

Types of Primary Healthcare Emergencies in Muscat, Oman

A retrospective cross-sectional study of five primary care centres

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ABSTRACT: *Objectives:* Emergencies can occur at any time and be life-threatening or cause permanent damage. Accordingly, the management of emergency cases is an integral part of primary healthcare (PHC). This study aimed to estimate the proportion and types of emergency cases presented to PHC centres in Muscat, Oman. *Methods:* This retrospective cross-sectional study was conducted from March to August 2016 at five PHC centres in the Muscat Governorate. A total of 800 emergency cases (i.e. those labelled in the health information system as an accident and emergency) of Omani patients aged ≥ 5 years presented during this period. Every second case, based on arrival to the registration desk, was selected for analysis. Electronic medical records were reviewed to collect data regarding demographic features, presenting complaints, time and season of presentation, management provided and method of transportation if referred to tertiary care. *Results:* The proportion of emergency cases was $< 2.5\%$ (range: 1–2.5%). The most common type of emergency was musculoskeletal issues/trauma (34.3%) followed by gastroenterological (15.1%) and genitourinary (10.0%) emergencies. Most patients were either 21–39 or 5–12 years old (35.0% and 21.6%, respectively). The majority (59.6%) were treated directly at the health centre, while the remaining patients (40.4%) were referred to tertiary care. At referral, only 12.1% were transported by ambulance and the rest via private transport. *Conclusion:* Musculoskeletal issues/trauma was the most common type of emergency seen at the selected PHC centres in Muscat. Further research is needed to determine whether PHC centres have the capability and resources necessary to appropriately manage emergency cases.

Keywords: Emergencies; Primary Healthcare; Public Health; Emergency Medicine; Oman.

ADVANCES IN KNOWLEDGE

- Musculoskeletal/trauma cases were the most common type of emergency seen at primary healthcare (PHC) centres in Muscat.
- A small percentage of emergency cases at PHC centres required transportation by ambulance.

APPLICATIONS TO PATIENT CARE

- Patients attending the emergency room in PHC centres were most commonly referred to tertiary care when they presented with cardiovascular or pharmacological emergencies.
- Most patients who were referred to tertiary care hospitals did not require an ambulance and were able to travel using their own mode of transport.

A MEDICAL EMERGENCY IS DEFINED AS A sudden acute incident that necessitates urgent and appropriate management in order to treat immediate risks and avoid negative sequelae.¹ Such an event can occur at any time and be life-threatening or result in permanent damage to the patient; as such, the delivery of appropriate emergency care is integral at all levels of health services, including primary healthcare (PHC) settings.^{1,2} As the first point of contact for medical care in the community, general and family practitioners in PHC centres often see patients requiring urgent medical attention.³

However, there is limited information regarding the frequency and characteristics of emergency cases encountered in primary care settings in the Gulf. For instance, Mahfouz *et al.*'s study which was conducted in Abha, Saudi Arabia, found that the most common

emergencies were trauma, burns and orthopaedic injuries.¹ In Jeddah, Aloufi and Bakarman noted that more than 70% of PHC physicians had seen more than three cases of acute bronchial asthma in the last 12 months; in addition, frequent cases of renal colic and hypoglycaemia were reported.⁴ In Muscat, Oman, there were 1,613,308 outpatient visits to PHC centres in 2016; of these, approximately 1,419,666 visits were assigned to general practice clinics, including emergency cases.⁵ However, the exact nature of emergency cases seen by general practitioners (GPs) in PHC settings in Oman has not yet been explored except in a single study that determined that the rate of injury in PHC was 24 cases per 1,000 visits in 2010.⁶

The healthcare system in Oman is divided into primary, secondary and tertiary levels, with the local population receiving free access to public healthcare

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under the Ministry of Health.⁷ At the PHC level, there were a total of 108 regional centres in 2016 of which 28 were located in six *wilayats* (county) in the Muscat Governorate, the region surrounding the capital city; this comprises nearly 50% of the total population of Oman.^{5,8} These facilities act as the first point-of-care for citizens in designated catchment areas, with an estimated 95% of the population residing ≤ 5 km away from a PHC centre.⁷ All of these centres share the same structure and resources, use the same health information system software and provide various preventative, curative and rehabilitative primary care services for both acute and chronic illnesses, including standard diabetic, hypertension, antenatal, general and emergency services. Each centre is staffed by various types of healthcare professionals including GPs, nurses, dentists, laboratory technicians and pharmacists. In 2016, there were approximately 10.8 GPs per 10,000 individuals in the population.⁵ While efforts have been made to launch an appointment-based system, the majority of PHC patients are still seen on a walk-in basis.⁷

