis data ProQuest, PubMed, Scopus/ScienceDirect, dan Cochrane menggunakan kata kunci yang disusun berdasarkan kerangka PICO. Telaah kritis dilakukan menggunakan instrumen Oxford Centre for Evidence-Based Medicine (OCEBM) untuk *systematic review* dan *randomized controlled trial* (RCT). Sepuluh studi dipilih sebagai bukti terbaik yang tersedia. Sebuah *systematic review* melaporkan bahwa vaksinasi pneumokokus menurunkan angka rawat inap terkait pneumonia (OR 0,54; IK 95% 0,38–0,77; NNT = 46). Selain itu, sebuah RCT menunjukkan bahwa kombinasi vaksin influenza dan PPSV23 secara signifikan menurunkan risiko gejala infeksi saluran pernapasan akut (RR 0,71; IK 95% 0,55–0,92). Secara keseluruhan, studi-studi yang ditelaah memiliki validitas yang memadai dan dapat diterapkan pada skenario klinis pasien. Pada jamaah haji berusia 60 tahun dengan diabetes melitus dan hipertensi ini, vaksinasi PPSV23 perlu dipertimbangkan sebagai bagian dari persiapan kesehatan sebelum keberangkatan haji untuk mengurangi risiko pneumonia dan komplikasi pernapasan lainnya.

Kata Kunci: Vaksinasi *Pneumokokus*; Haji; Umrah, Efektivitas; *Pneumonia*

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Introduction

The Hajj and Umrah pilgrimage is a sacred activity for Muslims around the world as it is one of the five pillars of Islam and therefore to be able to perform the pilgrimage holds significant and historical. It is the world's largest annual mass gathering, attracting over two to three million pilgrims to Mecca and Medina. The high density, the duration of travel and activities, and the demographic variation (age, health status and country of origin) create an environment that is conducive to the transmission of respiratory pathogens.

Acute respiratory infections (ARIs) are the most common health problem reported among pilgrims. Among ARIs, pneumonia caused by *Streptococcus pneumoniae* and influenza viruses is the most serious, potentially leading to severe complications, hospitalization and death. A report from the cities of Mecca and Medina states that 15-40% of pneumonia cases occur during the Hajj season, with 22-31% of these cases requiring intensive care unit treatment and developing into sepsis. Between 33.3% and 50% of these cases are fatal, with pneumococcal pneumonia being the main cause.

The government of Saudi Arabia and various international health authorities (such as the WHO and CDC) consistently recommend vaccination for influenza and meningococcal disease as entry requirements. Pneumonia vaccination is also increasingly recognized as a crucial component of a comprehensive prevention strategy, especially for high-risk pilgrims (the elderly, those with diabetes, chronic heart or lung diseases). In Indonesia, strengthening health management and preventive health programs for Hajj and Umrah pilgrims has also been emphasized to reduce the burden of illness and improve pilgrims' readiness before departure.¹

¹ D. Mustaqim, "Improving Health Management for Hajj and Umrah Pilgrims in Indonesia: Implementation of Minister of Religious Affairs Decree No. 1456/2022," *Multazam: Jurnal Manajemen Haji dan Umrah* 4, no. 2 (2024), <https://doi.org/10.32332/multazam.v4i2.9362>.

Saudi health authorities and the WHO recommend pneumococcal vaccination (PPSV23 or PCV13) for high risk pilgrims, but uptake remains low (25–35% in many studies). There is ongoing debate about the strength of evidence specific to the Hajj setting. This evidence based case report (EBCR) aims to answer a focused clinical question derived from a real pilgrim's case, using the best available evidence to guide individual decision making.

Clinical Scenario

A 60-year-old Indonesian male pilgrim with diabetes mellitus and hypertension has just returned from performing the Hajj. Throughout the journey, he complained of fever, headache and coughing, accompanied by chest pain and muscle pain. These symptoms were felt for three days prior to departing for Indonesia

Upon learning this, the doctor on duty conducted an examination. When asked about his previous medical history, He had never received a pneumococcal vaccination. During examination, he asked his doctor: *“Will the pneumonia vaccine really protect people from getting sick during Hajj? I am worried because many pilgrims, including me, get severe cough and fever.”*

Theoretical Approach

This evidence based case report was conducted to answer a therapy focused clinical question arising from a real patient encounter: whether pneumococcal vaccination (PPSV23 or PCV13) reduces the risk of pneumonia in an elderly pilgrim with comorbidities during the Hajj pilgrimage.

According to the hierarchy of evidence for therapy questions, the most valid study designs are systematic reviews of randomized controlled trials (RCTs), followed by individual RCTs, then cohort studies. Therefore, our literature search prioritized these study types.

The theoretical framework follows the five steps of Evidence Based Medicine:

1. Asking an answerable clinical question, formulated using the PICO format (Table 1).
2. Acquiring the best evidence through a systematic search of electronic databases.
3. Appraising the evidence, using the Oxford Centre for Evidence Based Medicine (OCEBM) Critical Appraisal Tools.
4. Applying the evidence, to the individual patient, considering his values and clinical context.
5. Assessing the outcome, evaluating the clinical decision

Table 1. PICO Framework for the Clinical Question

<i>Population (P)</i>	<i>Intervention (I)</i>	<i>Comparison (C)</i>	<i>Outcome (O)</i>
Elderly Hajj pilgrims and Umrah with comorbidities	Pneumococcal Vaccination	No Pneumococcal Vaccination	Prevention of pneumonia
Question type	Therapy		
Study Design	<i>Systematic review, Meta-analysis, Randomized Control Trial</i>		

Based on this PICO, the following clinical question was formulated: *“In elderly pilgrims with comorbidities (P), does pneumococcal vaccination (PPSV23 or PCV13) (I), compared to no vaccination (C), reduce the risk of pneumonia(O)?”*. This theoretical approach

guided the subsequent search strategy, critical appraisal and application of evidence to the patient.

Research Methods

Search Strategies

A literature search was performed on November 8, 2025, using the *Proquest*, *PubMed*, *Scopus/Sciencedirect*, and *Cochrane* databases. The search strategy was developed based on the PICO framework, as presented in Table 1. Preference was given to high-quality evidence, including clinical trials, cohort studies, and systematic reviews published within the previous 10 years.

The search combined population-related terms ("Hajj" OR "Umrah" OR "pilgrim") AND ("elderly" OR "adult" OR "comorbid"), intervention-related terms ("pneumococcal vaccine*" OR "PPSV23" OR "PCV13" OR "pneumonia vaccine"), and outcome-related terms ("pneumonia" OR "respiratory infection" OR "hospitalization"). Additional synonyms and Boolean operators were incorporated to maximize the sensitivity of the search and ensure that all potentially relevant evidence was identified.

