

# Causes of hospitalization of pilgrims during the Hajj period of the Islamic year 1423 (2003)

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**BACKGROUND:** Approximately 2 to 3 million pilgrims perform Hajj every year. Planning for health care requires knowledge of the pattern of diseases, complications, and outcome of pilgrims who require hospitalization during the Hajj period.

**METHODS:** In a cross-sectional study we compiled data on all patients admitted to 1487 beds in four hospitals in Mena (793 beds) and three hospitals in Arafat (694 beds) from the seventh to the thirteenth day of the Hajj season of the Islamic year 1423, corresponding to 8 to 14 February 2003.

**RESULTS:** Of 808 patients hospitalized, most (79%) were older than 40 years. There was no sex preponderance. A total of 575 (71.2%) patients were admitted to medical wards, 105 (13.0%) to surgical wards, and 76 (9.4%) to intensive care units. Most patients (84.8%) had one acute medical problem. Pneumonia (19.7%), ischemic heart disease (12.3%), and trauma (9.4%) were the most common admitting diagnoses. More than one third (39%) had co-morbid conditions. A total of 644 (79.7%) patients were discharged from the hospital in stable condition to continue therapy in their residential camps, 140 (17.3%) were transferred to other hospitals in Makkah for specialized services or further care, 19 (2.3%) were discharged against medical advice, and 5 (0.7%) patients died.

**CONCLUSION:** This study provided information on the most common causes of hospitalization, pattern of diseases, and required medical services for pilgrims in Hajj. It is hoped that this data will be of help to health sector planners and officials to provide optimal and cost-effective health care services to pilgrims in Hajj.

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Accepted for publication  
June 2006

Ann Saudi Med 2006;26(5):346-351

Hajj is the fifth of the five pillars of Islam. Any healthy Muslim adult is obliged to perform Hajj once in his/her life if he/she is financially and physically capable. The Hajj begins on the eighth day of Dhul-Hijjah, the twelfth month of the lunar Islamic year, and ends on the thirteenth day of the same month. Hajj has to be performed in three main locations in Makkah: the sacred Kaaba (in the holy city of Makkah), and Mena and Arafat, which are approximately 5 and 18 kilometers from Makkah, respectively. Approximately 2 to 3 million pilgrims perform Hajj every year; one third come from within Saudi Arabia and two thirds come from other countries. Most pilgrims stay in fire-resistant air-conditioned camping tents in Mena during the entire Hajj period. Financially deprived pilgrims who cannot afford to pay for the cost of staying in camps usually stay outdoors. Free medical care is provided to pilgrims by the Saudi Ministry of Health.

The time of Hajj has coincided with the winter season since the

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Islamic year 1420 (2000) and will continue to do so until year 1428 (2008). The climate in this season in Makkah is usually temperate with an average high temperature of 26–32°C and a low temperature of 18–24°C. In this study we describe the pattern of diseases, complications, and outcome of pilgrims who required hospitalization during the Hajj period of the Islamic year 1423.

## Methods

This was a cross-sectional study of all patients admitted to hospitals in Mena and Arafat from the seventh to the thirteenth day of the Hajj month of the Islamic year 1423, corresponding to the eighth to the fourteenth day of February 2003.

There are four hospitals in Mena-Mena General hospital (350 beds), Mena Aljisr (207 beds), Mena Alwadi (145 beds), and Mena Almahbat (91 beds), and three hospitals in Arafat-Arafat General hospital (424 beds), Jabal Alrahma hospital (150 beds), and Namera Hospital (120 beds). The hospitals in Mena and Arafat are temporary health care facilities that provide essential medical services to pilgrims during the Hajj season only. The hospitals in Mena begin operation on the seventh of Dhul-Hijjah month and close on the evening of the thirteenth, whereas Arafat hospitals operate for one day only, the ninth day of Dhul-Hijjah, as pilgrims stay in Arafat only from sunrise to sunset of that day. Upon closure of these hospitals, patients who cannot be discharged are transferred to permanent tertiary health care facilities in Makkah for further management.

Patients were reviewed at hospital admission, and data were recorded on a standard case report form by the admitting physician. Information collected included patient demographic characteristics, clinical manifestations, co-morbidities, and laboratory and radiological results. Patients were followed until the end of the hospital stay to record medical complications and outcome.

