

2016

NATIONAL BURN REPOSITORY

REPORT OF DATA FROM 2006-2015



National Burn Repository

2016 Report

Dataset Version 12.0



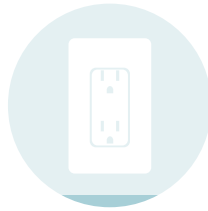
FIRE/FLAME INJURIES REPRESENT 41% OF THE CASES IN THIS REPORT WITH A KNOWN ETIOLOGY



SCALD INJURIES REPRESENT 33% OF THE CASES IN THIS REPORT WITH A KNOWN ETIOLOGY



CONTACT WITH HOT OBJECT INJURIES REPRESENT 9% OF THE CASES IN THIS REPORT WITH A KNOWN ETIOLOGY



ELECTRICAL INJURIES REPRESENT 3% OF THE CASES IN THIS REPORT WITH A KNOWN ETIOLOGY



CHEMICAL INJURIES REPRESENT 3% OF THE CASES IN THIS REPORT WITH A KNOWN ETIOLOGY



National Burn Repository 2016 Report

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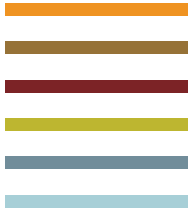


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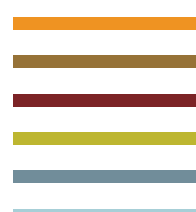


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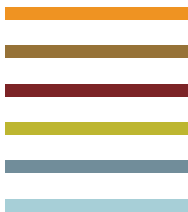


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Introduction

This year's report represents ten years of cumulative data from ninety-six United States Burn Centers, four Canadian Burn Centers, 2 Swedish Burn Centers, and one Swiss Burn center. The report contains over 205 thousand entries. This report represents the largest resource on epidemiology of thermal injury for patients admitted to burn centers in North America. It is also the single most useful reference for determining benchmark standards for outcomes such as mortality rate and hospital length of stay.

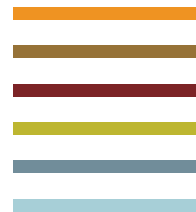
This largely demographic and epidemiology data is important, as it reports on the current state of burn care; but quality and value, rather than volume, are increasingly emphasized by federal health care programs and this will significantly impact reimbursement for increasingly scarce health care dollars. Thus, it is imperative that we include quality indicators in this report. This year marks the first year of the American Burn Association's Burn Quality Improvement Program (BQIP) Pilot Project. While the pilot centers have uncovered many difficulties in collecting and recording the many new data points and the data is not included in this report, the increased data obtained from BQIP participation has the potential to add greatly to how we define quality and strengthen our ability to assess the variability of practice and outcomes between participating centers. We hope to learn much from this project and include data from BQIP in future reports.

Despite the tremendous importance of the annual NBR report and ongoing efforts to improve the data contained within it, there are many threats to its viability. This data is the foundation of how burn quality will be measured. With seemingly increasingly strained hospital budgets, resources still need to be allocated to our burn centers registries and registrars. While accuracy and participation continue to improve and resultantly the NBR continues to improve,

the NBR only includes inpatient data with some records incomplete. To minimize the number of missing variables; better assess quality, through collection of BQIP quality indicators; and reflect the true scope of burn practice through future inclusion of outpatient data, we will need to have adequately supported burn registries. It is imperative that we support both the manpower to collect this data completely, as well as, continue to be thoughtful about the data that is collected, if the NBR is to continue to serve as the single best resource for health care planners within our institutions and our governments.

If we are to impact change and not simply try to maintain our individual practices, we must head the call to invest in collecting, contributing, and comparing our data and outcomes. This commitment is labor and cost intensive, but highlights and demonstrates our ability to not only sustain life, but optimize quality of life following burn injury. If we are to have a voice in how quality is defined in our field, rather than deferring to the mandates of others, we need to have a unified effort in collecting the data and utilizing its analysis to provide strength for the argument that we are the best suited to assess quality of care for the burn-injured patient. Thank you to all members of the American Burn Association for your continued support of and belief in the NBR. I hope that you find this report informative and useful.

Michael J. Mosier, MD, FACS, FCCM
Chair, ABA NBR Advisory Committee



Summary of Findings

The 2016 National Burn Repository Annual Report reviewed the combined data set of acute burn admissions for the time period between 2006 and 2015. Key findings included the following:

1. 96 hospitals from 36 states, and the District of Columbia, contributed to this report, totaling 205,033 records. The majority of patients came from hospitals with 500 or more beds, with the next largest group coming from hospitals with 200–299 beds. Data are not dominated by any single center and appeared to represent a reasonable cross section of U.S. hospitals.

2. In all age categories, except age greater than 80 years old, there is considerably more men than women. There is a bimodal distribution, with greatest prevalence in the pediatric age range from 1 to 15 comprising 30% of the total burns and the adult age group from ages 20 to 59 years which makes up 54% of burns. Patients age 60 or older represented 14% of the cases.

3. More than 75% of the reported total burn sizes were less than 10% TBSA and these cases had a mortality rate of 0.6%. The mortality rate for all cases was 3.3% and 5.8% for fire/flame injuries.

4. The two most common etiologies were fire/flame and scalds, accounting for 75% of cases reported. Scald injuries were most prevalent in children under 5, while fire/flame injuries dominated the remaining age categories. Six percent of cases did not designate an etiology of injury.

5. Seventy three percent of the burn injuries with a known place of occurrence, were reported to have occurred in the home. Nearly 95% of cases with known circumstances of injury were identified as accidents, with nearly 14% of these reported as work-related. Just over 2% of cases were suspected abuse and 1% were self-inflicted.

6. During the ten year period from 2006 through 2015, the average length of stay for females declined from 9.3 days to 7.9 days, while that for males declined less significantly from 9.1 to 8.8 days. The mortality rate for females declined from 4.1% to 2.9% and 3.9% to 3.0% for males.

7. Deaths from burn injury increased with advancing age and burn size, as well as presence of inhalation injury.

8. Pneumonia was the most frequent clinically related complication and occurred in 5.4% of fire/flame injured patients. The frequency of pneumonia and respiratory failure was much greater in patients with 4 days or greater of mechanical ventilation. As expected, with increasing age, the rate of complications increases (with the exception of infants, who have a higher rate than other children).

9. For survivors, the average length of stay was slightly greater than 1 day per %TBSA burned. For those who died, the total hospital days were nearly two times that of survivors on average; however, this trend was reversed in patients with >20% TBSA burns. Eighty seven percent of patients were discharged home and 3% were transferred to rehabilitation facilities.

10. Overall, the charges for patients who died were over 3 times greater than those who survived; however, this was greatly affected by the large number of patients with burns < 10% TBSA. For burns >10% TBSA, total charges for surviving patients averaged \$257,582 and charges for non-survivors averaged \$340,474.

All cases received from contributing hospitals (both ABA Burn Registry and non-burn registry users) that met the data structure requirements were initially accepted into the NBR. This report includes only cases with an admit year of 2006–2015 inclusive. Records were excluded from the analysis for this report if the “Admit Type” or “Admit Status” was:

- Readmission
- Admission for reconstruction/rehabilitation
- Outpatient encounter
- Same patient
- Scheduled/elective admission
- Acute admission, not burn injury related



Summary of Findings

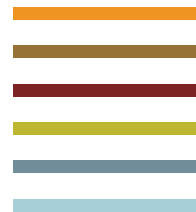
In addition, records were excluded from analysis of this report if they contained missing values for the following variables:

- Gender
- LOS < ICU days
- Discharge disposition
- Both Calculated Age and Manually entered Age
- Both TBSA and Etiology

As was done last year, an algorithm was used to identify and remove potential duplicate records from the analysis. Duplicate records can exist in the database if a facility submits the same record during two different calls for data. The algorithm that was implemented identified records that contained identical information on the variables listed below. The more recently submitted record was included in the analysis while the older record was eliminated as a duplicate.

- Facility
- Admission Year
- Age
- Gender
- Race
- Admission Type
- Discharge Date
- E CODE
- %TBSA

Lastly, the records received from our Canadian and International contributors are not included in the body of the analysis, but are presented separately in Section 6.



Analysis of Contributing Hospitals

1

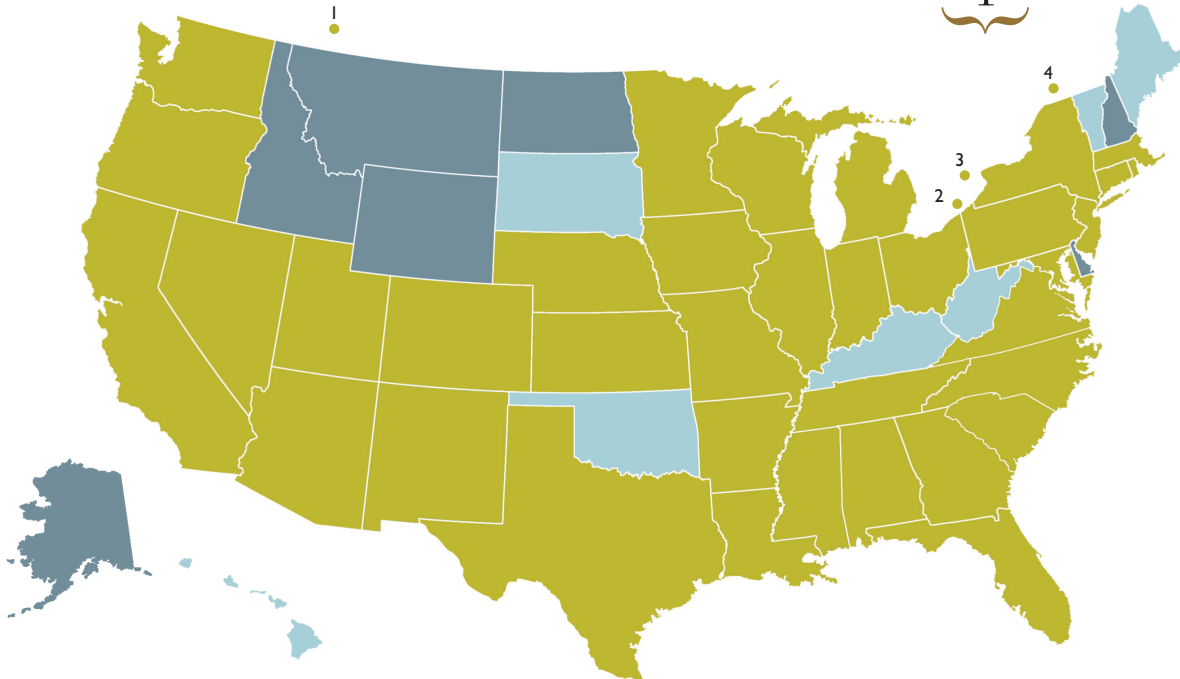


Analysis of Contributing Hospitals

The first section of the National Burn Repository (NBR) report deals with an evaluation of the contributing hospitals. Because the report reflects a rolling 10-year average and hospitals submit data, the mix of hospitals may vary from year to year. This year's NBR report contains data from 36 states in the U.S., 4 Canadian centers, 2 Swiss and 1 center from Switzerland. Sixty-eight of the reporting centers are ABA verified (65 U.S. and 3 Canadian). Seven states with burn centers have not contributed data to the NBR report. The U.S. data comes from a representative sample of burn centers that appears quite comparable to the actual distribution of burn centers in the U.S.

