

Causes of admission to intensive care units in the Hajj period of the Islamic year 1424 (2004)

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BACKGROUND: Approximately 2 to 3 million pilgrims perform Hajj every year. We describe the pattern of diseases, complications, and outcome of pilgrims who required admission to intensive care units (ICUs) during the Hajj period of the Islamic year 1424 (2004).

METHODS: This was a cross-sectional study of all patients admitted to 104 ICU beds in four hospitals in Mena and three hospitals in Arafat during the Hajj.

RESULTS: Of 140 patients admitted to ICUs, 75 (54%) patients were older than 60 years. The risk of complications and death increased with age, with the highest risk noticed among pilgrims older than 80 years. Ninety-four (67.6%) patients were men. Eighty-nine (63.6%) patients were admitted with cardiovascular diseases and 37 (26.4%) patients with infections. Myocardial infarction (25%) and pneumonia (22%) were the most common admitting diagnoses. Trauma accounted for only 6.4% (9 patients) of admissions. Sixty-three (45.0%) patients recovered and were discharged or transferred to hospital wards in stable condition, 40 (28.6%) were transferred to tertiary care centers for specialized services, 21 (15.0%) were transferred to tertiary care centers after closure of the temporary hospitals in Mena and Arafat, 15 (10.7%) patients died, and one (0.7%) patient was discharged against medical advice.

CONCLUSION: This study revealed information on the pattern of diseases and the most common causes of admission of pilgrims to ICUs and the required medical services during Hajj. It is hoped that this information will be of help to health care planners and officials to provide optimal and cost effective health care services to pilgrims in Hajj.

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, namely, 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 of them 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 af-

ford to pay for the cost of staying in camps usually stay outdoors. Free medical care services are provided to pilgrims by the Saudi Ministry of Health.

We recently published data on the pattern of diseases, complications, and outcome of pilgrims who required hospitalization during the Hajj period of the Islamic year 1423 (2003).¹ In this study, we describe the pattern of diseases, complications, and outcome of pilgrims who required admission to intensive care units (ICUs) during the Hajj period of the Islamic year 1424 (2004).

METHODS

This was a cross-sectional study of all patients admitted to ICUs in Mena and Arafat hospitals from the seventh to the thirteenth day of the Hajj month of the Islamic

1 year 1424, corresponding to January 28 to February 3,
2 2004.

3 There were 4 hospitals in Mena, namely, Mena
4 General hospital (350 total beds including 18 ICU
5 beds), Mena Aljisir (207 total beds including 10 ICU
6 beds), Mena Alwadi (145 total beds including 10 ICU
7 beds), and Mena Almahbat (91 total beds including 16
8 ICU beds), and 3 hospitals in Arafat, namely, Arafat
9 General hospital (424 total beds including 28 ICU
10 beds), Jabal Alrahma hospital (150 total beds including
11 10 ICU beds), and Namera Hospital (120 total beds
12 including 12 ICU beds). The hospitals in Mena and
13 Arafat are temporary health care facilities that provide
14 essential medical services to pilgrims during the Hajj
15 period only. The hospitals in Mena begin operation on
16 the seventh day of Dhul-Hijjah month and end on the
17 evening of the thirteenth day, whereas Arafat hospitals
18 operate for one day only, the ninth day of Dhul-Hijjah,
19 as pilgrims stay in Arafat from sunrise to sunset of that
20 day. Upon closure of these hospitals, patients who can-
21 not be discharged are transferred to permanent tertiary
22 health care facilities in Makkah for further management.
23 ICUs in Mena and Arafat hospitals are well-equipped
24 with up-to-date monitoring devices and ventilators and
25 are run by well qualified medical and nursing staff.

26 Patients were reviewed upon admission to ICUs, and
27 data were recorded on structured case report forms by
28 the admitting physicians. Information collected includ-
29 ed patient demographic characteristics, clinical mani-
30 festations, co-morbidities, laboratory and radiological
31 results, procedures performed, and medications taken.
32 Patients were followed until the end of the hospital stay
33 to record medical complications and outcome.

