Mediterranean Journal of Emergency Medicine
https://mjemonline.com/

MJEM
Mediterranean Journal of Emergency Medicine

Establishment of a national catastrophe burn plan for the delivery of care for burn patients in Lebanon

Citation: Deghayli L, Moufarrij S, Frangieh M, Assaad S, Souaiby N. Establishment of a national catastrophe burn plan for the delivery of care for burn patients in Lebanon. Med Emergency, MJEM 2020; 28:21-8.
DOI: 10.26738/MJEM.2017/MJEM28.2020/SM.OAE.190220
Key words: burns; burn victims; emergency response; mass casualties; big bang incident; national catastrophe

ABSTRACT

Objective: This study aims at gathering data concerning the care of burn patients in Lebanon. Based on the findings, a national burn plan will be drafted to standardize burn treatment.

Methods: Questionnaires were distributed to physicians in four hospitals, emergency medical team responders in two Lebanese Red Cross centers, the Lebanese Army and the Lebanese Civil Defense with the approval of the Lebanese Society of Emergency Medicine and the Syndicate of Hospitals, after obtaining informed consent. The questions covered topics including burn treatments, patient triage, burn wound evaluation, and the perceived role of the different parties involved in dealing with a burn catastrophe. A retrospective burn patient chart review was conducted at the American University of Beirut Medical Center in order to better understand the epidemiology of burns in the country

Results: A total of 97 questionnaires were distributed, 58 were collected from various hospitals throughout Lebanon and 39 were collected from various respondents, 140 charts were reviewed from the American University of Beirut's medical records department. When asked to define a "severe burn", the only hospital that answered with internal consistency is Nabatieh hospital, choosing "< 10% of total body surface area (TBSA)" to define a severe burn in adults and "20% TBSA" to define it in the pediatric population. When asked about the most important first step when dealing with a burn patient, 32% of responders from the Lebanese Red Cross in Spears correctly identified fluid resuscitation as the first step in management, whereas no responder from the Lebanese Red Cross in Tripoli chose this answer. The medical charts reviewed from the American University of Beirut showed that the most common type of burn was the thermal burn (84.1%). Only 2.3% of patients got treated at the site of the accident and 3.8% of patients went on to get treated at a burn hospital after being seen at the American University of Beirut.

Conclusion: In Lebanon, burn care appears to be fragmented and heterogeneous, in addition to the fact that the different parties (Army, Lebanese Red Cross, Civil Defense and physicians), that should sequentially be involved in addressing burn care, seem unsure of their role in the chain of command. Centralization of burn care by means of a national catastrophe burn plan would allow for a multi-disciplinary and coordinated approach, which is the only effective way of treating a burn victim.

Authors' affiliation:

Corresponding author: Sarah Moufarrij, MD
Faculty of medicine, American University of Beirut, Lebanon
Sara.moufarrij@gmail.com

Deghayli L, MD[1], Moufarrij S, MD[1], Frangieh M, MS-EH[2], Assaad S, MPH[1], Souaiby, MD[3,4]
1. Faculty of medicine, American University of Beirut, Beirut, Lebanon
2. New Health Concept, Fanar, Lebanon
3. Faculty of Medicine, Saint Joseph University, USJ, Beirut, Lebanon
4. Emergency Department, Maritime Hospital, Jbeil, Lebanon

Article history / info:

Category: Original article
Received: Oct. 16, 2019
Revised: Dec. 18, 2019
Accepted: Feb. 19, 2020

Conflict of interest statement:

The authors declare a conflict of interest although the article followed the regular reviewing procedure

GENERAL OVERVIEW OF BURNS

Burns are the fourth most common type of trauma worldwide, with about 90% of burns occurring in low to middle income countries that lack the necessary infrastructure to cope with these injuries [1]. Approximately 11 million people sought medical care for burns in 2004, exceeding the combined incidence of tuberculosis and human immunodeficiency virus (HIV) [2]. Flame injuries and scalds are the most common causes of burns in children and adults worldwide [3]. A burn is defined as a traumatic injury to the skin or other organs primarily due to thermal or other acute exposures. Burns are classified by the depth of injury into five categories: superficial, superficial partial thickness, deep partial thickness, full thickness and fourth degree burns [4]. The depth of the burn largely determines the healing potential and the need for surgical grafting.

