

## Duration of Hospital Stay in Infantile Burn: A Retrospective Study Conducted at Tertiary Care Hospital

Syed Zafar Mehdi<sup>1</sup>, Jalal uddin Akber<sup>2</sup>, Mazhar Nizam<sup>3</sup>, Arshad Hamid Khan<sup>4</sup>,  
Veena Kumari<sup>5</sup>, Ahmed Raheem Buksh<sup>6</sup>

### Abstract

**Objective:** The aim of this study was to determine the duration of hospital stay in different types of infantile burn.

**Methods:** This retrospective study was conducted at the plastic surgery, burn unit of Patel hospital during the period of 7 years from January 2007 to December 2013. Children ageing one year or less at the time of admission with any type of burn were included in the study and those above one year were excluded. The patients medical records were obtained from medical record department. SPSS 21 version was used for statistical analysis. Data description is given by percentage. Standard deviation and central tendency (medians and means) were taken as measures of variability. For comparison Chi square test was used. P value less than 0.05 was taken as statistically significant.

**Results:** Total 789 paediatric burn patients were admitted in Patel Hospital during January 2007 to December 2013, in which 106 were infants. Infants having scald burn were 83 (78.3%), fire burn 21 (19.8%) and chemical burn 2 (1.9%). Male to female ratio was 1.5:1. Out of these 106 infants, 74 (70%) were hospitalized for 1 - 10 days, 18 (16.9%) were hospitalized for 11 - 20 days, 6 (5.6%) and 8 (7.5%) infants were hospitalized for 21 - 30 days and more than 30 days respectively. Most of the infants with different types of burn injuries remained under treatment between 1 - 10 days. Infants with scald, fire and chemical burn were 59 (71.1%), 14 (66.7%), and 1 (50%) respectively and remained under treatment at hospital between 1 - 10 days. It was observed that duration of stay was prolonged for infants with fire burn as compared to those with scald burn, if total body surface area (TBSA) was more than 10%. Infants with both second and third degree of fire burn (66.6%) had length of stay more than 20 days as compared to (27.3%) of scald burn. The length of stay was affected mostly in those infants who had secondary wound infections. Out of 106 infants, 28 (26.4%) had growth of organisms in wound cultures. In 106 infants, 95 (89.6%) were discharged, 2 (1.9%) left against medical advice (LAMA) and 9 (8.5%) expired. Among these 6 (66.6%) of them expired due to scald burn and 3 (33.3%) expired due to fire burn. Most of the infants 5 (55.5%) expired within 5 days due to more than 40% of their TBSA involved and having third degree burn.

**Conclusion:** We have seen through this study that infants with less than 10% of their TBSA involved were hospitalized for less than 10 days due to scald, fire or chemical burn. However in fire burn the duration of stay was prolonged as compared to scald burn if TBSA was more than 10% or having both second and third degree burn. The length of stay is also affected for those infants who developed secondary bacterial wound infections. Infants who had more than 40% of their TBSA involved and had third degree burn, survived for less than 5 days.

**Keywords:** Total body surface area, length of stay, infantile burn.

**IRB:** Approved by Ethical Review Committee of Patel Hospital. Dated: 8<sup>th</sup> July 2015

(ASH & KMDC 20(2):142;2015).

<sup>1,2,4,5</sup>Department of Paediatrics

Baqai Medical University Karachi

<sup>3</sup>Department of Plastic Surgery and Burn Unit  
Patel Hospital Karachi.

