A Regression Analysis of Epidemiologic Factors Affecting Survival in Pediatric Burn Patients in a Philippine Tertiary Burn Center (January 2004 – December 2008)

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ABSTRACT

Background. The Alfredo T. Ramirez (ATR) Burn Center of the University of the Philippines–Philippine General Hospital, being the first burn unit assembled in the Philippines, is currently at the forefront of burn care in the country. It remains the largest tertiary burn center locally with an 11-bed capacity and caters to every Filipino in need of treatment due to burns.

Objective. To describe the clinico-epidemiologic profile of pediatric patients admitted to the UP–PGH ATR Burn Center from January 2004 to December 2008 as to the following: Age, Gender, % total body surface area (%TBSA) involvement, Severity of injury based on %TBSA involvement, Etiology of burn, Place of injury, Incidence of inhalational injury, Length of time prior to consult, Number of operations, Morbidity, Mortality; to determine the factors predictive of mortality among pediatric burn patients.

Methods. A retrospective study on pediatric patients admitted to the ATR Burn Center UP–PGH treated for burn injuries from January 2004 to December 2008 was conducted. The Integrated Surgical Information System (ISIS), a computerized registry of the patients of the Department of Surgery was searched to identify pediatric burn patients aged 0 to 18 years old.

Results. Of the 361 patients, 234 patients were male (64.82%) while 127 patients were female (35.18%). The odds of mortality in patients with flame burns was 2.24 (OR 95% CI: 1.01 to 4.96) times that of those who were scalded. The odds of mortality in patients with inhalational injury was 11.98 (OR 95% CI: 5.07 to 27.88) times higher than those without. The odds of mortality in patients with late consultation (>8 hours post-injury) was 2.24 (1.05 to 4.77) times that of those who were treated early. There was a significant association between survival outcome and the aforementioned factors.

Conclusion. The presence of inhalational injury, flame burns, delayed time of consultation, increased number of operations and the presence of nosocomial pneumonia, burn wound infection, and/or graft loss, were the variables noted to be independent predictors of mortality. Age, gender, burn size, severity, place of injury and length of stay were not found to be statistically associated with mortality.

Key Words: pediatric burn injury, burn mortality rate

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Introduction

Burn injury is one of the most traumatic, disfiguring, and excruciating experiences that any human being can go through in his/her lifetime, especially for children, individuals who are just beginning to experience the goodness of life. These injuries not only result in physical hardship, but also take its toll in terms of emotional torture and financial burden involving both the patients and their families. In some instances, these injuries may even result in death.

The Alfredo T. Ramirez (ATR) Burn Center of the University of the Philippines–Philippine General Hospital, being the first burn unit assembled in the Philippines, is currently at the forefront of burn care in the country. It remains the largest tertiary burn center in the country with an 11-bed capacity and caters to every Filipino in need of treatment due to burns. In a recent study conducted by Espiritu[1] in 2008, 48.01% of patients admitted from 2004 to 2006 at this institution were of the pediatric age group (≤18 years old), indicating its significant incidence in our general population. A study by Shields[2] in the USA in 2000 revealed a total of 10,000 pediatric burn admissions in that year alone, despite the adequate resources available to prevent these injuries in developed countries; what more in a developing country like the Philippines?

It is the goal of this study to gather epidemiologic data involving the pediatric burn patient population covering a 5-year period (2004–2008) and determine which of these factors have a significant effect on survival, in order to formulate recommendations for the prevention and early management of pediatric burn injuries.

Significance

It is unfortunate that despite many published studies worldwide describing pediatric burn admission, few meet criteria that allow for comparative epidemiologic review.[3] It is the aim of this study to determine the data and factors significantly associated with mortality in order to develop a systematic burn injury registry involving all burn centers in the Philippines that will eventually have an available, centralized database, easily accessible and useful for global comparison.

