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Medical emergencies requiring first aid at home: A  
population-based survey study.

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Keywords:	First aid, Accident, Functional outcome, Burden, Kuwait
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 3000 self-administered questionnaires were distributed between 16 September-30 November 2019. Medical emergencies prevalence 118.5 per 100,000/ year. Women were more likely to encountered medical emergencies 78%(n=238).Victims above 18 years of age were more likely to experience hypoglycemia 39%(n=55),while children suffered from hypoglycemia 19%(n=22) or burns 17 %(n=20). Compliance with first aid guidelines was seen in, hypoglycemia 31%(n=44) but lacking during burns incidents 44%(n=15).participants called the ambulance only 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.

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**Title: Medical emergencies requiring first aid at home: A population-based survey study.**

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**Authors' contributions:**

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

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1   **Abstract**  
2   Background: Most medical emergencies requiring first-aid occur at home. Little is known  
3   about the prevalence of specific medical emergencies at home requiring first aid. The objective  
4   of this study is to describe medical emergencies occurring at people’s homes requiring first  
5   aid; characteristics, burden and impact on functional outcome and to address the national  
6   public knowledge and practices of first aid. Method; a confidential, cross-sectional survey  
7   ,primarily based on *2015 American Heart Association (AHA) and American Red Cross first*  
8   *aid guidelines*, was conducted among adults (>18 years) from 12 educational centers, Ministry  
9   of Awqaf and Islamic affairs, state of Kuwait. Results: A total of 3000 self-administered  
10   questionnaires were distributed between 16 September-30 November 2019. The response rate  
11   was 34% (n= 1033 participants) and 1% (n= 11) were partially answered questionnaires  
12   leaving 1022 questionnaires for valid statistical analysis. The prevalence of medical  
13   emergencies 118.5 per 100,000/ year. Level of public knowledge19%. Medical emergencies  
14   were more likely to occur in Hawali province 49%(n=149), women were more likely to  
15   encountered medical emergencies 78%(n=238). Victims above 18 years of age were more likely  
16   to experience hypoglycemia 39%(n=55) and children were more likely to suffer from  
17   hypoglycemia 19%(n=22) or burns 17 %(n=20). Compliance with *first aid guidelines* was seen  
18   in, hypoglycemia 31%(n=44) but lacking in burn incidents 44%(n=15).participants called the  
19   ambulance in seizures 50% (n=13), 62% of medical emergencies required attendance at a  
20   healthcare facility and 29% required hospital admission.15% of victims missed school or day  
21   of work and 25% had impaired functional outcome. Conclusion: Home medical emergencies  
22   are relatively common in Kuwait. Public training on first aid is low. Kuwait has unique medical  
23   emergencies. Hypoglycaemia, seizure and burns are the most frequent medical emergencies at  
24   home. Medical emergencies are causing a burden on healthcare system. Quarter of medical  
25   emergencies had negative impact on victim’s functional outcome.

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26   **Introduction:**

27   First aid is defined as the helping behaviour and initial care provided for an acute illness or

28   injury<sup>[1]</sup>. 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 <sup>[2]</sup>. Provision of immediate

30   first aid to patients who require emergency care can make a significant difference to the

31   outcome <sup>[3]</sup>, as the first action taken for management of injuries and common illness decides

32   the future course of disease and complication rates <sup>[4]</sup>. In certain self-limiting illnesses or minor

33   injuries, appropriate first aid measures may be sufficient to avoid a medical consultation <sup>[4]</sup>.

34   Most incidents requiring first-aid occur in places where people feel secure – at home in

35   particular <sup>[5]</sup>. 41.4 percent of accidents in the United Kingdom happen at home, whilst 19.5

36   percent are on roads <sup>[5]</sup>. 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 <sup>[2]</sup>.

39   In Europe alone, visits to hospital Emergency Department (ED) following an incident in the

40   home reached 20.2 million a year <sup>[5]</sup>. 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 <sup>[5]</sup>. 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   <sup>[6]</sup>. The local EMS systems mean response time 9.3±5 minutes <sup>[7]</sup>.Potential life saving measures

46   for home incidents need to be delivered in a narrower time window by witnessing bystanders

47   <sup>[5- 6]</sup>.

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 <sup>[8-10]</sup>.

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

56 and impact on functional outcome and to address the national public knowledge and practices  
57 of first aid.

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

61 **Method**

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

68  
69 *Study design and Setting:*

70  
71 There are 90 education centers across Kuwait’s six provinces with 20,000 enrolled students  
72 above the age of 18<sup>[11]</sup>. The education centers accept all adult applicants regardless to their age,  
73 gender, nationality or background <sup>[11]</sup>. Their wide distribution all over Kuwait provinces and  
74 their mixed culture in terms of age, professional background, nationalities and gender made  
75 education centers’ population representative of Kuwait population with its variable  
76 demographics <sup>[12]</sup>.

