ORIGINAL RESEARCH

Medical Emergencies Requiring First Aid at Home: A Population-Based Survey Study

Dalal Al Hasan, MD, MS, PhD; Eloise Monger, PhD; Richard Brightwell, MS, PhD

ABSTRACT

Background: Most medical emergencies requiring first-aid occur at home. Little is known about the prevalence of these medical emergencies.

Objective: The objective of this study is to describe medical emergencies occurring at people's homes requiring first aid; characteristics, burdens and impact on functional outcome, and to address the national public knowledge and practice of first aid.

Method: A confidential, cross-sectional survey, primarily based on the *2015 American Heart Association (AHA) and American Red Cross first aid guidelines*, was conducted among adults (>18 years) from 12 educational centers, under the Ministry of Awqaf and Islamic affairs, State of Kuwait.

Results: A total of 3000 self-administered questionnaires were distributed from September 16 2019 to November 30, 2019. The response rate was 34% (n = 1033 participants) of which 1% (n = 11) were partially answered questionnaires leaving 1022 questionnaires for valid statistical analysis. The prevalence of medical emergencies was 118.5 out of 100000 per year and the level of public knowledge was 19%. Medical emergencies were more likely to occur in Hawali 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), with 62% of medical emergencies requiring attendance at a health-care facility and 29% requiring hospital admission. Of the victims, 15% missed school or a day of work, and 25% had impaired functional outcomes.

Conclusion: Medical emergencies occurring at home are relatively common in Kuwait, and public training on first aid is low. Kuwait has unique medical emergencies, with hypoglycemia, seizures and burns being the most frequent emergencies that occur at home. These emergencies cause a burden on the health-care system with a quarter of them having negative impact on the victim's functional outcome.

Key Words: first aid, functional outcome, accident, Kuwait

First aid is defined as the helping behavior and initial care provided for an acute illness or injury.[1] Indeed, it is the provision of initial care for an illness or injury, usually by a non-expert but trained person until medical treatment can be accessed.[2] Providing immediate first aid to patients who require emergency care can make a significant difference in the outcome,[3] as the first action taken for management of injuries and common illness decides the future course of disease and complication rates.[4] In certain self-limiting illnesses or minor injuries, appropriate first aid measures may be sufficient to avoid a medical consultation.[4]

Most incidents requiring first-aid occur in places where people feel secure – at home in particular.[5] In the United Kingdom, 41.4% of accidents happen at home, while 19.5% are on roads.[5] Among children, injuries from home accidents actually constitute a public health problem. According to the National Safe Kids Campaign in the United States, 40% of deaths and 50% of non-fatal un-intentional injuries occur in and around the home.[2]

In Europe alone, visits to the hospital Emergency Department (ED) following an incident in the home reach 20.2 million a year.[5] First aid education and training, not only saves lives but also reduce the severity of medical emergencies, the high cost of medical treatment and the long-term consequences of severely injuries people.[5] Although first aid is not a replacement of the emergency medical services (EMS), it is a vital and effective initial intervention. The response time of EMS systems in developed countries vary between 6 and 8 minutes.[6] The local EMS system's mean response time is 9.3 ± 5 minutes.[7] Potential life-saving measures for home incidents need to be delivered within a narrower time frame by witnessing bystanders.[5,6]

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The 2015 American Heart Association and American Red Cross Guidelines Update for First aid divides emergency cases into medical and trauma emergencies. Medical emergencies include shortness of breath, stroke, chest pain, anaphylaxis, hypoglycemia, seizure, cardiac arrest, syncope, and poisoning; while trauma emergencies include obstructed airways, bleeding, wounds, burns, and spinal injury.

Middle Eastern countries, including Kuwait, have limited studies on medical emergencies at home.[8-10] The objective of this study, therefore, is to describe the medical emergencies occurring in people's homes, in terms of characteristics, burdens, 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 practice of first aid in Kuwait? What are the medical emergencies occurring in people's homes, and the characteristics, burdens and impact on functional outcome?