ACUTE MANAGEMENT OF BURN INJURIES

Assessing burns can be difficult due to the complexity of the injury, requiring a multidisciplinary approach for stabilization. Initial burn management begins with a trauma primary survey, which includes early endotracheal intubation if indicated, support oxygenation and ventilation, followed by a secondary survey, which includes a head to toe examination of the patient [5]. Furthermore, a thorough and accurate estimation of the burn size, expressed as the total body surface area (TBSA), is essential in guiding therapy and in determining whether the patient requires transfer to a burn center [6]. Criteria to refer a burn victim to a burn center includes: partial thickness burns greater than 10% TBSA, burns involving specific anatomic sites such as the perineum, third degree burns at any age group, electrical or chemical burns, burns with associated inhalation injury or burns in patients with preexisting medical conditions that can complicate management, prolong recovery or affect mortality [7]. Burn management requires a particular framework in order to maximize patient care. This was reiterated in an expert opinion article by Legrand, et al, which highlighted key recommendations in acute burn care [6]. The recommendations centered on early recognition of severe wounds, appropriate fluid resuscitation and appropriate triage to burn centers are the cornerstone of burn care [6]. Certain countries, such as Switzerland, have noted the need for a burn plan to promptly address burn patients' needs at the onset of the incident. The Swiss burn plan, established in 2013 by Raffoul, et al. [8], revolves around two pillars: the need for early involvement of specialists in a centralized burn center as well as the optimal use of existing resources. Thus, Switzerland has devised and adopted a plan comprised of a network of hospitals that are classified and stratified based on competencies into specialized centers, first level centers (depending on the availability of intensive care units and plastic surgeons) and second level centers (availability of intensive care units and general surgeons) [8]. This network of hospitals is buttressed by emergency teams that have received the appropriate training in dealing with acutely burned patients by established transportation routes (both by land and air) and continuous contact with burn centers abroad. The multi-disciplinary approach of the Swiss burn alarm plan highlights the importance of addressing burn injuries as separate trauma cases and approaching their care in a holistic method.

BURNS IN LEBANON

Valid national burn statistics and burn epidemiological studies are lacking in Lebanon. Three burn centers exist in Lebanon: Geitawi Hospital, Nabatieh Hospital and Al Salam Hospital. However, the only data ever collected on burns in Lebanon was in 2010 from Geitawi Hospital's trauma unit. According to their registry, over a period of one year, a total of 84 burn cases were admitted [8]. The most common cause was from home accidents (60%) do we have the percentage of adults vs. children involved in home accidents, and 13% of which resulted in deaths [9]. According to the Lebanese Red Cross' statistics, the Emergency Medical Services dealt with 124 burn injuries during the month of November 2016. The extent of care for these injuries was not specified. From a study conducted by Attiyeh, et al. in 1995 [10], it was found that the majority of minor burns, and, at times, more serious burns were treated at local fire stations. Patients are referred late to tertiary care centers, such as the American University of Beirut Medical Center (AUBMC), and only if they fail to heal or if they develop complications, such as contractures [9]. Currently, the country does not have a mass catastrophe burn plan but follows an Emergency Health Contingency Plan, which is a tool that describes the level of preparedness and the arrangements made in anticipation of a crisis [11]. Unlike the Swiss model, which incorporates paramedics at the scene involving burn patients, civic defense forces and the army in addition to emergency medical responders are involved in burn care at the site of damage in Lebanon. The lack of a proper chain of command in the acute management of burn patients is undoubtedly affecting morbidity and mortality from this condition.