34 The Statistical Package for Social Science (SPSS)
35 program (Release 10.0.1, 1999) was used for data en-
36 try and analysis. Descriptive statistics were calculated
37 as appropriate including frequencies, means \pm standard
38 deviations, and cross tabulations.

40 RESULTS

41 A total of 140 patients were admitted to the ICUs. The
42 demographic characteristics of patients are shown in
43 Table 1. Fifty-five (39.3%) patients were from Arabic
44 countries, 50 (35.7%) patients were from the Indian
45 subcontinent, 13 (9.3%) patients were from East Asia,
46 10 (7.1%) patients were from North Asia, 8 (5.7%)
47 patients were from Africa, and 4 (2.9%) patients were
48 from Europe. A total of 106 (75.7%) patients were ad-
49 mitted to ICUs in Mena hospitals, and the remaining
50 34 (24.3%) patients were admitted to ICUs in Arafat
51 hospitals (Table 2). Most of the patients (88.2%) were
52 admitted through the emergency room and only 11.8%

1 were transferred from the medical wards. Table 3 shows
2 the number of patients admitted to ICUs by the day
3 of Hajj. On admission to ICUs, 84 (60.0%) patients
4 had one acute medical problem, 51 (36.4%) patients
5 had two acute medical problems, and 5 (3.6%) patients
6 had three acute medical problems. Table 4 shows the
7 most frequent causes of admission to ICUs. Myocardial
8 infarction was the most common admitting diagnosis
9 followed by pneumonia, pulmonary edema, chronic
10 obstructive pulmonary disease (COPD), and bronchial
11 asthma. Surgical diseases (trauma and acute abdomen)
12 accounted for only 7.1% of admissions to ICUs. A total
13 of 99 (70.7%) patients had at least one of the co-morbid
14 conditions listed in Table 5.

15 One hundred and two (72.9%) patients had chest
16 radiographs upon admission, of which 41 (40.2%) ra-
17 diographs were normal. The remaining 61 (59.8%) pa-
18 tients had at least one of the following signs: pulmonary
19 edema (21 patients or 20.6%), a localized pneumonic
20

21
22 **Table 1.** Demographic characteristics of 140 patients admitted
23 to intensive care units in Mena and Arafat hospitals in the Hajj
24 period of the Islamic year 1424 (2004).

Characteristics	n (%)
Sex	
Male	94 (67.6)
Female	45 (32.4)
Age Group	
21-40	11 (7.9)
41-60	53 (38.1)
61-80	72 (51.8)
>80	3 (2.2)
Hajj (Pilgrimage) status	
Pilgrim	137 (97.9)
Non-pilgrim	3 (2.1)
Country of origin	
India	26 (18.6)
Egypt	22 (15.7)
Pakistan	18 (12.9)
Indonesia	9 (6.4)
Iran	8 (5.7)
Other*	57 (40.7)

*Includes 21 nationalities

Table 2. Number of patients admitted to intensive care units by hospitals in the Hajj period of the Islamic year 1424 (2004).

Hospital	Number of intensive care unit beds	Number of patients admitted (%)
Mena General hospital	18	36 (25.7)
Mena Alwadi hospital	10	29 (20.7)
Mena Aljesr hospital	10	24 (17.1)
Mena Almahbat hospital	16	17 (12.1)
Arafat General hospital	28	12 (8.6)
Arafat Namera hospital	12	12 (8.6)
Arafat Jabal Al-Rahma hospital	10	10 (7.1)
Total	104	140 (100)

Table 3. The number of admissions to intensive care units by the day of Hajj of the Islamic year 1424 (2004).

Date of admission (day / month / year)	n (%)
07/12/1424 (28/01/2004)	1 (0.7)
08/12/1424 (29/01/2004)	23 (16.4)
09/12/1424 (30/01/2004)	36 (25.7)
10/12 /1424 (31/01/2004)	37 (26.4)
11/12/1424 (01/02/2004)	17 (12.1)
12/12/1424 (02/02/2004)	21 (15.0)
13/12/1424 (03/02/2004)	5 (3.6)
Total	140 (100)

infiltrate (17 patients or 16.7%), patchy pneumonic infiltrates (14 patients or 13.7%), chronic obstructive pulmonary disease (12 patients or 11.8%), old tuberculosis (5 patients or 4.9%), cardiomegaly (4 patients or 3.9%), rib fractures (2 patients or 2%), pleural effusion (1 patient or 1%), and wide mediastinum (1 patient or 1%).