Table 2. Search strategy

Database	Search Strategies	Result	Selected
Proquest	fulltext(pneumococcal diseases in hajj AND umrah) OR fulltext(pneumonia infection in hajj AND umrah) AND fulltext(pneumococcal vaccine elderly in hajj pilgrims)	116	9
Scopus	["hajj and umrah"] AND ["vaccine" AND "pneumoniae"] AND ["effectiveness"]	37	9
Pubmed	(((((pneumonia disease) OR (Pneumococcal infectious disease)) AND (Pneumococcal Vaccines)) OR (effectiveness of pneumococcal vaccines)) AND (hajj pilgrim)) OR (hajj season)) OR (umrah)	288	19
Cochrane	#pneumococcal infectious OR Pneumococcal disease OR Pneumonia Disease #2 Pneumococcal vaccines OR Pneumococcal Vaccination OR Pneumonia Vaccines OR Pneumonia vaccination #3 Hajj pilgrim an Umrah OR Hajj season OR Pilgrimage OR Pilgrim to mecca #4 #1 AND #2 #5 #3 AND #4	5	3

Article Selection

In the article selection process, the inclusion criteria used were (i) systematic review, meta-analysis, and randomized controlled trial study design, (ii) The population are adult Hajj/Umrah pilgrims (≥ 50 years or with comorbidities), (iii) The outcome are pneumonia incidence, pneumonia related hospitalization, or acute respiratory symptoms, (iv) Articles written in English, (v) Publication date: last 10 years (2015–2025).

The exclusion criteria used were (i) studies that used drugs or other methods as prevention or prophylaxis for pneumonia, (ii) pneumococcal vaccines as part of routine immunization programs for children, (iii) studies other than therapeutic studies on pneumonia, and (iv) no full-text access. Publications were not restricted to specific years, but studies within the last 10 years were prioritized.

The selected articles were then read thoroughly and critically reviewed using the *Oxford Centre for Evidence-Based Medicine Critical Appraisal Tools for therapeutic studies*. The *Oxford Centre for Evidence-Based Medicine Level of Evidence* was used to determine the level of evidence.

Result

A literature search was performed independently by two researchers to identify the best available evidence addressing the clinical question. Titles and abstracts of the retrieved studies were screened for eligibility according to the predefined inclusion criteria. Full-text reviews of all potentially relevant articles were subsequently performed independently by the same two authors. Data extraction from the included studies was also carried out by two reviewers, and the extracted information was cross-checked and verified by the remaining authors to ensure data accuracy and consistency. Electronic databases including ProQuest, PubMed, Cochrane Library, and Scopus/ScienceDirect were searched using keywords derived from the PICO framework.

A total of 446 articles were initially identified. After removing duplicate records, 357 articles remained for screening. Studies were then assessed based on study design, resulting in 40 potentially relevant articles. Title and abstract screening according to the predefined inclusion and exclusion criteria yielded 15 articles for full-text review. After critical appraisal for validity, importance, and applicability to the clinical scenario, 10 articles were selected as the best available evidence. The literature search and selection process are summarized in the PRISMA flow diagram figure 1.

Figure 1. PRISMA Flow Diagram

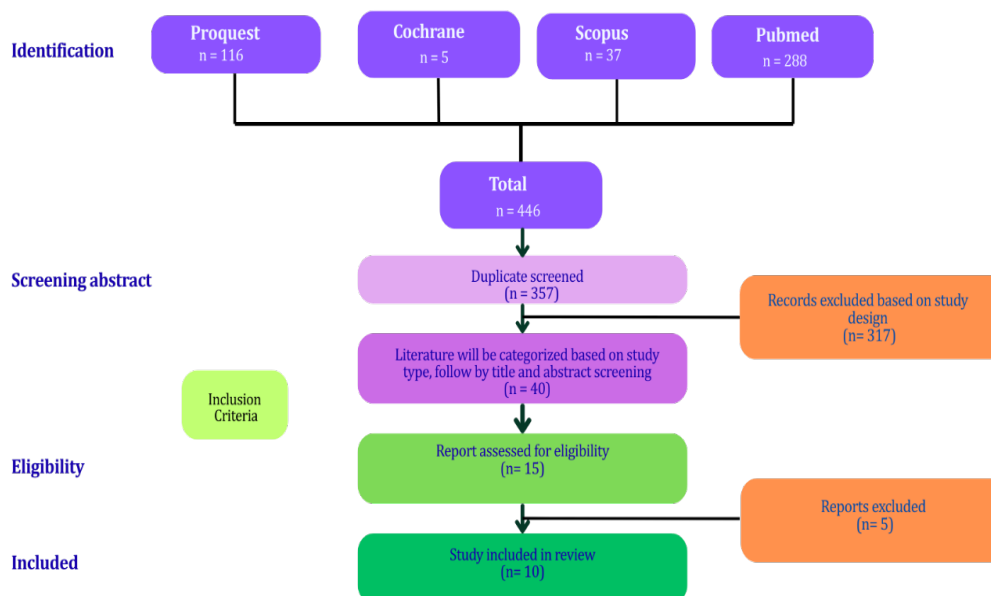


Table 3. Inclusion Study Characteristic

Author (years)	Country	Study Design	Population	Intervention	Comparison	Outcome
Khan AA, et.al (2025)	Saudi Arabia	Systematic review	Hajj pilgrims at high risk of infectious disease transmission	Comprehensive Hajj vaccination program + digital health passport	No/partial vaccination; non-digital systems	Lower disease rates, better protection, enhanced GHS, improved surveillance
Almalki MA, et.al (2024)	Saudi Arabia	Systematic review	Hajj pilgrims in Saudi Arabia, especially elderly and high-risk individuals	Health education interventions (e.g., hygiene promotion, vaccination awareness, cough etiquette, mask use)	Comparison of pre- and post-intervention outcomes, or between educated vs. non-educated groups	Improved knowledge, attitudes, and practices; reduced respiratory infection rates during Hajj
Mahdi HA, et.al (2023)	Australia	Systematic Review	Pilgrims attending Hajj from low- and middle-income countries (LMIC) and high-income countries (HIC)	Exposure to airborne infections during the Hajj pilgrimage	Differences in infection rates and patterns between LMIC and HIC pilgrims	Attack rates and burden of viral and bacterial airborne infections (e.g., influenza, rhinovirus, meningococcus, tuberculosis)
Yezli S, et.al (2019)	Saudi Arabia	Narrative Review	Adult Hajj and Umrah pilgrims (≥50 years or with comorbidities such as diabetes, heart disease, or chronic lung conditions)	Pneumococcal vaccination using PCV13 and PPV23 combination as per Saudi guidelines	Unvaccinated individuals or those receiving only one type of vaccine (PCV13 or PPV23)	Reduction in pneumonia and lower respiratory tract infections. Decreased nasopharyngeal colonization by <i>Streptococcus pneumoniae</i> . Lower hospitalization rates and antibiotic usage. Vaccine effectiveness in mass gathering settings
Benkouiten S, et.al (2019)	France	Systematic Review	Hajj pilgrims from various countries (1999–2015),	Influenza and pneumococcal vaccination; non-	Pilgrims with vs. without vaccination;	Prevalence of respiratory symptoms (cough, sore

