

Original article:

Knowledge, Attitudes and Practice of Burns Prevention and First Aid among Medical Students of King Khalid University, Saudi Arabia

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Abstract

Background: Burn prevention and first aid knowledge amongst medical students is a neglected subject. **Objectives:** 1. Assess the knowledge, attitudes and practices of medical students regarding burn prevention and first aid 2. Identify their sources of knowledge. **Materials and Methods:** This cross-sectional survey of KKU medical students documented their sociodemographic data, knowledge, attitudes and practices of burn prevention and first aid, and their sources of information. Data was analysed using SPSS 17. Descriptive information was presented as frequency and percentages, while Chi square test was used to find association of knowledge with sociodemographic factors. **Results:** A total of 273 students, from preclinical and clinical level were enrolled in the study. With an average of 9.3 correct responses, the median score of knowledge regarding burn prevention and first aid was 56.2 %. About half of the respondents (50.9%) achieved a fair knowledge score i.e. between 50-75%. College curriculum emerged as the major source of information for burn prevention (34.06%) and first aid (25.27%). About 42 % students suggested that inclusion in college curriculum would be the best way to increase awareness. YouTube emerged as the most common extra-curricular learning method (67.7%). Students in clinical years of medical education demonstrated significantly higher knowledge than those in pre-clinical years ($p=0.01$, $COR=1.82$). Fire prevention practices were not widely in place; however students revealed a positive attitude towards the same. **Conclusion:** Medical students have a fair knowledge in burn prevention and first aid and carry a positive attitude towards training. Incorporating social media for health awareness shows promise.

Keywords: knowledge; attitude; burns; first aid; medical students.

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Introduction:

Burns injuries are a major global health problem, with a great impact on community resources. In Saudi Arabia, studies have reported that the majority of burn injuries occur in children and most of these occur at home. Scald injuries predominate while flame injuries are the second most common^{1,2}. First aid refers to assessments and interventions that can be performed by a bystander (or by the victim) with minimal or no medical equipment³. It is treatment for the purpose of preserving life and minimizing the consequences of burn injury until help, from a

medical practitioner or nurse, is available. While primary prevention remains the best way to reduce burden of this problem in the community, providing a proper burn first aid remains the cornerstone of burns management, especially as it reduces complications of burn injuries.

Studies have found that the knowledge of first aid amongst medical students is a neglected subject. Hence, it should not be surprising to note that even junior doctors at certain hospitals cannot perform the first aid skills satisfactorily⁴. Training of medical and nursing students includes handling of burns in a

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hospital setting where necessary equipment and drugs are available. However, the knowledge required for handling an emergency like burn, without hospital setting at the site of the accident or emergency may not be sufficient^{5,6}.

Based on the need assessment, generated through studies of existing knowledge and practices, education of first aid in general and for burns in particular can be incorporated in the medical and nursing curricula. This has been demonstrated in some studies, like a study conducted in Turkey on occupational physicians reported that only 31.7% used up to date modalities of burn first aid with many having inadequate knowledge⁷. In UAE, a study of the efficacy of first aid training program for first year medical students concluded that the program provides students with adequate first aid knowledge and practical basic life saving skills⁸. Another study in Turkey stated that it was highly effective to teach medical students First aid and Basic life saving skills and they can form effective peer first aid trainers for other university students⁹. Considering importance of this issue, we realized that there is a great paucity of research on burns in Saudi Arabia in general and its prevention and first aid knowledge in particular. Consequently, this study was conceptualized with the objectives to assess the knowledge, attitudes and practices of undergraduate medical students about burn prevention and first aid. We also aimed to identify their current and preferred sources of information on this issue.

Material and Methods:

Study design: A cross-sectional study to ascertain the knowledge of burns prevention and first aid was conducted on medical students of King Khalid University during April-May, 2016.