STATES THAT SUBMITTED TO THE NBR, 2006 TO 2015

Figure 1



- Have burn centers which have contributed to the NBR between 2006 to 2015
 - Have burn centers that have not contributed data to the NBR (Hawaii, Kentucky, Maine, Oklahoma, South Dakota, Vermont, and, West Virginia)
 - Do not have burn centers (Alaska, Delaware, Idaho, Montana, New Hampshire, North Dakota, and, Wyoming)
- Canadian contributing burn centers are noted above and are located in: (1) Edmonton, Alberta; (2) Hamilton, Ontario; (3) Toronto, Ontario; and (4) Montreal, Quebec. International contributors not shown above include Uppsala and Linköping, Sweden and Switzerland.

Table 1
BURN CENTER LOCATION AND PARTICIPATION BY REGION

Region	U.S. Burn Care Facilities*	U.S. Facilities in the Annual Report	ABA U.S. Verified Centers**	ABA U.S. Verified Centers in the Annual Report
East	34	29	13	13
North	39	22	22	22
South	29	22	16	16
West	26	23	14	14
Total	128	96	65	65

EAST – DC, Maryland, Massachusetts, New Jersey, New York, Pennsylvania, Rhode Island, and Connecticut. **NORTH** – Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, Ohio, Wisconsin, and South Dakota. **SOUTH** – Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Kentucky, Oklahoma, Virginia, West Virginia, and Texas. **WEST** – Arizona, California, Colorado, Nevada, New Mexico, Oregon, Utah, and Washington

*ABA Burn Care Resource Directory, Edition April 2016

** ABA Verified Burn Centers, April 2016

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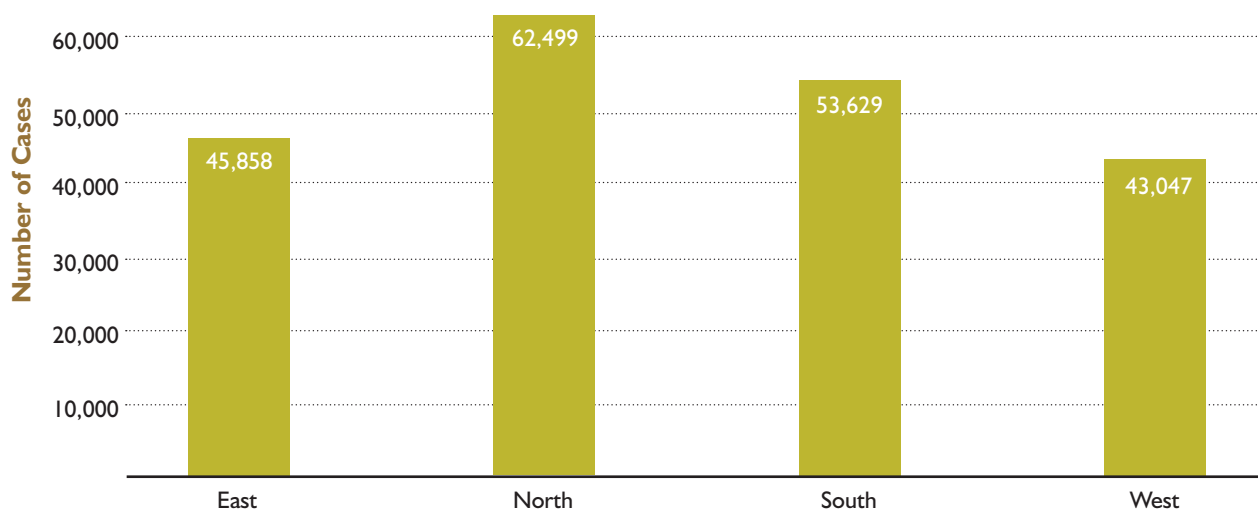
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ANALYSIS OF CANADIAN AND INTL. RECORDS

Analysis of Contributing Hospitals

For this year's data call, 22,087 records were submitted by 81 U.S. burn centers. Fewer centers reported data this year, but the 2016 report contain 205,033 total records. This report contains 1611 more entries than last year's report.

The north region, which has the largest number of burn centers, contributes the highest number of records. However, the states that represent the south region have the highest overall population, 102,657,250 vs. 64,377,806 for the north (second most population region). Despite being almost twice as heavily populated, the south has fewer NBR entries than the north, 53,629 vs 62,499. The south has significantly fewer entries than would be expected based on its relative population size compared to the entire United States (Chi Square Test, $p < 0.001$). This finding may represent a disparity in access to burn centers in the south, fewer total burns, or a reporting bias. The etiology of the discrepancy is unclear and should be further studied.

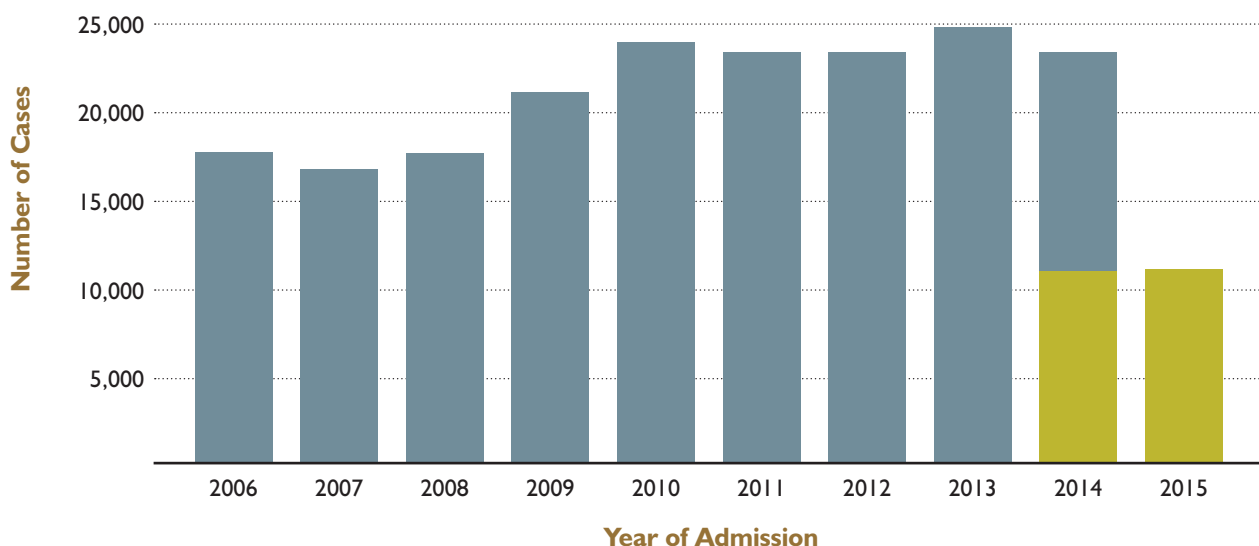
Figure 2
VOLUME OF RECORD SUBMISSION BY GEOGRAPHIC REGION



ARRIVAL/ADMISSION YEAR, ACUTE BURN ADMISSIONS

Figure 3

Record Submission
 ● Before 2015
 ● 2015



22,087 records were submitted in 2015 for this report
 205,033 records are included in this report

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Analysis of Contributing Hospitals

The majority of records submitted to the NBR report come from centers at non-governmental “not for profit” hospitals, representing 53.7% of records. “State” (or government run) hospitals were the second most common group, at 17.7% of entries.

Burn centers in the largest hospitals (500 beds or more) contribute most of the NBR records, at 52.8% of total entries. Hospitals in the 200–299 bed range come in second place with 18% of entries.