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

81  
82 To optimise representativeness of the population, teaching staff administered the questionnaire  
83 randomly to participants during the general required classes in which participants from all  
84 specialities are registered and allowed 15 minutes to complete the questionnaire. Participants  
85 completed a multiple-choice question on their medical emergencies at home occurring at their  
86 homes during the year of 2018. Therefore no reminder were used.

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88    *Study instruments and variables assessment:*  
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90    The questionnaire included 15 multiple choice questions with space for additional answers.  
91    The questionnaire categories included demographic characteristics of participants (5 items),  
92    general first aid knowledge (1 item), medical emergencies at home (3 items), medical  
93    emergencies practice (1 item), and medical emergencies burden (2 items), and medical  
94    emergencies impact (2 items). Aside from the participants demographic information, the  
95    questionnaire domains were primarily based on *2015 American Heart Association and*  
96    *American Red Cross first aid guidelines*.  
97    In the questionnaire, general first aid knowledge is assumed from the undertaking of first aid  
98    training. The occurrence of medical emergencies at home is a yes/no response, while the type  
99    of medical emergency is based on *the 2015 American Heart Association and American Red*  
100    *Cross first aid list of emergencies*. The initial practices at the time of medical emergency at  
101    home were again founded on *2015 American Heart Association's and American Red Cross'*  
102    *first aid recommendations*. A participant who selected a response that is compliant with the  
103    AHA recommendation was categorised as “ appropriate management, in-line with AHA  
104    recommendation”. A participant who chose a response non-compliant with AHA  
105    recommendation was categorised as ‘ inappropriate management, not in-line with AHA  
106    recommendation’. In this item, we also included two responses; ‘not doing anything’ and  
107    ‘calling the ambulance’. these responses were categorised as ‘no action’ in our analysis.  
108    The burden of the medical emergencies was assessed by identifying whether a consultation at  
109    a health care facility occurred and whether a hospital admission was required.  
110    The impact of medical emergencies on functional outcome was assessed by evaluating  
111    functional outcome after the incident occurrence and the length of period of recovery. This is  
112    because measures of functional outcome and general well-being are becoming increasingly  
113    important in evaluating strategies to reduce the burden of injury <sup>[13]</sup>. We define functional  
114    outcome as Which is defined as limitations in activities of daily living including toilet use,  
115    grooming, bathing, dressing, feeding and transfer <sup>[10]</sup> and recovery period is the time required  
116    for a patient to return to his / her normal function.  
117  
118    The questionnaire was scrutinised by an expert, reviewer for refinement and re-wording of  
119    questions to ensure that statements were understandable and meaningful to the participants,  
120    The reviewer also ensured that there was face validity. Two review rounds were conducted



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121 before the questionnaire was concluded. Reliability of questionnaire items was examined using  
122 SPSS split-half reliability index formula on 50 initial participants. Problematic items were  
123 removed once a correlation coefficient of ( $r$ ) >0.80 was established.  
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125 *Sample size*  
126 All participants were recruited from the identified education centers and were adults (>18  
127 years old) enrolled at the college between 15 September and 30 November 2019.  
128 The calculated minimum target sample size was 385 (n) using Cochran’s formula. This was  
129 based on the Kuwait current population being 4,137,000 people ,setting a power of 95%.  
130 Random sampling was used to obtain the study population.  
131  
132 *Statistical methods*  
133 All data were analyzed using SPSS (Version 23 for Windows) (SPSS Statistics for Windows,  
134 Version 23.0. Armonk, NY: IBM Corp). Frequency distribution and descriptive criteria were  
135 calculated. Questionnaire responses were compared using Chi-squared test .A  $P < 0.05$  was  
136 considered to indicate statistical significance in all cases.  
137  
138 *Ethical Considerations*  
139 Ethical approval was granted approved by IRB committee on December 5 2019. Consent is  
140 anticipated with completion of the questionnaire. Participant confidentiality is ensured as the  
141 questionnaire forms were anonymous <sup>[14]</sup>.  
142  
143 **Results**  
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145 A total of 3000 self-administered questionnaires were distributed randomly among Kuwait six  
146 provinces. The response rate was 34% (n= 1033 participants) and 1% (n= 11) were partially  
147 answered questionnaires leaving 1022 valid questionnaires for statistical analysis.  
148 Of the 1022 participants, 30% (n=303) reported medical emergencies occurrence at their  
149 homes, A prevalence of 118.5 per 100,000/ year .  
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151 *Level of public knowledge*