The Statistical Package for Social Science (SPSS) program (Release 10.0.1, 1999) was used for data entry and analysis. Descriptive statistics were calculated as appropriate including frequencies, means±standard deviations, and cross tabulations.

## Results

A total of 808 patients were admitted to the study hospitals. The demographic characteristics of patients are shown in Table 1. Four hundred and twenty-two (52.2%) patients were from Arabic countries, 206 (25.5%) patients were from the Indian

subcontinent, 68 (8.4%) patients were from Africa, 55 (6.8%) patients were from east Asia, 30 (3.7%) patients were from north Asia, 23 (2.8%) patients were from Europe, and 4 (0.5%) patients were from North America and Australia.

A total of 661 (81.8%) patients were admitted to Mena hospitals, and the remaining 147 (18.2%) patients were admitted to Arafat hospitals (Table

**Table 1.** Demographic characteristics of 808 patients hospitalized in Mena and Arafat hospitals in the Hajj season of the Islamic year 1423 (2003).

Demographic data	n (%)
Sex	
Male	466 (57.7)
Female	342 (42.3)
Age Group	
≤10	12 (1.5)
11–20	14 (1.7)
21–30	64 (7.9)
31–40	80 (9.9)
41–50	133 (16.5)
51–60	196 (24.3)
61–70	205 (25.3)
71–80	80 (9.9)
>80	24 (3.0)
Hajj (Pilgrimage) Status	
Pilgrim	787 (97.4)
Non-pilgrim	21 (2.6)
Nationality	
Egypt	133 (16.5)
Pakistan	95 (11.8)
India	75 (9.3)
Saudi Arabia	52 (6.4)
Indonesia	47 (5.8)
Morocco	45 (5.6)
Sudan	39 (4.8)
Syria	29 (3.6)
Nigeria	24 (3.0)
Bangladesh	23 (2.8)
Other*	246 (30.4)

\* Includes 47 nationalities

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**Table 2.** Distribution of 808 patients by hospitals in the Hajj season of the Islamic year 1423 (2003).

Hospital	n (%)
Mena General hospital	195 (24.1)
Mena Alwadi hospital	176 (21.8)
Mena Almahbat hospital	169 (20.9)
Mena Aljesr hospital	121 (15.0)
Arafat General hospital	94 (11.6)
Arafat Namera hospital	28 (3.5)
Arafat Jabal Al-Rahma hospital	25 (3.1)
Total	808 (100)

**Table 3.** The number of admissions by the day of Hajj of the Islamic year 1423 (2003).

Date of Admission (day / month / year)	n (%)
07/12/1423 (08/02/2003)	8 (1.0)
08/12/1423 (09/02/2003)	157 (19.4)
09/12/1423 (10/02/2003)	164 (20.3)
10/12/1423 (11/02/2003)	169 (20.9)
11/12/1423 (12/02/2003)	158 (19.6)
12/12/1423 (13/02/2003)	145 (17.9)
13/12/1423 (14/02/2003)	7 (0.9)
Total	808 (100)

2). A total of 575 (71.2%) patients were admitted to medical wards, 105 (13.0%) patients to surgical wards, and 76 (9.4%) patients to intensive care units. Table 3 shows the number of admissions by the day of Hajj. On admission, 685 (84.8%) patients had one acute medical problem, 111 (13.7%) patients had 2 acute medical problems, and 12 (1.5%) patients had 3 acute medical problems.

Table 4 shows the admitting diagnoses of hospitalized patients. Infections accounted for 36.4% (294 patients) of all admitting diagnoses and included non-tuberculous pneumonia (159 patients, 19.7%), gastroenteritis (27 patients, 3.3%), upper respiratory tract infection (27 patients, 3.3%), cellulitis (13 patients, 1.6%), sepsis (11 patients, 1.4%), acute bronchitis (10 patients, 1.2%), pulmonary tuberculosis (10 patients, 1.2%), meningitis (9 patients, 1.1%), urinary tract infection (7 patients, 0.9%), diabetic foot infection (6 patients, 0.7%), tonsillitis (3 patients, 0.4%), septic shock (3 patients, 0.4%), skin abscess (2 patients, 0.2%), encephalitis (2 patients, 0.2%), stridor (1 patient, 0.1%), septic arthritis (1 patient, 0.1%), acute viral hepatitis (1 patient, 0.1%), gangrene (1 patient, 0.1%), and infected bed sore (1 patient, 0.1%). Of the 9 cases of meningitis diagnosed, 6 cases were caused by *Streptococcus pneumoniae*, one case by *Neisseria meningitidis*, and in the remaining two cases, the cerebrospinal fluid alterations were consistent with partially treated bacterial meningitis with no definable etiologic agents.