Author (years)	Country	Study Design	Population	Intervention	Comparison	Outcome
Alqahtani AS, et.al (2018)	Australia	Systematic review	including elderly and those with chronic conditions Hajj pilgrims (all adults, especially elderly and comorbid)	pharmaceutical measures (e.g., masks, hygiene) Exposure to Hajj mass-gathering environment (high crowd density, intense contact)	cohort vs. hospital-based data Pre- vs post-Hajj, vaccinated vs unvaccinated, pilgrims vs non-pilgrims	throat, fever); pneumonia rates; vaccine coverage Pneumococcal infections (pneumonia, IPD), pneumococcal carriage, disease burden
Razavi SM, et.al (2016)	Iran	Systematic review	Pilgrims attending Hajj, a mass gathering with high infectious disease risk.	Recommended vaccinations for Hajj (meningococcal ACWY, pneumococcal influenza, pneumococcal, COVID-19, hepatitis A/B, varicella, others).	No vaccination or incomplete vaccination (implicitly discussed).	Prevention of infectious diseases, reduction in morbidity/mortality and outbreak risk, and improvement of global health security.
Edouard S, et.al (2018)	France	Systematic Review	Hajj pilgrims (pre- and post-Hajj) from various countries	Participation in the Hajj; vaccination (PCV10/PCV13/PV23)	Pre- vs post-Hajj nasopharyngeal carriage; vaccinated vs unvaccinated pilgrims	Changes in <i>Streptococcus pneumoniae</i> carriage prevalence, serotype distribution, and antibiotic resistance
Zafer N, et.al (2018)	Canada	RCT	Hajj pilgrims from the UK, Australia, Saudi Arabia, and Qatar (2005–2015), including elderly and high-risk individuals	Dual vaccination: seasonal influenza + 23-valent pneumococcal polysaccharide vaccine (PPSV23)	Vaccinated vs. unvaccinated pilgrims; trend of ARTI symptoms over time	Prevalence of acute respiratory tract infection symptoms (cough + fever); relative risk (RR) of ARTI
Tashani M, et.al (2018)	Australia	RCT	Adult Hajj pilgrims receiving the	Administration of Tdap vaccine at	Comparison among the three	Immunogenicity against meningococcal serogroup

Author (years)	Country	Study Design	Population	Intervention	Comparison	Outcome
			quadrivalent meningococcal ACWY CRM197-conjugate vaccine	different timings relative to ACWY vaccination: ☐ Before ACWY ☐ Concurrent with ACWY ☐ After ACWY	timing groups to evaluate whether the timing of Tdap affects the immune response to serogroup W of ACWY	W, typically measured by geometric mean titers (GMT) and proportion achieving protective antibody levels.

Result and Discussion

The literature search identified 10 studies that met the eligibility criteria and were included for critical appraisal to answer the clinical question, comprising seven systematic reviews, two randomized controlled trials, and one narrative review. The studies included Hajj and Umrah pilgrims, older adults, and individuals with comorbidities from various countries, with a particular focus on populations participating in mass gatherings in Saudi Arabia. Overall, the evidence demonstrated a favorable effect of pneumococcal vaccination in reducing pneumonia-related outcomes, respiratory infections, and hospitalization among high-risk populations. The validity, importance, and applicability of the included studies were subsequently assessed using the *Oxford Centre for Evidence-Based Medicine* (OCEBM) critical appraisal tools, as summarized in the following tables.

Table 4A. Critical Review Result: Validity, Importance and Applicability

Author	Appraisal Item						
	1. Did the review address a clearly focused question?	2. Did the authors look for the appropriate type of papers?	3. Were the inclusion criteria appropriate and clearly reported?	4. Was the search strategy comprehensive?	5. Did the authors assess the quality of included studies?	6. Were the methods used to combine studies appropriate?	7. Are the results of the review clear and reliable?
Khan AA, et.al (2025)	Yes The review clearly aimed to explore the role of vaccinations in Hajj and their contribution to global health security.	Partially The authors used policy documents, epidemiological studies, and previous Hajj-related research; however, inclusion was selective and not systematically searched.	Unclear The review is narrative and does not report any search strategy, inclusion criteria, or databases, which risks omission of important studies.	No No formal search method, keywords, or timeframe were reported. This limits reproducibility and introduces selection bias.	No There is no methodological appraisal or assessment of bias for the included references.	Not applicable As a narrative review, it synthesizes themes rather than comparing homogeneous outcomes across studies.	Yes Key themes (mandatory vaccines, influenza, pneumococcal disease, digital health passports, GHS) are clearly described.
Almalki MA, et.al . (2024)	Yes Population, intervention, comparison, and outcome are clearly defined.	Yes A systematic review is suitable to summarize evidence across multiple intervention studies.	Yes Criteria are generally stated; details may vary depending on article quality.	Moderate Databases used (e.g., PubMed, Scopus); however, unclear if grey literature or full PRISMA protocol was applied.	Limited to moderate No standardized tools (JBI, CASP, CEBM) were used, the risk of bias remains uncertain.	Yes High heterogeneity prevents meta-analysis; narrative synthesis is appropriate.	No (Heterogeneous) Interventions, outcomes, measurement tools, and populations varied widely.
Mahdi HA, et.al . (2023)	Yes. The review clearly aimed to	Partially. The authors looked for	Partially. General criteria were provided,	Moderately comprehensive. Major databases	Partially. Risk of bias was mentioned but	Yes, for the chosen approach.	Moderately reliable. Findings are plausible, but