From an economic perspective, it is often difficult to plan for medical emergencies. However, an understanding of the nature and type of emergencies that are most frequently faced by GPs in Oman may help in allocating sufficient resources and equipment in order to lower the morbidity and mortality rates and ensure an optimum level of care. Thus, this study aimed to determine the proportion and types of emergencies presenting to selected primary PHC centres in Muscat. It is hoped that the outcomes of this study will help healthcare administrators in the delivery of appropriate staff training as well as assist policymakers in formulating an evidence-based policy for the implementation of improved emergency services for patients with acute complaints in Oman.

Methods

This retrospective cross-sectional study was conducted over a period of six months from March to August 2016 at selected PHC centres in Muscat Governorate, Oman. The target population included Omani nationals aged ≥ 5 years who visited the centres during this period and were labelled as emergency cases in the electronic medical record system based on the decision of the caregivers and receiving triage nurses (this is standard procedure in all PHC centres). All younger patients (i.e. < 5 years of age), pregnant women and routine cases were excluded. Based on a 95% confidence level, an anticipated prevalence of 50% and a design effect of 2.0, the necessary sample size was calculated to be 800 cases.

A two-stage cluster sampling strategy was utilised. First, a simple random sample of five centres (clusters) was selected from the 28 PHC centres in Muscat Governorate; all had the same structure and resources and were distributed throughout the region. Second, simple random subsampling was employed to select 800 emergency cases within these five centres, wherein every second case was included in the study based on their time of arrival to the registration desk. The number of cases included from each centre was proportional to its size. Overall, the sample was distributed as follows: 192 cases (24%) from the Al Khoud centre in Seeb *wilayat*, 160 cases (20%) from the Al Khuwair centre in Bawsher *wilayat*, 128 cases (16%) from the Muscat centre in Muscat *wilayat*, 200 cases (25%) from the Al Nahda centre in Al Amirat *wilayat* and 120 cases (15%) from the Ruwi centre in Muttrah *wilayat*. These five centres were deemed appropriate for inclusion in the study based on published statistics from 2016 detailing the number of general and emergency visits per year.⁶

Subsequently, data were collected from the electronic medical record systems of each centre using a well-designed datasheet. The study included every second emergency case coded as 'A&E' (i.e. Accident & Emergency) based on the opinion of the treating doctors (who are assigned on a daily basis to treat emergencies) and triage nurses. Three measures were adopted in this study. First, the demographic features of the patients were determined including age, gender and place of residence. Second, the presenting complaints as recorded by the treating physician in each case were noted and categorised according to different body systems (e.g. cardiovascular complaints included ischaemic chest pain, acute heart failure and palpitations). Third, the time and season of presentation, type of management provided (if the patient was treated directly at the health centre or referred to tertiary care) and, if necessary, the method of referral of the patients to tertiary care (by private transport or ambulance) were determined.

The data were analysed using the Statistical Package for the Social Sciences (SPSS), Version 25.0 (IBM Corp., Armonk, New York, USA). Descriptive statistics were computed for all sociodemographic characteristics and items. Frequencies and percentages were reported for categorical variables. The proportion of emergency cases was calculated out of the net total of cases recorded during the period (both emergency and non-emergency attendees).

This study received ethical approval from the Research Ethics Committee of the Ministry of Health in Oman. In addition, the confidentiality of the information collected was maintained at all times.

Results

This study included a total of 800 emergency cases that presented to PHC centres. The proportions of emergency cases were 1%, 2.5%, 1.6%, 2.3% and 1% at the Al Khoud, Al Khuwair, Muscat, Al Nahda and Ruwi PHC centres, respectively; the overall rate of emergency cases was <2.5%. In terms of frequency, the most common type of emergency was musculoskeletal/trauma-related (n = 274, 34.3%) followed by gastroenterological (n = 121, 15.1%) and genitourinary (n = 80, 10.0%) emergencies. Within the musculoskeletal/trauma emergencies, cuts and wounds were most common (n = 159, 58.0%) followed by fractures (n = 27, 9.9%). Among the gastrointestinal emergencies, vomiting (n = 59, 48.8%), acute abdomen (n = 32, 26.4%) and gastroenteritis (n = 29, 24.0%) were most frequent, while renal colic (n = 41, 51.3%) and gynaecological emergencies (n = 29; 36.3%) were the most prevalent forms of genitourinary emergencies.