Sample size and sampling procedure: Sample size was estimated using the Raosoft sample size calculator. As no previous similar study in the region is available, we calculated our sample size based on the assumption that 50% of students have adequate knowledge about burns prevention and first aid. At 95% confidence interval and margin of error as 5%, the target sample size was calculated as 377. Using a convenient sampling procedure, the consenting students were selected and handed out the questionnaires. From a total of 370 students who agreed to participate in the research, 273 returned completely filled questionnaires, generating a response rate of 72.8%, and were included for analysis. The rest were discarded due to incomplete information. **Inclusion criteria:** Students enrolled

in medical college of King Khalid University and having completed 2 years of college training. **Study instrument:** A self-administered anonymous questionnaire was used for data collection. It contained 22 questions in the following sections: sociodemographic information, knowledge of burn first aid, sources of information and burn prevention practices. The questionnaire included a range of close ended questions with the answer options as agree, disagree, do not know to assess knowledge. Situation based practice questions included multiple options with one correct answer. Questions to assess sources of information and identification of learning methods were constructed in a manner to provide for multiple responses. The content validity of this questionnaire was ascertained by experts in burns and plastic surgery unit of Aseer Central Hospital, Abha. **Scoring of the instrument:** There were 16 questions assessing knowledge and each correct option was scored as 1, while incorrect answer and “do not know” was scored as 0. Total score out of 16 was used to calculate percentage. Scores were graded as very poor ($\leq 25\%$), poor (25-50%), fair (50-75%) and excellent ($\geq 75\%$). Further categorization of overall knowledge of students about first aid as being adequate or inadequate was ascertained by dichotomization of median score (calculated as 10.0) of the respondents. Attitude was determined as positive, negative or indifferent based on responses to questions assessing the fire prevention and control practices and opinions. Where prevention practices were not in place, a positive attitude was reflected by the response “it is needed”, and a negative attitude by the response “not needed”. Failure to respond was assessed as “indifference”. **Statistical analysis:** The data entry and analysis was performed using Statistical Package for Social Sciences software package (SPSS Inc., Chicago, IL, USA) version 17 [10]. Data was described using frequencies and percentages. Mean and median were calculated for the knowledge score. Chi-square test was used to find out the association of sociodemographic variables with the level of knowledge about burns prevention and first aid. All associations were considered significant at $P < 0.05$. **Ethical consideration:** The study was conducted consequent to approval by the institutional ethics committee vide letter number (REC#2016-04-09). The students were briefed about the objective of the study and their informed consent was taken for participation. The study was entirely self-financed by the researchers.

Results:

This study included 273 medical students. Table 1 presents their baseline information and its association with burn first aid knowledge. The mean age of respondents was 21.7 years \pm 2 years. The ratio of males to female students was 1.5:1 (164 males and 109 female students). Students belonged to both Preclinical and clinical years, with 108 students in level 3-6 (preclinical) and 165 students of level 7-12 (clinical). Parents educational level revealed that 50 % of fathers and 27% of mothers had a university education, while 5% of fathers and 14 % of mothers were reported as illiterate. Parental occupation status revealed that majority of fathers were in government service (58.2%) while majority of mothers were housewives (73.3%). Almost 61% students revealed a monthly income of more than 20,000 Saudi Riyals (5333 US\$) . Sixty one students reported that there are children (less than 18 years) in the family. Age, gender , family income, paternal education, presence of children in the family and previous experience of burn in the family, or previous history of providing burn first aid did not show any significant association with burn first aid knowledge. Students in pre-clinical years of medical education demonstrated significantly lower knowledge than those in clinical years ($p=0.01$, $COR=1.82$). An interesting finding of the study was that students whose father was in teaching or health occupation had significantly lower score than those in other occupations ($p=0.03$, $COR=1.74$).

Table 1: Associated socio-demographic factors of burn first aid knowledge: Unadjusted OR and 95% CI

Variable		Knowledge		Chi square	p	COR	CI 95%	
		Inadequate	Adequate				Lower	Upper
Age	<22	81	89	0.23	0.70	1.12	0.69	1.84
	≥ 22	46	57					
Gender	Male	73	91	0.66	0.41	0.81	0.50	1.32
	Female	54	55					
Level	Pre-clinical	60	48	5.86	0.01*	1.82	1.12	2.98
	Clinical	67	98					
Father's Education	Upto secondary	59	76	1.09	0.29	0.77	0.48	1.25
	University	68	69					
Fathers Occupation	Doctor/Teacher	44	34	4.29	0.03*	1.74	1.02	2.96
	Other	83	112					
Mothers education	Upto secondary	91	108	0.18	0.66	0.88	0.52	1.57
	University	36	38					
Mothers occupation	Doctor/Teacher	27	31	0.00	0.99	1.00	0.56	1.79
	Other	100	115					
Family Income SR/month	<10,000	48	59	0.19	0.65	0.89	0.55	1.45
	$\geq 10,000$	79	87					
<18 Years in family	Yes	99	113	0.01	0.91	1.03	0.58	1.82
	No	28	33					
Experience of burn to self or family	Yes	63	78	0.39	0.52	0.85	0.53	1.38
	No	64	68					
Ever provided burn first aid	Yes	41	37	1.60	0.20	1.40	0.82	2.37
	No	86	109					