Author	Appraisal Item						
	1. Did the review address a clearly focused question?	2. Did the authors look for the appropriate type of papers?	3. Were the inclusion criteria appropriate and clearly reported?	4. Was the search strategy comprehensive?	5. Did the authors assess the quality of included studies?	6. Were the methods used to combine studies appropriate?	7. Are the results of the review clear and reliable?
	compare epidemiological differences in Hajj-acquired airborne infections between pilgrims from LMIC vs HIC.	generally appropriate types of epidemiological studies, but the breadth of study types may not have been fully exhaustive, limiting the comprehensiveness of the review.	but details such as timeframe, types of infections included, and specific study designs were not fully elaborated.	(e.g., PubMed, Scopus, Web of Science) were searched. However, no grey literature search, limited details on keywords, and unclear language restrictions reduce comprehensiveness.	not assessed using standardized tools (e.g., JBI, NOS). Quality assessment lacked depth and structured reporting.	A narrative synthesis was used due to heterogeneity, which is appropriate. No meta-analysis performed.	variability in study quality and methods reduces certainty.
Yezli S, et.al (2019)	Yes. The review clearly focuses on pneumococcal disease risks during Hajj/Umrah and the need for an evidence-based vaccination policy.	Yes. They used epidemiological studies, pneumococcal carriage data, surveillance reports, and vaccine effectiveness studies. However, sources were not	No The inclusion criteria were not clearly reported, and therefore cannot be fully judged as appropriate.	No. The authors did not present a formal search strategy (databases, keywords, timeframe), limiting the assessment of completeness.	No. There was no systematic quality assessment (e.g., CEBM levels, GRADE).	Limited. As a narrative review, evidence was summarized descriptively without systematic synthesis or quantitative analysis.	Yes, but moderately reliable The burden of pneumococcal disease and the identified research gaps are clearly discussed. Conclusions are plausible, but the lack of systematic

Author	Appraisal Item						
	1. Did the review address a clearly focused question?	2. Did the authors look for the appropriate type of papers?	3. Were the inclusion criteria appropriate and clearly reported?	4. Was the search strategy comprehensive?	5. Did the authors assess the quality of included studies?	6. Were the methods used to combine studies appropriate?	7. Are the results of the review clear and reliable?
Benkouiten S, et.al. (2019)	Yes. The review clearly focuses on clinical respiratory infections and pneumonia during Hajj.	systematically selected. Yes. Observational epidemiological studies, surveillance data, and clinical studies relevant to respiratory infections among Hajj pilgrims were included.	Yes. Clear criteria for population, exposure (Hajj), outcomes.	Yes. Multiple databases were searched (PubMed, Scopus, Embase), No. language restriction.	Partially, Discussed limitations but no formal risk-of-bias table..	Moderately. Heterogeneity in pneumonia definitions, but direction of effect consistent.	methods reduces robustness. Yes. Reported odds ratios with 95% CI for pneumonia hospitalization.
Alqahtani AS, et.al (2018)	Yes The review clearly focuses on the burden of <i>S. pneumoniae</i> infections among Hajj pilgrims, including clinical infection and carriage. Population, exposure, and	Yes The review appropriately included observational studies (cohort, cross-sectional, surveillance) that measure pneumococcal infection or carriage during Hajj.	Yes Criteria for including studies (Hajj population, pneumococcal disease/carriage, observational designs) were clearly described. Exclusion criteria were also provided.	Yes, with limitations Multiple major databases were searched (e.g., PubMed, Embase, Scopus). However, search strategy details (Boolean strings, timeframe, grey literature) were	Partially The review discussed limitations of included studies but did not consistently use formal risk-of-bias tools (e.g., Newcastle-Ottawa, ROBINS-I). Quality	Yes A narrative synthesis was appropriate due to heterogeneity in study designs, methods, and outcomes. Meta-analysis was not feasible.	Clear, but their reliability is <i>moderate</i> . The reliability is moderate due to heterogeneity, variable quality of included studies, and limited risk-of-bias assessment. The conclusions can guide policy

Appraisal Item							
Author	1. Did the review address a clearly focused question?	2. Did the authors look for the appropriate type of papers?	3. Were the inclusion criteria appropriate and clearly reported?	4. Was the search strategy comprehensive?	5. Did the authors assess the quality of included studies?	6. Were the methods used to combine studies appropriate?	7. Are the results of the review clear and reliable?
	outcomes are well defined.			not fully reported.	assessment was narrative.		and clinical practice, but should be interpreted with caution.
Razavi SM, et.al. (2016)	Yes The article aimed to summarize recent findings regarding vaccinations recommended for Hajj pilgrims. The focus is clear and relevant to mass gathering health.	No As a narrative review, the article does not describe search databases, search terms, or time limits. No PRISMA flow or systematic method is reported.	No There are no explicit inclusion/exclusion criteria. Study selection appears subjective.	No No database was reported, no search terms provided, No inclusion/exclusion criteria, no search timeframe, possible reliance on convenience sampling, no multiple reviewer process.	No The article does not perform a risk-of-bias assessment, GRADE, or methodological appraisal.	No The methods used to combine studies were not appropriate for evidence synthesis, because the article is a <i>narrative review</i> without a systematic methodology.	Partially Results are organized by vaccine type and disease burden, but the structure is descriptive rather than systematic. Result: Vaccination is essential in reducing infectious disease burden among Hajj pilgrims; ACWY is mandatory; influenza and pneumococcal vaccines are

Author	Appraisal Item						
	1. Did the review address a clearly focused question?	2. Did the authors look for the appropriate type of papers?	3. Were the inclusion criteria appropriate and clearly reported?	4. Was the search strategy comprehensive?	5. Did the authors assess the quality of included studies?	6. Were the methods used to combine studies appropriate?	7. Are the results of the review clear and reliable?
Edouard S, et.al (2018)	Yes The study aims to determine the impact of Hajj on pneumococcal carriage and whether pneumococcal vaccines reduce carriage among pilgrims. → Clear PICO, clinically relevant	Yes The review included observational studies (cohort and cross-sectional), appropriate for assessing carriage rates → No RCTs exist in this field; the inclusion type is appropriate.	Unclear Abstract mentions methodological review but does not provide detailed inclusion/exclusion criteria. → Full-text likely contains details; abstract is insufficient.	Unclear Database sources and search terms are not stated in the abstract → Limits transparency; possible search bias.	Unclear The abstract does not mention bias assessment tools e.g., Newcastle-Ottawa → Weakens internal validity of the review.	Partially Synthesis of heterogeneous observational studies; narrative approach used. → Heterogeneity (methods, timing, lab techniques) limits comparability.	strongly recommended; COVID-19 vaccination remains important. Partially Clear trend: carriage increases post-Hajj; no vaccine effect on carriage reported. → Reliability limited by heterogeneous data and small sample sizes.
Zafer N, et.al . (2018)	Yes The study aims to investigate whether dual immunization with influenza	Yes Although it is not a literature review, the author used surveillance	Partially The authors used relevant data from the correct population (Hajj pilgrims), but the	No The authors relied on a large and relevant dataset, but their non-systematic	No The authors did not undertake a systematic appraisal of the	No. The study synthesis was conducted through pooling of individual-	Yes The findings are reasonably reliable; however, due to limitations in

