# Disaster Medicine and Public Health Preparedness

## Abstract

**Background:** The objective of this study is to describe medical emergencies occurring at people's homes requiring first aid; characteristics, burden and impact on functional outcome. Method: a confidential, cross-sectional survey, primarily based on 2015 American Heart Association and American Red Cross first aid guidelines, was conducted among adults (>18 years) from 12 education centers, Ministry of Awqaf and Islamic Affairs, state of Kuwait. Results: A total of 3200 self-administered questionnaires were distributed between 16 September–30 November 2019. Medical emergencies prevalence 118.5 per 100,000s/year. Women were more likely to encounter medical emergencies 78% (n=238). Victims above 18 years of age were more likely to experience hypertension 39% (n=155), while children suffered from hypoglycaemia 19% (n=32) or burns 17% (n=20). Compliance with first aid guidelines was seen in, hypoglycaemia 1% (n=4) but lacking during burns incidents 44% (n=15). Participants called the ambulance only in seizures 50% (n=13), 52% of medical emergencies required attendance at a healthcare facility and 29% required hospital admission. 15% of victims missed school or day of work and 28% had impaired functional outcomes. Conclusion: Home medical emergencies are relatively common in Kuwait. Public training on first aid is low. Kuwait has unique medical emergencies. Hypoglycaemia, seizure and burns are the most frequent medical emergencies at home. Medical emergencies are causing a burden on healthcare system. Quarter of medical emergencies had negative impact on victim's functional outcome.

**Keywords:** First aid, Accident, Functional outcome, Burden, Kuwait
Title: Medical emergencies requiring first aid at home: A population-based survey study.

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Study conception and design: DA.

Acquisition of data: DA

Analysis and interpretation of data: DA

Drafting of manuscript: RB, EM.

Critical revision: RB, EM.

All authors read and approved the final manuscript.
Abstract

Background: Most medical emergencies requiring first-aid occur at home. Little is known about the prevalence of specific medical emergencies at home requiring first aid. The objective of this study is to describe medical emergencies occurring at people’s homes requiring first aid; characteristics, burden and impact on functional outcome and to address the national public knowledge and practices of first aid. Method: a confidential, cross-sectional survey primarily based on 2015 American Heart Association (AHA) and American Red Cross first aid guidelines, was conducted among adults (>18 years) from 12 educational centers, Ministry of Awqaf and Islamic affairs, state of Kuwait. Results: A total of 3000 self-administered questionnaires were distributed between 16 September-30 November 2019. The response rate was 34% (n= 1033 participants) and 1% (n= 11) were partially answered questionnaires leaving 1022 questionnaires for valid statistical analysis. The prevalence of medical emergencies 118.5 per 100,000/ year. Level of public knowledge 19%. Medical emergencies were more likely to occur in Hawalli province 49%(n=149), women were more likely to encounter medical emergencies 78%(n=238). Victims above 18 years of age were more likely to experience hypoglycemia 39%(n=55) and children were more likely to suffer from hypoglycemia 19%(n=22) or burns 17%(n=20). Compliance with first aid guidelines was seen in, hypoglycemia 31%(n=44) but lacking in burn incidents 44%(n=15). Participants called the ambulance in seizures 50% (n=13), 62% of medical emergencies required attendance at a healthcare facility and 29% required hospital admission. 15% of victims missed school or day of work and 25% had impaired functional outcome. Conclusion: Home medical emergencies are relatively common in Kuwait. Public training on first aid is low. Kuwait has unique medical emergencies. Hypoglycaemia, seizure and burns are the most frequent medical emergencies at home. Medical emergencies are causing a burden on healthcare system. Quarter of medical emergencies had negative impact on victim’s functional outcome.
26 **Introduction:**

27 First aid is defined as the helping behaviour and initial care provided for an acute illness or 28 injury\(^{(1)}\). Indeed, it is the provision of initial care for an illness or injury, usually by a non- 29 expert but trained person, until medical treatment can be accessed \(^{(2)}\). Provision of immediate 30 first aid to patients who require emergency care can make a significant difference to the 31 outcome \(^{(3)}\), as the first action taken for management of injuries and common illness decides 32 the future course of disease and complication rates \(^{(4)}\). In certain self-limiting illnesses or minor 33 injuries, appropriate first aid measures may be sufficient to avoid a medical consultation \(^{(4)}\).