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4 152 19% of participants had received previous first aid training. Women (53%) and people with  
5 153 a non-health related background (49%) were the most likely to have attended first aid training.  
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7 154 Moreover, had the highest rates of trained lay people in Kuwait (35%) followed by Al-Ahmadi  
8 155 province (22%) and the lowest in Mubarak Al-Kabeer province (7%). Having received  
9 156 previous training in First Aid doubled the lay persons chance of providing appropriate  
10 157 management in medical emergencies at home (Table 1).  
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15 159 *Characteristics of medical emergencies*  
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19 161 Medical emergencies were more likely to occur in Hawali province 49%(n=149). Females  
20 162 participants were more likely to report medical emergencies at their homes 78%(n=238)  
21 163 (Figure 1). Victims of medical emergencies had variable presentations. Victims above 18  
22 164 years of age were more likely to experience hypoglycemia 39%(n=55). Whereas victims 1-8  
23 165 years of age group were more likely to suffer from hypoglycemia 19%(n=22) or burns 17  
24 166 %(n=20) (Figure 2). In terms of compliance with first aid guidelines during medical  
25 167 emergencies, hypoglycemia was the most appropriately managed medical emergency  
26 168 31%(n=44) , whilst burns were the least appropriately managed incident 44%(n=15).  
27 169 Participants were more likely to call an ambulance without providing first aid during seizures  
28 170 50% (n=13) (Figure 3).  
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40 173 *Impact and burden of medical emergencies at home*  
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42 174  
43 175 Overall 62% of medical emergencies required attendance at a healthcare facility and 29%  
44 176 required hospital admission, a prevalence of 117.4 per 100,000 a year. Incidents of  
45 177 hypoglycemia and seizures incidents were more likely to require a health care facility visit and  
46 178 hospital admission (Table 2).  
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49 179 In terms of impact on victims of medical emergencies, 15% missed school or day of work or  
50 180 school and 25% had impaired functional outcome (Table 3).  
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186    **Discussion**  
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188    *Level of public knowledge*  
  
189    The observed level of training among the public is within range of western countries (95% -  
190    5% ) <sup>[15]</sup> but lower than regional countries, 33.8% <sup>[16]</sup>. This maybe because first aid training is  
191    voluntary in Kuwait.  
  
192    Our analysis showed first aid training doubled participant’s chance of providing appropriate  
193    management during medical emergencies. First aid programs are known to cause better help  
194    and higher helping rates<sup>[17]</sup>.  
195  
196    *Characteristics of medical emergencies*  
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198    Our study reports unique characteristics of medical emergencies at home. Victim’s age,  
199    medical emergency type were all new to the literature. In the United States, unintentional home  
200    incidents were more likely to occur among the over 75 years age group <sup>[17]</sup>. Poisoning and falls  
201    were the commonest underlying causes of those medical emergencies <sup>[17]</sup>.  
202  
203    There are also some discrepancies in participant’s initial practices during medical emergencies  
204    at home. Our study participants appropriately managed hypoglycaemia but poorly managed  
205    burns. Inadequate first aid is common during burn’s management <sup>[18-19]</sup>. Furthermore, no action  
206    was taken during seizure emergencies. Providing first aid for seizures appears to be a global  
207    challenge, *O’ Hara 2007 et al.* documented low first aid provision during seizures in a group  
208    of school nurses, EMS personnel and teachers <sup>[20]</sup>.  
209  
210    *Impact and burden of medical emergencies*  
211  
212    Medical emergencies at home caused a burden on the health care system. 56% of medical  
213    emergencies required health care facility. To our knowledge, this is the first study to estimate  
214    victim’s approach to health care facility after medical emergency <sup>[21-22]</sup>. The burden was again  
215    confirmed by high hospital admission rate.  
216    More over medical emergencies at home had a negative impact on functional outcome and  
217    recovery time. These outcomes have never been addressed before in the literature.

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4 218 The main strengths of this study are the following: This is the first study that complies with the  
5 219 2015 American Heart Association and Red Cross guidelines and recommendations during  
6 220 medical emergencies evaluation. Second, the proposed study is the first to evaluate home  
7 221 medical emergencies impact on functional outcome. Third, this research is one of few to  
8 222 address impact of first aid training of appropriate management during medical emergencies at  
9 223 home. on a national level, this is the first national study on medical emergencies at home of  
10 224 Kuwait.  
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16 225 *Limitations*  
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19 227 limitations of the study include; the nature of a self-administered survey which is based on  
20 228 recall making it open to bias. The current study maximized the optimum recall period, by  
21 229 asking respondents to record events with in the last 12 months. Another limitation is that  
22 230 although the sample size is appropriate to Kuwaiti population, other countries in the region are  
23 231 more heavily populated. Therefore the replication of this study in another setting can produce  
24 232 different results.  
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33 235 **Conclusion:**  
34 236 Home medical emergencies are relatively common in Kuwait. Public training on first aid is  
35 237 low. Kuwait has unique medical emergencies. Hypoglycaemia, seizure and burns are the most  
36 238 frequent medical emergencies at home. Medical emergencies are causing a burden on  
37 239 healthcare system. Quarter of medical emergencies had negative impact on victim's functional  
38 240 outcome.  
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#### 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.