Figure 4
CONTRIBUTING U.S. HOSPITALS BY HOSPITAL BED SIZE CATEGORY

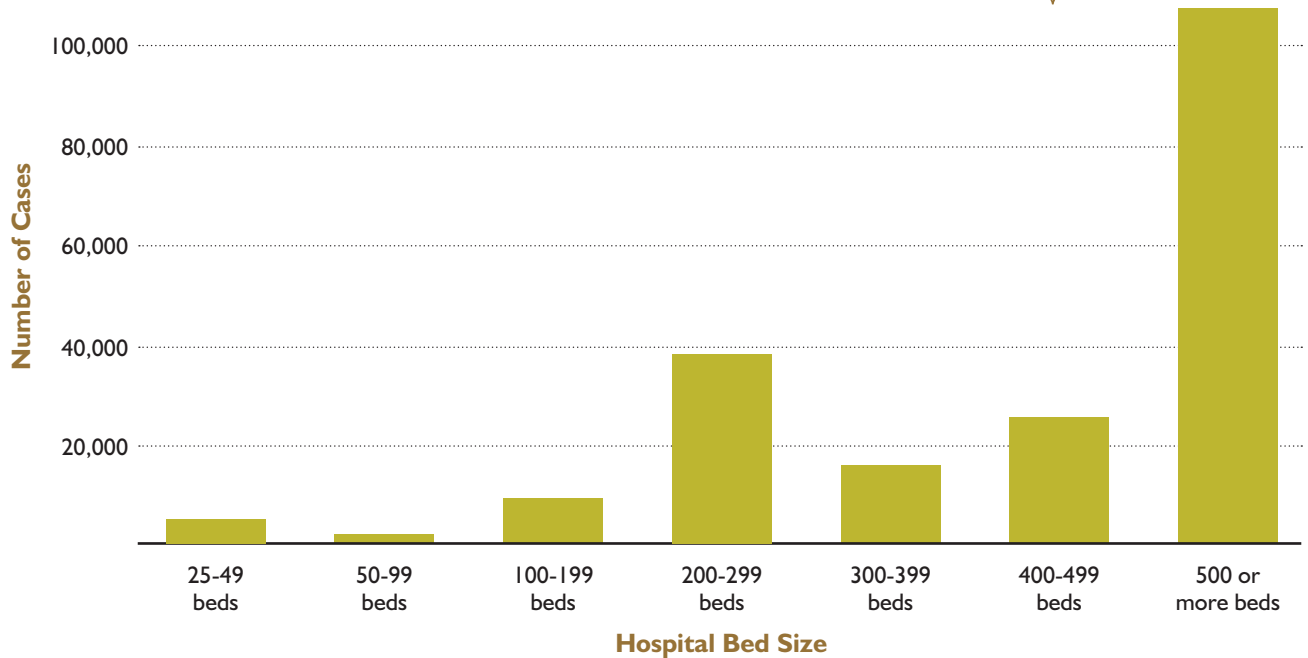
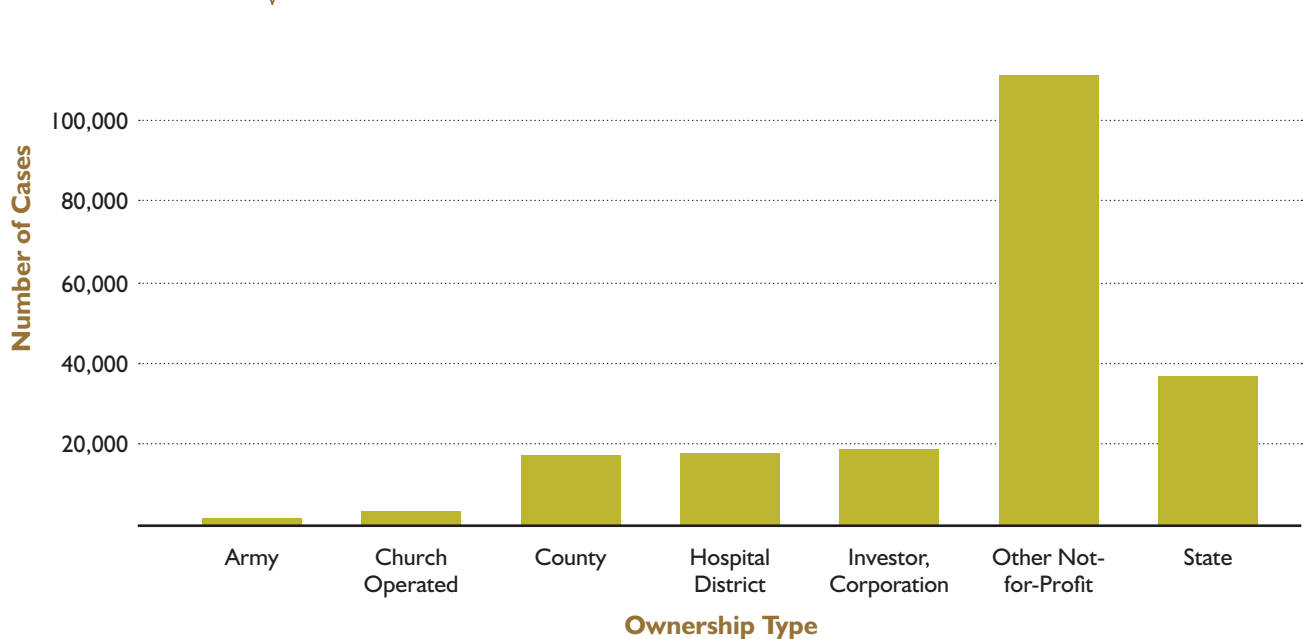


Figure 5
CONTRIBUTING U.S. HOSPITALS BY HOSPITAL OWNERSHIP TYPE



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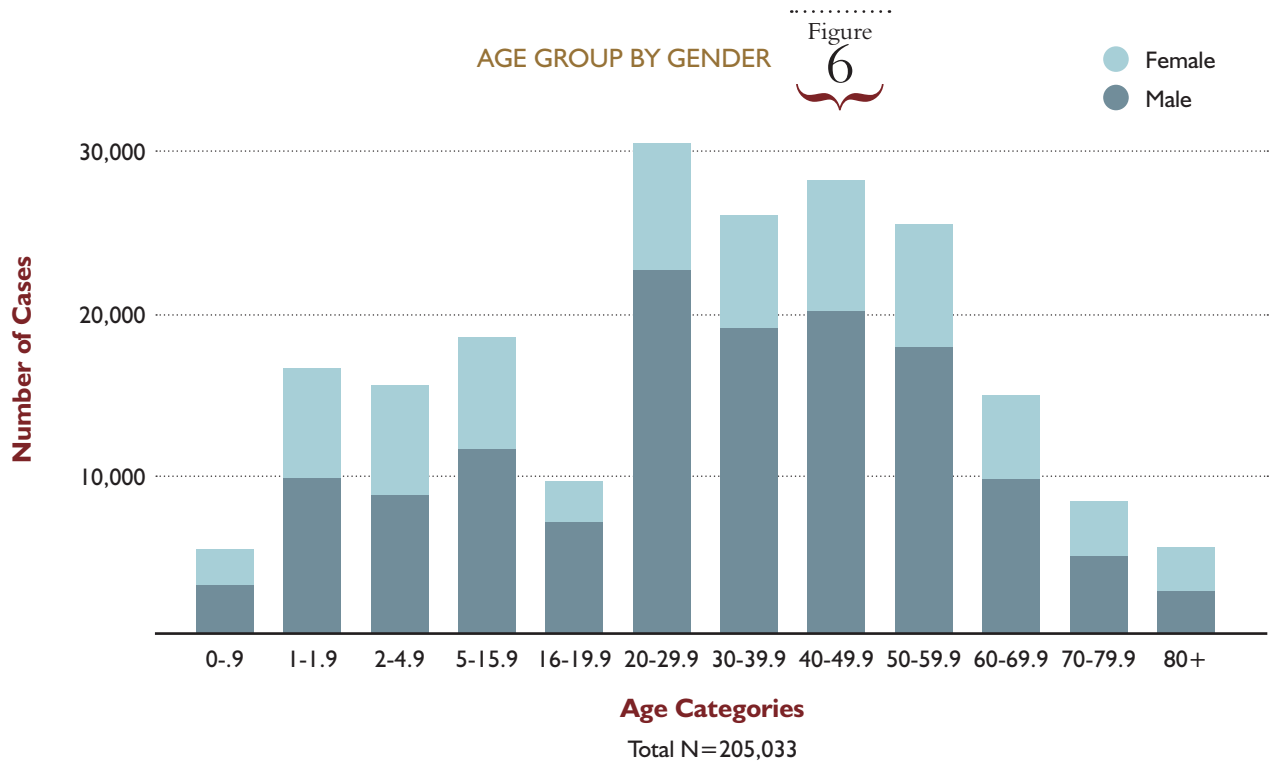
Analysis

of All U.S. Records



Analysis of All U.S. Records

Figure 6 and Table 2 show the distribution of reported burn cases from 2006 – 2015 divided into age categories with a gender distribution. In all age categories, except greater than 80 years old, there is considerably more men than women that sustain burn injuries. There is a bimodal distribution of burn injuries with greatest prevalence in the pediatric age range from age 1 to 15 year comprising 30% of the total burns, and the adult age group from ages 20 to 59 years which makes up 54% of burns. The prevalence of burn occur in the age category between 20 – 30 years. The overall number of burn cases increased slightly for the 10 year period which was evenly distributed across all ages; however, there was a decrease of approximately 4,000 burn cases in the 0-0.9 year group.



AGE GROUP BY GENDER

Table 2

Age Categories	Gender					
	Total		Female		Male	
	Cases	Column N %	Cases	Column N %	Cases	Column N %
0-0.9	5,326	2.6	2,162	3.3	3,164	2.3
1-1.9	16,663	8.1	6,688	10.1	9,975	7.2
2-4.9	15,466	7.5	6,786	10.2	8,680	6.3
5-15.9	18,510	9.0	6,809	10.2	11,701	8.4
16-19.9	9,637	4.7	2,550	3.8	7,087	5.1
20-29.9	30,607	14.9	7,833	11.8	22,774	16.4
30-39.9	26,214	12.8	7,065	10.6	19,149	13.8
40-49.9	28,348	13.8	8,066	12.1	20,282	14.6
50-59.9	25,597	12.5	7,494	11.3	18,103	13.1
60-69.9	14,936	7.3	5,079	7.6	9,857	7.1
70-79.9	8,232	4.0	3,236	4.9	4,996	3.6
80 and over	5,497	2.7	2,695	4.1	2,802	2.0
Subtotal	205,033	100.0	66,463	100.0	138,570	100.0
Missing	0	0.0	0	0.0	0	0.0
Total	205,033	100.0	66,463	100.0	138,570	100.0

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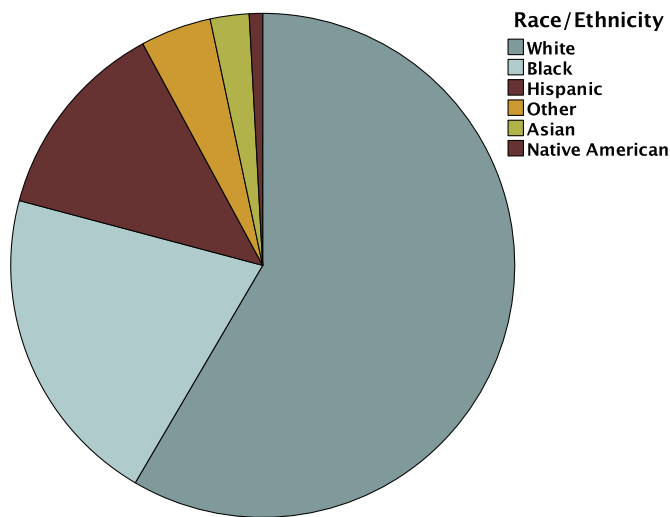
ANALYSIS OF CANADIAN AND INTL. RECORDS

Analysis of All U.S. Records

Figure 7 and Table 3 depict the distribution of cases in the NBR by race. The table shows that 3.7% of records did not specify race. The figure is based only on those records in which race was specified.

Figure 8 illustrates the number of cases per age group for white versus non-white patients. Patients age less than 16 years of age show greater prevalence for burn in the non-whites category. More specifically, this can be seen in children less than age 5 which show a prominence for scald burns as the most common etiology (Figure 11). In all other age categories greater than 16 years, there are more whites than non-whites that sustained burns. Suggesting a racial influence on the occurrence of admitted burn injuries as a function of age.