Table 2 describes the knowledge scores and grading of knowledge of the respondents. With an average of 9.3 correct responses from a total of 16, the median score of knowledge regarding burn first aid was 56.2 %. About half of the respondents (50.9%) achieved a fair knowledge score i.e. between 50-75%. Very poor knowledge score i.e. less than 25% was achieved by

8.4% respondents. Thirteen students (4.8%) achieved an excellent score. All respondents gave at least one correct response while 2 students had all correct responses. The median number of correct responses being 10, the dichotomization of respondents into less than median and more than the median score was made to classify the knowledge as inadequate

and adequate knowledge and to study the factors associated with adequate knowledge.

Table2. Knowledge level of respondents

Knowledge grade	Knowledge score	Frequency	Percentage
Very Poor	≤ 25%	23	8.4
Poor	25-50%	98	35.9
Fair	50-75%	139	50.9
Excellent	>75%	13	4.8

Table 3 represents detailed information on responses to knowledge based statements and practice based situational statements on burn first aid. Majority of the students responded correctly to the various items assessing their knowledge regarding burn first aid except when asked about giving fluids by mouth in persons with large or deep burn, where almost equal number of correct (30.8%) and incorrect (34.4%) responses were given. Equal number of students did not know the answer. When inquired about pouring water on burn as first aid, a little over half of the students (52%) agreed with the statement. Regarding the duration of pouring cold water to cool the burn,

Table 3: Burn first aid knowledge of respondents.

Knowledge based statements	Correct Response	Incorrect response	Do not Know
Always seek medical help if size of burn is larger than 2-3cm and skin is burnt through.	170(62.3)	66(24.2)	37(13.5)
Always seek medical help if age of victim is <4yrs or >60 yrs.	199(72.9)	39(14.3)	35(12.8)
Always seek medical help if hands, feet, face, groin, buttocks, or a major joint is burnt.	222(81.3)	22 (8.1)	29(10.6)
Always seek medical help if it is a chemical or electrical burn	235(86.1)	17(6.2)	21(7.7)
Keep blowing/fanning on the burn	125(45.8)	72(26.4)	76(27.8)
Place burn in cold water if it involves a large area and internal tissue can be seen.	141(51.6)	78(28.6)	54(19.8)
One should take off clothes and accessories from affected area.	190(69.6)	47(17.2)	36(13.2)
If someone catches fire and is in flames, wrap the person in thick material; such as a wool or cotton coat, rug, or blanket	156(57.2)	50(18.3)	67(24.5)
Remove burned clothing that is stuck to the skin.	148(54.2)	78(28.6)	47(17.2)
If there are large areas or very deep burn, give water/milk by mouth.	84(30.8)	94(34.4)	95(34.8)
Cover the affected areas with clean cotton cloth after removing surrounding dress?	110(40.3)	73(26.7)	90(33.0)
Should pour cold water on burned areas.	142(52.0)	77(28.2)	54(19.8)
Length of time for pouring cold water on burn	28(10.2)	69(25.3)	176(64.5)
Situation based decision statements			
Hot boiling oil spills on chest of a child in the kitchen	102(37.4)	113(41.4)	58(21.2)
Someone's clothes catch fire during picnic	168(61.5)	62(22.7)	43(15.8)
During a social meeting, boiling water spills on someone's hand	109(39.9)	110(40.3)	54(19.8)

* All numbers in parentheses are percentages.

only 28 students (10.2%) answered correctly, while 53 respondents opted for a shorter duration and 16 opted for a longer duration. Majority of the students (176, 64.5%) responded that they did not know the optimum duration. For questions based on situations requiring decision based action, large number of students could not opt for the suitable decision. In situation where hot boiling oil spills on child, majority of students responded that they would keep the child's clothes and call for help, or pour water on the child's body; while a good proportion of students (37.36%) responded correctly that they would remove the child's clothes and then pour water on his body. Similarly for the situation where boiling water spills on someone's hand, about 40% of students responded incorrectly that they would put ice cubes on affected part, or cover the affected part with clean cloth, while 39.9% responded that they'd keep the affected area under cold water for 10-20 minutes. In the situation where someone's clothes catch fire during picnic, majority of the students responded correctly by agreeing that they would ask him to stop moving, lie down and roll over the ground.