METHOD

A qualitative descriptive approach was used to analyze the case studies. This approach was used to develop an in-depth description and analysis of multiple cases: a confidential and cross-sectional survey conducted among education centers and the 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, Hawali, Al Farwanya, Al Jahra, Mubarak Al Kabeer, and Al Ahmidi.[11]

Study Design and Setting

There are 90 education centers across Kuwait's six provinces with 20000 enrolled students above the age of 18.[11] These education centers accept all adult applicants regardless of their age, gender, nationality, or background. Their wide distribution all over Kuwait's provinces and their mixed culture in terms of age, professional background, nationalities, and gender makes them a representative of Kuwait's population with their variable demographics.[12]

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

To optimize the representativeness of the population, the teaching staff administered the questionnaires randomly to participants during the general required classes in which participants from all specialties were registered, and allowed 15 minutes to complete the questionnaire. Participants also completed a multiple-choice question on the medical emergencies that had occurred in their homes during the year 2018, so no reminders were used.

Study Instruments and Variables Assessment

The questionnaire included 15 multiple choice questions with space for additional answers. Questionnaire categories included the demographic characteristics of participants (5 items), general first aid knowledge (1 item), medical emergencies at home (3 items), medical emergency practices (1 item), medical emergency burdens (2 items), and medical emergency impact (2 items). Apart from the participants' demographic information, the questionnaire's domains were primarily based on The 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 the 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 categorized as 'appropriate management, in-line with AHA recommendation.' A participant who chose a response non-compliant with AHA recommendation was categorized 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 categorized 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 the 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.[13] We define functional outcome as *limitations in activities of daily living including toilet use, grooming, bathing, dressing, feeding, and transfer*.[10] The recovery period is the time required for a patient to return to his / her normal function.

The questionnaire was scrutinized 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 (IBM Corp, Armonk, NY)

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TABLE 1

Comparison Between Laypeople With Prior First Aid Training and Those With no Previous First Aid Training in Terms of Demographics and Impact on Management Using a Chi-Square Test

Variables	Previous First Aid Training n = 194 (%)	No Previous First Aid Training n = 828 (%)	*P-value* (CI = 95%)
1. Gender			
a. Male	91 (47)	198 (23)	<0.001
b. Female	103 (53)	639 (77)	
2. Nationality			
a. Kuwaiti	93 (48)	361 (43)	0.29
b. Non-Kuwaiti	101(52)	467 (58)	
3. Background			
a. Non-health related	96 (49)	275 (33)	<0.001
b. Health related	39 (20)	23 (3)	
c. Unemployed	59 (31)	289 (64)	
4. Province			
a. Al-Asimah	24 (12)	82 (10)	<0.001
b. Hawali	69 (35)	428 (52)	
c. Al-Farwanya	17 (9)	71 (8)	
d. Mubarak Al-Kabeer	12 (7)	60 (7)	
e. Al-Ahmidi	42 (22)	98 (12)	
f. Al-Jahra	29 (15)	86 (11)	
5. Type of Management			
a. Within AHA guidelines	39 (20)	85 (11)	0.001
b. Not within AHA guidelines	21 (11)	68 (8)	
c. Called the ambulance	7 (5)	43 (6)	
d. No action	6 (4)	31 (5)	
e. Did not have a first aid incident	117 (60)	594 (71)	

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 September 15, 2019 and November 30, 2019.

The calculated minimum target sample size (n) was 385 using Cochran's formula. This was based on Kuwait's current population of 4137000 people and 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), and SPSS Statistics for Windows (Version 23.0, IBM Corp, Armonk, NY). Frequency distribution and descriptive criteria were calculated. Questionnaire responses were compared using chi-square test. A $P < 0.05$ was considered to indicate statistical significance in all cases.

Ethical Considerations

Ethical approval was granted by the Institutional Review Board (IRB) committee on December 5, 2019. Consent was anticipated with completion of the questionnaire and participant confidentiality was ensured as the questionnaire forms were anonymous.[14]

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, resulting in a prevalence of 118.5 out of 100000 per year.

Level of Public Knowledge

Of the participants, 19% had prior first aid training. Women (53%) and people with a non-health related background (49%) were the most likely to have attended the first aid training. Moreover, Hawali province had the highest rates of trained lay people in Kuwait (35%), followed by Al-Ahmadi province (22%), with the Mubarak Al-Kabeer province having the lowest rates (7%). Having received previous training in First Aid doubled the chances lay persons had of providing appropriate management in medical emergencies at home (Table 1).

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FIGURE 1

Gender Profile of Participants During Medical Emergencies.