RESEARCH QUESTIONS

Lebanon can benefit from a burn alarm plan due to the growing refugee population and political instability that renders it prone to man-made catastrophes. The role of various stakeholders that come into contact with a burn patient is not well delineated. Based on limited literature on the subject, we hypothesize that there is no standardized approach to burn care in the country. With this in mind, the study aims at understanding the epidemiology of burns in Lebanon and describing the current management of burn care by assessing the practices and interviewing the stakeholders involved in patient care. The information gathered will be analyzed with the aim of establishing a national catastrophe burn plan to accommodate for the needs of burn trauma patients and maximize their care in an acute setting.

METHODS

Questionnaires were devised for physicians and emergency responders (see **Appendices**). These surveys were validated by burn surgeons in Switzerland and in Lebanon and an official emergency responder from the Lebanese Red Cross. They were then translated into arabic and french by a professional translator to ensure legitimacy and accuracy. Approval to distribute the questionnaires was obtained by the Ministry of Health and the Order of Physicians of Lebanon, as was similarly done from the Lebanese Red Cross committee. The questionnaires were then administered in opaque folders, and placed at the entrance

Tables
Data presented are column percentages except in the first row.
Abbreviations: N, number; SD, standard deviation; NA, data not available; LRC, Lebanese Red Cross; EMT, Emergency Medical Technician; TBSA, total body surface area.

Table 1: Responses to questionnaire from Chifa'a, Al Youssef, Rassoul Al Azam and Nabatiyeh hospitals

Hospital		Chifa'a	Al Youssef	Rassoul Al Azam	Nabatiyeh	TOTAL
Respondents						
Total, N		17	30	4	7	58
Burn patients' characteristics						
Cause of burn						
Home accidents	Yes (vs. No)	94	80	100	71	85
Work related injuries	Yes (vs. No)	35	27	25	100	38
Others	Yes (vs. No)	6	16	0	0	11
Treatment assessment						
Patient chart	Yes (vs. No)	6	39	0	0	22
First aid oral account	Yes (vs. No)	6	36	33	83	32
Family/friend oral account	Yes (vs. No)	82	32	67	17	48
Patient's oral account	Yes (vs. No)	35	29	33	0	28
Average Length of stay of burn patient						
Pediatric	< 10 days	19	71	0	0	47
	10 days	75	13	100	0	40
	20 days	6	17	0	100	14
Adult	< 10 days	56	72	67	0	57
	10 days	44	28	33	0	29
	20 days	0	0	0	100	14
Geriatric	< 10 days	13	42	0	0	24
	10 days	56	29	67	0	36
	20 days	25	21	33	100	34
	50 days	6	8	0	0	6
Burn patient's treatments and procedures						
Frequency of 'showers'						
Before surgery	Every day	73	39	50	100	62
	Every other day	27	56	50	0	36
	Once a week	0	6	0	0	2
After surgery	Every day	20	41	0	100	42
	Every other day	53	35	100	0	39
	Once a week	27	24	0	0	20
Prophylactic treatment for burns						
Administration	Yes (vs. No)	75	86	75	100	83
Cell therapy for burns						
Common practice	Yes (vs. No)	27	50	0	100	48
Recommend as a common practice	Yes (vs. No)	80	100	NA	100	94
Common type of Grafts	Allografts	25	19	0	0	17
	Autografts	63	50	100	100	66
	Xenografts	13	25	0	0	15

of the emergency rooms of the respective hospitals, Red Cross committee center and in the Civil Defense lobby, each with a consent sheet. The folders were then collected and kept in a locked drawer. Additionally, a retrospective chart review was conducted at the AUBMC, after approval from the institutional review board. The aim was to collect information on burn patients that were seen in an emergency setting at AUBMC. The data was then inputted and analyzed on Statistical Package for the Social Sciences or SPSS®, according to the method described below.

