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 type of emergency cases presenting to PHC centres in Muscat, Oman. Methods: This retrospective cross-sectional study was conducted from March to August 2016 at five PHC centres in Muscat Governorate. A total of 800 emergency cases (i.e. those labelled in the health information system as accident and emergency) presenting during this period and involving Omani patients aged ≥5 years were randomly selected for analysis, comprising every second case based on arrival to the registration desk. Electronic medical records were reviewed to collect data regarding demographic features, presenting complaints, time and season of presentation, management provided and, if referred to tertiary care, method of transportation. Results: The proportion of emergency cases was <2.5% (range: 1–2.5%). The most common type of emergency was musculoskeletal/trauma (34.3%), followed by gastroenterological (15.1%) and genitourinary (10%). Most patients were either 21–39 or 5–12 years old (35% and 21.6%, respectively). The majority (59.8%) were treated directly at the health centre, while 40.3% were referred to tertiary care. At referral, only 12.1% were
transported by ambulance, with the rest leaving via private transport. **Conclusion:**
Musculoskeletal/trauma was the most common type of emergency seen at 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 centres in Muscat.
- A small percentage of emergency cases at primary care centres required transportation by ambulance.

**Application to Patient Care**
- Patients attending the emergency room in primary care centres were referred to tertiary care most commonly 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.

**Introduction**
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 events can occur at any time and can 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. In Saudi Arabia, for instance, a study conducted in Abha by Mahfouz *et al.* found that the most common emergencies were trauma,
burns and orthopaedic injuries. In Jeddah, Aloufi et al. 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. In Oman, there were 1,613,308 outpatient visits to PHC centres in 2016 in Muscat; of these, approximately 1,419,666 visits were assigned to general practice clinics, including emergency cases. However, the exact nature of emergency cases seen by general practitioners (GPs) in PHC settings in Oman has not yet been explored, apart from a single study which determined that the rate of injury in primary care was 24 cases per 1,000 visits in 2010.

The healthcare system in Oman is divided into primary, secondary and tertiary levels, with the local population receiving free access to public healthcare under the Ministry of Health. At the PHC level, there were a total of 108 regional centres in 2016, of which 28 are located in six wilayats in Muscat Governorate, the region surrounding the capital city which comprises nearly 50% of the total population of Oman. 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 from a PHC centre. 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. While efforts have been made to launch an appointment-based system, the majority of PHC patients are still seen on a walk-in basis.

From an economic perspective, it is often difficult to plan for medical emergencies; as such, 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 morbidity and mortality rates and ensure an optimum level of care. As such, this study aimed to determine the proportion and types of emergencies presenting to selected primary care centres in Muscat. It is hoped that, in addition to helping to formulate an evidence-based policy for the implementation
of improved emergency services for patients with acute complaints in Oman, the outcomes of this study will help healthcare administrators in the delivery of appropriate staff training.

Methods

This retrospective cross-sectional study was conducted over a six-month period from March to August 2016 at selected PHC centres in Muscat Governorate. The target population included Omani nationals aged ≥5 years old visiting the centres during this period and labelled as emergency cases in the electronic medical record system based on the decision of the caregivers and receiving triage nurses, a standard procedure in all PHC centres. All patients who were younger (i.e. <5 years of age), pregnant women and routine cases were excluded from the study. Based on a 95% confidence level, anticipated prevalence of 50% and 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 of which 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 their size. Overall, the sample was distributed as follows: 192 cases (24%) from the Al Khoud centre in Seeb wilayat (county), 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 data sheet. 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 was included in the study. Three measures were sought for this study. Firstly, the demographic features of the patients were determined, including age,
gender and place of residence. Secondly, the presenting complaints as recorded by the treating physician in each case were noted, categorised according to different body systems (i.e. cardiovascular complaints included ischaemic chest pain, acute heart failure and palpitations). Lastly, the time and season of presentation, type of management provided (i.e. 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 (i.e. by private transport or ambulance) was 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 (i.e. both emergency plus 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**

The proportion of emergency cases was 1%, 2.5%, 1.6%, 2.3% and 1% at the Al Khoud, Al Khuwair, Muscat, Al Nahda and Ruwi primary health centres, respectively, for an overall rate of <2.5%. In total, 800 emergency cases presented to the primary health centres [Table 1]. 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%). Within the musculoskeletal/trauma emergencies, cuts and wounds were most common (n = 159; 58%), followed by fractures (n = 27; 9.9%). Among the gastrointestinal emergencies, vomiting (n = 59; 48.8%), gastroenteritis (n = 29; 24%) and acute abdomen (n = 32; 26.4%) 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.