Review of Related Literature

The global incidence of pediatric burn injury is unknown.[3] Studies from all over the world show the significant number of pediatric burn injuries occurring in different parts of the globe. In a study in Hong Kong, 550 pediatric burn patients were admitted into the Prince of Wales Hospital–Burn Unit for various etiologies in a span of six years.[4] 10-year study in Canada revealed a total of 10,229 pediatric patients admitted for burn-related injuries.[5] In Vellore, India, 119 pediatric patients were registered within four years into the Burn Registry.[6] Several other studies concerning pediatric burn injury from different countries of different levels of development have been documented. It is the aim of this study to develop a 5-year epidemiologic profile and analysis of factors affecting survival in the Philippine setting so as to eventually contribute to a continuous database at par in quality with data worldwide.

The elderly and the very young are most likely to succumb to severe burns. In a study by Pereira et al., extremes of ages (children <5 years and elderly >65 years) had increased mortality due to burn 6 times the national average.[7] In this study, pediatric burn survival improved in younger age groups, with all but those with the most severe injuries surviving.

Studies under review showed a male predilection with regard to incidence of pediatric burn injuries. It is important to note that mechanisms of burn-associated injury are closely related to children's developmental stage, and developmental stage is an important determinant of risk and type of burn injury.[2] Most burns occurred in younger children, with more than half of the patients younger than 3 years. The largest group of children was the 1-year-olds. Sixty-five percent of the children were boys.[8]

Two thirds of all burns occur at home and commonly involve young adult men, children younger than 15 years, and the elderly.[9] Seventy-five percent of all burn-related deaths occur at home. Young adults are frequently burned with flammable liquids, whereas toddlers are often scalded by hot liquids. A significant percentage of burns in children are due to child abuse. Other risk factors include low socioeconomic class and unsafe environments. These generalizations emphasize that most of these injuries are preventable and therefore amenable to prevention strategies. In the studies reviewed, most of the admitted patients belonged to the toddler age group, with injuries usually occurring domestically. In relation to this, the most common cause of burn injury seen in the pediatric population was scalding, a cause of burn that is actually preventable.[10] A 10-year Canadian study revealed that 49% of pediatric burns in that period were caused by scalding.[5]

In the study by Wolf et al. on mortality determinants in pediatric burn injuries, the authors concluded that those patients who are most apt to die are the very young, those with limited donor sites, those who have inhalation injury, those with delays in resuscitation, and those with burn-associated sepsis or multiorgan failure.[11] Inhalational injury remains a significant source of morbidity and mortality in children with burn injury. A 10-year study by Shields et al. at Shriners Hospital revealed a 16.4% mortality rate in relation to the presence of inhalational injury in children.[11]

Most of the studies reviewed conclude with recommendations for burn injury prevention. Conducting a study involving pediatric burn injuries, a major form of trauma, contributes to both local and global pediatric injury prevention initiatives such as SKP (Safe Kids Philippines) or SKW (Safe Kids Worldwide).

Objectives

This study aims to describe the clinico-epidemiologic profile of pediatric patients admitted to the UP–PGH ATR Burn Center from January 2004 to December 2008 as to the following: Age, Gender, % total body surface area involvement, Severity of injury based on % TBSA involvement, Etiology of burn, Place of injury, Incidence of inhalational injury, Length of time prior to consult, Number of operations, Length of hospital stay, Morbidity, Mortality.

This study aims to determine the factors predictive of mortality among pediatric burn patients.

Methods

A retrospective study on pediatric patients admitted to the ATR Burn Center UP–PGH treated for burn injuries from January 2004 up to December 2008 was conducted. The Integrated Surgical Information System (ISIS), a computerized registry of the patients of the Department of Surgery, was searched to identify pediatric burn patients aged 0 to 18 years old.

The term "burn" was searched in the admitting and discharge diagnosis of each subject who had the Burn Division as either primary or co-managing service. The records were reviewed and the following data taken into consideration:

1. AGE – All patients aged 0 to 18 years old were included in the study and grouped according to the American Academy of Pediatrics definition of age group terminology (Appendix A).