STATISTICAL METHOD

Data gathered from the surveys and AUBMC patient charts were summarized using means and standard deviations for continuous variables and counts and percentages for categorical ones. Descriptive analysis was conducted among the total sample in all datasets and by categories of the main exposure (hospitals and emergency medical technician, or EMT sites) in the hospitals and EMT sites datasets. Most variables were categorical with at least two categories and these were summarized using column percentages to allow for comparison among exposure groups. In the results tables, variables were presented under main section titles for organizational and readability purposes. Analysis was conducted using the SPSS® version 24.

RESULTS

A total of 97 questionnaires were distributed, 58 were collected from various hospitals throughout Lebanon and 39 were collected from various respondents. Among the 58

Table 2: Responses to questionnaire from Lebanese Red Cross, Army and Civil Defense

	Statistics/Categories	LRC Tripoli	LRC Spears	Army	Civil defense	TOTAL
Total	N	15	25	**20**	**18**	**78**
Emergency medical technician's (EMT) characteristics						
Average years of experience as EMT	Mean (SD)	6.9 (6.0)	5.2 (4.9)	**7.9 (2.4)**	**16.5 (5.3)**	**8.8 (6.4)**
Exposed to burn victims	Yes (vs. No)	87	68	**65**	**100**	**78**
Burn Patient age group						
Pediatric (0 to < 18 years)	Yes (vs. No)	54	35	**20**	**67**	**44**
Adult (18 to 64 years)	Yes (vs. No)	62	76	**73**	**56**	**67**
Geriatric (> 65 years)	Yes (vs. No)	23	6	**7**	**17**	**13**
Type of burn						
Thermal	Yes (vs. No)	77	83	**88**	**89**	**85**
Electrical	Yes (vs. No)	38	6	**13**	**67**	**31**
Chemical	Yes (vs. No)	23	22	**6**	**22**	**18**
Other	Yes (vs. No)	8	0	**0**	**0**	**2**
Average % total body surface area (TBSA) affected of burn patients interacted with						
< 10% TBSA	Yes (vs. No)	31	22	**31**	**22**	**26**
10% TBSA	Yes (vs. No)	46	33	**50**	**33**	**40**
20% TBSA	Yes (vs. No)	23	33	**38**	**56**	**38**
50% TBSA	Yes (vs. No)	15	28	**6**	**22**	**18**
> 50% TBSA	Yes (vs. No)	23	6	**0**	**0**	**6**
Cause of burn						
Home accidents	Yes (vs. No)	80	56	**85**	**100**	**80**
Outdoor activities	Yes (vs. No)	0	6	**0**	**39**	**11**
Work related injuries	Yes (vs. No)	60	44	**25**	**67**	**48**
Other cause	Yes (vs. No)	20	0	**15**	**11**	**11**
First emergency responder to arrive at scene	Yes (vs. No)	100	96	**95**	**100**	**97**
Training for EMT						
Ever received specialized training to deal with burn patient	Yes (vs. No)	36	36	**NA**	**100**	**55**
Training updated on continuous basis	Yes (vs. No)	50	50	**NA**	**73**	**64**

questionnaires, 17 questionnaires came from Al Shifa Hospital, located in Tripoli, four questionnaires from Rassoul-Al-Azam Hospital in Beirut, 30 questionnaires from Youssef Hospital in Akkar and seven questionnaires from Nabatiyeh Hospital in Nabatiyeh. Emergency medical responders questionnaires are summarized in **Table 1**, hospital questionnaire responses are summarized in **Table 2**, and AUMBC chart review is summarized in **Table 3**. Among the emergency respondents, a total of 39 questionnaires were from the Lebanese Red Cross, 14 from the Tripoli branch and 25 from the Spears branch. Nineteen Army respondents participated and 17 Civil Defense members partook in the project.