In terms of age group, adults between 21–39 years (n = 280; 35%) and children between 5–12 years (n = 173; 21.6%) most frequently presented to primary care with emergencies and, respectively). Musculoskeletal/trauma and gastroenterological emergencies were most common in patients aged 5–12 (61.3% and 16.8%, respectively) and 13–20 years old (52.4% and 14.3%,
respectively). Moreover, those aged 21–39 years old most commonly presented with musculoskeletal/trauma (28.9%) and genitourinary (19.3%) emergencies, while cardiovascular (23.5%) and musculoskeletal/trauma (15.4%) emergencies were commonest in patients aged 40–60 years old. Finally, respiratory (21.1%) and cardiovascular (20.2%) emergencies were most common among those 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%), 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 in both winter and summer (50.1% and 49.9%, respectively), with musculoskeletal/trauma and gastroenterological 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 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, 478 (59.7%) of the emergency cases were treated directly at the health centre, while 271 (33.9%) were referred immediately to tertiary care and 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%) of cardiovascular, musculoskeletal/trauma and central nervous system (CNS) emergencies were referred to tertiary care for further management [Table 2]. Of the 322 cases (40.3%) referred to tertiary care, only 39 (12.1%) were transported by ambulance and the rest by private transport. Among those referred to tertiary care, 124 (38.5%) were cardiovascular (i.e. ischaemic chest pain or acute heart failure) and 82 (25.5%) were CNS-related (i.e. seizures, transient ischaemic attacks and syncope) emergencies. Respiratory emergencies constituted 57 (17.7%) of those 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 25 (7.8%), 17 (5.3%) and 17 (5.3%) of 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 attending PHC centres in Jeddah was 5.2%, while this rate has been reported to be <3% and 4.6% in Norway and the Netherlands, respectively. The lower rate observed in the present study in comparison to other research may be due to the proximity and easy accessibility of the tertiary hospital in Muscat Governorate, thus 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 mis-registered as routine outpatient cases.

In the current study, musculoskeletal/trauma-related cases were the most common type of emergency, regardless of age group. This finding is 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. Similar outcomes were also seen in a study conducted in Selangor, Malaysia, with the most common emergencies being bronchial asthma, viral fever and trauma/injury. In Oman, trauma or musculoskeletal emergencies are fairly common, particularly among adolescents and young adults, a factor often attributed to the high incidence of road traffic crashes in the country. 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.

Overall, the majority of emergency cases presenting to selected PHC centres in the current study were either 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 in 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 (59.8%) in the current study were treated directly at the PHC centres, while the remaining cases (40.3%) were referred to a tertiary hospital. Among the referred cases, only 12.1% were transported by ambulance, with the other cases leaving by 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, Omani relatives often prefer to transport stable patients themselves. Similarly, a study conducted in Selangor found that 40% of emergencies were referred to other hospitals, while the others were either advised to attend a clinic follow-up appointment (31.2%) or discharged upon recovery (28%). On the other hand, the rate of hospital referrals was much lower at out-of-hour GP practices in Scotland, the Netherlands and Nottingham, UK (6.8%, 7.5% and 12%, respectively). This may be due to the much higher percentage of trauma cases noted in the present study.

In Australia, Johnston et al. found that GPs saw a median of eight emergencies per year, of which 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. Another survey conducted in South Carolina, USA, found that the average family practice office witnessed 3.8 annual paediatric emergencies. Similarly, Ablah et al. observed that 62% of family medicine and child care offices in New York saw at least one child requiring hospitalisation or urgent treatment on a weekly basis. In light of the frequency with which emergency cases present 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.
This study was undertaken to generate evidence to aid decision-making regarding the service-delivery capabilities of PHC centres and whether there is a need to incorporate specialised services for emergency cases. The implications of the current study show 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 indicates that the symptoms most likely to be associated with referral to hospital include chest pain, shortness of breath and localised abdominal pain.\textsuperscript{9,18} Likewise, the commonest complaint among those referred to tertiary care in the present study was chest pain. This was consistent with findings reported from Abha and Nottingham.\textsuperscript{1,13} This is to be expected as patients with chest pain may need immediate specialist intervention.

