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ORIGINAL ARTICLE

The burden on EDs during Hajj due to pilgrim noncompliance with treatment for chronic conditions

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ABSTRACT

Background: Makkah, Saudi Arabia, receives about three to four million pilgrims for Hajj annually. Many of these pilgrims are elderly and sick, and many have chronic medical conditions (CMCs) for which they take medication. The emergency department (ED) physicians working in Makkah have previously claimed that many pilgrims present to the ED because they need medications to control their CMCs. We aim to investigate the magnitude of this burden on Saudi Arabian EDs.

Methods: We conducted a survey study among Hajj pilgrims during the Hajj season of 2018. Data was collected, which included demographics, CMCs, the medications taken for CMCs, did the pilgrims bring their medication with them from home, and, if not, the source for obtaining replacement medications during Hajj.

Results: Of the 2402 subjects surveyed, 1953 were included in our study. Only 436 (22.3%) had a CMCs, and of those only 16% did not bring sufficient medication with them from home. We found that only 7% ultimately needed to visit the ED at some point. The number of pilgrims with CMCs who needed to be given new medication was 13.3%.

Conclusion: Our pilot study indicates that approximately 20% of all pilgrims have a CMCs. Of those with CMCs, only 18% did not bring sufficient medication with them to Makkah, and many of these pilgrims presented to the ED at some point due to uncontrolled symptoms of their CMCs. The responsibility for dispensing medications to pilgrims for treating their CMCs was mainly shared by the MOH and the Hajj mission to which the pilgrim belongs.

Keywords: Medication compliance, Chronic disease, Hajj, Pilgrims

Introduction

Hajj is a unique gathering in Makkah in which two to four million Muslims (General Authority for Statistics, GASTAT) from around the world gather to perform one of the five pillars of Islam. Due to the huge number of pilgrims, Hajj poses several challenges to global health and public safety, such as logistics, supply and demand of medications, and consumables, as well as surge capacity in case of disasters. It is not surprising that many pilgrims are exhausted by some hajj activities, which may overwhelm those who suffer from chronic diseases. Chronic medical conditions (CMCs) are defined as long-term, slowly developing conditions that can be controlled, but unlikely to resolve or be cured. Most CMCs are not infectious but require treatment to control their symptoms. Progression of the disease is usually slow, although complications with acute exacerbation can occur [1,2]. One of the most basic strategies for managing chronic diseases is to ensure patient compliance with treatment [3]. Compliance with treatment is not only the use of prescribed medicine, but also cooperation of patients and their families with healthcare-related decisions and patient compliance with the treatment timetable. Noncompliant patients assume that their health will improve over time [4]. Factors such as education level, cultural background, the accessibility

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to health services and treatments, the occurrence of complications, and medication side effects can affect compliance with treatment [5,6]. Compliance has been defined as the extent to which a person's behavior (such as taking medication, following diets, or changing lifestyles) corresponds to medical or health advice. The noncompliance to medication creates an enormous burden for healthcare systems; thus, it is vital to assess medication adherence in the population [6]. Many studies have investigated compliance predictors, seeking a deeper understanding of compliance barriers [8,9,10]. Compliance predictors include socio-demographics (sex, age, race, educational level, and marital and employment statuses), lifestyle, health awareness, and attitude toward the treatment. Drug- and disease-related factors include the type and severity of the pathology, the duration of drug treatment, the drug class, the complexity of the regimen, and drug cost. Drug compliance in chronic illness has interested researchers for many decades. It is crucial for the success of drug therapy and presents a major challenge to healthcare professionals. In recent years, many ED physicians practicing in Makkah and the Holy Land Hajj regions have observed that a large number of pilgrims present to the ED due to acute exacerbations of their CMCs, brought about by medication noncompliance. The most common reason reported by physicians is that these pilgrims did not bring their medications with them from home. Pilgrims have stated many reasons for not bringing their medications: they simply could not afford the medication, they believed that arriving in the Holy Land was healing in of itself, and they believed that healing the spirit through religious practice would somehow also address their physical needs. In light of these reports, we have proceeded to investigate the presence and magnitude of this problem, which places a burden on the Saudi Arabian healthcare system.