Table 1: Characteristics of emergency cases seen at five selected primary healthcare centres in Muscat, Oman (N = 800)

Characteristic	n (%)
Type of emergency	
Cardiovascular	72 (9)
Respiratory	67 (8.4)
Gastroenterological	121 (15.1)
CNS	63 (7.9)
Endocrinological	51 (6.4)
Genitourinary	80 (10)
Musculoskeletal/trauma	274 (34.3)
Pharmacological	2 (0.3)
Other	70 (8.8)
Age in years	
5–12	173 (21.6)
13–20	84 (10.5)
21–39	280 (35)
40–60	149 (18.6)
>60	114 (14.3)
Outcome	
Direct management	477 (59.6)
Immediate referral	272 (34)
Delayed referral*	51 (6.4)

CNS = central nervous system.

*Due to a lack of response to initial treatment.

In terms of age, adults between 21–39 years (n = 280, 35.0%) and children between 5–12 years (n = 173, 21.6%) most frequently presented to primary care with emergencies [Table 1]. Musculoskeletal/trauma and gastroenterological emergencies were most common in patients aged 5–12 (61.3% and 16.8%, respectively) and 13–20 years (52.4% and 14.3%, respectively). Moreover, those aged 21–39 years most commonly presented with musculoskeletal/trauma (28.9%) and genitourinary (19.3%) emergencies, while cardiovascular (23.5%) and musculoskeletal/trauma (15.4%) emergencies were most common in patients aged 40–60 years. Finally, respiratory (21.1%) and cardiovascular (20.2%) emergencies were most common among those aged 60 years or older.

Regarding gender distribution, there were 394 (49.3%) male and 406 (50.8%) female patients. Male patients most frequently presented with musculoskeletal/trauma (n = 134, 34.0%), gastroenterological (n = 46, 11.7%) and cardiovascular (n = 32, 8.1%) emergencies, while female patients commonly presented with musculoskeletal/trauma (n = 102, 25.1%), gastroenterological (n = 76, 18.7%) and genitourinary (n = 50, 12.3%) emergencies. Emergency cases presented at similar rates during both winter and summer months (50.1% and 49.9%, respectively), with musculoskeletal/trauma and gastroenterological

Table 2: Distribution according to outcomes of different types of emergencies seen at five selected primary healthcare centres in Muscat, Oman (N = 800)

Type of emergency	n (%)	
	Direct management (n = 477)	Referral to tertiary care* (n = 323)
Cardiovascular (n = 72)	22 (30.6)	50 (69.4)
Respiratory (n = 67)	51 (76.1)	16 (23.9)
Gastroenterological (n = 121)	84 (69.4)	37 (30.6)
CNS (n = 63)	34 (53.9)	29 (46.1)
Endocrinological (n = 51)	38 (74.5)	13 (25.5)
Genitourinary (n = 80)	42 (52.5)	38 (47.5)
Musculoskeletal/trauma (n = 274)	144 (52.6)	130 (47.4)
Pharmacological (n = 2)	0 (0)	2 (100)
Other (n = 70)	62 (88.6)	8 (11.4)

CNS = central nervous system.

*Either immediately or after a delay following a lack of response to initial treatment.

emergencies being most common regardless of season. Overall, 44.6% of emergency cases presented on weekday mornings, 45.8% on weekday evenings and 9.6% over the weekend. Within the individual health centres, the most common emergencies were musculoskeletal/trauma and gastroenterological at the Al Khoud (45.8% and 19.3%, respectively), Muscat (37.5% and 13.3%, respectively), Al Khuwair (31.3% and 16.3%, respectively) and Al Nahdha (27.5% and 14%, respectively) centres. However, at the Ruwi centre, the most common type of emergency was musculoskeletal/trauma (27.5%) followed by cardiovascular (15.8%).

In terms of outcome, 477 (59.6%) of the emergency cases were treated directly at the health centre, while 272 (34%) were referred immediately to tertiary care and a further 51 (6.4%) were referred due to a lack of response to initial treatment. Upon further analysis, 50 (69.4%), 130 (47.4%) and 29 (46.0%) cases of cardiovascular, musculoskeletal/trauma and central nervous system (CNS) emergencies were referred to tertiary care for further management [Table 2].