DISCUSSION

According to the data gathered, the epidemiology of burns in Lebanon seems to be in line with world statistics, with thermal sources being the most common cause of burns (83%), with most occurring in a domestic setting (85%). There was discrepancy in responses from the Civil Defense, Army and EMTs, especially pertaining to knowledge and standardization of practice. All parties claimed to be the first to arrive at the scene, and this prioritized treatment on site as well as triage of patients differently. This could be due to the fact that burn care is not fully integrated in the EMT training program, with only 36% of Lebanese Red Cross responders reporting receiving specialized burn training as opposed to 100% of responders confirming training in the Civil Defense group. Furthermore, there is no clear algorithm for patient triage, as Lebanese Red Cross responders emphasized different aspects of a hospital's adequacy to receive burn patients. These disparities are further enhanced by the lack of standardization in knowledge and practice of burn care across institutions, including differentiation between pediatric and adult burn care. For example, most hospital and EMT responders did not correctly define a severe burn as greater than 10% TBSA. This highlights the lack of standardization of care, which can no doubt influence outcomes in burn patients.

Our retrospective chart analysis at AUBMC hospital allowed us to look into an institution's approach to burn care. Most burn patients seen at AUBMC hospital have second degree or greater burn wounds, requiring specialized management. The fact that the mean TBSA was around 15.3% and the majority were multisite burns as well as the fact that only 3.8% of the patients went on to be treated at a burn center proves the need for more institutional crosstalk and the need for more infrastructure to deal with burns. Furthermore, the fact that almost half of the charts indicated patients with no insurance also calls for a need to address the financial coverage of burns, which is out of the scope of this paper. Additionally, the political instability has been found to lead to burn accidents, with approximately 18.4% of the burn cases at AUBMC occurring due to blast injuries.

There are limitations to this study. The difficulty with data collection resulted in a 29% response rate, which the Geitaoui Burn Center choosing not to take part in the study. Furthermore, it is crucial to gather more data from other hospitals in order to establish a national burn registry. Additionally, while switching from paper charts to a computerized system facilitated chart retrieval and analysis, there was difficulty in retrieving unscanned charts, leading to only 56.5% of the charts being analyzed.

Table 3: American University of Beirut medical center chart review

Variables	N (%) Mean (SD)
Burn degree	
1st degree (N = 61)	9 (14.7)
2nd degree superficial (N = 62)	29 (46.8)
2nd degree deep (N = 61)	45 (73.8)
3rd degree (N = 61)	36 (59.0)
Treatment, % present	
At site of accident	3 (2.3)
Emergency room	120 (87.6)
Inpatient	134 (95.7)
Outpatient	38 (28.6)
Type of treatment received, % present	
At site of accident (intubation, fluid resuscitation, ventilation, topical creams)	4 (3.2)
Emergency room (intubation, fluid resuscitation, ventilation)	82 (64.6)
Inpatient (ventilator support, fluid resuscitation, medical intervention, surgical intervention, psychiatry consultation, physical therapy)	130 (99.6)
Outpatient (medical functional unit or FU, surgical FU, rehabilitation, psychiatry FU)	73 (62.4)
None	31 (28.4)
Length of stay	
Intensive care unit	10.69 (94.6)
Normal unit	6.03 (9.14)
Treated at burn hospital (% Yes)	5 (3.8)

CONCLUSION: A NATIONAL CATASTROPHE BURN PLAN FOR LEBANON

With the data obtained from our study, heterogeneity and discordance among and within institutions are an apparent problem in Lebanon. In order to standardize burn care, we must first identify the existing infrastructures involved, the degree of expertise, as well as the extent of their geographical coverage. Next, we must stratify hospitals and accredit them based on their competencies. We must identify the burn centers in the country and ensure that they contain adequate equipment and trained personnel. Similar to the Swiss national catastrophe burn plan, we must designate Level 1 hospitals and Level 2 hospitals based on staffing, and clarify the roles of each institution involved in acute care of a burn patient. As seen from our data, Civil Defense, the Army and the Red Cross have insufficient coordination at the site of accident in Lebanon.