Figure 7
RACE/ETHNICITY



Total N= 197,376 (Excluding 7,657 Unknown/Missing)

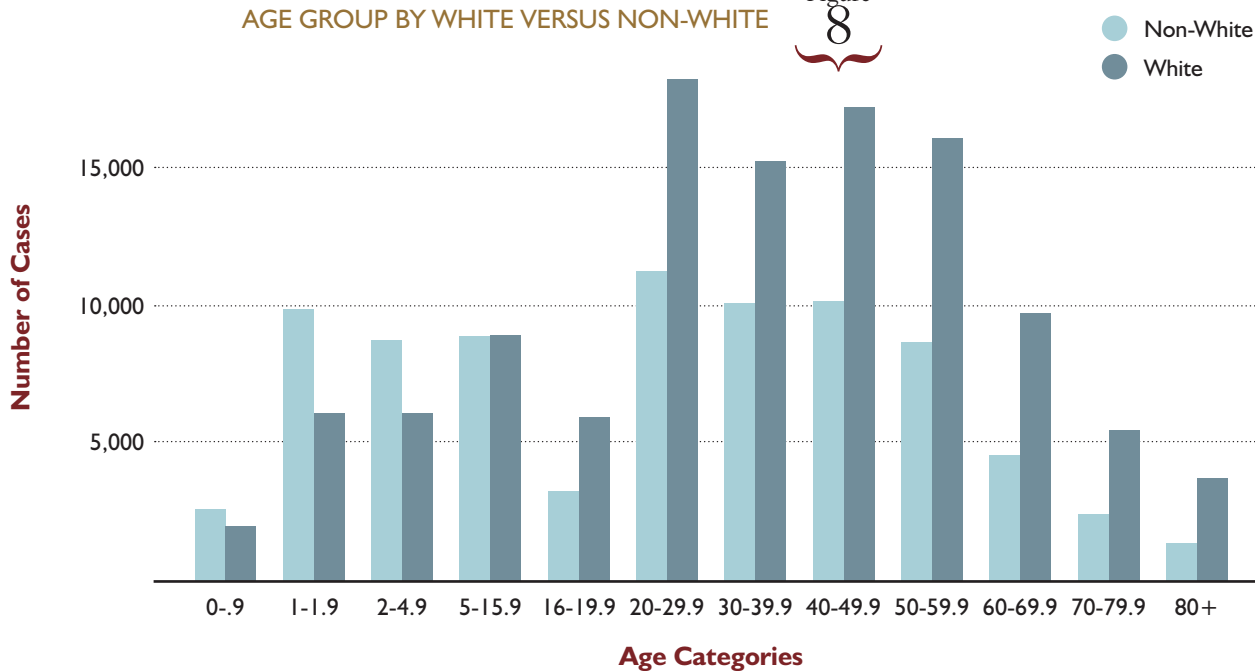
RACE/ETHNICITY

Table 3

Race	Cases	% of Valid
White	115,337	58.4%
Black	40,869	20.7%
Hispanic	25,597	13.0%
Other	8,960	4.5%
Asian	4,920	2.5%
Native American	1,693	0.9%
Unknown	7,657	
Total	205,033	

AGE GROUP BY WHITE VERSUS NON-WHITE

Figure 8



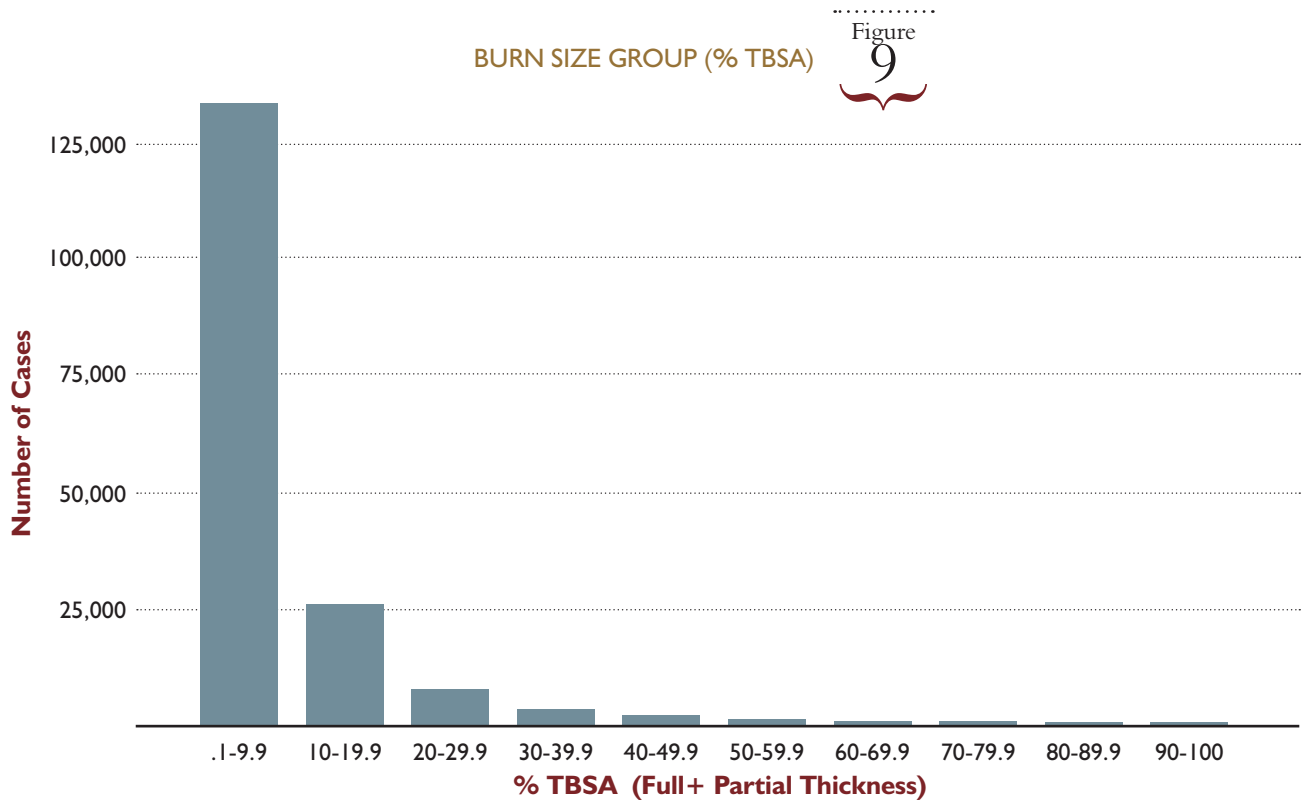
Total N= 197,376 (Excluding 7,657 Unknown/Missing)

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Analysis of All U.S. Records

Figure 9 shows the distribution of burn cases based on the total burn surface area of second and third degree burns. A small portion of the patients' records do not have a burn size value reported, and this made up 13% of the cases. These cases include patients with pure inhalation injuries and no burn or skin injury, in addition to patients in which the total burn surface area was not known or recorded. In patients with a recorded skin injury, 90% had a burn surface area of 20% or less. Burns that have a > 50% total body surface area make up only 2% of cases with a recorded burn injury.

Table 4 provides the total number of patients and mortality rates for admitted burns based on total body surface area burned. The mortality rate increases with the size of the burn. The burn size associated with a 50% case fatality (LD-50) occurs once burns are greater than 65 -70%TBSA.



Total N=177,498 (Excluding 27,535 Unknown/Missing)

Table 4 LIVED/DIED BY BURN GROUP SIZE (%TBSA)

%TBSA	Lived Cases	Died Cases	Mortality Rate
0.1 - 9.9	133,958	849	0.6
10 - 19.9	24,850	698	2.7
20 - 29.9	7,003	660	8.6
30 - 39.9	2,951	598	16.8
40 - 49.9	1,474	578	28.2
50 - 59.9	760	461	37.8
60 - 69.9	469	419	47.2
70 - 79.9	261	345	56.9
80 - 89.9	121	433	78.2
> 90	75	535	87.7
Subtotal	171,922	5,576	3.1
Missing or 0%	26,447	1,088	4.0
TOTAL	198,369	6,664	3.3

Total N=205,033

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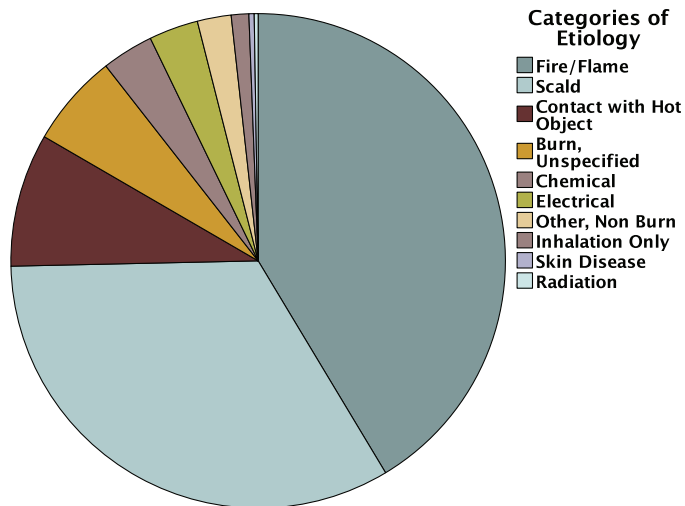
ANALYSIS OF CANADIAN AND INTL. RECORDS

Analysis of All U.S. Records

Table 10 and Figure 5 depicts the distribution of different burn etiologies amongst the cases in which one was specified. Fire/flame and scald burns make up the majority of burns and account for 74% of cases. The table documents that only 5% of the records did not include an etiology. The figure is based only on those cases with a specified etiology.

Figure 11 depicts the numbers of cases admitted to the participating burn centers that were caused by one of the four most common burn etiologies and the distribution based on age groups. Burns due to Fire/Flame continue to be the primary etiology in patients 5 years and older. Scalds and contact burns were more frequent than fire/flame in children less than age 5. Electrical injuries have a relatively low prevalence, but occur mainly in patients of working age, as shown in age categories between 20 to 60 years.