Sixty-six (47.1%) patients had at least one of the following procedures: central venous catheterization (42 patients or 30%), endotracheal intubation (41 patients or 29.3%), arterial line insertion (27 patients or 19.3%), pacemaker insertion (7 patients or 5%), thoracocentesis or abdominocentesis (2 patients or 1.4%), chest tube insertion (1 patient or 0.7%), lumbar puncture (1 patient or 0.7%), pulmonary catheterization (1 patient or 0.7%), and tracheostomy (1 patient or 0.7%).

A total of 71 (50.7%) patients received antibiotics, of whom 25.4% received one antibiotic, 63.4% received two antibiotics, and 9.9% received three antibiotics. A total of 39 (27.9%) patients received anticoagulation

therapy, 26 (18.6%) patients received insulin and oral hypoglycemic, 24 (17.1%) patients received inotropic agents, 20 (14.3%) patients received streptokinase, 18 (12.9%) patients received antihypertensive agents, 18 (12.9%) patients received glucocorticoids, and 72 (51.4%) patients received other medications. Three (2.1%) patients received a blood transfusion, and one (0.7%) patient underwent surgery under general anesthesia.

Sixty-six (47.1%) patients had at least one of the complications shown in Table 6. Of the 66 patients who had complications, 3 (4.5%) patients were 21 to 40 years of age, 22 (33.3%) patients were 41 to 60 years of age, 38 (57.6%) patients were 61 to 80 years of age, and 3 (4.5%) patients were older than 80 years.

Sixty-three (45.0%) patients recovered and were discharged or transferred to the hospital wards in stable conditions, 40 (28.6%) patients were transferred to tertiary care centers in Makkah for special services or fur-

Table 4. Admitting diagnoses in 140 patients admitted to intensive care units during Hajj of the Islamic year 1424 (2004).*

Admitting diagnosis	n (%)	Admitting diagnosis	n (%)
Cardiovascular diseases	89 (63.6)	Endocrine and metabolic diseases	16 (11.4)
Myocardial infarction	35 (25.0)	Diabetic ketoacidosis	10 (7.1)
Left ventricular failure (Pulmonary edema)	20 (14.3)	Metabolic acidosis	3 (2.1)
Unstable angina	10 (7.1)	Uncontrolled diabetes mellitus	1 (0.7)
Angina	5 (3.6)	Hypoglycemia	1 (0.7)
Hypertension	4 (2.9)	Hyponatremia	1 (0.7)
Atrial fibrillation	4 (2.9)	Surgical diseases	10 (7.1)
Cardiac arrest	4 (2.9)	Trauma	9 (6.4)
Biventricular failure	3 (2.1)	Acute abdomen	1 (0.7)
Hypotension	3 (2.1)	Neurological diseases	6 (4.3)
Bradycardia	1 (0.7)	Cerebrovascular accidents	4 (2.9)
Infectious diseases	37 (26.4)	Seizure disorder	2 (1.4)
Pneumonia	31 (22.1)	Gastrointestinal tract diseases	3 (2.1)
Septic shock	6 (4.3)	Upper gastrointestinal tract bleeding	3 (2.1)
Pulmonary diseases	33 (23.6)	Renal diseases	3 (2.1)
Acute exacerbation of chronic obstructive pulmonary disease	13 (9.3)	Renal failure	3 (2.1)
Bronchial asthma	12 (8.6)	Other diseases	4 (2.9)
Respiratory failure	7 (5.0)	Sickle cell crisis	1 (0.7)
Upper airway obstruction	1 (0.7)	Hypovolemic shock	1 (0.7)
		Shock	1 (0.7)

*Some patients had more than one admitting diagnosis, hence, the total number of admitting diagnoses adds up to more than 140 patients (see text under Results for details).