Cardiovascular diseases accounted for 24.9% (201 patients) of admissions and included ischemic heart disease (99 patients, 12.3%), hypertension (68 patients, 8.4%), congestive heart failure (25 patients, 3.1%), atrial fibrillation (6 patients, 0.7%), and su-

**Table 4.** Admitting diagnoses in 808 patients hospitalized during Hajj of the Islamic year 1423 (2003).\*

Admitting diagnosis	n	%
Infections	294	36.4
Cardiovascular diseases	201	24.9
Pulmonary diseases	109	13.5
Surgical diseases	98	12.1
Endocrine diseases	75	9.3
Neurological diseases	36	4.5
Gastrointestinal diseases	34	4.2
Obstetrics and gynecological diseases	33	4.1
Heat-related diseases	32	4.0
Renal diseases	19	2.4
Psychiatric diseases	6	0.7
Other	6	0.7

\*Some patients had more than one admitting diagnosis, hence, the total number of admitting diagnoses adds up to more than 808 (see text under Results for details).

praventricular tachycardia (3 patients, 0.4%). Of the 99 patients who were admitted with ischemic heart disease, 49 (6.1%) patients had angina, 27 (3.3%) patients had acute myocardial infarction, and 23 (2.8%) patients had unstable angina. Pulmonary diseases accounted for 13.5% (109 patients) of admissions and included bronchial asthma (74 patients, 9.2%) and chronic obstructive pulmonary disease (35 patients, 4.3%).

Surgical diseases accounted for 12.1% (98 patients) of admissions and included trauma (76 patients, 9.4%), acute abdomen (7 patients, 0.9%), her-

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**Table 5.** Co-morbid conditions in 808 patients hospitalized during Hajj of the Islamic year 1423 (2003). \*

Co-morbidity	n (%)
Diabetes mellitus	157 (19.4)
Hypertension	113 (14.0)
Chronic obstructive pulmonary disease (COPD)	58 (7.2)
Ischemic heart disease	33 (4.1)
Congestive heart failure	25 (3.1)
Immunosuppression	11 (1.4)
Chronic liver disease	10 (1.2)
Valvular heart disease	5 (0.6)
End stage renal disease	3 (0.4)
Old cerebrovascular accidents	3 (0.4)
Other**	6 (0.7)

\*A total of 317 (39.2%) patients had co-morbid conditions. Some patients had more than one co-morbidity, hence the total number of co-morbidities adds up to more than 317 patients.

\*\*Other co-morbidities include peptic ulcer disease (2 cases), paraplegia (1 case), pancytopenia (1 case), anemia (1 case), and systemic lupus erythematosus (1 case).

nia (5 patients, 0.6%), acute appendicitis (4 patients, 0.5%), acute cholecystitis (3 patients, 0.4%), and bleeding hemorrhoids (3 patients, 0.4%). Trauma, the commonest surgical diagnosis (76/98 or 77.6%), included stampede accidents, road traffic accidents, falls, and motor vehicle-run over accidents. Of the 76 trauma cases, 52 (68.4%) cases were men and the remaining 24 (31.6%) cases were women.

Endocrine disorders accounted for 9.3% (75 patients) of admissions and included uncontrolled diabetes mellitus (53 patients, 6.6%), diabetic ketoacidosis (21 patients, 2.6%), and hypocalcemia (1 patient, 0.1%). Neurological disorders accounted for 4.5% (36 patients) of admissions and included cerebrovascular accidents (23 patients, 2.8%), seizure disorder (11 patients, 1.4%), febrile convolution (1 patient, 0.1%), and acute paraplegia (1 patient, 0.1%). Gastrointestinal diseases accounted for 4.2% (34 patients) of admissions and included gastritis (13 patients, 1.6%), upper gastrointestinal bleeding (10 patients, 1.2%), cirrhosis/hepatic encephalopathy (7 patients, 0.9%), peptic ulcer disease (3 patients, 0.4%), and acute pancreatitis (1 patient, 0.1%). Obstetrics and gynecological diseases accounted for 4.1% (33 patients) of admissions and included abortion (11 patients, 1.4%), delivery (10 women, 1.2%), vaginal bleeding (6 patients, 0.7%), ovarian cyst (3 patients, 0.4%), and pregnancy with nonspecific ab-