Figure 10
ETIOLOGY



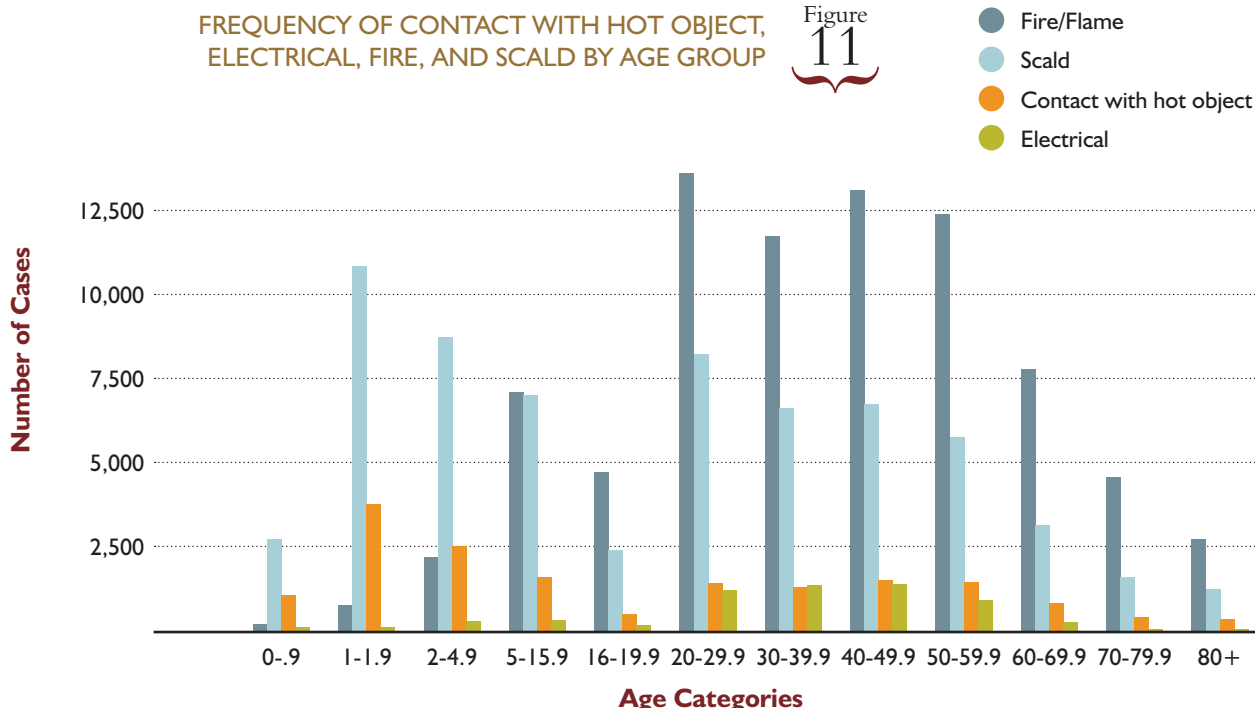
Total N=194,730 (Excluding 10,303 Unknown/Missing)

ETIOLOGY
Table 5

Etiology	Cases	% of Valid
Fire/Flame	80,583	41.4%
Scald	64,795	33.3%
Contact with Hot Object	16,966	8.7%
Burn, Unspecified	11,832	6.1%
Chemical	6,577	3.4%
Electrical	6,265	3.2%
Other, Non Burn	4,315	2.2%
Inhalation Only	2,235	1.1%
Skin Disease	665	0.3%
Radiation	497	0.3%
Unknown	10,303	
Total	205,033	

FREQUENCY OF CONTACT WITH HOT OBJECT, ELECTRICAL, FIRE, AND SCALD BY AGE GROUP

Figure 11

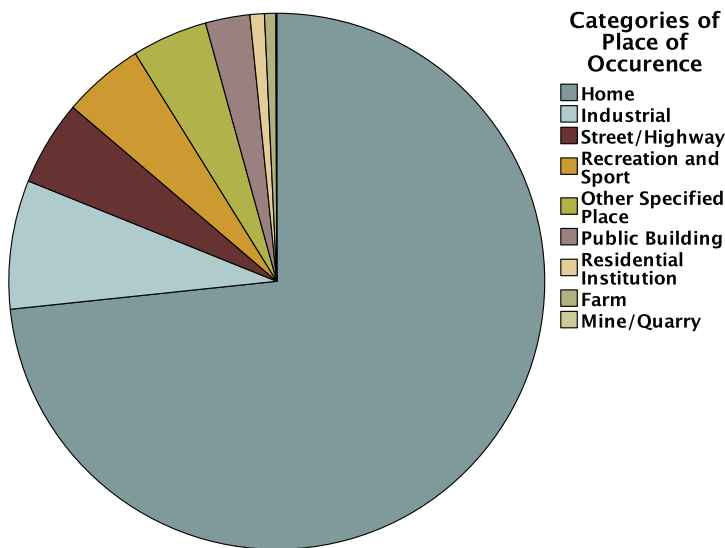


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Figure 12 and Table 6 shows the distribution of cases in the NBR by the place of occurrence. The home remains the most common location for a burn injury to occur, accounting for 73.3% of burn injuries cared for in burn centers. The table shows that 10% of records did not specify a place of occurrence. The figure is based only on those records in which a place of occurrence was specified.

Figure 13 and Table 7 represents the distribution of cases in the NBR by the circumstances of the injury. The vast majority of burns (95%) admitted to burn centers were considered accidental, with only 13.6% of these related to work. Non-accidental burns which result from arson, assault, abuse or self-inflicted injuries only constitute 3.4% of burns. The table shows that 7.4% of records did not specify the circumstances in which the burn injury occurred. This has improved since 2014, where 9% of the records did not specify. The figure is based on those records in which these circumstances were specified.

Figure 12 PLACE OF OCCURRENCE - E849 CODE

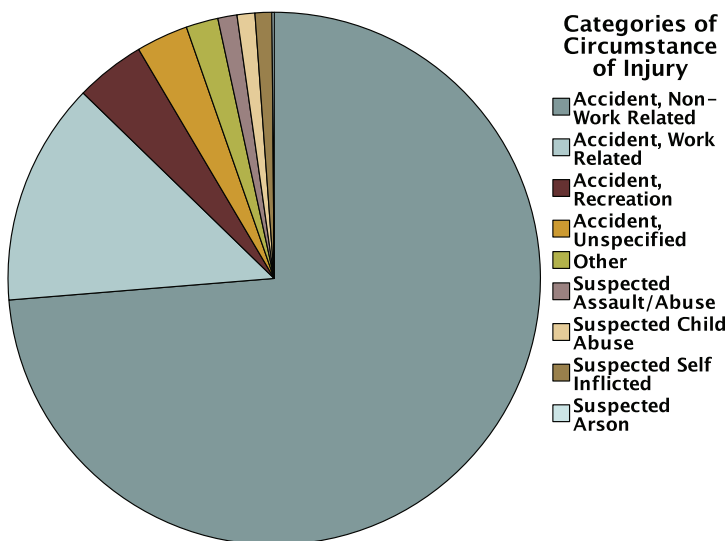


Total N = 184,177 (Excluding 20,856 Unknown/Missing)

PLACE OF OCCURRENCE - E849 CODE Table 6

Place of Occurrence	Cases	% of Valid
Home	135,069	73.3%
Industrial	14,308	7.8%
Street/Highway	9,461	5.1%
Recreation and Sport	9,041	4.9%
Other Specified Place	8,410	4.6%
Public Building	4,929	2.7%
Residential Institution	1,605	0.9%
Farm	1,252	0.7%
Mine/Quarry	102	0.1%
Unspecified	20,856	
Total	205,033	

Figure 13 CIRCUMSTANCE OF INJURY



Total N = 189,869 (Excluding 15,164 Unknown/Missing)

CIRCUMSTANCE OF INJURY Table 7

Circumstance of Injury	Cases	% of Valid
Accident, Non-Work Related	139,953	73.7%
Accident, Work Related	25,729	13.6%
Accident, Recreation	8,041	4.2%
Accident, Unspecified	5,994	3.2%
Other	3,708	2.0%
Suspected Assault/Abuse	2,206	1.2%
Suspected Child Abuse	2,043	1.1%
Suspected Self Inflicted	1,937	1.0%
Suspected Arson	258	0.1%
Unknown	15,164	
Total	205,033	

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Figure 14 depicts the proportion of patients in the NBR that died during their admission. Since outcome is a criterion for inclusion in the NBR, all records have a reported outcome. The overall mortality rate from 2006 to 2015 is 3.3% for patients cared for in verified reporting burn centers.

Table 8 displays the number and percentage of cases to various discharge dispositions for all NBR cases in the 10 year reporting period. The majority of patients (86.8%) were discharged to home. Only 6% of cases required discharge to an advanced care facility like inpatient rehabilitation facility, skilled nursing facility, or extended care facility.

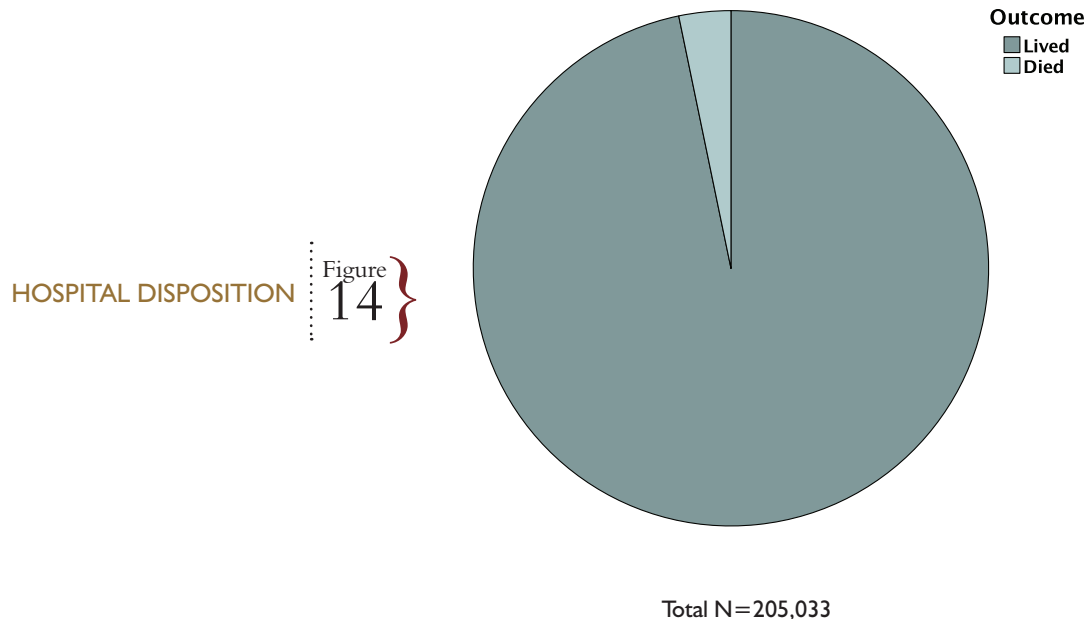


Table 8
HOSPITAL DISPOSITION

Discharge Disposition	Cases	Percent
Discharged Home, No Home Health	165,480	80.7
Discharged Home, With Home Health	12,455	6.1
Death	6,611	3.2
Rehabilitation Facility	5,906	2.9
Nursing home/skilled nursing facility (SNF)	4,713	2.3
Transfer to another hospital	2,101	1.0
Discharged to extended care facility (ECF)	1,599	0.8
Jail or Prison	1,389	0.7
Transfer to another service	1,237	0.6
Unable to Complete Treatment	1,023	0.5
Psychiatry, inpatient	863	0.4
Discharged to alternate caregiver	739	0.4
Discharged to foster care	636	0.3
Transfer to an acute burn facility	281	0.1
Total	205,033	100.0