<sup>6</sup>Bio-statistician

Aga Khan University Hospital, Stadium Road, Karachi

**Correspondence:** Dr. Syed Zafar Mehdi

**Address:** B-107, Block-10, F. B. Area, Karachi

**Email:** zafar.mehdi14@gmail.com

## Introduction

Burn injury is considered to be an important preventable cause of injuries among children, and it still causes significant morbidity and mortality in our country. Treatment for burns is sophisticated, expensive, and time consuming since patients need special care and equipment, as well as trained staff. Burn treatments result in substantial financial liabilities for the patient's families and hospitals<sup>1</sup>. In Middle East the leading cause of morbidity and mortality are burn injuries<sup>2</sup> and it represents 5-12% of all traumas<sup>3</sup>. The incidence of burns ranges from 112 to 518 per 100,000 per year across all ages<sup>4-10</sup>. In Pakistan the incidence is 1,388 per 10,000 per year for children below 5 years,<sup>10</sup> while in another study published in 2006 the incidence for children aged 0-4 years in Kuwait was 34 per 100,000 per year<sup>11</sup>. The treatment of the burn due to any cause (scald, fire, chemical) require multidisciplinary approach because it causes a significant physical and psychological sequelae, the long term treatment and follow up is required for rehabilitation and regular surgical intervention<sup>12,13</sup>. Paediatric burns impose enormous burdens on families and the society as a whole. Parents and family members are concerned regarding the duration of hospitalization and finance required for the treatment. Mothers are gravely concerned regarding the length of stay because most infants are on breast feeding and therefore it is very important to determine the duration of hospital stay in different types of burns like scald, fire and chemical in relation to the total body surface area involved and with degree of burn. This may not only be helpful in counselling the families but will also help the hospital administration regarding bed occupancy and expenditures to be incurred for the treatment, because sometimes patients are treated via welfares funds.

Immense studies have been carried out on paediatric burn and their causes on both national and international levels. We do not have definite data for duration of stay on infantile burn injuries and we have seen that parents are too much concerned regarding the length of stay especially in the

infants, may be because most of them are breast fed. The objective of this study was to determine the duration of hospital stay in different types of infantile burn. This study may help professionals dealing with infantile burns both at national and international level and may help in counselling the families, as they are concerned regarding the duration of stay and prognosis.

## Patients and Methods

The retrospective study was conducted at plastic surgery, burn unit of Patel Hospital during the period of 7 years (January 2007 to December 2013). This study was carried out to know the duration of hospital stay in different types of infantile burn (scald, fire and chemical) in relation to the body surface area involved and with degree of burn. Children ageing one year or less at the time of admission were included in the study and those above one year were excluded. The patient's medical records were obtained from the medical record department. Non-probability consecutive sampling technique was applied. The sample size was calculated by using WHO open resource calculator version by KC lun and Peter chiam. The prevalence of Paediatric burn was found to be 82%<sup>10</sup> taking 95% confidence interval ( $\alpha = 0.05$ ) with 7.5% absolute precision. Final sample size came out to be  $n = 101$  infant. SPSS 21 version was used for statistical analysis. Data description is given by percentage. Standard deviation and central tendency (medians and means) are taken as measures of variability. For comparison Chi square test was used. P value less than 0.05 was taken as statistically significant.

## Results

Total number of burn patients admitted was 1862, out of these 789 (42.4%) aged up to 15 years and within this category 106 (13.4%) were infants. Scald burn was the major burn injury among children aged less than 1 year. Out of 106 infants, 83 (78.3%) were admitted because of scald burn, 21 (19.8%) and 2 (1.9%) were admitted because of fire and chemical burn respectively. Males were

mainly affected (male to female ratio, 1.5:1). The mean age of admission was  $7.98 \pm 4.68$  months. The lowest recorded age in the data was twenty one days, while maximum age was 11 months and twenty days.

Fig. 1. shows that out of 106 infants, 74 (70%) were hospitalized for 1-10 days, 18 (16.9%) were hospitalized for 11-20 days, 6 (5.6%) and 8 (7.5%) infants were hospitalized for 21-30 days and more than 30 days respectively. Most of the infants with different types of burn injuries remained under treatment between 1-10 days. Infants with scald, fire and chemical burn 59 (71.1%), 14 (66.7%), and 1 (50%) respectively remained under treatment between 1-10 days. Table 1 shows the length of stay in relation to the total body surface area involved in scald burn. While the length of stay in relation to the total body surface area involved in fire burn is shown in (Table 2).