Subjects and Methods

This cross-sectional, pilot study was conducted among Hajj pilgrims during the Hajj season of 2018 AD/1439 H in Makkah and the Holy Land Hajj regions (including Mina, a region located 9 km from Makkah) of Saudi Arabia. Data was collected from pilgrims regarding demographics, CMC incidence, medication compliance, ED visits, and the source of medication replacement. Our inclusion criterion was pilgrims presenting for the 2018 (1439H) Hajj season who were under the care of a legitimate Hajj campaign. We used the following exclusion criteria: pilgrims presenting for Hajj in an unauthorized manner, pilgrims who were initially part of the Hajj service workforce (cooks, police officers, caterers, guides, scouts, etc.), and pilgrimage campaign organizers. The calculated sample size needed for a study in this population, for a power of 80% and CI of 95%, is 2400 subjects. Sampling for this study was conducted in two major areas: the Haram (the holy mosque in Makkah) and Mina (the region where all pilgrims gather during the five days of Hajj). Surveys were conducted by the interviewing team at the main entrance and exit points at the Haram, as well as at the Hajj missions in the Mina region. The Hajj missions at Mina are organized into five main sections, with a total population of 2,371,675 pilgrims, as recorded by the Ministry of Hajj in the 2018 Hajj season. Hajj missions were selected at random (via the study randomizer website: https://www.randomizer.at) from all five sections in Mina; the interviewers were blinded to the mission size and nationality. We carried out data collection using an electronic survey on the Survey Monkey® site. The survey questions were formulated in English, translated into Arabic, and then retranslated back into English by a professional notarized translator to ensure translation equivalence. Our interviewers conducted the interviews directly in Arabic and English with participants who spoke those languages; they used interpreters found at the Hajj mission to interview participants who spoke another language. All data were collected by the interviewing teams from the designated missions and from the Haram. Participants provided data on demographics, the occurrence of CMCs, and medications taken. Those who were on medications were asked if they brought their medications with them and, if not, did they need replacement medication, did present to an ED, and from which source they had received replacement medication. We carried out a subgroup analysis to assess the relationship between medication compliance and parameters such as age, gender, and ethnicity. All interviewers were blinded to the results obtained by the other teams. Data were collected and downloaded from the Survey Monkey® website, entered into the Microsoft access database, and analyzed for frequencies and percentages. We applied the chi-squared test to establish statistical significance, with a p-value <0.05 denoting a statistically significant result.

Results

A total of 2404 subjects were approached for this survey, out of which 449 (18.69%) did not consent to an interview. Of those who were interviewed, only 436 (22.28%) reported having a CMC (see algorithm below). The age and sex distribution are given in Table 1. Of the pilgrims who had CMCs, 90.6% received medication for their conditions; the majority reported having their medications with them and only 13% did not bring enough medication from their respective home countries. In addition, 23.2% needed to seek medical help for symptoms related to their CMCs, although only one-third of these eventually presented to the ED, as shown in Figure 1. The age and sex distribution are given in Table 1. Subjects nationality distribution is shown in Table 2. The chronic medical condition (CMC) distribution is shown in Figure 2. Subject responses to the questions asked are presented in Table 3.

Subgroup Analysis: Table 4 presents data on the effect of ethnicity, age, and gender on medication compliance in participants with a chronic disease. As expected, elderly subjects had more CMCs than younger ones; females were twice as likely to have CMCs as males. Also, Arab pilgrims had more CMCs than non-Arab