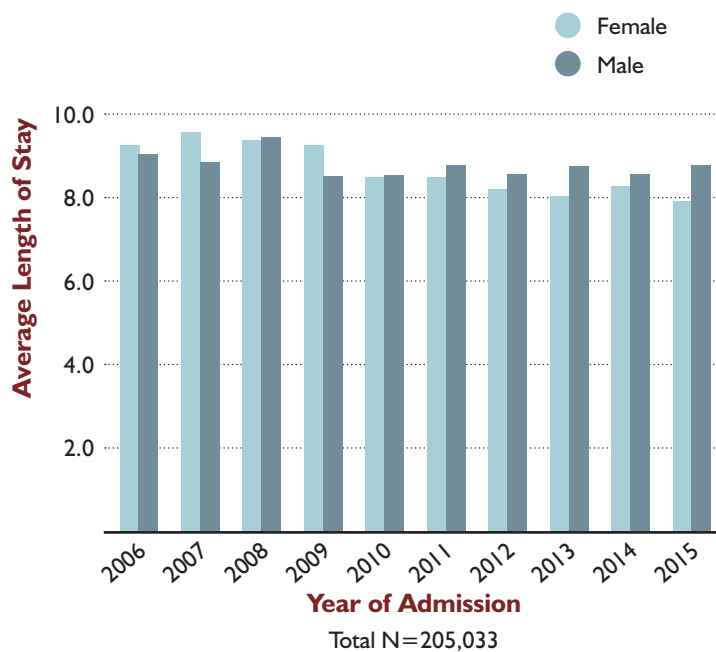
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Figure 15 depicts the average total duration of hospitalization (Total Hospital Days, Length of Stay or LOS) for both men and women by year. Although LOS was substantially greater for women in the first two years of the reporting period, this evened out from 2008 – 2010. There is a definite shift to greater length of stay in men after 2010, who make up the majority of burns as shown in prior figures and tables. In both men and women, there is a trend toward decreased length of stay by a day over the course of the reporting period.

Figure 16 depicts the mortality rate in patients admitted to verified burn centers reporting to the NBR (case fatality) by gender and year. Case fatality continues to be greater in women (3.6%) than men (3.2%) through the decade, except for the most recent reporting year. Over the course of the ten year reporting period the overall mortality rate has decreased for both men and women from 4% to 3%.

AVERAGE HOSPITAL LENGTH OF STAY
BY GENDER, 2006-2015

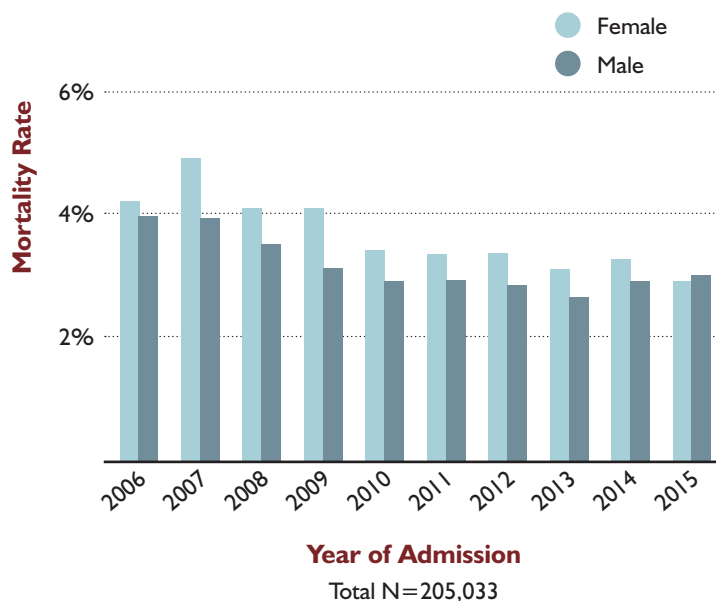
Figure
15



Admission Year	Female	Male
	Mean +/- SEM	Mean +/- SEM
2006	9.3 +/- 0.3	9.09 +/- 0.1
2007	9.63 +/- 0.1	8.89 +/- 0.1
2008	9.45 +/- 0.1	9.51 +/- 0.1
2009	9.3 +/- 0.1	8.5 +/- 0.1
2010	8.5 +/- 0.1	8.5 +/- 0.1
2011	8.5 +/- 0.1	8.8 +/- 0.1
2012	8.2 +/- 0.1	8.6 +/- 0.1
2013	8.0 +/- 0.1	8.8 +/- 0.1
2014	8.3 +/- 0.1	8.5 +/- 0.1
2015	7.9 +/- 0.1	8.8 +/- 0.1

MORTALITY RATE BY GENDER, 2006-2015

Figure
16



Admission Year	Mortality Rate	
	Female	Male
2006	4.1	3.9
2007	4.8	3.9
2008	4.0	3.5
2009	4.0	3.1
2010	3.4	2.9
2011	3.3	2.9
2012	3.3	2.8
2013	3.1	2.6
2014	3.2	2.9
2015	2.9	3.0

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Table 9 depicts the case fatality for each decile of total burn size for each decade of age group. As age and/or burn size increased, so did the case fatality. The numbers of cases used to determine these values (proportion of cases in each group that died/total cases) are listed in the row beneath the case fatality values for each age group. The size of some of the groups is small, so that the calculated case fatality value would have a high variance and standard error. This grouping does not account for inhalation injury or the portion of burn that is full thickness (3rd degree) as a factor of mortality.

Table
9

**MORTALITY RATE BY AGE GROUP AND BURN SIZE
(EXPRESSED AS THE NUMBER OF DEATHS OVER THE TOTAL NUMBER OF PATIENTS IN THAT GROUP)**

Age Group	Burn Size (% TBSA)										Total
	0.1 - 9.9	10 - 19.9	20 - 29.9	30 - 39.9	40 - 49.9	50 - 59.9	60 - 69.9	70 - 79.9	80 - 89.9	> 90	
Birth - .9	0.0	0.2	2.6	11.4	16.7	7.7	85.7	0.0	0.0	0.0	0.5
Died/Total	0/3400	1/475	3/116	5/44	4/24	1/13	6/7	0/3	0/1	0/0	20/4083
1 - 1.9	0.0	0.3	0.3	0.0	6.0	20.0	22.7	10.0	25.0	66.7	0.1
Died/Total	0/12921	6/1996	1/321	0/110	3/50	4/20	5/22	1/10	1/4	2/3	23/15457
2 - 4.9	0.1	0.2	0.9	3.0	8.6	17.1	27.1	21.1	57.1	57.1	0.6
Died/Total	14/11253	4/1789	4/428	6/203	9/105	12/70	13/48	4/19	12/21	12/21	90/13957
5 - 15.9	0.1	0.3	1.0	1.0	5.7	6.4	10.4	13.6	47.7	68.2	0.6
Died/Total	11/12996	7/2080	6/596	3/297	10/176	6/94	8/77	8/59	21/44	15/22	95/16441
16 - 19.9	0.2	0.4	1.6	2.1	2.0	10.0	18.2	30.8	52.6	67.6	1.0
Died/Total	13/6388	5/1151	6/365	3/146	2/98	6/60	8/44	8/26	10/19	25/37	86/8334
20 - 29.9	0.2	0.5	1.3	4.0	9.6	14.3	25.7	46.3	64.6	84.7	1.3
Died/Total	31/19926	21/3882	16/1231	19/473	26/271	22/154	36/140	44/95	51/79	83/98	349/26349
30 - 39.9	0.2	1.1	2.3	7.0	10.7	17.7	39.0	43.3	79.5	88.4	1.9
Died/Total	36/16515	36/3347	24/1058	36/515	31/289	29/164	48/123	42/97	62/78	84/95	428/22281
40 - 49.9	0.4	1.4	4.6	10.6	23.0	37.6	43.5	63.8	82.7	92.5	2.7
Died/Total	73/17822	50/3667	54/1181	60/568	70/304	70/186	57/131	44/69	81/98	98/106	657/24132
50 - 59.9	0.8	3.1	9.9	20.0	38.6	49.5	63.9	74.3	90.9	94.1	4.5
Died/Total	129/16152	101/3298	103/1038	97/485	118/306	94/190	78/122	75/101	90/99	95/101	980/21892
60 - 69.9	1.8	5.7	18.5	36.9	58.7	69.9	89.0	93.3	97.7	92.9	7.4
Died/Total	167/9366	112/1967	121/655	117/317	111/189	95/136	73/82	56/60	43/44	52/56	947/12872
70 - 79.9	3.7	13.8	35.1	56.2	77.7	85.7	97.8	93.1	88.2	95.1	12.8
Died/Total	186/4997	152/1104	132/376	127/226	108/139	60/70	44/45	27/29	30/34	39/41	905/7061
80 or Greater	6.2	25.6	63.8	75.8	85.1	96.9	91.5	94.7	97.0	100.0	21.5
Died/Total	189/3071	203/792	190/298	125/165	86/101	62/64	43/47	36/38	32/33	30/30	996/4639
Total	0.6	2.7	8.6	16.8	28.2	37.8	47.2	56.9	78.2	87.7	3.1
Died/Total	849/134807	698/25548	660/7663	598/3549	578/2052	461/1221	419/888	345/606	433/554	535/610	5576/177498

Total N = 177,498 (Excluding 27,535 Unknown/Missing)

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Figure 17 depicts the number of several complications in all NBR case records. Like in past years, pneumonia was the most prevalent complication. Urinary tract infection and cellulitis total second and third, respectively, which is flip in order from last year. Respiratory failure and wound infection round out the top five which is consistent with last year's report.

Figure 18 demonstrates the association of several complications with duration of mechanical ventilation. Except for cellulitis, wound infections and urinary tract infection, the prevalence of complications increased with the number of days on mechanical ventilation. The duration of mechanical ventilation might be considered a cause of some complications, e.g. the development of pneumonia. In other cases, the duration of ventilation could be a marker of illness severity and correlate with other complications of the critically ill, such as renal failure. This trend has stayed consistent over the last few years.