Appendix 1: Emergency Medical Technician (EMT) questionnaire in English

1. How long have you been an EMT?

_____

2. Have you had any exposure to burn victims?
   a. Yes
   b. No

3. What is the average age of the burn patients that you have interacted with? More than 1
   a. Pediatric patients (up to 18 years old inclusive)
   b. Adult patients (above 18 years old)
   c. Geriatric patients (above 65 years old)

4. What is the most common type of burn injury you have dealt with?
   a. Thermal
   b. Electrical
   c. Chemical
   d. Frostbite

5. What is the average % total body surface area affected of the burn patients you have interacted with?
   a. Less than 10% Total Body Surface Area
   b. 10% TBSA
   c. 20% TBSA
   d. 50% TBSA
   e. Above 50% TBSA

6. On average, where were most of the burns located on the patient's body?
   a. Upper extremities
   b. Lower extremities
   c. Torso
   d. Head
   e. More than one site on the body

7. On average, what were the circumstances of the burn injury?
   a. Home accidents
   b. Outdoor activities
   c. Work related injuries
   d. Industrial accident
   e. Natural disaster
   f. Political events/ man made catastrophe
   g. Physical abuse
   h. Other:_____

8. Do you tend to be the first emergency responder (ex police, red cross, other) to arrive at the scene?
   a. Yes (go to question 10)
   b. No (go to question 9)

9. Why are you not the first to arrive at the scene of the accident?
   a. Not the first to be contacted
   b. Another emergency service:
   c. Transportation difficulties (road blocks/traffic)
   d. Other: _____

10. What criteria do you use when assessing burn injuries on site?
   a. The criteria you were taught
   b. Criteria you have established based on personal experience

11. What is your definition of a severely burned patient for:
   a. Adult patients
      i. Less than 10% TBSA
      ii. 10% TBSA
      iii. 20% TBSA
      iv. 50% TBSA
      v. Above 50% TBSA
   b. Pediatric patients
      i. Less than 10% TBSA
      ii. 10% TBSA
      iii. 20% TBSA
      iv. 50% TBSA
      v. Above 50% TBSA

12. In the case of a severely burned individual, rank the following procedures in order of urgency/priority
   a. Secure the airway
   b. Stop the burning process (irrigate, brush off solid agents)
   c. Remove clothing and jewelry
   d. Assess extent of the burn
   e. Cover with sterile dressing

13. Please list the most common topical treatments (creams, gels, ointments, bandages, firefighter black cream)

_____

14. Do you have the resources (manpower, medical equipment, financial resources, training), as an organization, to deal with a mass catastrophe burn event? (Using Swiss definition: an external event that causes the death of more than 10 individuals)
   a. Yes
   b. No
      i. If no, what is lacking?
   1. Man power
   2. Medical equipment
   3. Financial resources
   4. Training
   5. Other: _____

15. What is the role of the army during a mass catastrophe?
   a. Protection of civilians at the site of harm
   b. Clearing the zone
   c. Facilitating entry and exit points (roads)
   d. Other: _____

16. How do you decide which hospital is most adequate to receive and treat burn patients?
   a. Affiliation
   b. Proximity
   c. Assessment of resources
   d. Other: _____

17. What single change could drastically improve the way you deliver care?
   a. Better roads
   b. More ambulances
   c. More equipment
   d. More personnel
   e. Better triage
   f. Better collaboration with other responders (Army, police, etc.)
   g. Other: _____

18. Have ever you received specialized training to deal with burn patients?
   a. Yes
      i. If so, by whom?
      ii. Is this training updated on a continuous basis?
   1. If yes, how often?
      iii. When was the last time you received specialized burn training?
   b. No