Appraisal Item							
Author	1. Did the review address a clearly focused question?	2. Did the authors look for the appropriate type of papers?	3. Were the inclusion criteria appropriate and clearly reported?	4. Was the search strategy comprehensive?	5. Did the authors assess the quality of included studies?	6. Were the methods used to combine studies appropriate?	7. Are the results of the review clear and reliable?
	and pneumococcal vaccines has any impact on the rate of acute respiratory tract infection (ARTI) symptoms among Hajj pilgrims.	studies and clinical trials involving Hajj to measure the relative risk (RR) of giving a combination of influenza and pneumococcal therapy	inclusion criteria were too broad and not reported with sufficient clarity.	search approach introduces a high risk of selection bias. As a result, the findings reflect only the data they had access to, rather than the full scope of existing evidence on the topic.	methodological quality of each study included in the analysis.	level data from the dataset and calculating the risk ratio (RR). However, there was notable heterogeneity in study design and methodology, and no systematic search was performed.	data quality, consistency, and heterogeneity, as well as the use of a non-rigorous pooling method, the results cannot be considered sufficiently robust to inform recommendations. Nonetheless, they may serve as preliminary evidence for future research.
Tashani M, et.al. (2018)	Partially The study aims to examine the immune interaction of separate versus concomitant administration of Tdap with MCV4	Yes The authors searched for and utilized randomized controlled trial (RCT) articles and compared	Yes The inclusion criteria were clearly specified and transparently reported.	No Because this study is a randomized controlled trial (RCT), not a systematic review.	No This is an RCT study that reports and analyzes its findings and compares them with those of other studies.	Not applicable, as this article is an RCT report.	Yes, the results are reliable, well-structured, and robust.

Appraisal Item							
Author	1. Did the review address a clearly focused question?	2. Did the authors look for the appropriate type of papers?	3. Were the inclusion criteria appropriate and clearly reported?	4. Was the search strategy comprehensive?	5. Did the authors assess the quality of included studies?	6. Were the methods used to combine studies appropriate?	7. Are the results of the review clear and reliable?
	(co-administered with PCV13)	them with other relevant studies.					

Tabel 4B. Critical Review Result: Validity, Importance and Applicability

Appraisal Item						
Author	8. Are the results consistent across studies?	9. Are the results precise?	10. Any concerns about publication bias?	11. Are the conclusions supported by the data?	12. Can the results be applied to the local population?	13. Overall level of evidence (Oxford CEBM)
Khan AA, et.al (2025)	Yes The conclusions align with previous Hajj vaccination experiences and global health frameworks, though limited by a lack of systematic analysis.	Low Precision No effect size, confidence intervals, or statistical synthesis. Conclusions are qualitative and descriptive.	Yes Major limitations include a narrative approach, no search strategy, risk of bias, lack of quantitative synthesis, and variable evidence quality.	Yes, broadly The conclusions align with previous Hajj vaccination experiences and global health frameworks, though limited by a lack of systematic analysis.	Highly applicable The article directly informs vaccination policies, digital verification strategies, and pre-departure health management relevant to Indonesian Hajj operations.	Level 5
Almalki MA, et.al . (2024)	Yes Aligns with known literature on Hajj health education	Low Moderate precision No pooled effect size; precision	Yes Lack of grey literature search, absence of formal	Generally supported Health education interventions	Highly applicable Directly relevant to Hajj contexts and	Level 2a/2b

Author	Appraisal Item					
	8. Are the results consistent across studies?	9. Are the results precise?	10. Any concerns about publication bias?	11. Are the conclusions supported by the data?	12. Can the results be applied to the local population?	13. Overall level of evidence (Oxford CEBM)
	and respiratory infection prevention.	depends on individual study quality.	assessment, and the field's tendency to publish positive findings.	appear effective. However, the strength of support is limited by heterogeneity, variable study quality, and the absence of a quantitative synthesis	similar mass-gathering settings.	
Mahdi HA, et.al. (2023)	Mixed. The general trend (higher infection prevalence among LMIC pilgrims) was consistent, but large heterogeneity existed in sampling methods, diagnostic techniques, and clinical definitions.	No While the general trend (higher infection burden in LMIC pilgrims) is consistent, the lack of pooled estimates and methodological variability limits the precision of the findings.	Yes. Limited studies from LMIC, dominance of certain research groups (Saudi Arabia, France), and underreporting from low-resource settings suggest potential publication bias.	Moderate Conclusions: pilgrims from LMIC have a higher burden of Hajj-acquired airborne infections than those from HIC, but due to methodological variability and lack of precise measures, the conclusions should be interpreted with moderate confidence rather than definitive certainty.	Yes. Findings are highly relevant for Hajj health planning, especially for LMIC countries such as Indonesia.	Level 2

Author	Appraisal Item					
	8. Are the results consistent across studies?	9. Are the results precise?	10. Any concerns about publication bias?	11. Are the conclusions supported by the data?	12. Can the results be applied to the local population?	13. Overall level of evidence (Oxford CEBM)
Yezli S, et.al (2019)	Generally consistent, but consistency cannot be fully evaluated due to limited methodological reporting.	The results are informative but not precise, due to the narrative nature of the review and the absence of numerical effect estimates or formal uncertainty measures.	Yes. Without a systematic search process, publication bias is likely (e.g., overrepresentation of positive or published studies only).	Yes. Conclusions align with the presented evidence, but should be interpreted cautiously due to methodological limitations.	Partially generalizable to the local population of Hajj/Umrah pilgrims, but local epidemiology and healthcare context must be considered before applying policy recommendations.	Level 5
Benkouiten S, et.al . (2019)	Partially consistent, while the overall conclusion (high burden of respiratory infections) is consistent, the quantitative results (exact rates, pathogen distribution) show considerable variability.	Not very precise. Heterogeneity and lack of meta-analysis mean confidence intervals are often unavailable. Effect estimate: OR 0.54 (0.38-0.77), NNT 46	Yes. Selective publication is possible because many small observational studies from Hajj settings may be unpublished or missing negative results.	Yes, in terms of trends and clinical observations. Specific numerical claims should be interpreted cautiously due to variability across studies.	Yes. The findings are relevant to many Hajj pilgrim populations, including older adults and those with comorbidities.	Level 2A
Alqahtani AS, et.al (2018)	Generally yes. Most studies showed increased pneumococcal carriage and	No / limited. Many studies had small sample sizes, wide confidence intervals, or	Yes. It likely inflates the reported burden of pneumococcal infection during	Partially. The conclusions are generally supported, but with some limitations	Highly applicable to countries sending large numbers of Hajj pilgrims (e.g., Indonesia). The	Level 2A

