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# Mass gathering medicine (Hajj Pilgrimage in Saudi Arabia): The clinical pattern of pneumonia among pilgrims during Hajj

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## KEYWORDS

Mass-gathering medicine;  
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Community-acquired pneumonia

**Abstract** The planned annual Hajj to the holy shrines in Makkah, Saudi Arabia, is recognized as one of the largest recurring religious mass gatherings globally, and the outbreak of infectious diseases is of major concern. We aim to study the incidence, etiology, risk factors, length of hospital stay, and mortality rate of pneumonia amongst pilgrims admitted to Al-Ansar general hospital, Madinah, Saudi Arabia during the Hajj period of December 2004–November 2013. A retrospective analysis of all patients diagnosed and admitted as pneumonia was done. Patients were assessed according to the CURB-65 scoring system and admitted to the ward or intensive care unit accordingly. Throat and nasopharyngeal swabs, sputum, and blood culture were collected prior to antibiotic treatment. 1059 patients were included in the study (23% of total hospital admissions and 20% of ICU admissions). The mean age of participants was 56.8 years, the Male:Female ratio was 3:1, and the lengths of stay in the ward and intensive care units were 5 and 14.5 days, respectively. The main organisms cultured from sputum were *Klebsiella Pneumoniae*, *Streptococcus Pneumoniae*, *Haemophilus Influenzae*, *Staphylococcus Aureus*, *Pseudomonas aeruginosa*, and community-acquired MRSA. The mortality rate in the ward was 2.4%, while the rate in the ICU was 21.45%. The organisms which caused pneumonia were found to be different during Hajj. The usual standard guideline for the treatment of pneumonia was ineffective for the causative organisms. Therefore, specific adjustments

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in the guidelines are needed. All efforts should be made to determine the infectious agent. Healthcare workers and pilgrims should adhere to preventive measures.

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## Introduction

Mass gathering is defined as a group of more than 1000 people present in one location. Most of the published literature mentions much larger numbers (>25,000 people) [1]. A more precise definition is a large number of people attending an event that is focused on specific sites for a finite time. As a consequence, Mass Gathering Medicine has emerged as a new field in the medical and health service specialty that focuses on the health risks due to mass gatherings [2–4]. The World Health Organization (WHO) defines it as “events attended by a sufficient number of people to strain the planning and response resources of a community, state or nation” [5].

Mass gatherings could be categorized into two types: spontaneous gatherings and planned gatherings. Planned gatherings are recurrent at different locations (e.g. Olympic Games and World Cup football tournament) or recurrent events at the same location (e.g. the Hajj pilgrimage in Saudi Arabia) [6].

One of the crucial concerns regarding mass gatherings is the dissemination of infectious diseases that may result in outbreaks, especially at large events attended by visitors from different regions, nations, and cultures [7]. Infectious diseases associated with mass gatherings may vary according to the type and location of the mass gathering [8]. For example, religious gatherings are commonly associated with respiratory and gastrointestinal diseases.

The planned annual Hajj to the Islamic holy shrines at Makkah in Saudi Arabia is recognized as one of the largest annually recurring mass religious gatherings worldwide. The officially recorded number of pilgrims attending the annual Hajj each year is approximately 3 million, and these pilgrims originate from approximately 184 countries representing all continents of the world [9]. Recently, the number of pilgrims increased substantially from 58,584 pilgrims in 1920 to 3,161,573 in 2012 [10].

Each year between the 8th and 13th day of the 12th month of the Islamic lunar calendar (Dhul-Hijjah), approximately 3 million pilgrims gather from across the world for Hajj in Saudi Arabia. Considered to be one of the largest mass gatherings of its kind, the Hajj pilgrimage faces health challenges. Pilgrims (Hajjis) come from different parts of the world and present diverse socio-demographic characteristics and health backgrounds. These factors result in the manifestation of many health risks to pilgrims and subject them to communicable diseases, injuries, and loss of thousands of lives while attending these large events [9]. During Hajj, most of the pilgrims are over 50 years of age and have concomitant co-morbid illnesses.

Those health risks, particularly infectious diseases, may predispose individuals to infectious diseases such as meningococcal meningitis, respiratory tract infections, and blood-borne diseases [11]. Moreover, outbreaks of infectious diseases, particularly acute respiratory tract infections, diarrheal diseases, and meningococcal meningitis, have frequently been reported among Hajjis [12]. Given that the average Hajj journey ranges between 30 to 45 days, the majority of pilgrims will most likely be at risk for contracting an illness. This pilgrimage consists of a stay of approximately 6 days in Jeddah city, which is the entry point to Saudi Arabia in preparation for the arranged events. Followed by approximately 10 days of special prayers in the city of Madinah. After that, approximately 8 days are spent in Makkah performing important tasks, and, finally, the remainder of the period is spent preparing to return to the starting location [13].

It was well-known that mass gatherings in a confined location, increases the risk of acquiring and spreading infectious diseases, specifically respiratory infections. As a result, respiratory illnesses are the leading cause of visits to primary health centers in Mina, Makkah, and Madinah (the holy shrines locations), and pneumonia is a leading cause of admissions to the hospital [14,15].

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