Appendix 2: Hospitals questionnaire in English

1. Gender
   a. Male
   b. Female

2. How many of your patients are burn patients?
   a. 25%
   b. 50%
   c. 75%
   d. Other:_____

3. What age group do you deal with the most in terms of burn patients?
   a. Pediatric patients (up to 18 years old inclusive)
   b. Adult patients (above 18 years old)
   c. Geriatric patients (above 65 years old)
   d. Both adults and pediatric patients

4. What kinds of burns do you most commonly deal with?
   a. Thermal
   b. Electrical
   c. Chemical
   d. Frostbite

5. Where are the burns mostly localized (anatomical sites)?
   a. Upper extremities
   b. Lower extremities
   c. Torso
   d. Head
   e. Multisite

6. What are the most common causes of most burn injuries?
   a. Home accidents
   b. Outdoor activities
   c. Work related injuries
   d. Industrial accident
   e. Natural disaster
   f. Political events/ man made catastrophe
   g. Physical abuse
   h. Other:_____

7. How do you assess what kind of treatments your patients have received on the way to the hospital from the site of the accident?
   a. Patient chart
   b. First aider's oral account
   c. Family/friend's oral account
   d. Patient's oral account

8. What is your preferred line of treatment for the following degrees of burns in an adult patient (above the age of 18 years old)?
   a. 2nd degree superficial: _____
   b. 2nd degree deep _____
   c. 3rd degree _____
   d. 4th degree _____

9. What is your preferred line of treatment for the following degrees of burns in a pediatric patient (below the age of 18 years old)?
   a. 2nd degree superficial: _____
   b. 2nd degree deep _____
   c. 3rd degree _____
   d. 4th degree _____

10. What is the average hospital stay for an adult burn patient?
   a. Less than 10 days
   b. 10 days
   c. 20 days
   d. 50 days
   e. Above 50 days

11. What is the average hospital stay for a pediatric burn patient?
   a. Less than 10 days
   b. 10 days
   c. 20 days
   d. 50 days
   e. Above 50 days

12. What is the average hospital stay for a geriatric burn patient?
   a. Less than 10 days
   b. 10 days
   c. 20 days
   d. 50 days
   e. Above 50 days

13. Rank the following treatments for a severely burned patient in order of urgency/priority:
   a. Intubation
   b. Debridement (treating against fungal/bacterial infection)
   c. Hydration
   d. Fluid resuscitation
   e. Ventilation

14. What is your definition of a "shower" when it comes to a burn patient?

_____

15. How often are burn patients "showered"?
   a. Before surgery
      i. Every day
      ii. Every other day
      iii. Once a week
   b. Post surgery
      i. Every day
      ii. Every other day
      iii. Once a week

16. Is prophylactic treatment administered to burn patients?
   a. Yes (go to next question)
   b. No (skip to question 18)

17. If so, when is prophylactic treatment (antibiotic treatment) administered?
   a. From the beginning
   b. During patient stay
   c. After discharge

18. What are the criteria for the administration of prophylactic treatment?

_____

19. What is your definition of a severely burned patient for:
   a. Adult patients
      i. Less than 10% TBSA
      ii. 10% TBSA
      iii. 20% TBSA
      iv. 50% TBSA
      v. Above 50% TBSA
   b. Pediatric patients
      i. Less than 10% TBSA
      ii. 10% TBSA
      iii. 20% TBSA
      iv. 50% TBSA
      v. Above 50% TBSA

20. Is cell therapy (autologous dermal fibroblasts) a common practice for severely burned patients?
    a. Yes (go to question 21)
    b. No (go to question 22)

21. Do you think cell therapy should be a common practice for severely burned patients? If yes, please provide an explanation.
    a. Yes: _____
    b. No

22. For severely burned patients, what grafts are the most commonly used in your practice?
    a. Allografts
    b. Autografts
    c. Xenografts