Appraisal Item						
Author	8. Are the results consistent across studies?	9. Are the results precise?	10. Any concerns about publication bias?	11. Are the conclusions supported by the data?	12. Can the results be applied to the local population?	13. Overall level of evidence (Oxford CEBM)
	infection risk during Hajj. The direction of findings was similar, although the magnitude varied.	descriptive results only. Overall precision was limited.	Hajj because positive studies are preferentially published, grey literature is omitted, and no formal assessment was performed.	due to heterogeneity and study quality.	demographic risk profile is similar (older adults and comorbidities prevalent).	
Razavi SM, et.al. (2016)	Yes Findings align with WHO, the Saudi Ministry of Health guidelines, and known epidemiological patterns of Hajj-related infections.	Low Precision Findings are qualitative; no pooled estimates, effect sizes, or confidence intervals are provided.	High Concern Because the review is non-systematic and selectively cites literature, its conclusions may overestimate the benefits of certain vaccines (e.g., pneumococcal, influenza) while underreporting uncertainties, cost barriers, or conflicting findings.	Partially The conclusions are broadly supported by the cited studies, but the lack of systematic methods limits the strength of the support.	Yes Recommendations match the needs of countries sending pilgrims, including Indonesia. All vaccines discussed are available locally.	Level 5
Edouard S, et.al (2018)	Moderately Most studies showed increased post-Hajj carriage. → Some variation in exact carriage	No/Low Precision Includes a few studies, small sample sizes; no pooled effect size. →	Yes Small number of studies; regionally concentrated; unclear search strategy.	Yes with caution Increase in pneumococcal carriage is well supported; vaccine	Yes Findings apply to Hajj pilgrims globally, including Indonesian pilgrims.	Level 2

Author	Appraisal Item					
	8. Are the results consistent across studies?	9. Are the results precise?	10. Any concerns about publication bias?	11. Are the conclusions supported by the data?	12. Can the results be applied to the local population?	13. Overall level of evidence (Oxford CEBM)
Zafer N, et.al. (2018)	rates and serotypes.	Wide variations reduce precision.	→ Negative or small studies may have been missed.	effect is less conclusive.		
	No. This analysis demonstrates substantial year-to-year variation (inconsistency) in the effectiveness of double vaccination.	Yes, but with limitations. The results are consistent with the analyzed data, Relative risk 0.71 (95% CI 0.55–0.92); however, the quality of the dataset raises concerns about potential recall bias.	Yes This study has methodological limitations.	Partially. The overall conclusions are supported by the data; however, important considerations such as data quality and consistency present limitations, and therefore, the findings should be interpreted with caution.	Yes. These findings may apply to Hajj and Umrah pilgrims, particularly those belonging to high-risk groups	Level 4
Tashani M, et.al. (2018)	Yes. The findings are internally consistent within this study; however, they are not fully consistent with all external studies, partly due to serogroup W interference. This suggests emerging	Precisely. The findings of this study are supported by a robust methodological design, transparent data analysis, strong internal consistency, and a well-established understanding of	Yes. Although this study is valid, there are concerns regarding potential bias in several foundational aspects of its research design.	Yes. Each conclusion statement can be traced back to specific statistical results presented in the tables, which were analyzed using appropriate methods.	Yes. These findings may be applicable to the local population, but with important considerations such as immunization status, ethnicity, genetic factors, and vaccine brand.	Level 2B

Appraisal Item						
Author	8. Are the results consistent across studies?	9. Are the results precise?	10. Any concerns about publication bias?	11. Are the conclusions supported by the data?	12. Can the results be applied to the local population?	13. Overall level of evidence (Oxford CEBM)
	scientific complexity arising from vaccine interactions and their dependence on other specific factors.	the underlying biological mechanisms.				

Discussion

This evidence-based case report (EBCR) was conducted to determine whether pneumococcal vaccination could reduce the risk of pneumonia in an elderly Hajj pilgrim with diabetes mellitus and hypertension. A critical appraisal was performed on ten therapeutic studies identified through the literature search, consisting of seven systematic reviews, two randomized controlled trials (RCTs) and one narrative review. The quality and level of evidence were assessed using the Oxford Centre for Evidence-Based Medicine (OCEBM) Critical Appraisal Tools and Levels of Evidence framework.

The Hajj and Umrah pilgrimages in Saudi Arabia represent one of the world's largest annual mass gatherings, attracting millions of pilgrims from over 180 countries.² Such conditions facilitate a high risk of transmission of infectious diseases, including respiratory infections such as pneumonia and meningitis.³ Consequently, preventive strategies have become an integral component of the Global Health Security (GHS) framework, emphasizing vaccination as a key intervention to reduce morbidity, mortality and the potential international spread of communicable diseases.⁴ Vaccination policies play a central role in GHS strategies, particularly in Saudi Arabia. One of the key implementations has been the mandatory administration of meningococcal and poliomyelitis vaccines,⁵ with influenza vaccination recommended as an additional measure prior to pilgrimage.⁶ In 2018, the Kingdom of Saudi Arabia reported low vaccination uptake among Malaysian Hajj and Umrah pilgrims, with only 28.6% receiving influenza vaccination and 25.4% receiving pneumococcal vaccination. Among 527 high-risk pilgrims, only 31.9% received influenza vaccines and 34.9% received pneumococcal vaccines.⁷ Several studies have demonstrated that pneumococcal vaccination is effective in preventing and reducing morbidity and mortality associated with pneumonia among Hajj and Umrah pilgrims,⁸ particularly in individuals aged >65 years and those with underlying conditions.⁹ As highlighted by

² Mansour Tobaiqy et al., "Assessment of Preventative Measures Practice among Umrah Pilgrims in Saudi Arabia, 1440H-2019," *International Journal of Environmental Research and Public Health* 18, no. 1 (2020): 257, <https://doi.org/10.3390/ijerph18010257>.