Of the 323 cases (40.4%) referred to tertiary care, only 39 (12.1%) were transported by ambulance and the rest by private transport. Among those referred to tertiary care, 50 (15.5%) were cardiovascular (i.e. ischaemic chest pain or acute heart failure) and 29 (9%) were CNS-related (i.e. seizures, transient ischaemic attacks and syncope) emergencies. Respiratory emergencies constituted 16 (5%) of the cases referred to tertiary care (i.e. asthma and chronic obstructive pulmonary disease) while endocrinological (i.e. diabetes), musculoskeletal/trauma (i.e. drowning or electrocution) and gastroenterological (i.e. acute abdomen) emergencies accounted for 13 (4%), 130 (40.2%) and 37 (11.4%) of the referred cases, respectively.

Discussion

The current study described the frequency and characteristics of emergency cases presenting to primary care settings in Muscat. Overall, the proportion of emergency cases was <2.5% at the five selected health centres. In contrast, the proportion of emergency cases presenting to PHC centres in Jeddah was 5.2%.⁴ It should be noted that this rate has been reported to be <3% and 4.6% in Norway and the Netherlands, respectively.^{9,10} The lower rate observed in the present study compared to those reported in other research studies could be due to the proximity and easy accessibility of the tertiary hospital in Muscat Governorate, thereby encouraging more serious or critical cases to present immediately to a tertiary

emergency department. Alternatively, it is also possible that the studied PHC centres had comparatively heavy patient turnovers and that many emergency cases were misregistered as routine outpatient cases.

In the current study, musculoskeletal/trauma-related cases were the most common type of emergency, regardless of age. This finding was consistent with previous research. Trauma was one of the most common emergencies observed by Mahfouz *et al.* in Abha along with burns and orthopaedic emergencies.¹ A similar outcome was also found in a study conducted in Selangor, Malaysia, with the most common emergencies being bronchial asthma, viral fever and trauma/injury.¹¹ In Oman, trauma or musculoskeletal emergencies are fairly common, particularly among adolescents and young adults; this is often attributed to the high incidence of road traffic crashes in the country.¹² However, in the present study, children constituted the majority of musculoskeletal/trauma cases. A previous study in Oman also found that injuries more predominantly affected children compared to older patients because of their increased physical activity, emotional immaturity and high propensity for risk-taking behaviours.⁶

Overall, the majority of emergency cases presenting to selected PHC centres in the current study involved individuals who were either between 21–39 or 5–12 years old. In the former group, there was a high percentage of genitourinary emergencies including gynaecological emergencies and renal colic. After musculoskeletal/trauma, gastroenterological emergencies were most common among children. This is to be expected, as children are generally more prone to trauma, gastroenterological issues and respiratory infections. In contrast, elderly patients made up a comparatively small proportion of emergency cases in the current study. Typically, most elderly patients in Oman have additional comorbidities and related complications and are, therefore, referred to tertiary care centres where they continue their follow-up; hence, such patients are often under-represented in PHC centres.

The majority of emergency cases (59.6%) in the current study were treated directly at the PHC centres, while the remaining cases (40.4%) were referred to a tertiary hospital. Among the referred cases, only 12.1% were transported by ambulance, with the other cases used private transport. While there are policies in place detailing ambulance escort guidelines, most families in Oman choose not to avail themselves of ambulance services. This is because most families own two or three cars each; hence, relatives often prefer to transport stable patients themselves. Similarly, a study

conducted in Selangor found that 40.3% of emergencies were referred to other hospitals, while the others were either advised to attend a follow-up appointment at a clinic (31.5%) or discharged upon recovery (28.2%).¹¹ On the other hand, the rate of hospital referrals was much lower at out-of-hours GP practices in Scotland, the Netherlands and Nottingham, UK (6.8%, 7.5% and 12%, respectively).^{9,13,14} In the current study, the higher referral rate could be due to the much higher percentage of trauma cases.