2. GENDER – All patients were classified as either male or female.
3. %TBSA was noted in the admitting and discharge diagnoses of each patient and was classified as minor, moderate and severe based on the American Burn Association Classification (Appendix B).
4. ETIOLOGY – The etiology of burn, listed as scald, flame, electrical, chemical, and/or contact in the admitting diagnosis, was included.
5. Place of injury was also searched in the patient's clinical history and was classified as domestic if the injury occurred at home and others if it occurred elsewhere.
6. The presence of inhalational injury was based on direct laryngoscopy findings or fiberoptic bronchoscopic findings or clinical findings as seen in the admitting PE based on the following criteria: sooty phlegm, edematous upper airways, burned face, and singed nasal hairs.
7. Delay in consultation was defined as consultation and assessment >8 hours post-injury. This data was sought in the patient's clinical history.
8. The term "operations" included the following terms as indicated in the OR logs: "escharotomy", "fasciotomy", "debridement", "amputation – BEA/AEA, BKA/AKA", "TE/tangential excision", "FE/fascial excision", "STSG/ split thickness skin grafting", "FTSG/full thickness skin grafting". The number of operations performed was likewise retrieved from the OR logs.
9. Length of hospital stay was defined as the period from date of admission to the date of discharge.
10. Morbidities included were hospital-acquired pneumonia (HAP), infected burn wounds and graft loss.
11. Outcomes were defined as either recovered or died as indicated by the mortality reports.

Statistical Analysis

Study subjects were retrieved from the Integrated Surgical Information System (ISIS), the computerized patient registry of the Department of Surgery. A total of 361 pediatric burn patients were identified.

The data was encoded completely and analyzed using Epi Info™ Version 3.5.1.

The epidemiologic factors of the pediatric burn patients were summarized descriptively using frequency distribution. The frequency and its corresponding proportion (percent) of patients affecting survival given an epidemiologic factor were presented. The descriptive measures of quantitative variables – median (inter-quartile range) and range were used due to non-normality and the presence of extreme values.

Chi-square test and Fisher's exact test were used for the analysis of the association between factors and the survival outcome whenever appropriate. The association was significant if the p-value was ≤0.05. Logistic regression analysis was used to determine the significance and measure of associations of the epidemiologic factors and its survival effect. Association was measured utilizing odds ratio. The factors were significant if the p-value was ≤0.05.

Results

Gender

Of the 361 patients, 234 patients were male (64.82%) while 127 patients were female (35.18%). A 1.8:1 male to female ratio was derived.

Age

Range of age was 0.04 y.o. – 18 y.o., with a median age of 4 y.o. Of the 361 patients, the following distributions according to age terminology were derived:

Neonates (<1 mo.): 1 (0.28%)
Infant (1 mo – 1 y.o.: 62 (17.17%)
Child (>1 y.o. – 12 y.o.): 244 (67.59%)
Adolescent (>12 y.o. – 18 y.o.): 54 (14.96%)

% Total Body Surface Area (TBSA)

%TBSA was distributed as follows: 1–10% = 92 patients (25.48%), 11–20% = 140 patients (38.78%), >20% = 129 patients (35.73%).

Severity of Injury

Most of the burn injuries were categorized as severe, 216 patients (59.83%); 24 (6.65%) and 121 (33.52%) were categorized as minor and moderate, respectively. The median %TBSA was calculated at 17% with a range of 1% to 80%.

Etiology

More than half of the population or 198 patients (54.85%) had scald burns, followed by flame burns (119, 32.96%), electrical injury (39, 10.8%), chemical burns (2, 0.55%) and contact burns (3, 0.83%). The odds of mortality in patients with flame burns was 2.24 (OR 95% CI: 1.01 to 4.96) times that of those who were scalded.

Place of Injury

93.63% of pediatric burn injuries occurred domestically (at home).

Presence of Inhalational Injury

Of the 361 patients, 33 (9.14%) had inhalational injury. Of the 30 mortalities, 17 (56.6%) had inhalational injury. The odds of mortality in patients with inhalational injury was 11.98 (OR 95% CI: 5.07 to 27.88) times higher than those without.

Delay in Consultation

Only 139 patients (38.5%) sought consultation at the ER on a delayed basis or >8 hours post-injury, with the remaining 222 patients (61.5%) coming in at ≤8 hours post-injury. The odds of mortality in patients with delayed consultation was 2.24 (OR 95% CI: 1.05 to 4.77) times that of those who were treated early.