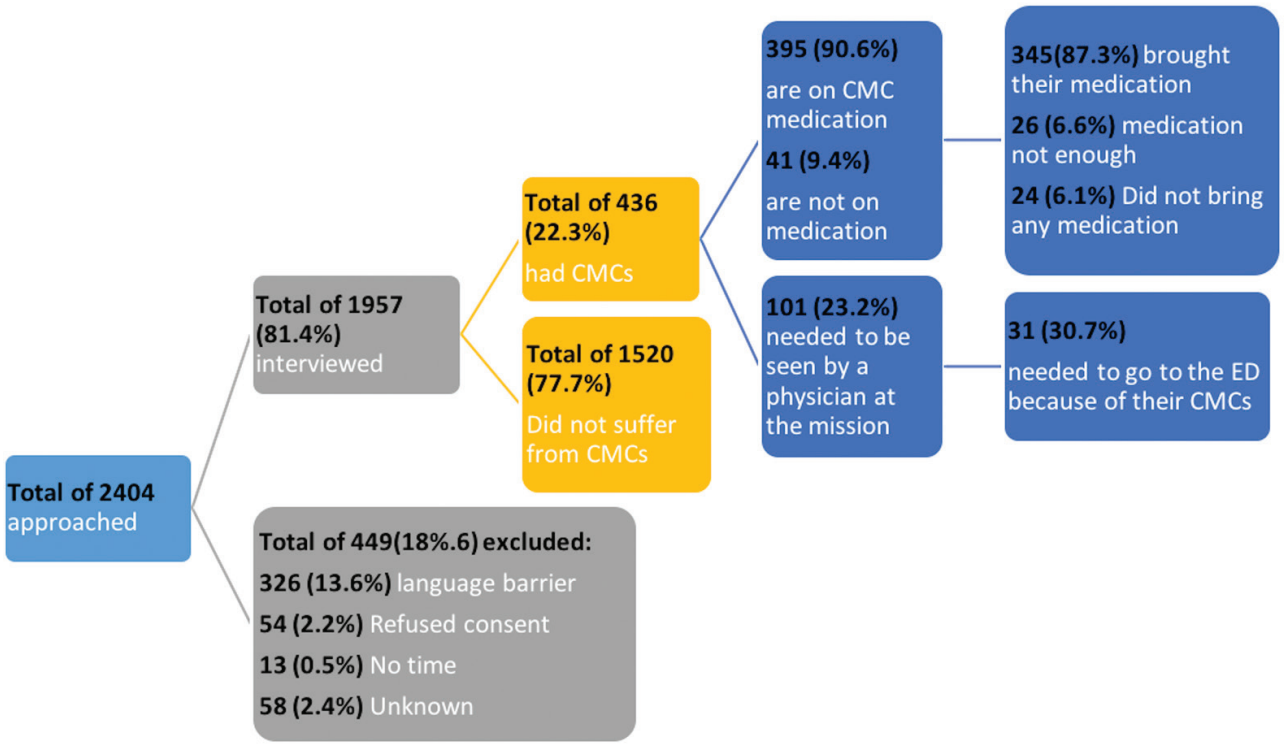

Figure 1. *Subjects recruited and enrolled.*

Table 1. *Age and Sex Distribution*

Age (years)	n	%
< 18	28	1.43%
18-24	130	6.65%
25-34	424	21.68%
35-44	517	26.43%
45-54	437	22.34%
55-64	303	15.49%
65-74	97	4.96%
≥ 75	20	1.02%
Sex	n	%
Male	1042	53.27%
Female	914	46.73%

pilgrims. Elderly pilgrims and Arab pilgrims were more likely than other participants to have brought their CMC medications with them. Although females were more likely than males to have CMCs, males were found to suffer more symptoms from their CMCs in about 30% of the cases. Naturally, they needed more medication once they arrived in Makkah and the Hajj region. All other factors yielded no significant differences.

Discussion

Our subject enrollment did achieve the sample size required. However, 18.6% of those approached declined to participate in our survey, the most common reason for which was the presence of a language barrier. The majority of those were from the data site collection at the entrances of the Haram in Makkah, rather than the Hajj missions at Mina. The majority of interviews were conducted directly with the subjects and in Arabic (80.52%), which is not surprising as most pilgrims know some degree of Arabic as they read the Holy Quran, which is in Arabic, as well as reading the translation in their own language. In 15.6% of the subjects, the interview was conducted in English and data were obtained directly from the subject. In only 3.87% of the subjects, data were obtained through an interpreter who was available at the Hajj mission.