In Australia, Johnston *et al.* found that GPs saw a median of eight emergencies per year; of these, the most frequent were cases of acute asthma (72%), psychiatric emergencies (58%) and convulsions (49%); in addition, 95% of GPs had seen at least one patient potentially requiring resuscitation in the preceding year.³ Another survey conducted in South Carolina, USA, found that the average family practice office witnessed 3.8 annual paediatric emergencies.¹⁵ In light of the frequency with which emergency cases are presented in these settings, it is crucial that medical personnel working in PHC centres have sufficient knowledge and procedural skills as well as access to the necessary equipment and medications to provide optimum emergency care.¹⁶

The current study was undertaken to generate evidence to aid decision-making regarding the service-delivery capabilities of PHC centres and determine whether there is a need to incorporate specialised services for emergency cases. The implications of this study are that individuals in Oman do present to PHC centres with medical emergencies; moreover, just under two-thirds of such cases are treated directly at the PHC centres. Given the rate of presentation and treatment of emergency cases at PHC centres in Muscat, additional studies are needed to determine whether these centres have the capability and resources necessary to appropriately manage such cases. Emergency cases are often referred to tertiary care because their treatment entails additional observation or specialised knowledge, skills, equipment and medication. Previous research indicated that the symptoms most likely to be associated with referral to hospitals include chest pain, shortness of breath and localised abdominal pain.^{9,17} Likewise, the commonest complaint among those referred to tertiary care in the present study was chest pain. This was consistent with the findings reported by other studies.^{1,13} This is to be expected, as patients with chest pain may need immediate specialist intervention. However, the transfer of care to tertiary care facilities is not always feasible, particularly in light of the acute nature of emergency care. Delays in the admission or treatment of emergency cases have a significant

impact on patient outcomes besides placing an additional financial burden on the healthcare system by increasing subsequent length of stay and inpatient costs once such patients are eventually admitted.¹⁸ Unfortunately, many primary care physicians report being unprepared to deal with emergency cases or perform common emergency procedures, such as needle and surgical cricothyrotomies.^{3,19} A cross-sectional study conducted in Dammam, Saudi Arabia, revealed a severe lack of the resources necessary for the provision of emergency care at the PHC level; for instance, none of the centres had crucial emergency drugs or equipment, such as tracheostomy sets or cervical collars and only 38.46% were equipped with electrocardiography and X-ray machines.²⁰ Moreover, the researchers identified culture-specific factors that could potentially complicate this issue, such as the need for dedicated emergency services in both male and female sections of gender-segregated PHC facilities.²⁰ Apart from ensuring that appropriate systems, infrastructure and equipment are in place to deal with emergency cases, Kalidindi and Lacy and Kalidindi *et al.* encouraged primary care personnel to increase their preparedness for emergencies through mock scenarios, in situ simulated training activities and maintaining of basic and advanced life support certifications.^{21,22}

This study was subject to certain limitations. The results may have underestimated the actual number and type of emergencies that attend PHC centres, as only those cases specifically designated as emergency visits in the electronic record system were included in the analysis. Some cases involving real emergencies might have been incorrectly registered on the system as routine outpatient visits. Moreover, another limitation of the study was that the sample size was calculated using a large estimate of 50% prevalence, which was based on the anecdotal experience of PHC doctors. Additionally, the clustering of data in the analysis was not considered, as the aim of the study was to determine the simple proportion and types of emergencies presenting to PHC centres in Muscat. Furthermore, the study took place over a six-month period that included the summer months (June to August) during which time many individuals choose to leave Muscat for their annual holidays. Similarly, the holy month of Ramadan coincided with July 2016, which may have also affected the results, since many Muslims choose to delay medical visits to avoid having to wait and undergo interventions while fasting. It is, therefore, possible that results for the second half of the year would have been different. Finally, the current study excluded children under 5 years of age, as they are coded differently within the health information system

and emergency cases could not be distinguished. In addition, pregnancy-related emergencies were excluded, as such cases usually present directly to tertiary facilities with antenatal services.

Conclusion

Overall, the proportion of emergency cases presenting to primary care centres in Muscat, Oman, was <2.5%. Musculoskeletal/trauma was the most common type of emergency, regardless of demographic or geographical distribution. More than half of the total cases were managed directly at the PHC level although cardiovascular cases were usually referred to tertiary care by ambulance. Further research is necessary to evaluate the capacity of PHC centres to manage these cases. Moreover, additional equipment and training are recommended for GPs to ensure the provision of appropriate and effective emergency care.

CONFLICT OF INTEREST

The authors report no conflicts of interest.

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AUTHORS' CONTRIBUTION

AM, RM and FF conceptualised and designed the study. AM and RM collected the data. AM, RM, FF and AS analysed and interpreted the results. AM and RM drafted the manuscript. All authors reviewed the results and approved the final version of the manuscript.

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