The duration of stay was prolonged for infants with fire burn as compared to those with scald burn. Infants with scald burn (n=83) had a mean duration of stay for  $18.63 \pm 13.41$  days as compared to 21 infants with fire burn having a mean duration of  $25.04 \pm 22.56$  days.

Infants with both second and third degree of fire burn (66.6%) had length of stay more than 20 days as compared to (27.3%) of scald burn (Table 3).

There is very limited data regarding infants admitted with chemical burn, only 2 were admitted and stayed for less than 20 days with second degree burn. The length of stay was affected mostly in those infants who had secondary wound infections. Out of 106 infants, 28 (26.4%) had growth of organisms in wound cultures.

In 106 infants, 95 (89.6%) were discharged, 2 (1.9%) left against medical advice (LAMA) and 9 (8.5%) expired. Among these 6 (66.6%) of them expired due to scald burn and 3 (33.3%) expired due to fire burn. Most of the infants, 5 (55.5%) expired within 5 days having more than 40% of their total body surface area (TBSA) involved and having third degree burn.

## **Discussion**

We have seen very limited data on infantile burn despite the large amount of international literature on paediatric burn and their causes. In paediatrics burn admissions scald burn is the major cause of morbidity as well as mortality<sup>14,15</sup>. Similar to many studies in our region, the incidence of burn injuries among males was higher than among females<sup>5,7,8,10</sup>. In Middle Eastern countries the mean total body surface area burned in all ages was found to range from 10% to 48%<sup>2</sup>, while in the US and Canada<sup>16</sup> 62% of all patients had less than 10% TBSA affected. In our study 40.6% had less than 10% of their TBSA affected and 39.6% had 10% to 19% of their TBSA affected. We do not have definite data regarding duration of stay in infantile burn. The length of hospital stay (LOS) has been observed to be an important measure of morbidity among trauma patients and has an influence on patient's final outcome<sup>17,18</sup>. Prolonged duration of hospital stay is related with unacceptable burden on hospital resources as well as increased costs of health care<sup>19</sup>. In 1997 the average length of hospital stay (ALOS) in Kuwait<sup>20</sup> was 16 days. According to the National Burn Repository data for 2005, the mortality rate in USA was 4.67% and the ALOS was 8.22 days<sup>21</sup>. The hospital stay was directly related to TBSA, in another study from Hong Kong, the mean hospital stay was 7.4 days<sup>22</sup>. In our study 83 infants with scald burn the mean duration of stay was  $18.63 \pm 13.41$  days and in fire burn was  $25.04 \pm 22.56$  days. Infants with scald burn 30 (93.8%) stayed for less than 10 days as compared to 7 (77.8%) infants with fire burn whose TBSA involved was less than 10%. The mortality rate in our study was 8.5% and most of them survived for less than 5 days with more than 40% of TBSA involved and having third degree burn. These results are similar to those reported in Turkey<sup>23</sup> and China<sup>24</sup>; however, it is higher than that reported in other countries<sup>22, 24-26</sup>.

In prolonged duration of stay, there is an increased risk of hospital acquired infections among patients and staff<sup>27,28</sup>. We know that sepsis is the