The prevalence of chronic medical conditions in the pilgrim population

In this study, we found that only 22.3% of pilgrims arriving for Hajj had CMCs. Of course, this number can change from year to year depending on the pilgrim quotas allotted by the government of Saudi Arabia to each nation during the Hajj season in any particular year, as well as the age distribution of the pilgrims from those nations. For example, pilgrims from The People's Republic of China are generally more elderly than those from Yemen. Since it is expected that CMCs are more prevalent in an elderly population than in a younger one, the percentage of CMCs varies from year to year depending on the stated parameters. Our results show that approximately 90% of those with CMCs were taking at least one medication. This is not surprising, as the most prevalent CMCs were hypertension and diabetes; together they accounted for

Table 2. *Subject nationality distribution*

Country	n	%	Country	n	%	Country	n	%	Country	n	%	Country	n	%
Afghanistan	26	1.33	Egypt	294	15.0	Libya	4	0.20	Palestine	13	0.66	Tunisia	46	2.35
Algeria	73	3.73	Eritrea	1	0.05	Malaysia	13	0.66	Philippines	12	0.61	Turkey	19	0.97
Australia	1	0.05	Germany	1	0.05	Mali	2	0.10	Russia	8	0.41	Turkmenistan	1	0.05
Bahrain	57	2.91	India	59	3.01	Monaco	1	0.05	Saint Lucia	1	0.05	UAE	13	0.66
Bangladesh	48	2.45	Indonesia	46	2.35	Morocco	57	2.91	Saudi Arabia	670	34.2	UK	13	0.66
Belgium	1	0.05	Iran	5	0.26	Mozambique	5	0.26	Senegal	2	0.10	USA	9	0.46
Bosnia	3	0.15	Iraq	34	1.74	Nicaragua	1	0.05	Somalia	7	0.36	Yemen	61	3.11
Brunei	1	0.05	Jordan	24	1.23	Niger	3	0.15	South Africa	4	0.20			
Canada	3	0.15	Kenya	1	0.05	Nigeria	49	2.50	Sri Lanka	4	0.20			
Chad	7	0.36	Kuwait	21	1.07	Oman	10	0.51	Sudan	49	2.50			
China	1	0.05	Lebanon	30	1.53	Pakistan	122	6.23	Syria	23	1.17			