Student's sources of information are described in table 4. College curriculum emerged as the major source of information for burn prevention and first aid. It was also identified as best way to increase awareness on burn prevention and first aid. School curriculum and audio-visual sources like TV/Radio /Internet, and print media like newspapers and medical publication appeared as the other sources of information. Besides curriculum, students reported wide use of television and internet, particularly YouTube as the most frequently used learning method (67.7%). A vast majority agreed that first aid training is needed as a part of their medical curriculum (87.2%).

Table 4: Sources of information on burn prevention and first aid.

Source of information	Area	
	Burn Prevention	Burn first aid
School curriculum	38 (13.91)	31(11.35)
College curriculum	93 (34.06)	69(25.27)
Medical publications	38(13.91)	29(10.62)
Newspapers	43 (15.75)	14(5.12)
Tv/radio	46 (16.84)	24(8.79)
Internet	46 (16.84)	35(12.82)

Multiple Responses*. All numbers in parentheses are percentages.

Fire prevention and control practices and it's related attitudes are presented in table 5. A very small proportion of students (9.2%) reported the presence of a smoke alarm at their place of residence, while majority (72.5%) said it was not available but needed. Fire extinguisher was reported to be present by about one fourth (26.8%) and not present currently but needed by 66.3% respondents. A store room for inflammable chemicals and materials was reported to be present by 19.8% respondents, and 52.4% felt it was needed. About one in ten respondents reported the availability of evacuation plan (11.3%), while 70.0% felt it was needed. These findings reveal an overall positive attitude towards burn prevention and control practices by the students.

Discussion:

Assessment of burn first aid knowledge, attitudes and prevention practices among health services professionals including medical students is the first step in having a sound burn services delivery system. The current study aimed to extract this vital information, which is currently wanting in Saudi Arabia. Results of this study revealed fair level of knowledge of burn first aid among medical students

Table 5: Fire prevention and control: respondent's practices and attitude

Practice	Present	Positive attitude	Negative attitude	Indifference
Smoke alarm	25 (9.2)	198 (72.5)	42 (15.4)	8 (2.9)
Fire extinguisher	73 (26.8)	181 (66.3)	14(5.1)	5 (1.8)
Store room for inflammable chemicals or materials	54 (19.8)	143 (52.4)	69 (25.3)	7 (2.5)
A plan to evacuate the house in case of fire	31 (11.3)	191 (70.0)	45 (16.5)	6 (2.2)

* All numbers in parentheses are percentages.

and identified certain gaps in their knowledge and practices. Half of the respondents demonstrated fair/moderate knowledge regarding burn first aid. This is similar to that reported in studies on medical students elsewhere^{11,12}, though the mean scores achieved in our study is higher than that by medical students in Pakistan^{5, 11}. Similar conclusions were made regarding nurse's knowledge on burns as being poor, irrespective of their field of specialization in a study¹³. Data from various studies indicates that knowledge among medical students¹¹ is comparable to knowledge among other students¹⁴ and general population¹⁵. One study even reported a higher knowledge score among non health care workers than the health care workers¹⁶. Interestingly, as reported in a study in Cambodia,¹⁷ primary school students had similar knowledge pattern as that observed for older populations like college students and adults reported in the other studies^{5, 12, 15,18}.

Pertaining to the most important first aid actions, experimental studies have found that water at 12–18°C provides the optimal temperature to cool a burn wound^{19, 20}. Twenty minutes is the optimal duration for cooling under water^{21,22}. Ice has been shown to be either ineffective¹⁹ or associated with increased tissue damage²⁰. In our study, a little over half of the students agreed with pouring water on burn as first aid. Although this is better as compared to medical students in Pakistan where less than one third of students whether trained or untrained correctly marked that they would put the hand in cold water in case it gets burnt¹¹, there are varying results regarding burn first aid with cool water among different studies. In a cross sectional study in Nigeria, just about 10 % burn victims reported having applied cold water to their burn¹⁸, which draws distinction from another

cross-sectional study in Wales that reported very high proportion (82%) of respondents answering that they would cool the burn with cool or cold water²³.

The knowledge of duration for cooling the burn is however lacking among all groups of people as evidenced by various studies and also supported by our study. Majority of the students in the current study did not know the length of time for which water should be poured on burn for first aid. Very few respondents opted for 20 minutes as the optimum time for pouring water over a burn injury. In the Wales study, results was similar to the current study, with less than ten percent of respondents knowing to cool the burn for 20 minutes and a high proportion reporting that they did not know for how long cold running water should be applied²³. Similar lack of knowledge was observed in the studies on children and adolescents in Cambodia¹⁷ and Zaria²⁴.