Number of Operations

Of the 361 patients, 144 (39.89%) did not undergo any operations, 158 (43.77%) had at least one operation, 40 (11.08%) had two operations, while 19% (5.26%) underwent three operations.

Length of Stay

Only 50 patients (13.85%) stayed beyond 30 days; the remaining patients had hospital stays within 3 weeks. The median length of stay was 13 days.

Morbidity

Of the 361 patients, 54 (14.96%) developed HAP during their confinement, 49 (13.57%) had burn wound infections, while 44 (12.19%) had graft losses.

Mortality

Of the 361 patients, 32 patients died resulting in a pediatric burn mortality rate of 8.31%.

Discussion

The patients were divided between two outcomes: those who died and those who survived, along with the epidemiologic factors considered (Table 1). Test of association using the Fisher's exact test and the Chi-Square test revealed no significant association between mortality and the factors age, gender, %TBSA, severity, place of injury, and length of hospital stay. On the other hand, flame burns, the presence of inhalation injury, delay in consultation, and presence of morbidities (nosocomial pneumonia, infected burn wounds and graft loss) were significantly associated with mortality.

Odds ratio was used to show relationships within each epidemiologic factor, especially those deemed insignificant.

The incidence of burn injury involving the pediatric age group is significant. Numerous studies have shown data supporting the high incidence of pediatric burn injury in the general population.[1,12] Odds ratio analysis revealed that death among children was 1.19 times that of infants and 2.71 times that of adolescents. However, both values were not significantly associated with mortality. Age, considered a universal and historical predictor of mortality in most studies on burn injury, might not have been significant in this study since 76% of the mortalities came from children, a category of broad range (1 to 12 years old). If a breakdown of the "children" age group had been performed, age might have been a more significant factor in this study. Such a breakdown was not performed in our study since the definition of age group terminology provided by the American Academy of Pediatrics was used (Appendix A). Table 2 presents a comparison of epidemiologic data gathered in three studies performed at this institution with regard to pediatric burn injury spanning the years 1995 to 2008. The occurrence of injury in the younger age group (≤2 y.o.) decreased from 48.78% to 36.5%, and an increase in the older age group (>2 y.o.) from 51.22% to 63.4%. The increase in the older age group may be explained by the fact that children in recent years have been more exposed to occupational hazards (flame/electrical burns) due to the need to start working earlier in their life because of poverty. In this study, the highest incidence of injury was noted in 1 to 12 year old age group, probably due to the behavioral characteristics of this age group, that of increasing curiosity and experimentation resulting in more domestic accidents such as scald and flame injuries.

There was no significant association between gender and mortality. However, a male predominance was still noted in this study, similar to the findings of studies worldwide.[2,5,13]

There was no significant association between %TBSA and mortality. However, odds ratio analysis revealed that the odds of dying of those patients having >20% TBSA were 1.36 and 1.46 times more likely versus those who belonged to 1 to 10% TBSA and 11 to 20% TBSA groups. Therefore, those patients who had >20% TBSA involvement were more likely to die compared with those with less burned skin involvement.

Although the severity of injury was not significantly associated with mortality in this study, more than half of the whole patient population, 216 out of 361 (59.83%), were classified as severe. In the mortality population of 30 patients, the breakdown according to severity classification was as follows: 2 (6.45%) minor, 9 (29%) moderate, 19 (61.2%) severe. This may be explained by the fact that severity of injury does not necessarily pertain to a large %TBSA; a certain patient can also be classified as "severe" if, for instance: the burned area involves essential body parts (face, hands, feet, perineum, genitalia); the injury is caused by high voltage electricity; the injury is a full thickness burn > than 10%TBSA; the injury is a chemical burn; or if a patient is <2 y.o. and has been classified as moderate injury (Appendix B). The mere fact that a patient is suspected by history or by physical findings of possible inhalational injury