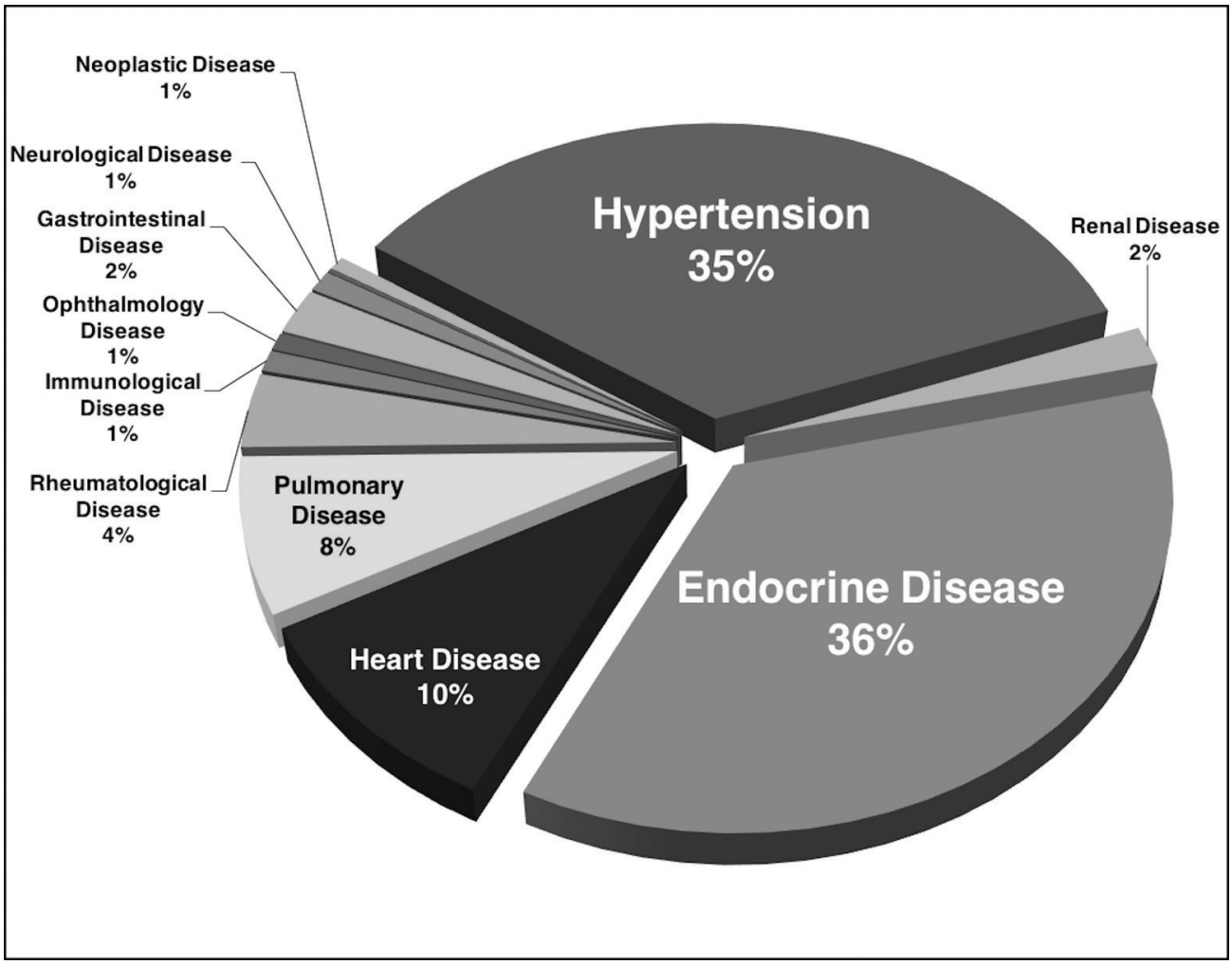

Figure 2. *The chronic medical condition (CMC) distribution.*

almost 70% of all CMCs encountered. Both of these conditions require daily medication treatment and are exacerbated by physical activity, a major component of the Hajj.

Ethnicity and gender differences

Notably, females were almost twice as likely as males to have CMCs. However, males were more likely

Table 3. *Subject responses to the questions asked:*

Question	Answer	n	%
Do you suffer from a CMCs?	Yes	436	22.29
	No	1520	77.71
Are you on medication for your CMCs?	Yes	395	90.6
	No	41	9.40
How many medications do you take for your CMCs?	1 medication	176	44.56
	2-3 medications	158	40.0
	4-5 medications	43	10.89
	6-8 medications	13	3.29
	>8 medications	5	1.27
Did you bring your CMC medication with you from home?	Yes	369	93.42
	No	26	6.58
Did you bring enough medication for your entire Hajj trip?	Yes	345	93.5
	No	24	6.5
What was the reason you did not bring your medication with you from your home country?	Could not afford it	4	16.67
	I don't need medication in the Holy-land	1	4.17
	I was going to buy it in Makkah once I arrived	1	4.17
	Decided to stop my medication during Hajj	4	16.67
	I was counting on the Hajj mission to supply it for me	3	12.50
	I thought the MOH will supply it for me	2	8.33
	Simply forgot to bring it	7	29.17
	Other reasons	2	8.33
Did you have any symptoms from your CMCs necessitating you to see a physician?	Yes	101	23.17
	No	335	76.83
Did your CMC symptoms necessitate you to go to the ED?	I had no need to see a physician	436	81.19
	I was seen by the mission physician	31	5.77
	I needed to go to the ED	70	13.04
Did you receive any medication during Hajj for your CMC that you did not get from home?	Yes	58	13.3
	No	378	86.70
From which source did you get your CMC medication in Makkah and the Holy-lands?	I did not need any medication	58	50.0
	I got medication from the mission	32	27.59
	I got medication from MOH ED	20	17.24
	I bought medication from a pharmacy	3	2.59
	I got medication from another pilgrim	3	2.59

Table 4. *Subgroup analysis data and p-values*

Parameter	Gender (%)			Age (%)			Ethnicity (%)		
	Male	Female	p-value	< 45 yrs	≥ 45 yrs	p-value	Arab	Non-Arab	p value
Pilgrims that have CMCs	15.74	29.76	<0.0001*	8.83	36.56	<0.0001*	24.24	16.53	0.0004*
Those who brought their medications from their home countries	91.10	94.78	0.154	88.37	94.82	0.032*	95.12	85.07	0.0025*
Pilgrims that suffered symptoms due to their CMCs	28.70	19.85	0.035*	25.70	22.40	0.49	23.0	23.60	0.94
Pilgrims that presented to the ED due to CMC symptoms	8.54	6.25	0.368	5.15	7.67	0.39	6.67	9.21	0.43
Pilgrims that got new medications during Hajj for their symptoms	20.73	8.82	<0.0001*	10.31	14.16	0.325	11.94	19.74	0.069
Medications dispensed by MOH sources	41.18	25.0	0.202	30.0	35.42	0.743	27.90	53.10	0.074