For questions based on situations requiring decision based action, large number of students could not give the correct decision. In situation where hot boiling oil spills on child about one third of students responded correctly that they would remove the child's clothes and then pour water on his body. Similarly for the situation where boiling water spills on someone's hand, almost equal number of students responded incorrectly that they would put ice cubes on affected part or cover the affected part with clean cloth and correctly that that they'd put the affected area under cold water for 10-20 minutes. In the situation where someone's clothes catch fire during picnic, majority of the students responded correctly by agreeing that they would ask him to stop moving, lie down and roll over the ground. In previous studies, similar situations have been put to the respondents with similar responses, as in the current study. In the Cambodian study, when asked how to extinguish the fire if their clothes caught on fire, very few students knew to roll on the ground, or the well-recognized burn messages such as applying cool water to burns or stop, drop, and roll on catching fire¹⁷. In the study in Nigeria too, more than half of the students did not know to stop, drop and roll when clothes catch fire, apply cold water if hot oil spills on hand²⁴.

In our study statistical analysis revealed a significant association of adequate burn first aid knowledge with certain factors like being in clinical level of medical college and father's occupation in a non teaching and non health field. Though it is simple to associate a higher level of clinical study with better knowledge, it is surprising to find association between father's occupation in a teaching and health profession

with lower levels of knowledge. Most studies on burn first aid have focused on the association of previous training or education with the knowledge scores²⁵. Few studies have considered analyzing the sociodemographic determinants of burn first aid knowledge. A study in Nigeria on adult population reported a positive correlation between respondent's educational level and knowledge level¹⁸. In the study in Australia by Wallace, males and younger (≤ 25 years) and older (≥ 65 years) age-groups had relatively lower levels of burn first aid knowledge¹⁵. In our study, half of the respondents reported no prior knowledge of burn first aid and more than one third reported no prior knowledge of burn prevention. This is similar to findings from Pakistan and Peru where about 50% medical students reported having prior training^{11,26}. Regarding the sources of burn prevention and first aid information, college curriculum emerged as the major source of information for burn prevention and first aid. Other studies have reported the most commonly nominated sources of information on burns first aid as a first aid book and the internet²³. The Wales study also suggested that inclusion in secondary school curriculum or workplace should be considered to improve the situation²³.

Training in first aid can go a long way in improving knowledge and practice of first aid among all population groups. A study for assessing nurse's knowledge reported a higher mean score among the trained nurses²⁷. In a cross sectional study, significantly more individuals gave correct answers if they had attended a first aid course compared to those who had not¹⁵. Studies in Pakistan and India have also proposed similar suggestions^{5, 12}. Almost all students in Pakistan realized that first aid training should be part of the curriculum with 84% suggesting that it should be part of pre-university curriculum⁵. In another study even though medical students scored higher than nonmedical students, yet their knowledge was not sufficient, suggesting the necessity of introduction of first aid training programme in medical curriculum. Some interventional studies have also proved that attendance at a burns first aid course improves knowledge¹⁶. Speaking specifically of medical students, the results of a study in UAE and Turkey suggest that having a first aid course in early period of medical curriculum program provides students with sound basic knowledge and adequate practical skills in first aid^{8, 9}.

The assessment of burn prevention practices and related attitudes was based on responses regarding availability of smoke alarms, fire extinguishers,

store for inflammable materials and provision of a fire evacuation plan in the respondent's residence. Individually, each prevention practice was in place for few respondents, but a positive indication was that most of them showed a positive attitude towards their need. These results are in contrast with the results in USA where, majority of respondents had smoke alarms and fire extinguishers installed at their place of residence¹⁴.

Gauging the student's opinion on use of social media as a learning method, besides formal techniques, we found YouTube as the most commonly used learning method. Interestingly though, the preferred way of improving awareness on burn prevention and first

aid was suggested as inclusion in college curriculum. Considering the ever increasing influence of social media in today's times, this is an important finding and signifies the importance of conventional training methods. Contrary to our finding, in a study in America, online information was considered most effective by the university students¹⁴.

Conclusion: Saudi medical students demonstrated a fair knowledge of burn first aid. Gaps in knowledge regarding optimum duration for cooling the burn were evident. Prevention practices were lacking, though a positive attitude was established for the same. Best potential formal (college curriculum) and informal (YouTube) educational aids were identified.



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