

## An evaluation of management of transferred paediatric burn patients

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### Abstract

The aim of study was to evaluate whether adequate initial management and safe transfer of paediatric burn patients was carried out in our setup. Patients transferred from other hospitals/ cities to Paediatric Surgery Department, Mayo Hospital were evaluated in this prospective study. Data was entered in a proforma. Around 90.4% patients on presentation had discrepancy in their burn percentage calculation. No intravenous fluids were administered to 75.4% patients and 71.1% patients did not have any intravenous access. Foley's catheter was inserted in 2 patients only though 72.8% needed it. No fasciotomy was performed in 10.5% patients needing it. Two patients needed endotracheal intubation but it was not passed, 49.1% patients were transferred by ambulance and 28.9% patients presented with sepsis. The mortality rate was 38.2%. Initial fluid resuscitation was compared with survival and found significant ( $p=0.000$ ). This shows that initial burn management, transfer system and referral system is full of errors.

**Keywords:** Paediatric Burn, Transfer, Management.

### Introduction

In Pakistan, burns cause over 2 million deaths per annum and around 35% of disability and disfigurement with lasting effects.<sup>1</sup>

It is important for better outcome of burn victims that the referring hospital should take all vital steps of initial management, before transfer of patient to burn centers.<sup>2,3</sup> Safe transfer protocols which include provision of ambulance and properly filled referral forms should be adhered to, as per guidelines of American Burn Association (ABA).<sup>4</sup>

There is evidence that primary burn management applied in health care facilities in Pakistan is either insufficient or inefficient. Transfer and referral system is also full of flaws.<sup>5</sup> This leads to an unprecedented increase in complication rate and mortality. Lack of feedback is adding to severity of the problem.<sup>6</sup> Aim of this study was to evaluate whether adequate initial management and safe transfer of

paediatric burn patient was carried out in our set up.

### Methods

This prospective study was carried out in the Department of Paediatric Surgery, Mayo Hospital, Lahore, from 1st March 2017 to 31st May 2017. All burn patients (<13 years old) transferred from other hospitals of Punjab to the emergency were included in the study, if there was no history of child abuse, associated trauma or congenital anomalies. As initial management is same for all burn victims, so all types of burn (scald, flame, electric) were included after informed consent was taken from the parents. Patients were enrolled in the study after ethical permission. Non probability convenience sample was used. Sample size was estimated using 95% confidence level, 5% precision with expected percentage of transferred burn patients as 8%, under appropriate conditions.<sup>7</sup>

$$n = (z^2 \cdot p \cdot q) / d^2$$

Information was recorded on a Proforma. When total body surface area (TBSA) of burn was not provided on referral form or differed more than 5% from the calculations at admission, it was considered as discrepancy. When intravenous access was not taken and/or no isotonic fluid was administered before transfer or hypotonic solution was given, then it was considered as mismanagement. In case of inhalation injury, absence of endotracheal intubation (ETT) and/or absence of escharotomy procedure for eschar and/or fasciotomy for limb compartment and/or absence of urine output monitoring in more than 20% TBSA was taken as mismanagement. Transfer was considered unsafe if ambulance was not used and information provided on referral form was incomplete. Patients fulfilling two or more of the following criteria were considered in Sepsis; heart rate >100, respiratory rate > 20 breaths/min, temperature  $\geq 100.4^\circ\text{F}$  and TLC >12000/mm<sup>3</sup>.

Data was analyzed using Statistical Package for the Social Sciences (SPSS®) v21.0. Quantitative variables i.e. age, duration of hospital stay, TBSA were given as mean and standard deviation. Qualitative variables i.e. gender, referring institution, transfer status, vehicle used for transfer, intravenous access status, type of intravenous solution infused, bladder catheterization, respiratory

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problems, endotracheal intubation, infections or sepsis, and surgical problems were given as frequencies. Outcome was either survival or death. Frequency of mortality was calculated and initial intravenous fluid resuscitation was compared with outcome and analyzed using Chi-Square chart. P value <0.05 was considered statistically significant.

**Results**

Total 114 paediatric patients were enrolled. Mean age was  $3.9 \pm 2.9$  years, while 52 (45.6 %) patients were male and 62 (54.4 %) were female.

A total of 44 (38.6 %) patients were transferred from hospitals in Lahore while 70 (61.4 %) patients were referred from hospitals outside Lahore.

Only 21 (18.4 %) referrals forms had TBSA of burn calculated whereas 93 (81.6%) patient's forms had not mentioned it. According to the available information, mean TBSA of burn was  $37.8 \pm 19.6\%$ ; in comparison to the mean TBSA of burn calculated at admission which was  $33.4 \pm 17.4\%$ . TBSA calculated by receiving doctor (house officer or medical officer) had discrepancy in 103 (90.4 %) of cases, while only 11 (9.6%) referrals had no discrepancy.

Intravenous catheter had not been administered in 81 (71.1%) patients upon admission. In addition, no intravenous fluid had been administered in a total of 86 patients (75.4%). Isotonic solutions (Ringer's lactate and

Normal saline) had been administered to 27 (23.7%) patients. Hypotonic fluid had been administered to 1 (0.9%) patient.

Bladder catheterization was done in only 2(1.8%) patients but 83(72.8%) required it and 29 (25.4%) patients did not need it.