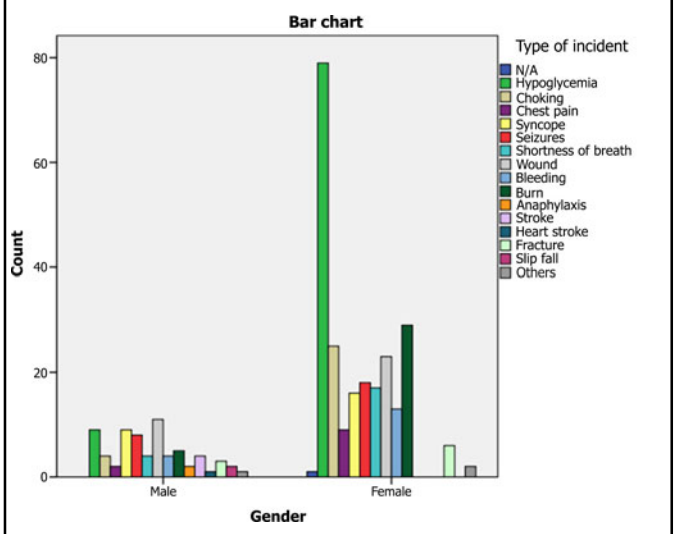
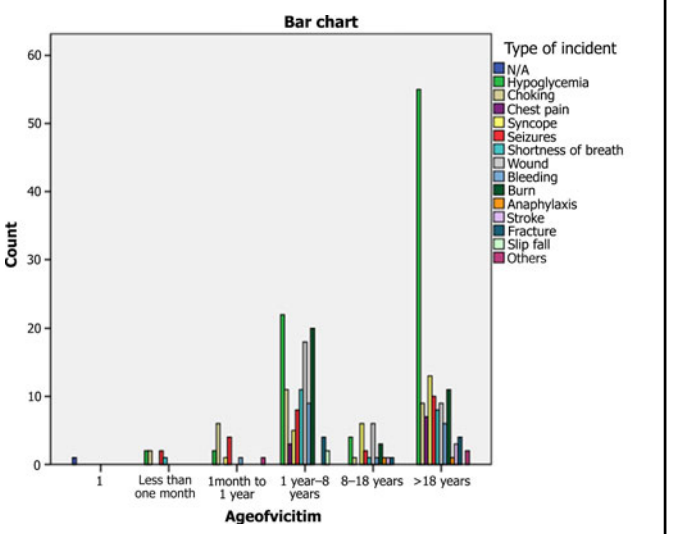


FIGURE 2

Age of Victims of Medical Emergencies at Home.

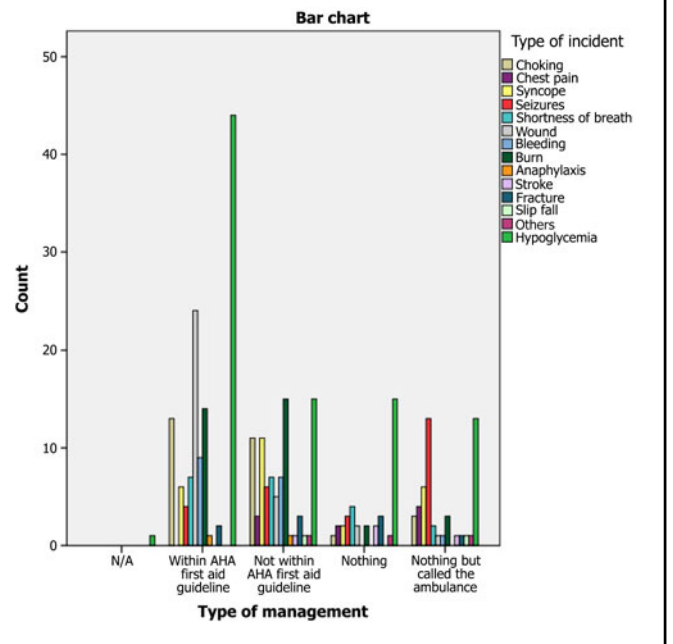


Characteristics of Medical Emergencies

Medical emergencies were more likely to occur in the Hawali province (49%, n = 149). Female participants were more likely to report medical emergencies in their homes (78%, n = 238) (Figure 1). Victims of medical emergencies had variable presentations. Victims above 18 years of age were more likely to experience hypoglycemia (39%, n = 55) whereas, victims between 1 and 8 years were more likely to suffer from hypoglycemia (19%, n = 22) or burns (17%, n = 20) (Figure 2). In terms of compliance with first aid guidelines during medical emergencies, hypoglycemia was the most appropriately managed medical emergency (31%, n = 44), whilst burns were the least appropriately managed incident (44%, n = 15). Participants were more likely to call an ambulance without providing first aid during seizures (50%, n = 13) (Figure 3).