dominal pain (3 patients, 0.4%). Heat-related diseases accounted for 4.0% (32 patients) of admissions and included heat exhaustion (22 patients, 2.7%), general weakness (5 patients, 0.6%), and dehydration (5 patients, 0.6%). Renal diseases accounted for 2.4% of admissions and included renal colic (9 patients, 1.1%), renal failure (9 patients, 1.1%), and hematuria (1 patient, 0.1%). Psychiatric diseases accounted for 0.7% (6 patients) of admissions and included acute psychosis and conversion reactions. Other diseases accounted for 0.7% (6 patients) of admissions and included deep venous thrombosis (3 patients, 0.4%), anemia (2 patients, 0.2%), and angioedema (1 patient, 0.1%).

A total of 317 (39.2%) patients had at least one of the co-morbid conditions listed on table 5. Four hundred and twenty two (52.2%) patients had chest radiographs upon admission. A total of 358 (46.1%) patients received antibiotics, of whom 52.5% received one antibiotic, 44.1% received two antibiotics, and 3.4% received 3 antibiotics. Ten (1.2%) patients required blood transfusion and 15 (1.9%) patients underwent surgical interventions under general anesthesia.

A total of 94 (11.6%) patients developed one or more of the complications shown in Table 6. Sixty-seven (8.3%) patients required admission to intensive care units and 27 (3.3%) patients required mechanical ventilation. Table 7 shows the distribution of patients who had any complication by age group. A total of 644 (79.7%) patients were discharged from the hospital in stable condition to continue therapy, when indicated, in their residential camps, 140 (17.3%) patients were transferred to other permanent hospitals in Makkah, for special services or further care, 19 (2.3%) patients were discharged against medical advice, and 5 (0.7%) patients died. The causes of death were myocardial infarction (3 patients), pneumonia (1 patient), and septic shock (1 patient). Three of the five patients who died were in the age group 41-60, and the other two patients were between 61-80 years old. Of the 803 hospitalized patients who survived, 61.4% were discharged or transferred to tertiary care facilities on the same day of admission, 27.5% after one day of admission, 9.1% after 2 days of admission, 1.8% after 3 days of admission, and 0.2% after 4 days of admission.

## Discussion

In this study, the majority (79%) of hospitalized patients were older than 40 years and more than one third (38.3%) of patients were older than 60 years.

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**Table 6.** Complications and mortality in 808 patients hospitalized during Hajj of the Islamic year 1423 (2003).

Complications	n (%)
Severe illness requiring admission to intensive care units	67 (8.3)
Severe illness requiring mechanical ventilation	27 (3.3)
Respiratory failure	13 (1.6)
Severe anemia requiring blood transfusion	10 (1.3)
Septic shock	9 (1.1)
Cardiogenic shock	8 (1.0)
Acute renal failure not requiring dialysis	4 (0.5)
Hypovolemic shock	4 (0.5)
Acute confusional state	4 (0.5)
Cardiac arrest successfully resuscitated	2 (0.2)
Arrhythmias	2 (0.2)
Acute respiratory distress syndrome (ARDS)	2 (0.2)
Convulsions	2 (0.2)
Diabetic ketoacidosis	2 (0.2)
Acute renal failure requiring dialysis	1 (0.1)
Coma	1 (0.1)
Mortality*	5 (0.6)

\*The mortality among 140 (17.3%) patients transferred to other permanent hospitals in Makkah and 19 (2.3%) patients discharged against medical advice was not studied.

**Table 7.** Distribution of patients who had any complication by age group in 808 cases hospitalized during Hajj of the Islamic year 1423 (2003).

Age group	Total number of patients	Number of patients who had any complication (%)
≤ 20	26	0
21-40	144	8 (5.6)
41-60	329	44 (13.4)
61-80	285	38 (13.3)
> 80	24	4 (16.7)
Total	808	94 (11.6)

The risk of complications and death increased with age with the highest risk noticed among pilgrims older than 80 years. Many pilgrims become financially capable to perform Hajj only at an older age after decades of saving money for that purpose. The likelihood of falling ill, developing more serious medical complications and death is understandably high in such elderly pilgrims. There was no sex preponderance. More than half of patients were from Arabic countries and one quarter were from the Indian subcontinent. Most of the patients (88.9%) were discharged from the hospital within a maximum of 24 hours of admission. This short hospitalization was mainly undertaken to stabilize patients who were then discharged from the hospital as soon as possible so that they would be able to complete the Hajj rituals and to free hospital beds to accommodate the big influx of patients requiring hospitalization in the Hajj period.