Only 3 (2.6%) patients had respiratory depression while the other 111 (97.4%) had normal respiration. 2(1.8%) patients needed ETT but it was absent. However, 1 (0.9%) patient had respiratory depression due to narcotic analgesics.

Fasciotomy was not performed in 12 (10.5%) patients. Other 102 (89.5%) patients did not need it.

A total of 33 (28.9%) patients were septic at admission. Mean time from actual accident to arrival at the hospital was  $2.7 \pm 5.6$  days (min: 0 day; max: 30 days).

Ambulance was used to transfer 56 (49.1%) patients and 58 (50.9%) patients used private transport.

Statistics of information provided on the referral forms are shown in Table-1.

Mean hospital stay of the admitted patients was  $5.04 \pm 4.13$  days.

Mortality rate was 38.2%. Initial fluid resuscitation was compared with survival of patient using chi square test and there was statistically significant ( $p = 0.000$ ) association between early fluid resuscitation and survival (Figure-1).

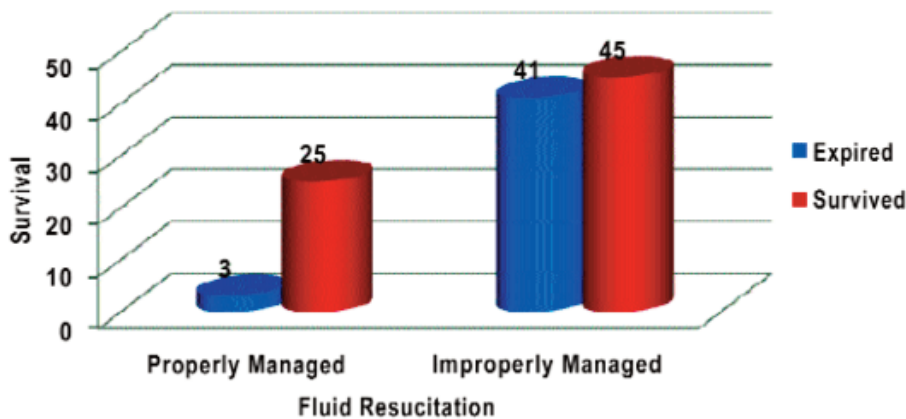


Figure-1: Fluid resuscitation and survival.

**Discussion**

Burns are emerging as a major health problem in our country. Though there is little data available about the incidence of burn injuries in Pakistan yet according to WHO, our region has high incidence of burn injuries and contributes to almost over half of burn related deaths worldwide.<sup>1,10</sup>

Table: Information on referral form.

		Age Percent	Sex Percent	Injury Mechanism Percent	Body Surface Area Percent	Treatment Given Percent
Valid	Yes	39.5	33.3	14.0	13.2	14.9
	No	60.5	66.7	86.0	86.8	85.1
	Total	100.0	100.0	100.0	100.0	100.0

Our study shows that the 90.4% referred patients got their burn percentage calculated incorrectly, which is a vital step in management of burns. The wrong calculation is normally due to the reason that these cases are seen only by junior doctors who lack the required exposure and training in burns management.<sup>8,9</sup> Another reason is extreme shortage of consultants in the field.<sup>6,9,10</sup> In our study, before referral, patients were seen by house officers or medical officers only.

The other important step in management of burn patients is fluid by securing line and giving intravenous fluids. In our study, 75.5% patients had not been given any fluid prior to referral which is similar to the Turkish study (68% of the patients).<sup>8</sup> Starting fluids early is important because it has been seen in a study that the survival depended upon how soon the fluid resuscitation was started and 64% of dead patients didn't get any fluid in first hour post burn.<sup>2</sup> Our study also establishes that survival is dependent on early fluid resuscitation.

The primary goal in fluid resuscitation in paediatric population is to maintain urine output of greater than 1ml/kg/hour assessed by catheterizing the patients. However, in our transferred population, only 1.8% kids had the Foley's catheter when they presented to us though 72.8% needed Foley's catheterization. Senayli et al showed that 49.7% of patients were wrongly catheterized.<sup>8</sup> Another important task during the resuscitation is to recognize and manage the burn related complications. None of the patients in our study, who needed fasciotomy (10.5%), underwent fasciotomy and Turkish study showed the same.<sup>8</sup> Three patients (2.6%) presented to us with respiratory depression of which 2(1.8%) needed intubation and this result is in contrast to the Turkish study where patients were wrongly intubated.<sup>8</sup> Again lack of training and lack of transfer protocols in Pakistan are the prime causes.

After appropriate management, safe transfer of patients require ambulance services. In our set up, only 49.1% of patients were sent by ambulance. High transfer rate is by private transport, due to inadequate and unsatisfactory government infrastructure.<sup>6,5</sup>

In our study, the mortality rate was 38.2%, more in septic patients, thus depicting that lack of adequate resuscitation leads to high mortality. Generally in Pakistan, the reported mortality rate ranges between 14-41.3%.<sup>7</sup>

This study was carried out in one burn unit and results need to be verified from other centers.

## Conclusion

Our study shows that initial burn management, transfer system and referral system is full of deficiencies and there is an imperative need to establish these protocols.

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**Conflict of Interest:** None.

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