34 Most incidents requiring first-aid occur in places where people feel secure – at home in 35 particular \(^{(1)}\). 41.4 percent of accidents in the United Kingdom happen at home, whilst 19.5 36 percent are on roads \(^{(1)}\). Among children, injuries from home accidents actually constitute a 37 public health problem. According to the National Safe Kids Campaign in the United States 38 40% of deaths and 50% of non-fatal unintentional injuries occur in and around the home \(^{(2)}\),

39 In Europe alone, visits to hospital Emergency Department (ED) following an incident in the 40 home reached 20.2 million a year \(^{(3)}\). First aid education and training not only save lives but 41 also reduces the severity of medical emergencies, the high cost of medical treatment and the 42 long-term consequences of severely injuries people \(^{(5)}\). And although first aid is not a 43 replacement of emergency medical services (EMS), it’s a vital and effective initial 44 intervention. EMS systems response time in developed countries varies between 6-8 minutes 45 \(^{(6)}\). The local EMS systems mean response time 9.3±5 minutes \(^{(7)}\). Potential life saving measures 46 for home incidents need to be delivered in a narrower time window by witnessing bystanders 47 \(^{(1-6)}\).

48 The 2015 American Heart Association and American Red Cross Guidelines Update for first 49 aid divide emergency cases in to medical and trauma emergencies. Medical emergencies 50 include the following: shortness of breath, stroke, chest pain, anaphylaxis, hypoglycaemia, 51 seizure, cardiac arrest, syncope and poisoning while trauma emergencies include: obstructed 52 airway, bleeding, wounds, burns and spinal injury.

53 To date, Middle Eastern countries have limited studies on medical emergencies at home \(^{(8-10)}\). 54 Medical emergencies at home have not yet been reported in Kuwait. The objective of this 55 study is to describe medical emergencies occurring at people’s homes; characteristics, burden
and impact on functional outcome and to address the national public knowledge and practices of first aid.

Research question: What is the public knowledge and practices of first aid in Kuwait? What are the medical emergencies occurring at people’s homes, characteristics, burden and impact on functional outcome?

Method

A qualitative descriptive approach was used to analyse the case studies. This approach was used to develop an in-depth description and analysis of multiple cases. A confidential, cross-sectional survey conducted among education centers, Ministry of Awqaf and Islamic affairs, state of Kuwait [11]. The study targeted participants from 12 education centers across Kuwait’s six provinces: Al Asimah, Hawalli, Al Farwanya, Al Jahra, Mubarak Al Kabeer and Al Ahmadi

Study design and Setting:

There are 90 education centers across Kuwait’s six provinces with 20,000 enrolled students above the age of 18[11]. The education centers accept all adult applicants regardless to their age, gender, nationality or background [11]. Their wide distribution all over Kuwait provinces and their mixed culture in terms of age, professional background, nationalities and gender made education centers’ population representative of Kuwait population with its variable demographics [32].

The investigator approached the administration department of two education centers in each province to disseminate a paper-based questionnaire about medical emergencies at home. The administration departments then distributed the questionnaire to students via the teaching staffs.

To optimise representativeness of the population, teaching staff administered the questionnaire randomly to participants during the general required classes in which participants from all specialities are registered and allowed 15 minutes to complete the questionnaire. Participants completed a multiple-choice question on their medical emergencies at home occurring at their homes during the year of 2018. Therefore no reminder were used.
Study instruments and variables assessment:

The questionnaire included 15 multiple choice questions with space for additional answers. The questionnaire categories included demographic characteristics of participants (5 items), general first aid knowledge (1 item), medical emergencies at home (3 items), medical emergencies practice (1 item), and medical emergencies burden (2 items), and medical emergencies impact (2 items). Aside from the participants demographic information, the questionnaire domains were primarily based on 2015 American Heart Association and American Red Cross first aid guidelines.