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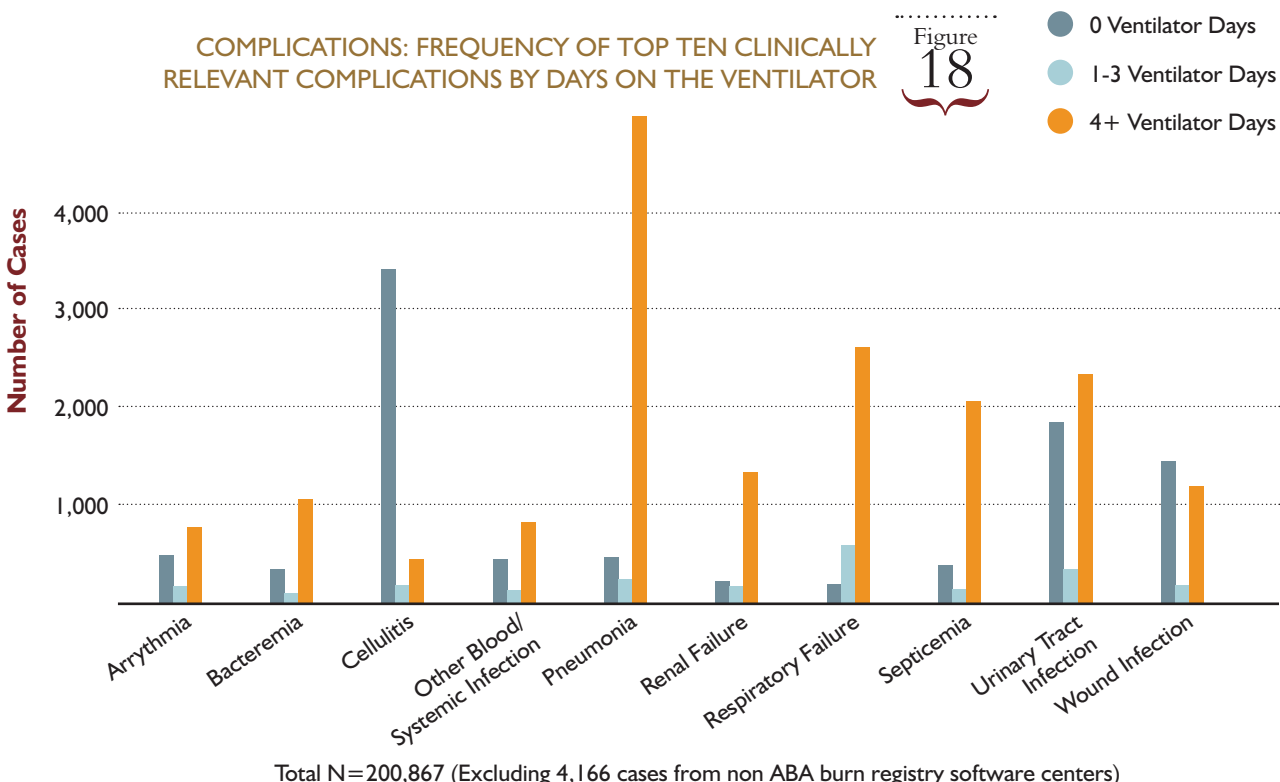
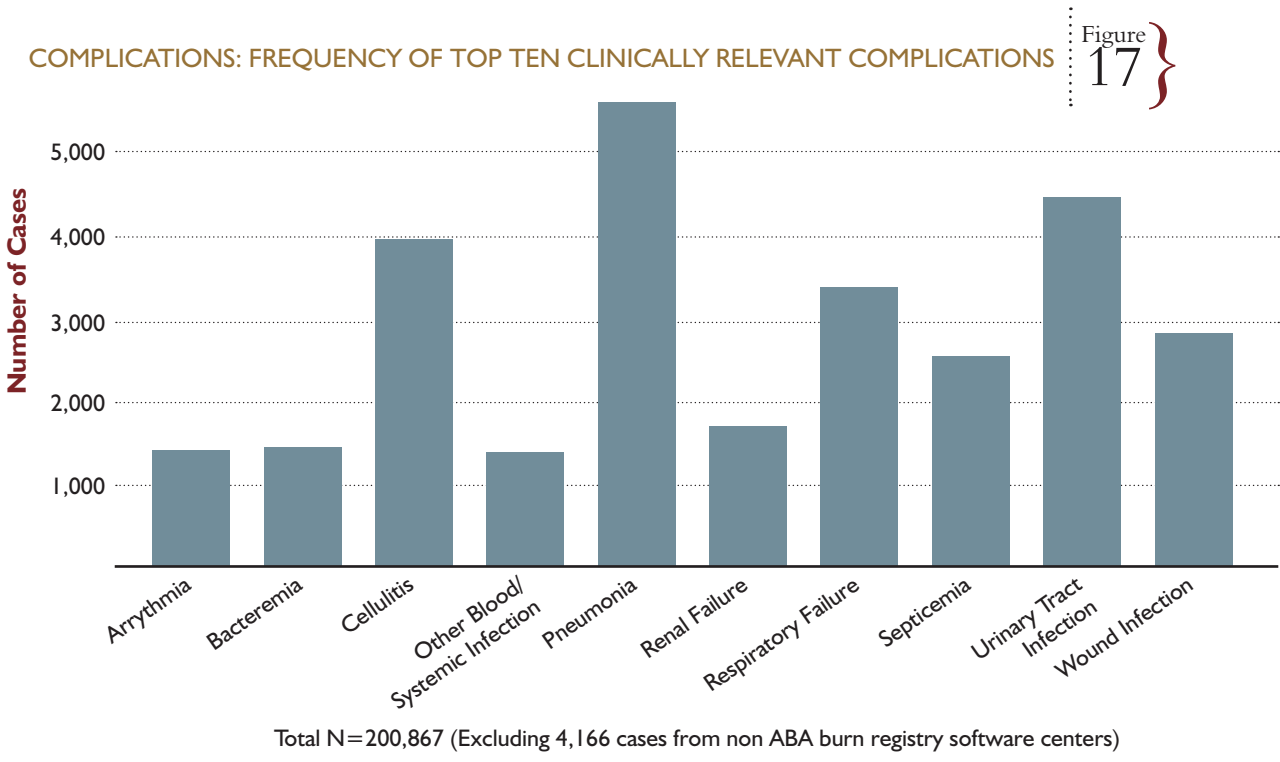
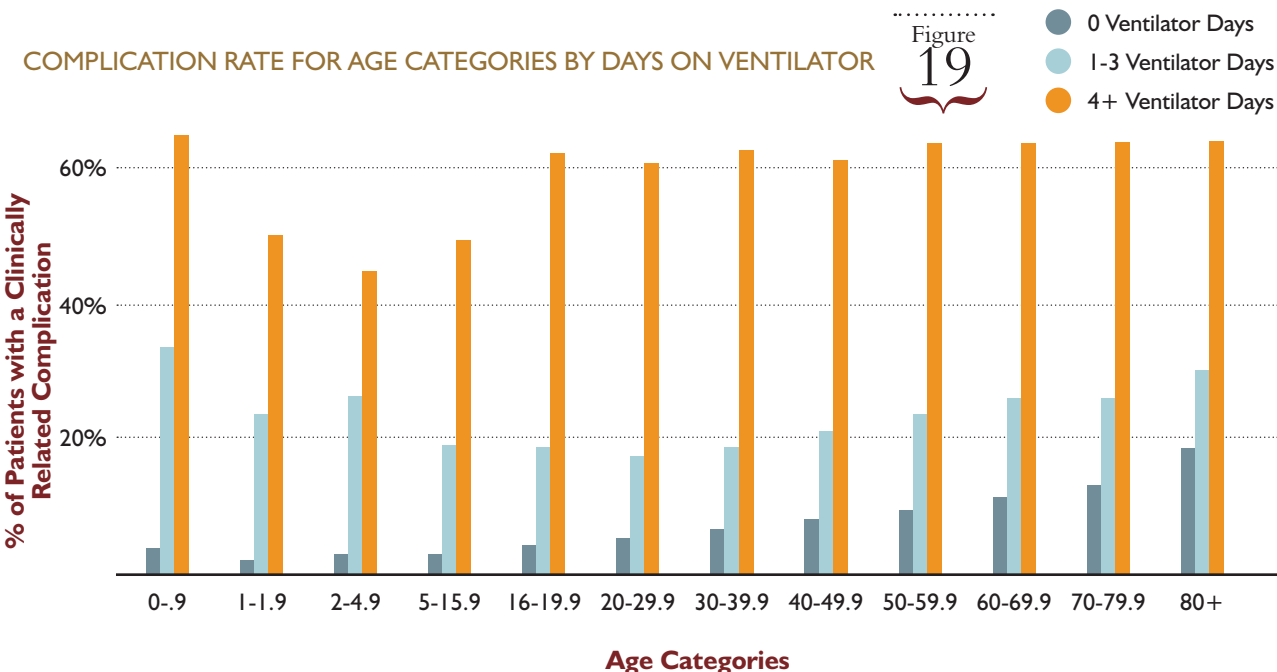


Figure 19 and Table 10 depict the association of occurrence of at least one complication with duration of mechanical ventilation by categories of age. For patients who did not require mechanical ventilation, age had a strong, direct association with the risk of developing a complication. For patients who required four or more days of mechanical ventilation; however, the association between age and the risk of complications was much less pronounced. The total complication rate increases with age category and days on the ventilator.



Total N=200,867 (Excluding 4,166 cases from non ABA burn registry software centers or unknown/missing ventilator days)

Table 10

COMPLICATION COUNT FOR AGE CATEGORIES BY DAYS ON VENTILATOR

Age Categories	Ventilator Days						Total	
	0 Ventilator Days		1-3 Ventilator Days		4 or More Ventilator Days		Total	
	Complication No	Complication Yes	Complication No	Complication Yes	Complication No	Complication Yes	Complication No	Complication Yes
0-9	4,777	192	85	44	70	134	4,932	370
1-1.9	15,697	363	124	39	130	134	15,951	536
2-4.9	14,249	418	169	62	234	195	14,652	675
5-15.9	16,443	531	448	107	393	388	17,284	1,026
16-19.9	8,164	351	400	93	157	266	8,721	710
20-29.9	25,124	1,435	1,446	306	582	923	27,152	2,664
30-39.9	20,764	1,509	1,281	300	620	1,070	22,665	2,879
40-49.9	21,873	1,946	1,410	380	812	1,302	24,095	3,628
50-59.9	18,731	1,953	1,460	457	851	1,540	21,042	3,950
60-69.9	10,163	1,283	1,003	358	623	1,128	11,789	2,769
70-79.9	5,232	795	652	232	390	711	6,274	1,738
80 and over	3,249	744	462	203	249	458	3,960	1,405
Subtotal	164,466	11,520	8,940	2,581	5,111	8,249	178,517	22,350
Missing	0	0	0	0	0	0	0	0
Total	164,466	11,520	8,940	2,581	5,111	8,249	178,517	22,350

Total N=200,867 (Excluding 4,166 cases from non ABA burn registry software centers or unknown/missing ventilator days)