Table 1. The Odds Ratio of Epidemiologic Factors on Mortality

EPIDEMIOLOGIC FACTOR	DEAD		ALIVE		TOTAL		OR (95% CI)	p-value
	COUNT	PERCENT	COUNT	PERCENT	COUNT	PERCENT		
AGE								
Neonates:<1 mo	0	0.00	1	100.00	1	0.28	-	
Infants: 1mo–1yo	5	8.06	57	91.94	62	17.17	1.19 (0.43-3.26)	0.740
Children: >1yo-12yo	23	9.43	221	90.57	244	67.59	1.00	
Adolescents:>12yo-18yo	2	3.70	52	96.30	54	14.96	2.71 (0.62-11.84)	0.186
Total	30	8.31	331	91.69	361	100.00		
Median(IQR): 4yo(2yo,9yo)								
Range: (0.04yo,18yo)								
GENDER								
Female	14	11.02	113	88.98	127	35.18	1.00	
Male	16	6.84	218	93.16	234	64.82	1.69 (0.80-3.58)	0.173
%TBSA								
1-10	7	7.61	85	92.39	92	25.48	1.36 (0.52-3.56)	0.530
11-20	10	7.14	130	92.86	140	38.78	1.46 (0.62-3.44)	0.392
>20	13	10.08	116	89.92	129	35.73	1.00	
Median %TBSA(IQR):17(10,60)								
Range: (1,80)								
SEVERITY								
Minor	2	8.33	22	91.67	24	6.65	1.13 (0.23-5.60)	0.880
Moderate	9	7.44	112	92.	121	33.52	1.00	
Severe	19	8.80	197	56	216	59.83	1.20 (0.53-2.74)	0.665
				91.20				
ETIOLOGY								
Scald	12	6.06	186	93.94	198	54.85	1.00	
Flame	15	12.61	104	87.39	119	32.96	2.24 (1.01-4.96)	0.048
Electrical	3	7.69	36	92.31	39	10.80	1.29 (0.35-4.81)	0.703
Chemical	0	0.00	2	100.00	2	0.55	-	-
Contact	0	0.00	3	100.00	3	0.83	-	-
PLACE OF INJURY								
Domestic	29	8.58	309	91.42	338	93.63	1.00	
Others	1	4.35	22	95.65	23	6.37	2.06 (0.27-15.88)	0.486
CRITERIA OF INHALATION								
INJURY		83.33	1	16.67	6	1.66	66 (7.42-586.89)	0.000
Sooty Phlegm	5	55.56	8	44.44	18	4.99	20.18(7.18-56.75)	0.000
Edematous Upper Airways	10	39.39	20	60.61	33	9.14	11.89(5.07-27.88)	0.000
Burned Face	13	57.89	8	42.11	19	5.26	23.38(8.42-64.92)	0.000
Singed Nasal Hairs	11							
PRESENCE OF								
INHALATIONAL INJURY	17	5.18	311	94.82	328	90.86	11.89(5.07-27.88)	0.000
None	13	39.39	20	60.61	33	9.14	1.00	
Presence								
NO. OF TIME BEFORE								
CONSULT	13	5.86	209	94.14	222	61.50	2.24 (1.05-4.77)	0.036
≤ 8 hrs.	17	12.23	122	91.69	361	38.50	1.00	
> 8 hrs.								
Median(IQR): 5 (2,24)								
Range: (0.5,1176)								
NUMBER OF OPERATIONS								
0	6	4.17	138	95.83	144	39.89	8.21 (2.22-30.38)	0.002
1	13	8.23	145	91.77	158	43.77	3.98 (1.23-12.81)	0.020
2	6	15.00	34	85.00	40	11.08	2.02 (0.53-7.73)	0.303
3	5	26.32	14	73.68	19	5.26	1.00	
Median(IQR): 1 (0,1)								
LENGTH OF STAY								
1 – 7	8	7.55	98	92.45	106	29.36	1.99 (0.68,5.85)	0.209
8 – 14	9	9.28	88	90.72	97	26.87	1.59 (0.56-4.56)	0.387
15 – 30	6	5.56	102	94.44	108	29.92	2.77 (0.88-8,72)	0.082
>30	7	14.00	43	86.00	50	13.85	1.00	
Median(IQR): 13 (6,22)								
Range: (1,217)								
MORBIDITY								
HAP	16	29.63	38	70.37	54	14.96	8.81 (3.99,19.47)	0.000
Infected Burn Wounds	21	42.86	28	57.14	49	13.57	25.25(10.56,60.36)	0.000
Graft Loss	14	31.82	30	68.18	44	12.19	8.78 (3.91,19.72)	0.000