In the questionnaire, general first aid knowledge is assumed from the undertaking of ‘first aid training. The occurrence of medical emergencies at home is a yes/no response, while the type of medical emergency is based on the 2015 American Heart Association and American Red Cross first aid list of emergencies. The initial practices at the time of medical emergency at home were again founded on 2015 American Heart Association’s and American Red Cross’ first aid recommendations. A participant who selected a response that is compliant with the AHA recommendation was categorised as ‘appropriate management, in-line with AHA recommendation’. A participant who chose a response non-compliant with AHA recommendation was categorised as ‘inappropriate management, not in-line with AHA recommendation’. In this item, we also included two responses; ‘not doing anything’ and ‘calling the ambulance’. These responses were categorised as ‘no action’ in our analysis.

The burden of the medical emergencies was assessed by identifying whether a consultation at a health care facility occurred and whether a hospital admission was required.

The impact of medical emergencies on functional outcome was assessed by evaluating functional outcome after the incident occurrence and the length of period of recovery. This is because measures of functional outcome and general well-being are becoming increasingly important in evaluating strategies to reduce the burden of injury. We define functional outcome as which is defined as limitations in activities of daily living including toilet use, grooming, bathing, dressing, feeding and transfer and recovery period is the time required for a patient to return to his/her normal function.

The questionnaire was scrutinised by an expert, reviewer for refinement and re-wording of questions to ensure that statements were understandable and meaningful to the participants, the reviewer also ensured that there was face validity. Two review rounds were conducted.
before the questionnaire was concluded. Reliability of questionnaire items was examined using SPSS split-half reliability index formula on 50 initial participants. Problematic items were removed once a correlation coefficient of ($r$) $>$ 0.80 was established.

Sample size

All participants were recruited from the identified education centers and were adults (>$18$ years old) enrolled at the college between 15 September and 30 November 2019. The calculated minimum target sample size was 385 (n) using Cochran’s formula. This was based on the Kuwait current population being 4,137,000 people, setting a power of 95%.

Random sampling was used to obtain the study population.

Statistical methods

All data were analyzed using SPSS (Version 23 for Windows) (SPSS Statistics for Windows, Version 23.0. Armonk, NY: IBM Corp). Frequency distribution and descriptive criteria were calculated. Questionnaire responses were compared using Chi-squared test. A $P < 0.05$ was considered to indicate statistical significance in all cases.

Ethical Considerations

Ethical approval was granted approved by IRB committee on December 5 2019. Consent is anticipated with completion of the questionnaire. Participant confidentiality is ensured as the questionnaire forms were anonymous.

Results

A total of 3000 self-administered questionnaires were distributed randomly among Kuwait six provinces. The response rate was 34% (n= 1033 participants) and 1% (n= 11) were partially answered questionnaires leaving 1022 valid questionnaires for statistical analysis.

Of the 1022 participants, 30% (n=303) reported medical emergencies occurrence at their homes, A prevalence of 118.5 per 100,000/year.

Level of public knowledge
152 19% of participants had received previous first aid training. Women (53%) and people with
153 a non-health related background (49%) were the most likely to have attended first aid training.
154 Moreover, had the highest rates of trained lay people in Kuwait (35%) followed by Al-Ahmadi
155 province (22%) and the lowest in Mubarak Al-Kabeer province (7%). Having received
156 previous training in First Aid doubled the lay persons chance of proving appropriate
157 management in medical emergencies at home (Table 1).

158 Characteristics of medical emergencies
159
160 Medical emergencies were more likely to occur in Hawai province 49%(n=149). Females
161 participants were more likely to report medical emergencies at their homes 78%(n=238)
162 (Figure 1). Victims of medical emergencies had variable presentations. Victims above 18
163 years of age were more likely to experience hypoglycemia 39%(n=55). Whereas victims 1-8
164 years of age group were more likely to suffer from hypoglycemia 19%(n=22) or burns 17
165 %(n=20) (Figure 2). In terms of compliance with first aid guidelines during medical
166 emergencies, hypoglycemia was the most appropriately managed medical emergency
167 31%(n=44), whilst burns were the least appropriately managed incident 44%(n=15).
168 Participants were more likely to call an ambulance without providing first aid during seizures
169 50% (n=13) (Figure 3).