to experience symptoms and acute episodes of their CMCs that required medical attention. One possible explanation is that males are tending to their families that have accompanied them on the Hajj and, hence, are performing more strenuous activities, such as carrying baggage, going out for food etc. They are, thus, more

likely to decompensate and experience symptoms. Interestingly, Arab pilgrims had a higher prevalence of CMCs than non-Arab pilgrims. However, Arab pilgrims were more likely to have brought their medications with them. It is worth noting that Arab pilgrims generally live in closer proximity to Saudi Arabia than non-Arabs. Consequently, the Hajj and travel to Makkah are less expensive and cumbersome for Arab pilgrims than for those coming from faraway places, such as Southeast Asia, Australia, and South America. For many Arab pilgrims, this is not their first visit to Makkah. They may be more aware of what is and is not available as far as medication and healthcare services. Thus, they may be better prepared than their counterparts visiting Makkah for the first time and coming from more distant countries.

Medication Compliance

The majority of those taking medication reported that they had brought their medications with them. Only 7% said that they did not have any medications with them at all, primarily because they simply forgot. Overall, 13.3% of pilgrims with CMCs had to obtain new medication during Hajj. Of these, 33% received their medication from their Hajj mission, while 20% received it from the MOH.

Study Limitations

We are aware that our study had the following limitations:

1.Non-participation: The percentage of subjects that declined to participate in our study was high (18.6%). The major problem was the language barrier. If we had anticipated this, we could have formulated our survey in multiple languages, assured translation equivalency, and administered it to more subjects.

2.Translation Equivalency: Language translation equivalency could not be assured in subjects who were interviewed using the Hajj mission interpreter. A multi-language survey conducted in the manner described earlier might possibly have remedied this limitation.

3.Temporal bias: The data were collected over a five-day period. It stands to reason that pilgrims who were interviewed on the first day were less likely to have experienced exacerbation of symptoms from their CMCs. However, as Hajj progressed, and as the pilgrims endured the physical and emotional demands of the religious events, they would be more likely to have symptoms, require medical help, and present to an ED. Consequently, the subjects interviewed on day 5 probably had more positive findings than those interviewed on the day 1. Furthermore, pilgrims on day 5 had had more chances to lose their medication. The event rate also changed from day to day, which may have affected the end result. The solution, of course, is to conduct all of the surveys in one day; however, we were unable to do that for logistical and financial reasons.

Conclusion

Approximately 20% of Hajj pilgrims have a CMC. Up to 16% of all pilgrims did not bring along sufficient medications for their CMCs when coming for Hajj. From our study (Hajj of 2018), we have found that 1.3% of all pilgrims in the Hajj region visited an ED due to exacerbations of their CMCs (ranging from 26,000 to 39,000 visits in a typical Hajj season). Female pilgrims were twice as likely to have CMCs as males,although males were twice as likely to require new CMC medications. Exacerbations of CMCs seem to be 50% more likely in males. Arabs attending Hajj are 10% more likely to have CMCs than non-Arabs. However, they are 10% more likely than non-Arabs to have their medications with them. Although it is the duty of the Saudi Arabian MOH to care for the pilgrims coming to the holy lands, this care is primarily geared toward acute and emergency conditions. Incoming pilgrims with CMCs should be educated about the importance of complying with their medication treatment and bringing sufficient medication to last the entire trip. Providing this education in advance to pilgrims at Saudi Arabian embassies around the world can ease the already heavy burden on the Saudi healthcare system, which is already carrying out a monumental task in caring for this annual mass gathering.

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List of abbreviations

ED	Emergency Department
CMC	Chronic Medical Condition
MOH	Ministry of Health
GASTAT	General Authority for Statistics

Conflict of interest
The authors declare that there is no conflict of interest regarding the publication of this article.

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Consent for publication
Written consent was obtained from all participants as the first question in the survey. If consent was not given, the reason for refusal was noted.

Ethical approval
Not applicable. This is a public survey with no proprietary information collected from any patient record. Consent for information use from the subjects enrolled was obtained directly from the participants.

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