³ Majid M Alshamrani et al., "Hajj Vaccination Strategies: Preparedness for Risk Mitigation," *Journal of Infection and Public Health* 17, no. 11 (2024): 102547, <https://doi.org/10.1016/j.jiph.2024.102547>.

⁴ Amani S Alqahtani et al., "Burden of Clinical Infections Due to *S. Pneumoniae* during Hajj: A Systematic Review," *Vaccine* 36, no. 30 (2018): 4440–46, <https://doi.org/10.1016/j.vaccine.2018.04.031>.

⁵ Jaffar A Al-Tawfiq, Philippe Gautret, dan Ziad A Memish, "Expected Immunizations and Health Protection for Hajj and Umrah 2018: An Overview," *Travel Medicine and Infectious Disease* 19 (2017): 2–7, <https://doi.org/10.1016/j.tmaid.2017.10.005>.

⁶ Alimuddin Zumla dan Esam I Azhar, "Optimizing the Benefits of Pneumococcal Vaccination in the Kingdom of Saudi Arabia," *Annals of Thoracic Medicine* 11, no. 2 (2016): 91, <https://doi.org/10.4103/18171737.180031>.

⁷ Mohammed Dauda Goni et al., "Uptake of Recommended Vaccines and Its Associated Factors among Malaysian Pilgrims during Hajj and Umrah 2018," *Frontiers in Public Health* 7 (2019): 268, <https://doi.org/10.3389/fpubh.2019.00268>.

⁸ Payman Salamati, SeyedMansour Razavi, dan Mina Saeednejad, "Vaccination in Hajj: An Overview of the Recent Findings," *International Journal of Preventive Medicine* 7, no. 1 (2016): 129, <https://doi.org/10.4103/2008-7802.195826>.

⁹ M A Almalki et al., "Effective Means of the Intervention Health Education for Prevention of Respiratory Infection Among Hajj Pilgrims: Systemic Review 2024," *Journal of International Crisis and Risk Communication Research* 7 (2024): 263–76.

Benkouiten et.al.,¹⁰ pneumococcal vaccine coverage remains low (1.2%–51.2%), while pneumonia prevalence among hospitalized and ICU-treated pilgrims remains high (0.2%–54.8%). Therefore, PPSV23 or PCV13 vaccination is recommended for elderly pilgrims and those with chronic illnesses.¹¹

Findings from one study indicate that pneumococcal vaccination plays a critical role in reducing the burden of pneumonia among Hajj and Umrah pilgrims. Available evidence suggests that the PPSV23 vaccine provides protection against approximately 84% of relevant pneumococcal serotypes in adults, making it one of the vaccines with the broadest serotype coverage. The study by Khan et al. (2025) further reinforces this evidence by demonstrating that PCV administration not only reduces the incidence of communicable diseases during the Hajj period but also contributes to preventing potential global outbreaks, supporting Global Health Security (GHS) initiatives and enhancing economic efficiency and health-system resilience.¹² Consistent findings were also observed in studies by Almalki et al. (2024)¹³ and Mahdi (2023),¹⁴ which reported that pneumococcal vaccination contributes to a reduction in respiratory tract infections and a decrease in antimicrobial resistance. These results indicate that the benefits of vaccination extend beyond individual protection to population-level advantages through reduced transmission and diminished selective pressure for antibiotic use. Zafer et al. (2018) further demonstrated that the combined administration of seasonal influenza vaccine and PPSV23 among Australian Hajj pilgrims significantly reduced the prevalence of pneumonia, underscoring the importance of a multipathogen vaccination approach in high-risk populations.¹⁵

Yezli (2019) provides a comparative perspective on PCV13 and PPSV23. PCV13 is considered to offer stronger immunological protection and more robust herd immunity, although its serotype coverage is more limited and its cost is higher. In contrast, PPSV23 covers a broader range of serotypes (23 serotypes) but confers lower immunological memory and weaker herd effects.¹⁶ These differing characteristics form the basis of Saudi Arabia's vaccination recommendations, which advise the administration of both PCV13 and

¹⁰ Samir Benkouiten et al., "Clinical Respiratory Infections and Pneumonia during the Hajj Pilgrimage: A Systematic Review," *Travel Medicine and Infectious Disease* 28 (2018): 15–26, <https://doi.org/10.1016/j.tmaid.2018.12.002>.

¹¹ Al-Mamoon Badahdah et al., "Meningococcal and Pneumococcal Carriage in Hajj Pilgrims: Findings of a Randomized Controlled Trial," *Journal of Travel Medicine* 27, no. 4 (2020), <https://doi.org/10.1093/jtm/taaa032>.

¹² Anas Khan et al., "Vaccinations for Hajj: Enhancing Health and Global Health Security," *Travel Medicine and Infectious Disease* 63 (2024): 102784, <https://doi.org/10.1016/j.tmaid.2024.102784>.

¹³ Almalki et al., "Effective Means of the Intervention Health Education for Prevention of Respiratory Infection Among Hajj Pilgrims: Systemic Review 2024."

¹⁴ Hashim A Mahdi et al., "Epidemiological Differences in Hajj-Acquired Airborne Infections in Pilgrims Arriving from Low and Middle-Income Versus High-Income Countries: A Systematic Review," *Tropical Medicine and Infectious Disease* 8, no. 8 (2023): 418, <https://doi.org/10.3390/tropicalmed8080418>.

¹⁵ Najim Zafer et al., "Acute Respiratory Tract Infection Symptoms and the Uptake of Dual Influenza and Pneumococcal Vaccines among Hajj Pilgrims," *International Maritime Health* 69, no. 4 (2018): 278–84, <https://doi.org/10.5603/IMH.2018.0044>.

¹⁶ Saber Yezli et al., "Pneumococcal Disease during Hajj and Umrah: Research Agenda for Evidence-Based Vaccination Policy for These Events," *Travel Medicine and Infectious Disease* 29 (2018): 8–15, <https://doi.org/10.1016/j.tmaid.2018.08.005>.