Table 2. Summary of Results of Cruz et al, Catindig et al and Lizardo et al[13, 15]

VARIABLE	Cruz, et al (1995)	Catindig,et al(2003)	Lizardo,et al (2009)
Total patients	200	205	361
Average / Year	40	94.5	72.2
Age			
<= 2	67 (33.5%)	100 (48.78%)	132 (36.5%)
> 2	133 (66.5%)	105 (51.22%)	229 (63.4%)
Gender			
Male	120 (60%)	135 (65.85%)	234 (64.82%)
Female	80 (40%)	70 (34.15%)	127 (35.18%)
% Burn			
Severe	N/A	100 (48.78%)	216 (59.83%)
Moderate	66 (33%)	53 (25.85%)	121 (33.52%)
Minor	N/A	52 (25.37%)	24 (6.65%)
Etiology			
Scald	68 (34%)	108 (52.68%)	198 (54.85%)
Flame	102 (51%)	69 (33.66%)	119 (32.96%)
Electrical	30 (15%)	28 (13.66%)	39 (10.8%)
# of operations			
No operation	125 (62.5%)	113 (55.12%)	144 (39.89%)
At least 1 operation	75 (37.5%)	92 (44.88%)	158 (43.77%)
Inhalational Injury			
Present	12 (6.67%)	35 (17.07%)	33 (9.14%)
None	168 (93.33%)	137 (66.83%)	328 (90.86%)
Length of Stay			
<= 7 days	64 (32%)	68 (33.17%)	106 (29.36%)
> 7 days	136 (68%)	137 (66.83%)	255 (70.6%)
Outcome			
Survived	152 (76%)	163 (79.51%)	331 (91.6%)
Died	48 (24%)	42 (20.48%)	30 (8.31%)

classifies him/her as a severe injury. In our setting where actual assessment of the airway and confirmation of injury is difficult due to the lack of scoping facilities, patients are relegated to the severe category by virtue of suspicion alone, thus resulting in an overestimate of patients expected to eventually succumb but who actually do not. Other factors such as delay in treatment and presence of co-morbidities may have resulted in increased minor and moderate burn mortalities (based on %TBSA) versus severe burn survival, such that a larger %TBSA did not necessarily result in higher mortality in this study.

With regard to burn etiology, scald was noted to be the most common cause of injury accounting for 54.85% of the whole population. However, in terms of mortality, only flame burn was found to be significantly associated, with a p value of 0.048. Flame injury was noted to have accounted for 50% of the mortality population. A 1995 study of Cruz et al. in this same institution had flame burns accounting for most of the pediatric burn injuries.[14]

Pediatric burn injuries commonly occur at home and thus reflect the level of parental care needed to prevent such injuries. There was no significant association between mortality and place of injury.

Presence of inhalational injury was noted in 17 out of 30 patients from the mortality population, and after logistic regression analysis, was noted to be significant with a p value of 0.000. Inhalational injury remains a significant source of morbidity and mortality in children with burn injury.[15]

In terms of delay in consultation, odds ratio analysis revealed that it was 2.24 times more likely that patients brought >8 hours post-injury would die, compared with those brought ≤8 hours post-injury. The 8-hour criterion was based on the Parkland formula of acute burn resuscitation. There was a significant association between delayed consultation and mortality, with a p value of 0.036.

The odds of death was 8.21 times more likely in patients with >3 operations performed than in those who were not operated on. This can be explained by the fact that a higher number of surgical operations exposes patients to more surgical and anesthetic risks.