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

**Figure1.** 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:

Variables	First-aid Previous training N=194 (%)	No First-aid Previous training N=828 (%)	P-value (CI=95%)
<b>1. Gender</b>			
a. Male	91 (47)	198 (23)	<.001
b. Female	103 (53)	639 (77)	
<b>2. Nationality</b>			
a. Kuwaiti	93 (48)	361 (43)	.29
b. Non-Kuwaiti	101 (52)	467 (58)	
<b>3. Background</b>			
a. Non-Health related	96 (49)	275 (33)	<.001
b. Health related	39 (20)	23 (3)	
c. Unemployed	59 (31)	289 (64)	

<b>4. Province</b>			
a. Al-Asimah	24 (12)	82 (10)	<.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)	
<b>5. Type of management</b>			
a. Within AHA* guidelines	39 (20)	85 (11)	.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)	



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

Type of incident	Hypoglycaemia	choking	Chest pain	Syncope	Seizures	SOB*	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	<.001
Hospital admission	29	1	5	6	18	7	3	5	5	0	3	6	0	1	<.001

Note: SOB\*=Shortness of breath

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Table 3. Comparison between first aid related incidents in terms of impact on functional outcome, Using Chi-square test.

Type of incident	Hypoglycaemia	Chocking	Chest pain	Syncope	Seizures	SOB*	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	<.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	<.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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Note: SOB\*= Shortness of Breath

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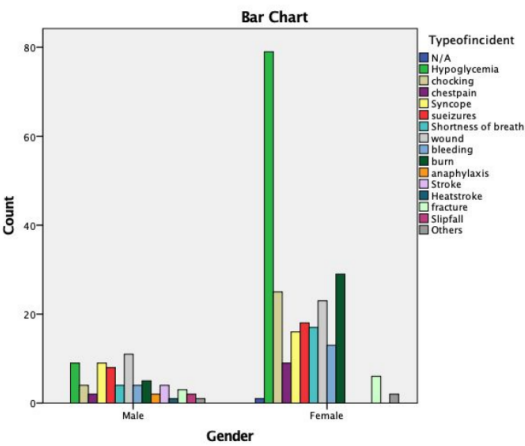


Figure 1. Participants gender during each medical emergency.

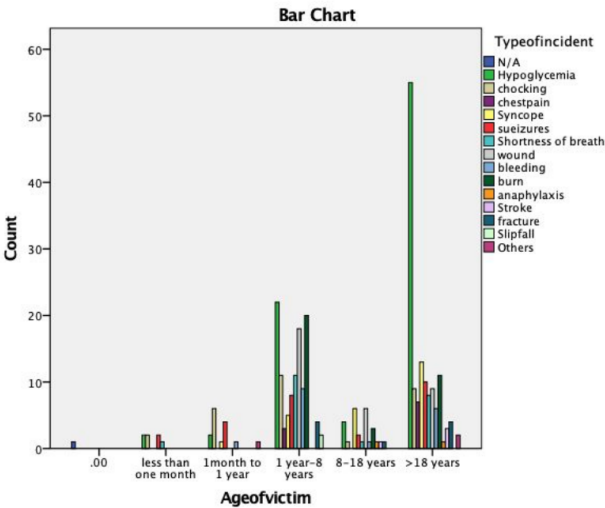


Figure 2. Victims age of medical emergencies at home.

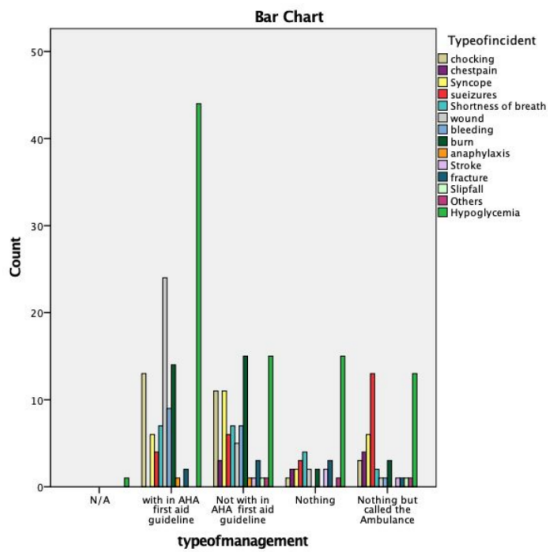


Figure 3. Level of compliance with first aid guidelines during the management of each first aid related incident.