Impact and burden of medical emergencies at home

170 Overall 62% of medical emergencies required attendance at a healthcare facility and 29%
171 required hospital admission, a prevalence of 117.4 per 100,000 a year. Incidents of
172 hypoglycemia and seizures incidents were more likely to require a health care facility visit and
173 hospital admission (Table 2).

174 In terms of impact on victims of medical emergencies, 15% missed school or day of work or
175 school and 25% had impaired functional outcome (Table 3).
Discussion

Level of public knowledge

The observed level of training among the public is within range of western countries (95%-5%) (35) but lower than regional countries, 33.8% (36). This maybe because first aid training is voluntary in Kuwait.

Our analysis showed first aid training doubled participant’s chance of providing appropriate management during medical emergencies. First aid programs are known to cause better help and higher helping rates (37).

Characteristics of medical emergencies

Our study reports unique characteristics of medical emergencies at home. Victim’s age, medical emergency type were all new to the literature. In the United States, unintentional home incidents were more likely to occur among the over 75 years age group (37). Poisoning and falls were the commonest underlying causes of those medical emergencies (37).

There are also some discrepancies in participant’s initial practices during medical emergencies at home. Our study participants appropriately managed hypoglycaemia but poorly managed burns. Inadequate first aid is common during burn’s management (18-19). Furthermore, no action was taken during seizure emergencies. Providing first aid for seizures appears to be a global challenge, O’Hara 2007 et al documented low first aid provision during seizures in a group of school nurses, EMS personnel and teachers (20).

Impact and burden of medical emergencies

Medical emergencies at home caused a burden on the health care system. 56% of medical emergencies required health care facility. To our knowledge, this is the first study to estimate victim’s approach to health care facility after medical emergency (21-22). The burden was again confirmed by high hospital admission rate.

More over medical emergencies at home had a negative impact on functional outcome and recovery time. These outcomes have never been addressed before in the literature.
The main strengths of this study are the following: This is the first study that complies with the 2015 American Heart Association and Red Cross guidelines and recommendations during medical emergencies evaluation. Second, the proposed study is the first to evaluate home medical emergencies impact on functional outcome. Third, this research is one of few to address impact of first aid training of appropriate management during medical emergencies at home on a national level, this is the first national study on medical emergencies at home of Kuwait.

Limitations

Limitations of the study include; the nature of a self-administered survey which is based on recall making it open to bias. The current study maximized the optimum recall period, by asking respondents to record events with in the last 12 months. Another limitation is that although the sample size is appropriate to Kuwaiti population, other countries in the region are more heavily populated. Therefore the replication of this study in another setting can produce different results.

Conclusion:

Home medical emergencies are relatively common in Kuwait. Public training on first aid is low. Kuwait has unique medical emergencies. Hypoglycaemia, seizure and burns are the most frequent medical emergencies at home. Medical emergencies are causing a burden on healthcare system. Quarter of medical emergencies had negative impact on victim’s functional outcome.

References:


4. Goel, S., Singh, A. Comparative impact of two training packages on awareness and practices of first aid for injuries and common illnesses among high school students in India. International.


**Legend section:**

**Table 1.** Compares between lay people with previous first aid training versus those with no previous first aid training in terms of demographics and impact on management, using Chi square test.

**Table 2.** Comparison between medical emergencies in terms of burden on health care facilities, Using Chi-square test.
Table 3. Comparison between medical emergencies in terms of impact on functional outcome, Using Chi-square test.

Figure 1. Participants gender during each medical emergency.

Figure 2. Age of victims of home medical emergencies in Kuwait.

Figure 3. Level of compliance with first aid guidelines during the management of each first aid related incident.
Table 1 Compares between lay people with previous first aid training versus those with no previous first aid training in terms of demographics and impact on management, using Chi square test:

<table>
<thead>
<tr>
<th>Variables</th>
<th>First-aid Previous training N=196 (%)</th>
<th>No First-aid Previous training N=828 (%)</th>
<th>P-value (CI=95%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Male</td>
<td>91 (47)</td>
<td>198 (23)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>b. Female</td>
<td>105 (53)</td>
<td>659 (77)</td>
<td></td>
</tr>
<tr>
<td>2. Nationality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Kuwaiti</td>
<td>93 (48)</td>
<td>361 (43)</td>
<td>.29</td>
</tr>
<tr>
<td>b. Non-Kuwaiti</td>
<td>103 (52)</td>
<td>467 (58)</td>
<td></td>
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<tr>
<td>3. Background</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Non-Health related</td>
<td>96 (49)</td>
<td>275 (33)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>b. Health related</td>
<td>99 (51)</td>
<td>253 (30)</td>
<td></td>
</tr>
<tr>
<td>c. Unemployed</td>
<td>99 (51)</td>
<td>289 (34)</td>
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<tr>
<td>4. Province</td>
<td></td>
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<tr>
<td>a. Al-Asimah</td>
<td>24 (12)</td>
<td>82 (10)</td>
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<tr>
<td>b. Hawali</td>
<td>69 (35)</td>
<td>428 (52)</td>
<td></td>
</tr>
<tr>
<td>c. Al-Farwany</td>
<td>17 (9)</td>
<td>71 (8)</td>
<td></td>
</tr>
<tr>
<td>d. Muhark Al-Khabur</td>
<td>12 (7)</td>
<td>60 (7)</td>
<td></td>
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<tr>
<td>e. Al-Ahmadi</td>
<td>42 (22)</td>
<td>98 (12)</td>
<td></td>
</tr>
<tr>
<td>f. Al-Jahra</td>
<td>29 (15)</td>
<td>86 (11)</td>
<td></td>
</tr>
<tr>
<td>5. Type of management</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Within AHA* guidelines</td>
<td>39 (20)</td>
<td>85 (11)</td>
<td></td>
</tr>
<tr>
<td>b. Not within AHA* guidelines</td>
<td>21 (11)</td>
<td>31 (4)</td>
<td>.001</td>
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<tr>
<td>c. Called the ambulance</td>
<td>7 (4)</td>
<td>43 (5)</td>
<td></td>
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<tr>
<td>d. No action</td>
<td>6 (4)</td>
<td>81 (5)</td>
<td></td>
</tr>
<tr>
<td>e. Did not have a first aid incident</td>
<td>117 (60)</td>
<td>594 (71)</td>
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</tr>
<tr>
<td>Type of incident</td>
<td>Hypoglycaemia</td>
<td>Shocking</td>
<td>Chest pain</td>
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</tr>
<tr>
<td>Health care facility approach</td>
<td>55</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Hospital admission</td>
<td>29</td>
<td>1</td>
<td>5</td>
</tr>
</tbody>
</table>

Note: SOB* = Shortness of breath
Table 3. Comparison between first aid-related incidents in terms of impact on functional outcome, using Chi-square test.

<table>
<thead>
<tr>
<th>N</th>
<th>Type of incident</th>
<th>Hypoglycaemia</th>
<th>Choking</th>
<th>Chest pain</th>
<th>Syncope</th>
<th>Seizures</th>
<th>SOB*</th>
<th>Wounds</th>
<th>Bleeding</th>
<th>Burn</th>
<th>Anaphylaxis</th>
<th>Stroke</th>
<th>Fracture</th>
<th>Slip/fall</th>
<th>Others</th>
<th>P-value (CI=95%)</th>
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<td>1. Functional outcome</td>
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<tr>
<td></td>
<td>a. Missed school or day at work</td>
<td>18</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>8</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
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<td></td>
<td>b. Could not practice daily activities</td>
<td>21</td>
<td>1</td>
<td>5</td>
<td>5</td>
<td>9</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>8</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td>&lt;.001</td>
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<tr>
<td></td>
<td>Mortality</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
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<td>2. Recovery period</td>
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<td>&lt;1 month</td>
<td>30</td>
<td>4</td>
<td>4</td>
<td>7</td>
<td>12</td>
<td>8</td>
<td>24</td>
<td>8</td>
<td>17</td>
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<td>1</td>
<td>&lt;.001</td>
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<td></td>
<td>&lt;1 year</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4</td>
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<td>1</td>
<td>3</td>
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<tr>
<td></td>
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<td>1</td>
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<td>1</td>
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</table>
Note: SOP = Standard of Practice
Figure 1. Participants gender during each medical emergency.
Figure 2. Victims age of medical emergencies at home.
Figure 3. Level of compliance with first aid guidelines during the management of each first aid related incident.