Regardless, 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 as well as placing an additional financial burden on the healthcare system by increasing subsequent length of stay and inpatient costs once such patients are eventually admitted.\textsuperscript{19} Unfortunately, many primary care physicians report being unprepared to deal with emergency cases or perform common emergency procedures, such as needle and surgical cricothyrotomies.\textsuperscript{3,20} A cross-sectional study conducted in Dammam, Saudi Arabia, revealed a severe lack of 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.\textsuperscript{21} Moreover, the researchers identified culture-specific factors which could potentially complicate this issue, such as the need for dedicated emergency services in both male and female sections of gender-segregated PHC facilities.\textsuperscript{21} Apart from ensuring that appropriate systems, infrastructure and equipment are in place to deal with emergency cases, Kalidindi \textit{et al.} encouraged primary care personnel to increase their preparedness for emergencies via mock
scenarios, *in situ* simulated training activities and maintaining basic and advanced life support certifications.\textsuperscript{22,23}

Certain limitations were present in this study. 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. It is possible that some cases involving real emergencies were 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. Also, 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 current study took place over a six-month period which included the summer months (June to August) wherein many individuals choose to leave Muscat for their annual holidays. Similarly, the holy month of Ramadan took place over July 2016 which may also have affected the results, since many Omanis 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 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 is recommended for general practitioners to ensure the provision of appropriate and effective emergency care.

**Conflict of Interest**
The authors report no conflicts of interest.

**Funding**

No funding was received for this study.

**References**


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

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type of emergency</strong></td>
<td></td>
</tr>
<tr>
<td>Cardiovascular</td>
<td>72 (9)</td>
</tr>
<tr>
<td>Respiratory</td>
<td>67 (8.4)</td>
</tr>
<tr>
<td>Gastroenterological</td>
<td>121 (15.1)</td>
</tr>
<tr>
<td>CNS</td>
<td>63 (7.9)</td>
</tr>
<tr>
<td>Endocrinological</td>
<td>51 (6.4)</td>
</tr>
<tr>
<td>Genitourinary</td>
<td>80 (10)</td>
</tr>
<tr>
<td>Musculoskeletal/trauma</td>
<td>274 (34.3)</td>
</tr>
<tr>
<td>Pharmacological</td>
<td>2 (0.3)</td>
</tr>
<tr>
<td>Other</td>
<td>70 (8.8)</td>
</tr>
<tr>
<td><strong>Age in years</strong></td>
<td></td>
</tr>
<tr>
<td>5–12</td>
<td>173 (21.6)</td>
</tr>
<tr>
<td>13–20</td>
<td>84 (10.5)</td>
</tr>
<tr>
<td>21–39</td>
<td>280 (35)</td>
</tr>
<tr>
<td>40–60</td>
<td>149 (18.6)</td>
</tr>
<tr>
<td>&gt;60</td>
<td>114 (14.3)</td>
</tr>
<tr>
<td><strong>Outcome</strong></td>
<td></td>
</tr>
<tr>
<td>Type of emergency</td>
<td>Outcome, n (%)</td>
</tr>
<tr>
<td>---------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Cardiovascular</td>
<td>26 (36.1)</td>
</tr>
<tr>
<td>Respiratory</td>
<td>51 (76.1)</td>
</tr>
<tr>
<td>Gastroenterological</td>
<td>84 (69.4)</td>
</tr>
<tr>
<td>CNS</td>
<td>34 (53.9)</td>
</tr>
<tr>
<td>Endocrinological</td>
<td>38 (74.5)</td>
</tr>
<tr>
<td>Genitourinary</td>
<td>42 (52.5)</td>
</tr>
<tr>
<td>Musculoskeletal/trauma</td>
<td>144 (52.6)</td>
</tr>
<tr>
<td>Pharmacological</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Other</td>
<td>62 (88.6)</td>
</tr>
</tbody>
</table>

*CNS = central nervous system. *Either immediately or after a delay following a lack of response to initial treatment.*