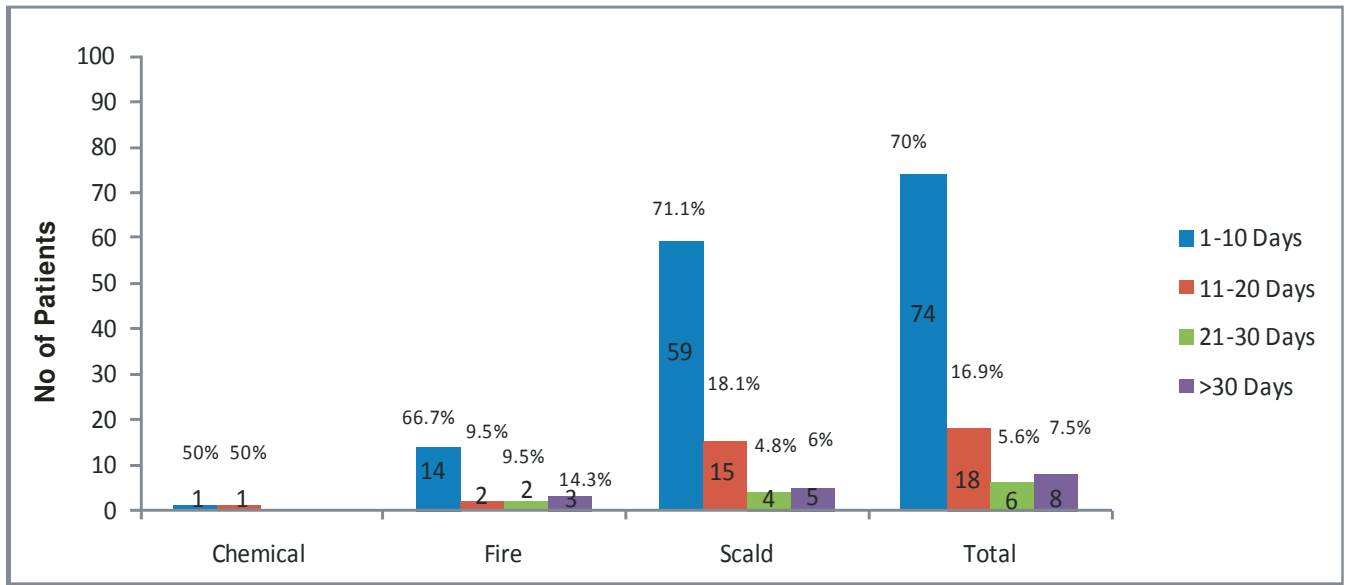


Fig. 1. Frequency and percentages of patients hospitalized (in days) with chemical, fire and scald burns.

Table 1. Length of stay in scald burn in relation to total body surface area (TBSA)

Length of stay in days	Total body Surface area (TBSA)												Mean ± SD		
	<10%		10-19%		20-29%		30-39%		40-49%		80-89%			Total	
	n	%	n	%	n	%	n	%	n	%	n	%		n	%
1-10	30	93.8	22	64.7	2	18.2	3	75	1	100	1	100	59	71.1	4.89 ± 2.82*
11-20	2	6.3	8	23.5	5	45.5	0	0	0	0	0	0	15	18.1	11.21 ± 6.17
21-30	0	0	2	5.9	2	18.2	0	0	0	0	0	0	4	4.8	23.25 ± 2.87
>30	0	0	2	5.9	2	18.2	1	25	0	0	0	0	5	6	35.2 ± 2.77*
Total	32	100	34	100	11	100	4	100	1	100	1	100	83	100	18.63 ± 13.41

Chi-square=28.89, P-value=0.017\*

Table 2. Length of stay in fire burn in relation to total body surface area (TBSA)

Length of Stay in days	Total body Surface area (TBSA)										Total (n=21)	Mean ± SD	
	<10%		10-19%		20-29%		60-69%		>90				
	n	%	n	%	n	%	n	%	n	%			
1-10	7	77.8	4	50	0	0	2	100	1	100	14	66.7	4.07 ± 2.52
11-20	0	0	1	12.5	1	100	0	0	0	0	2	9.5	15.5 ± 0.7
21-30	1	11.1	1	12.5	0	0	0	0	0	0	2	9.5	24 ± 2.82
>30	1	11.1	2	25	0	0	0	0	0	0	3	14.3	56.6 ± 39.31
Total	9	100	8	100	1	100	2	100	1	100	21	100	25.04 ± 22.56