Although odds ratio analysis revealed that patients with a length of stay (LOS) ≤7 days were 1.99 times more likely to die than those with LOS >30 days LOS, LOS was not found to have a significant association with mortality. This may be so due to the fact that patients who survive beyond 30 days eventually recover and those that succumb earlier do not survive the acute phase of injury and almost immediately die due to the severity of the injury.

The presence of nosocomial pneumonia (54 patients, 14.96%), graft loss (49, 13.57%) and/or infected burn wounds (44, 12.19%) was found to be significantly associated with

mortality with p values of 0.00. Of 30 mortalities, 23 (76.6%) were given a final diagnosis of septic shock; the presence of any of the three morbidities listed above would certainly have contributed to the development of sepsis in these mortalities.

The mortality rate in this study was 8.31%, lower than those presented in 1995 (24%)[15] and in 2003 (20.04%).[16] This could be due to the increased awareness of parents and caregivers with regard to burn injury prevention and early intervention.

Conclusion

Presence of inhalational injury, flame burn, delayed time of consultation, increased number of operations and presence of nosocomial pneumonia, burn wound infection and/or graft loss were the variables noted to be independent predictors of mortality. Age, gender, burn size, severity, place of injury and length of stay were not found to be statistically associated with mortality.

Limitations and Recommendations

The computer database for which this study was based upon is continuously updated with input made by the surgical staff, mainly the medical interns and surgical residents throughout the hospital stay of a patient. It is recommended that a template data form specific to burn epidemiologic data be included in the ISIS capabilities in order to facilitate easy encoding of important and relevant epidemiologic data in the least time possible. A checklist-type data form will help ensure that data needed for future studies will be more complete and easily accessible.

An efficient national burn referral system must be set in place in order to prevent delayed medical intervention, a proven factor in increased mortality. There are only four burn centers in the country (one in Mindanao and three in the NCR); if the creation of fully equipped and adequately funded burn centers in every region is not feasible, then the Department of Health must provide frontline health workers with the basic know-how for treating acute burn injuries to at least tide patients over until they are eventually received by these burn centers for optimum treatment.

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Appendices

Appendix A
American Academy of Pediatrics
Definition of Age Group Terminology

Gestational age (GA)	The time from conception until birth. More specifically, gestational age is defined as the number of weeks from the first day of the mother's last menstrual period (LMP) until the birth of the baby. Gestational age at birth is assessed by the date of the LMP and by physical exam (Dubowitz score).
Postnatal age (PNA)	Chronological age since birth
Postconceptional age (PCA)	Age since conception. Postconceptional age is calculated as gestational age plus postnatal age (PCA = GA + PNA).
Neonate	A full-term newborn 0-4 weeks postnatal age. This term may also be applied to a premature neonate whose postconceptional age (PCA) is 42-46 weeks.
Premature neonate	Neonate born at <38 weeks gestational age
Full-term neonate	Neonate born at 38-42 weeks (average ~ 40 weeks) gestational age
Infant	1 month to 1 year of age
Child/Children	1-12 years of age
Adolescent	13-18 years of age
Adult	>18 years of age

Source: American Academy of Pediatrics, Definition of Age Group Terminology. [Online]. May 2011. Available from http://www.pediatriccareonline.org

Appendix B
American Burn Association
Classification of Burns

	MINOR	MODERATE	SEVERE
Children			
Partial Thickness Burn	</= 10%	> 10% to < 20%	> 20%
Full Thickness Burn	</= 2%	> 2 % to < 10%	> 10%
Adults			
Partial Thickness Burn	</= 15%	> 15 to < 25%	> 25%
Full Thickness Burn	</= 2%	>2% to < 10%	> 10%
Age		Patients < 2 years old with Minor injury	Patients < 2 years old with Moderate Injury
Involvement of the hands, face, feet and perineum	(-)	(-)	(+)
Electrical Injury	(-)	(-)	(+)
Chemical Injury	(-)	(-)	(+)
Inhalational Injury	(-)	(-)	(+)
Major Associated Medical Illness	(-)	(-)	(+)
Associated Fractures, Multiple Trauma	(-)	(-)	(+)

Source: American Family Physician, American Burn Association (Classification of Burns). [Online]. November 2000. Available from http://www.aafp.org.