Infections (36.4%) and cardiovascular diseases (24.9%) were the most common admitting diagnoses. More specifically, pneumonia (19.7%) was the most common admitting diagnosis followed by the various clinical presentations of ischemic heart disease (12.3%). A previous report on 64 patients with pneumonia admitted to two hospitals during the Hajj season of 1994 showed that tuberculosis accounted for 20% of cases.<sup>1</sup> In our study, open pulmonary tuberculosis accounted for only 5.9% (10 patients) of 169 cases of pneumonia and 1.2% of all admissions.

Ischemic heart disease (12.3%) and hypertension (8.4%) were the most common cardiovascular diseases causing hospitalization. Despite the enormous overcrowding in Hajj, trauma accounted for less than one tenth of admissions. More than one third (39%) of pilgrims had co-morbid conditions requiring medical attention with more than one fifth (22.2%) having cardiovascular diseases (hypertension, ischemic heart disease, congestive heart failure, valvular heart disease, old cerebrovascular accidents) and one fifth (19.4%) having diabetes mellitus as a co-morbid condition.

The vast majority (79.9%) of patients were managed entirely in Mena and Arafat hospitals and discharged in stable condition. Less than one fifth (17.3%) of patients had to be transferred to other permanent hospitals in Makkah, for specialized services or further care. The outcome of these patients and of those discharged against medical advice was not studied.

Of note was the limited number of pilgrims with heat exhaustion (22 cases or 2.7%) with no single

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case of heat stroke diagnosed. This was most likely due to the fact that the Hajj season was in the wintertime. Similar results were described in the preceding Hajj season (1422).<sup>2</sup> Heat-related diseases were major Hajj-related health problems when Hajj coincided with the hot climate seasons.<sup>3-6</sup>

Meningococcal disease is a major concern in Hajj, with epidemics occurring periodically. The last meningococcal meningitis outbreak occurred in 2000-2001 with serogroup W135 emerging as a dominant etiologic pathogen.<sup>7</sup> Meningococcal meningitis was notably rare in this Hajj season likely because of better pilgrims' coverage with the quadri-

valent (ACYW135) meningococcal vaccination that was made an obligatory pre-requisite by the Saudi Ministry of Health for both external pilgrims to be allowed to come to Saudi Arabia, as well as for internal pilgrims to be issued permissions to perform Hajj.

In conclusion, this study provided information on the most common causes of hospitalization, pattern of diseases, and required medical services for pilgrims in Hajj. It is hoped that this data will be of help to health care planners, administrators, and officials to provide optimal and cost effective health care services to pilgrims in Hajj.

## References

1. Alzeer A, Mashlah A, Fakim N, Al-Sugair N, Al-Hedaihy M, Al-Majed S, Jamjoom G. Tuberculosis is the commonest cause of pneumonia requiring hospitalization during Hajj (pilgrimage to Makkah). *J Infect* 1998; 36: 303-6.
2. Al-Ghamdi SM, Akbar HO, Qari YA, Fathaldin OA, Al-Rashed RS. Pattern of admission to hospitals during muslim pilgrimage (Hajj). *Saudi Med J* 2003; 24: 1073-6.
3. Elhalawani AW. Heat illness. I. Heat illness during the Mecca pilgrimage. *WHO Chron* 1984; 18: 283-8.
4. Khogali M. Epidemiology of heat illnesses during the Makkah Pilgrimages in Saudi Arabia. *Int J Epidemiol* 1983; 12: 267-73.
5. Ghaznavi HI, Ibrahim MA. Heat stroke and heat exhaustion in pilgrims performing the Haj (annual pilgrimage) in Saudi Arabia. *Ann Saudi Med* 1987; 7: 323-6.
6. Seraj ME. Heat stroke during Hajj (Pilgrimage)-an update. *Middle East J Anesthesiol* 1992; 11: 407-41.
7. Al-Mazrou YY, Al-Jeffri MH, Abdalla MN, El-gizouli SA, Mishkas AA. Changes in epidemiological pattern of Meningococcal disease in Saudi Arabia. Does it constitute a new challenge for prevention and control?. *Saudi Med J* 2004; 25: 1410-13.