Chi-square=13.23, P-value=0.352

**Table 3.** Length of stay in relation with the degree of burn

Length of stay in days	Second degree of burn						Third degree burn						Second and third degree burn						Total	
	Scald (n=62)		Fire (n =12)		Chemical (n =2)		Scald (n =10)		Fire (n =3)		Chemical (n =0)		Scald (n=11)		Fire (n=6)		Chemical (n=0)		Total (n=106)	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
1-10	46	74.2	9	75	1	50	7	70	3	100	0	0	6	54.5	2	33.3	0	0	74	70
11-20	11	17.8	2	16.7	1	50	2	20	0	0	0	0	2	18.2	0	0	0	0	18	16.9
21-30	3	4.8	0	0	0	0	0	0	0	0	0	0	1	9.1	2	33.3	0	0	6	5.6
>30	2	3.2	1	8.3	0	0	1	10	0	0	0	0	2	18.2	2	33.3	0	0	8	7.5
Total	62	100	12	100	2	100	10	100	3	100	0	0	11	100	6	100	0	0	106	100

major cause of mortality in burn patients<sup>29</sup> and most of the children on admission present with bacterial wound infection, sepsis and septic shock<sup>30</sup>. In our study initially at the time of admission only 5% of infants had growth of organisms in wound cultures but on subsequent cultures the growth of organisms increased in wound cultures. Over all 28 (26.4%) infants had positive wound cultures and this affected the length of stay. This study may help in efficient management of patients and in calculating approximate duration of stay. The length of stay can be decreased by preventing hospital-acquired infections. There was limited data available for infants suffering from chemical and fire burns. Another limitation was to collect the accurate data regarding the time lapse between the incident and admission. However as this study was based on data gathered from Patel hospital, which receives referral for burn patients across Pakistan, its findings can be used as guidelines for devising future national health strategic plans for burns management, public awareness programs, building special burn units and allocation of intensive care units to burn patients.

### Conclusion

We have seen through this study that infant with less than 10% of TBSA involved were hospitalized for less than 10 days due to scald, fire and chemical burn. However in fire burn the duration of stay was prolonged as compared to scald burn if TBSA was more than 10% or having both second

and third degree burn. The length of stay was also affected in those infants who developed secondary bacterial wound infections. Infants who had more than 40% of their TBSA involved and having third degree burn, survived for less than 5 days. This may help in counseling the families, as they are concerned regarding the duration of stay and prognosis.

### Conflict of interest

Authors have no conflict of interest and no grant/funding from any organization.

### References

1. Van der Merwe E. Critical care of burn patients in developing countries: cost versus need. *Continuing Medical Education Burns*. 2008;26:428-30. Available from <http://www.ajol.info/index.php/cme/article/view/41819>
2. Othman N, Kendrick D. Epidemiology of burn injuries in the East Mediterranean Region: a systematic review. *BMC public health*. 2010;10:83.
3. Olaitan PB, Olaitan JO. Burns and scalds--epidemiology and prevention in a developing country. *Niger J Med* 2005;14:9-16.
4. Groohi B, MacKay Rossignol A, Perez Barrero S, Alaghebandan R. Suicidal behavior by burns among adolescents in Kurdistan, Iran: a social tragedy. *Crisis*. 2006;27:16-21.
5. Arshi S, Sadeghi-Bazargani H, Mohammadi R, Ekman R, Hudson D, Djafarzadeh H, et al. Prevention oriented epidemiologic study of accidental burns in rural areas of Ardabil, Iran. *Burns* 2006;32:366-71.