Appendix 6: Army Questionnaire in English

1. Define your role when it comes to mass casualty events (catastrophe is numerically described as the affliction of 10 individuals, whether burned or polytraumatized)
    a. Protection of civilians at the site of harm
    b. Clearing the zone
    c. Facilitating entry and exit points (roads)
    d. Other

2. What single change could potentially allow you to improve your services during a mass casualty event?
    a. Better roads
    b. More ambulances
    c. More equipment
    d. More personnel
    e. Better collaboration with other responders (paramedics, police, etc.)
    f. Other

3. How do you proceed in the event of a burned patient on the site of the casualty?
    a. Clear the area and call the paramedics
    b. Move the injured civilian to a safer location
    c. Treat the injury on site
    d. Other

Delineating each party's roles can clarify this: the Civil Defense should be responsible for search and rescue within the burn sector, while the Lebanese Red Cross is responsible for acute stabilization and patient transport, the latter being facilitated by the Army, which can aid in securing the area involved. Once the various parties' roles have been established, and the institutions involved properly distinguished, there should be a creation of mobile burn teams, each comprised of a plastic surgeon or disaster trained emergency physician, a nurse and an inhalation team. The role of this burn team is to triage patients and assist in the delivery of care to peripheral zones, when transporting a patient to a burn center, Level 1 or 2 hospital is deemed too difficult. A similar system has been set up in Switzerland, with very efficacious results [9].

The need for a national burn registry goes in parallel with the importance of a national catastrophe burn plan. Not only will it permit a better understanding of the epidemiology of burns in the country, but it will also allow for appropriate conclusions to be drawn by policymakers and physicians pertaining to addressing and optimizing burn care. Appropriate allocation of resources and centralization of care will benefit the nation and ensure optimal delivery of burn treatment.

REFERENCES

1. Peck M. Epidemiology of burn injuries globally. In M.J. Jeschke (Ed.) Uptodate. 2017. Available from: http://www.uptodate.com/contents/epidemiology-of-burn-injuries-globally (Last access 10/10/2019).
2. World Health Organization. The Global Burden of Disease: 2004 Update. 2008. Available from: www.who.int/healthinfo/global_burden_disease/GBD_report_2004update_full.pdf (Last access 10/10/2019).
3. Stewart B, Lafta R, Esa Al Shatari S, Cherewick M, Burnham G, Hagopian A, et al. Burns in Baghdad from 2003 to 2014: Results of a randomized household cluster survey. Burns 2016; 42:48-55.
4. World Health Organization. Burn Fact Sheet 2017. Available from: http://www.who.int/mediacentre/factsheets/fs365/en/ (Last access 07/10/2019).
5. Hettiaratchy S. Initial management of a major burn:1-overview. BMJ 2004; 328:1555-7.
6. Legrand M, Barraud D, Constant I, Devauchelle P, Donat N, et al. Management of severe thermal burns in the acute phase in adults and children. Anaesth Crit Care Pain Med 2020; 39:253-67.
7. American Burn Association (ABA). Burn center referral criteria. 2016. Available from: http://ameriburn.org/wp-content/uploads/2017/05/burncenterreferralcriteria.pdf (Last access 10/10/2019).
8. Al-Mousawi A, Mecott-Rivera G, Jeschke M, Herndon D. Burn teams and burn centers: The importance of a comprehensive team approach to burn care. Clin Plast Surg 2009; 36:547-54.
9. Raffoul W, Said JM, Berger M. Massive burn casualties in Switzerland: The burn alarm plan. Med Emergency, MJEM 2013; 15:13-6.
10. Attiyeh BS, Saba M. Cost/benefit value of a burn unit at the American university of Beirut medical center. Ann. Medit. Burns Club. 1995. Available from http://www.medbc.com/annals/review/vol_8/num_3/text/vol8n3p164.htm (Last access 07/10/2019).
11. Lebanon Ministry of Public Health. Emergency Health Contingency Plan. 2012. Available from https://www.moph.gov.lb/en/publications (Last access 01/10/2019).