ther care, 21 (15.0%) patients were transferred to tertiary care centers in Makkah after closure of the temporary hospitals in Mena and Arafat, 15 (10.7%) patients died, and one (0.7%) patient was discharged against medical advice. Of the 125 patients who survived, 59 (47.2%) patients were discharged, transferred to hospital wards, or transferred to other tertiary care facilities within 24 hours after admission, 44 (35.2%) patients within 48 hours after admission, 11 (8.8%) patients within 72 hours after admission, and 11 (8.8%) patients within 96 hours after admission. Of the 15 patients who died, 3 (15%) patients were in the age group 21 to 40 years, 5 (33.3%) patients were in the age group 41 to 60 years, 5 (33.3%) patients were in the age group 61 to 80 years, and 2 (13.3%) patients were older than 80 years. The causes of death of the 15 deceased patients were acute myocardial infarction (7 patients), acute pulmonary edema (2 patients), pneumonia (2 patients), diabetic

ketoacidosis (1 patient), and trauma (1 patient).

DISCUSSION

In this study, the vast majority (92%) of patients admitted to ICUs were older than 40 years and more than one half (54%) of patients were older than 60 years. The risk of complications and death increased with age, with the highest risk observed 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.

Approximately two thirds (64%) of patients were admitted to ICUs because of cardiovascular diseases. Infections accounted for about a quarter (26.4%) of admissions. More specifically, myocardial infarction (25%) and pneumonia (22%) were the most common

Table 5. Co-morbid conditions in 140 patients admitted to intensive care units during Hajj of the Islamic year 1424 (2004).

Co-morbidity	n (%) [*]
Hypertension	37 (26.4)
Diabetes mellitus	36 (25.7)
Ischemic heart disease	34 (24.4)
Chronic obstructive pulmonary disease	16 (11.4)
Congestive heart failure	10 (7.1)
Bronchial asthma	3 (2.1)
Chronic liver disease	2 (1.4)
End stage renal failure	2 (1.4)
Other [†]	6 (4.2)

^{*}A total of 99 (70.7%) 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 99 patients.

[†]Other co-morbidities include hepatitis C (1 cases), paraplegia (1 case), sickle cell anemia (1 case), pericardial effusion (1 case), and old cerebrovascular accident (1 case).

Table 6. Complications and mortality in 140 patients admitted to intensive care units during Hajj of the Islamic year 1424 (2004).

Complications	n (%) [*]
No complication	74 (52.9)
Mechanical ventilation	41 (29.3)
Septic shock	17 (12.1)
Respiratory failure	14 (10.0)
Cardiogenic shock	12 (8.6)
Arrhythmias	8 (5.7)
Acute renal failure not requiring dialysis	8 (5.7)
Hypovolemic shock	4 (2.9)
Acute respiratory distress syndrome	2 (1.4)
Metabolic acidosis	2 (1.4)
Pneumothorax	2 (1.4)
Other [†]	7 (5.0)
Mortality	7 (5.0)

^{*}A total of 66 (47.1%) patients had at least one of the listed complications. Some patients had more than one complication, hence the total number of complications adds up to more than 66 patients.

[†]Other complications include disseminated intravascular coagulation (1 cases), acute renal failure requiring dialysis (1 case), hypoxia (1 case), hematemesis (1 case), hemolytic crisis (1 case), status epilepticus (1 case), and pancreatitis (1 case).

admitting diagnoses. Despite the enormous overcrowding in Hajj, trauma accounted for only 6.4% of admissions to ICUs. More than two thirds (71%) of pilgrims had co-morbid conditions requiring medical attention with more than one half (59%) having cardiovascular diseases (hypertension, ischemic heart disease, congestive heart failure, pericardial effusion, old cerebrovascular accidents), and one quarter (26%) having diabetes mellitus as co-morbid conditions.

Of note was the absence of any patient with heat exhaustion or heat stroke, as the Hajj season was in the wintertime. The Hajj periods have coincided with the winter seasons since the 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°C to 32°C and a low temperature of 18°C to 24 °C. Similar results were described in the Hajj season of the Islamic year 1422 (2002) and 1423 (2003).^{1,2} Heat-related diseases were major Hajj-related health problems when Hajj coincided with the hot climate seasons.³⁻⁶

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

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