6. Groohi B, Alaghebandan R, Lari AR. Analysis of 1089 burn patients in province of Kurdistan, Iran. *Burns* 2002;28:569-74.
7. Panjeshahin MR, Lari AR, Talei A, Shamsnia J, Alaghebandan R. Epidemiology and mortality of burns in the South West of Iran. *Burns* 2001;27:219-26.
8. Maghsoudi H, Pourzand A, Azarmir G. Etiology and Outcome of Burns in Tabriz, Iran an Analysis of 2963 Cases. *Scand J of Surg* 2005;94:77-81.
9. Siddiqui N. Burn-injury is preventable: An analysis of 716 cases in a burns unit. *J Coll Physicians Surg Pak* 1998;8:148-52.
10. Ahmed M, Shah M, Luby S, Drago-Johnson P, Wali S. Survey of surgical emergencies in a rural population in the Northern Areas of Pakistan. *Trop Med Int Health* 1999;4:846-57.
11. Sharma PN, Bang RL, Al-Fadhli AN, Sharma P, Bang S, Ghoneim IE. Paediatric burns in Kuwait: incidence, causes and mortality. *Burns* 2006;32:104-11.
12. Rode H, Millar AJ, Castle B, Lyle J. Ethical decision making in severe paediatric burn victims. *S Afr Med J* 2011;101:17-9.
13. Poulos RG, Hayen A, Chong SS, Finch CF. Geographic mapping as a tool for identifying communities at high risk of fire and burn injuries in children. *Burns* 2009;35:417-24.
14. Parish RA, Novack AH, Heimbach DM, Engrav LH. Pediatric patients in a regional burn center. *Pediatr Emerg Care* 1986;2:165-7.
15. Hazinski MF, Francescutti LH, Lapidus GD, Micik S, Rivara FP. Pediatric injury prevention. *Ann Emerg Med*. 1993;22:456-67.
16. Miller SF, Bessey PQ, Schurr MJ, Browning SM, Jeng JC, Caruso DM, et al. National Burn Repository 2005: a ten-year review. *J Burn Care Res* 2006;27:411-36.
17. Krug EG, Sharma GK, Lozano R. The global burden of injuries. *Am Journal Public Health*. 2000;90:523.
18. Muller MJ, Pegg SP, Rule MR. Determinants of death following burn injury. *Br J Surg* 2001;88:583-7.
19. Wong MK, Ngim RC. Burns mortality and hospitalization time--a prospective statistical study of 352 patients in an Asian National Burn Centre. *Burns* 1995;21:39-46.
20. Prasanna M, Thomas C. A profile of methicillin resistant *Staphylococcus aureus* infection in the burn center of the Sultanate of Oman. *Burns* 1998;24:631-6.
21. Saffle JR, Davis B, Williams P. Recent outcomes in the treatment of burn injury in the United States: a report from the American Burn Association Patient Registry. *Journal Burn Care Rehabil* 1995;16:219-32.
22. Tse T, Poon CH, Tse K-H, Tsui T-K, Ayyappan T, Burd A. Paediatric burn prevention: an epidemiological approach. *Burns* 2006;32:229-34.
23. Liao CC, Rossignol AM. Landmarks in burn prevention. *Burns* 2000;26:422-34.
24. Kai-Yang L, Zhao-Fan X, Luo-Man Z, Yi-Tao J, Tao T, Wei W, et al. Epidemiology of pediatric burns requiring hospitalization in China: a literature review of retrospective studies. *Pediatrics*. 2008;122:132-42.
25. Albertyn R, Bickler SW, Rode H. Paediatric burn injuries in Sub Saharan Africa--an overview. *Burns* 2006;32:605-12.
26. Sakallioğlu A, Basaran Ö, Tarim A, Türk E, Kut A, Haberal M. Burns in Turkish children and adolescents: nine years of experience. *Burns* 2007;33:46-51.
27. Fatovich D, Hughes G, McCarthy S. High bed occupancy and emergency department are bad for patients, staff and the system itself. *MJA* 2009;190:362-3.
28. Hillier DF, Parry GJ, Shannon MW, Stack AM. The effect of hospital bed occupancy on throughput in the pediatric emergency department. *Ann Emerg Med* 2009;53:767-76.
29. Orban C. Fundeni Clinical Institute: Diagnostic criteria for sepsis in burn patients. *Chirurgia (Bucur)* 2012;107:697-700.
30. Ramakrishnan KM, Jayaraman V, Methivanan T, Babu M, Ramachandran B, Sankar J. Profile of burn sepsis-challenges and out come in an exclusive children hospital in chennai, India. *Ann Burns Fire Disasters*. 2012;25:13-1