PPSV23 for pilgrims aged >50 years and PPSV23 for high-risk pilgrims aged <50 years.¹⁷ Furthermore, the study by Tashani (2018) demonstrated that the co-administration of Tdap with either MCV4 or PCV13 is safe and elicits an adequate immune response, while also offering operational advantages by allowing administration within a single visit. These findings are particularly relevant in the context of Hajj and Umrah, where health care service efficiency and pilgrim compliance remain significant challenges.¹⁸

Beyond individual protection, the reviewed evidence suggests that pneumococcal vaccination offers broader public health benefits by reducing disease transmission, preventing severe complications, decreasing healthcare utilization and potentially mitigating antimicrobial resistance. Therefore, routine pneumococcal vaccination should be considered as part of comprehensive pre-Hajj medical preparation, particularly for elderly pilgrims and those with chronic diseases such as diabetes mellitus, cardiovascular disease, chronic lung disease or immunocompromising conditions. However, none of the articles included in this systematic review have examined the optimal pneumococcal vaccine dosing regimen for preventing pneumonia among Hajj and Umrah pilgrims. The following dosing recommendations are derived from standard textbooks and CDC guidelines, not from the systematic search or PICO framework of review. They are provided here solely as supplementary clinical guidance to assist healthcare providers in implementing vaccination and should not be interpreted as outcomes of the present evidence synthesis. According to CDC guidelines, the recommended pneumococcal vaccination schedule is divided into two categories.

For the first category, all individuals aged >65 years may receive one of two options: Option 1: a single dose of PCV20; or Option 2: a single dose of PCV15 followed by one dose of PPSV23, with a minimum interval of one year. For the second category, adults aged 19–64 years with high-risk conditions (e.g., diabetes, cardiac or pulmonary disease, immunocompromised states) may also receive two options: Option 1: a single dose of PCV20; or Option 2: a single dose of PCV15 followed by one dose of PPSV23. The recommended interval is at least eight weeks for immunocompromised individuals or one year for other risk groups. Among adults aged >19 years who have initiated pneumococcal vaccination with PCV13 but have not completed the recommended series, PPSV23 may be substituted with PCV15, PCV20, or PCV21 to complete the schedule. Administration of PCV15 alone or in combination with PCV20 and PPSV23 is expected to provide broader protection against locally circulating serotypes in adults.¹⁹

Several strengths and limitations should be acknowledged. A major strength of this report is the use of a structured literature search and standardized critical appraisal

¹⁷ Sophie Edouard et al., “Impact of the Hajj on Pneumococcal Carriage and the Effect of Various Pneumococcal Vaccines,” *Vaccine* 36, no. 48 (2018): 7415–22, <https://doi.org/10.1016/j.vaccine.2018.09.017>.

¹⁸ Mohamed Tashani et al., “Effect of Tdap Upon Antibody Response to Meningococcal Polysaccharide When Administered Before, With or After the Quadrivalent Meningococcal TT-Conjugate Vaccine (Coadministered with the 13-Valent Pneumococcal CRM197-Conjugate Vaccine) in Adult Hajj Pilgrims: A Randomised Controlled Trial,” *Vaccine* 36, no. 29 (2018): 4375–82, <https://doi.org/10.1016/j.vaccine.2018.04.033>.

¹⁹ M Kobayashi et al., “Expanded Recommendations for Use of Pneumococcal Conjugate Vaccines Among Adults Aged ≥50 Years: Recommendations of the Advisory Committee on Immunization Practices—United States, 2024,” *Morbidity and Mortality Weekly Report*, 2024.

methodology based on evidence-based medicine principles. In addition, the evidence identified was directly applicable to the patient's clinical characteristics and the Hajj setting, allowing an individualized recommendation that also incorporated patient values and preferences.

However, important limitations remain. Evidence specifically evaluating pneumococcal vaccination during Hajj is relatively limited, and many systematic reviews combine Hajj-related data with studies from the general adult population or focus on bacterial carriage rather than clinically confirmed pneumonia. Considerable heterogeneity exists among the included studies with respect to study design, participant characteristics, comorbidities, and outcome measures, precluding quantitative synthesis and limiting the strength of overall conclusions. Furthermore, one of the principal studies included, conducted by Zafer et al.,²⁰ represented a post-hoc analysis of participants within a randomized trial rather than an RCT specifically designed to evaluate pneumococcal vaccine effectiveness, introducing potential residual confounding. Publication bias may also be present because most available studies originate from middle- and high-income countries, and negative findings may be underreported. Furthermore, none of the included articles addressed the optimal dosing regimen for pneumococcal vaccination. The vaccination schedules described in this report were therefore adapted from current CDC recommendations rather than from the reviewed evidence itself. This limitation highlights the need for further prospective studies to establish evidence-based dosing strategies for Hajj and Umrah pilgrims.

Finally, this EBCR did not directly compare PPSV23 and PCV13 because robust head-to-head studies evaluating these vaccines in the Hajj population are currently lacking. Future prospective multicenter studies and randomized controlled trials specifically involving Hajj and Umrah pilgrims are needed to establish the optimal vaccination strategy, including the most effective vaccine type and dosing schedule for preventing pneumonia in this unique high-risk population. Overall, the findings of this EBCR are consistent with current recommendations from the CDC and the Saudi Ministry of Health, supporting pneumococcal vaccination as an effective and safe preventive intervention for elderly and high-risk pilgrims before Hajj.

Conclusion

For this 60 year old Indonesian pilgrim with diabetes and hypertension, the best available evidence suggests that pneumococcal vaccination is an effective and safe preventive measure against respiratory infections associated with pilgrimage. Moderate-quality evidence from systematic reviews and randomized controlled trials indicates that pneumococcal vaccination, particularly PPSV23, reduces the risk of pneumonia-related hospitalization and acute respiratory symptoms among high-risk adults. Although evidence specifically conducted in Hajj pilgrims remains limited, the available studies consistently support the use of pneumococcal vaccination in older individuals and those with chronic medical conditions.

²⁰ Zafer et al., "Acute Respiratory Tract Infection Symptoms and the Uptake of Dual Influenza and Pneumococcal Vaccines among Hajj Pilgrims."

Considering the patient's age, comorbidities, and participation in a mass gathering with a high risk of respiratory disease transmission, pneumococcal vaccination should be recommended as part of pre-Hajj health preparation. This recommendation is consistent with current international and Saudi Arabian guidelines advocating pneumococcal vaccination for high-risk travellers and pilgrims. Further studies are needed to determine the optimal vaccination strategy and dosing regimen specifically for Hajj and Umrah populations.

Recommendation for clinicians

Offer pneumococcal vaccination (PPSV23 or PCV13) to pilgrims aged ≥ 50 years or with comorbidities before Hajj/Umrah, based on current evidence and guidelines.

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