FIGURE 3

Level of Compliance With First Aid Guidelines During the Management of Each First Aid-Related Incident.



Impact and Burden of Medical Emergencies at Home

Overall, 62% of medical emergencies required reporting at a health-care facility and 29% required hospital admission—a prevalence of 117.4 per 100000 a year. Incidents of hypoglycemia and seizure were more likely to require a health care facility visit a well as hospital admission (Table 2).

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

DISCUSSION

Level of Public Knowledge

The observed level of training among the public is within the range of western countries (95% - 5%) but lower than regional countries (33.8%).[15,16] This may be due to the fact that first aid training is voluntary in Kuwait.

Our analysis showed first aid training doubled the participant's chance of providing appropriate management during medical

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TABLE 2

Comparison of Medical Emergencies in Terms of The Burden on Health Care Facilities Using the Chi-Square Test

Type of Incident	Hypoglycemia	Choking	Chest Pain	Syncope	Seizures	Shortness of Breath	Wounds	Bleeding	Burn	Anaphylaxis	Stroke	Fracture	Slip/Fall	Others	*P-value* (CI = 95%)
Health Care Facility Approach	55	8	8	14	21	13	22	12	17	1	4	9	1	3	<0.001
Hospital Admission	29	1	5	6	18	7	3	5	5	0	3	6	0	1	<0.001

TABLE 3

Comparison Between Medical Emergencies in Terms of Impact on Functional Outcome, Using a Chi-Square Test

Type of Incident	Hypoglycemia	Choking	Chest Pain	Syncope	Seizures	Shortness of Breath	Wounds	Bleeding	Burn	Anaphylaxis	Stroke	Fracture	Slip/Fall	Others	*P-value* (CI = 95%)
1. Functional Outcome															
a. Missed School or day at Work	18	1	2	3	8	2	4	6	2	0	1	1	0	0	<0.001
b. Could not Practice Daily Activities	21	1	5	5	9	6	7	4	8	1	2	5	1	1	
Mortality	2	0	0	0	1	0	0	0	0	0	0	0	0	0	
2. Recovery Period															
< 1 Month	30	4	4	7	12	8	24	8	17	1	2	6	2	1	<0.001
< 1 Year	6	0	0	0	2	0	0	0	4	0	1	3	0	0	
No Recovery	4	0	1	1	4	1	0	0	0	0	1	0	0	0	

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emergencies. First aid programs are known to be associated with better help and higher helping rates.[17]

Characteristics of Medical Emergencies

Our study reports unique characteristics of medical emergencies at home as the victim's age and medical emergency type were all new to the existing literature. In the United States, unintentional home incidents were more likely to occur among the over-75-year-age group.[17] Poisoning and falls were the commonest underlying causes of those medical emergencies.[17]

There are also some discrepancies in the participant's initial practices during medical emergencies at home. Our study participants appropriately managed hypoglycemia but poorly managed burns. Inadequate first aid is common while managing burns.[18,19] Furthermore, no action was taken during seizure emergencies. Providing first aid for seizures appears to be a global challenge. O' Hara 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, as 56% of such victims required health-care facilities. To our knowledge, this is the first study to estimate the victims' approach to health-care facilities after medical emergency.[20,21] The burden was again confirmed by high hospital admission rates.

Moreover, medical emergencies at home had a negative impact on functional outcome and recovery time. These outcomes have never been addressed before in 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 study is the first to evaluate the impact of medical emergencies that happen at home on functional outcome. Third, this research is one of the few to address the impact of first aid training on appropriate management during medical emergencies at home. On a national level, this is the first national study on medical emergencies at home in Kuwait.

LIMITATIONS

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

CONCLUSION

It is relatively common for medical emergencies to occur at home in Kuwait. Public training on first aid is low, although Kuwait has unique medical emergencies. Hypoglycemia, seizures and burns are the most frequent medical emergencies that occur at home. Medical emergencies are causing a burden on the health-care system with a quarter of them having negative impact on the victim's functional outcome.

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Conflict of Interest Statement

The authors report no conflicts of interest. The authors are responsible for the content and writing of the paper.

Author Contributions

Study conception and design, acquisition, analysis and interpretation of data: DA; drafting of manuscript, critical revision: RB, EM. All authors read and approved the final manuscript.

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