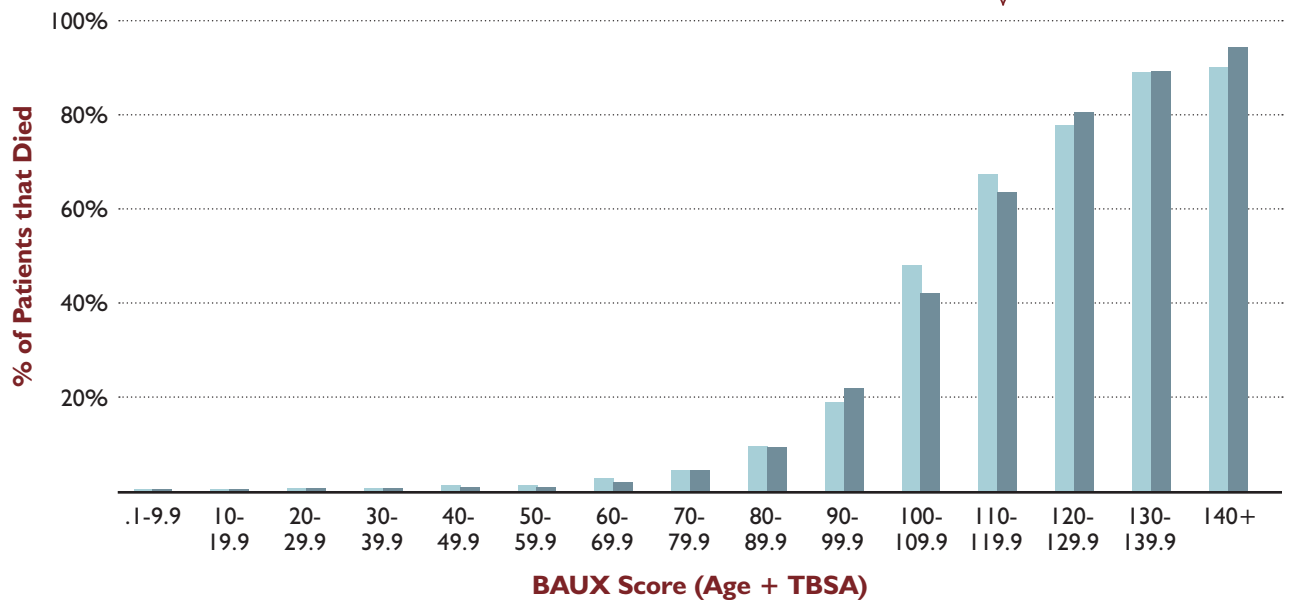
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Figure 20 depicts the data shown in Table 11 graphically and demonstrates a similar relationship with gender separation. The proportion of patients who died (case fatality) is plotted as a function of the sum of age and the total percentage of BSA burned, the BAUX Score.

There is a strong association between this score and case fatality for both men and women. Overall, women had a higher case fatality than men (3.5% vs 3.1%) but this difference is less pronounced. The sum of age and burn size (BAUX Score) associated with a case fatality of 50% (P 50) was 100. There was no significant difference between genders.

MORTALITY RATE FOR BAUX SCORE CATEGORIES BY GENDER

Figure 20
● Female
● Male



Total N = 190,276 (Excluding 14,757 Unknown/Missing)

NUMBER OF CASES IN BAUX SCORE CATEGORIES BY GENDER

Table 11

BAUX Score (Age + TBSA)	Female		Male	
	Lived	Died	Lived	Died
0-9.9	12,922	26	18,126	36
10-19.9	7,088	24	11,462	34
20-29.9	6,466	32	17,264	89
30-39.9	6,434	37	17,409	90
40-49.9	6,742	67	17,285	133
50-59.9	6,839	102	17,265	167
60-69.9	5,289	149	12,347	262
70-79.9	3,473	178	7,136	336
80-89.9	2,290	248	3,977	426
90-99.9	1,151	273	1,718	492
100-109.9	311	289	607	454
110-119.9	106	227	240	431
120-129.9	47	170	88	377
130-139.9	14	122	29	264
140 and Over	19	188	19	390
Total	59,191	2,132	124,972	3,981

Total N = 190,276 (Excluding 14,757 Unknown/Missing)

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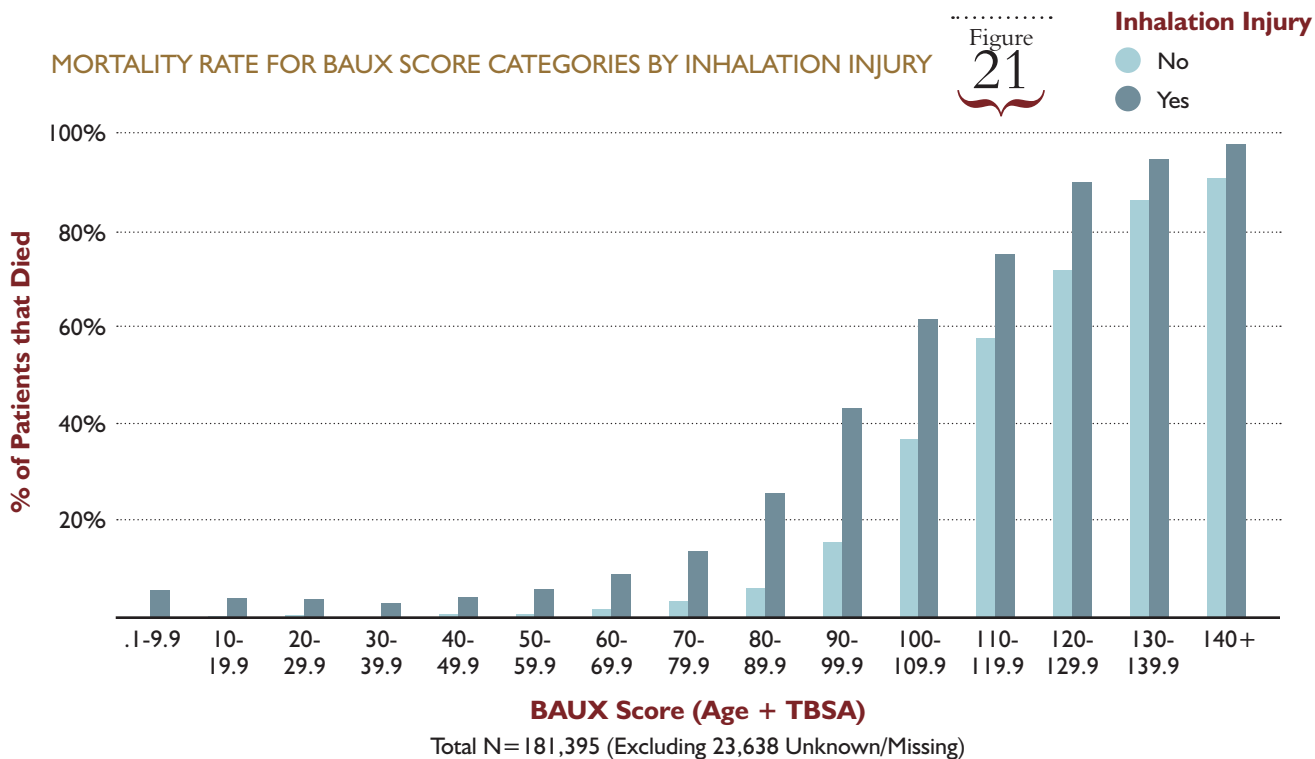
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In Figure 21 and Table 12, the relationship between the proportion of patients that died and the sum of age and burn size (BAUX Score) is shown both for those with and those without inhalation injury. Patients with inhalation injury had a higher case fatality for a given BAUX score than those with no inhalation injury, but the added risk was not constant. As the Baux score ranged greater than 100; the relationship between inhalation injury and no inhalation injury became more similar in case fatality.

For patients with an inhalation injury, the sum of age and burn size associated with case fatality of 50% was approximately 100, compared with approximately 110 for those with no inhalation injury, as seen in previous years.



NUMBER OF CASES IN BAUX SCORE CATEGORIES BY INHALATION INJURY

Table 12

BAUX Score (Age + TBSA)	No Inhalation Injury		Inhalation Injury	
	Lived	Died	Lived	Died
0-9.9	29,591	39	409	23
10-19.9	17,365	37	451	19
20-29.9	21,654	78	895	32
30-39.9	21,475	85	1,241	37
40-49.9	21,211	120	1,497	63
50-59.9	20,945	136	1,976	114
60-69.9	15,016	211	1,771	167
70-79.9	8,763	265	1,348	214
80-89.9	5,106	336	849	283
90-99.9	2,316	413	412	304
100-109.9	660	375	206	319
110-119.9	215	285	113	327
120-129.9	94	228	37	291
130-139.9	26	152	15	216
140 and Over	26	227	10	306
Total	164,463	2,987	11,230	2,715

Total N=181,395 (Excluding 23,638 Unknown/Missing)

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Analysis of All U.S. Records

Major predictors of case fatality in burns include burn size, age, and the presence of inhalation injury. Table 13 shows the case fatality for several combinations of these variables. There are four categories of burn size: 0.1-19.9%, 20-39.9%, 40-59.9%, and 60% BSA and greater; two categories of age: <60 and >60 years; and two categories of the presence of inhalation injury: No and Yes. As age and burn size together reach 60 and over, the presence or absence of inhalation injury is equally significant.

Additionally, in the age groups of >60 years of age, case fatality greatly increases at the level of 20% TBSA with inhalation injury and above as compared to <60 years of age.

Table 13 MORTALITY RATES FOR MATRIX OF MAIN PREDICTORS

TBSA Category	Age	Inhalation Injury	Lived	Died	Mortality Rate
0.1-19.9	0-59.9	No	126,980	263	0.2
0.1-19.9	0-59.9	Yes	5,390	240	4.3
0.1-19.9	60 and Over	No	17,693	636	3.5
0.1-19.9	60 and Over	Yes	1,679	309	15.5
20-39.9	0-59.9	No	6,886	178	2.5
20-39.9	0-59.9	Yes	1,422	232	14.0
20-39.9	60 and Over	No	917	456	33.2
20-39.9	60 and Over	Yes	244	308	55.8
40-59.9	0-59.9	No	1,348	203	13.1
40-59.9	0-59.9	Yes	618	267	30.2
40-59.9	60 and Over	No	115	243	67.9
40-59.9	60 and Over	Yes	54	250	82.2
60 and Over	0-59.9	No	537	424	44.1
60 and Over	0-59.9	Yes	320	722	69.3
60 and Over	60 and Over	No	23	194	89.4
60 and Over	60 and Over	Yes	9	277	96.9
TOTAL			164,235	5,202	3.1

Total N= 169,437 (Excluding 35,596 Unknown/Missing)

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Table 14 lists the number and proportion of cases in the NBR that were covered by several forms of payment. Only 7.9% of the records did not include any insurance information. Of those that did include this data, over one third (37.6%) were covered by Medicaid (22.6%) or uninsured (15.0%). The Medicaid and uninsured rates combined are slightly higher than last year. Reporting of this financial data is consistently improving each year.

Table 14
PRIMARY INSURANCE PAYOR

Insurance	Cases	Percent
Government-Medicaid	46,289	22.6
Government-Medicare	22,910	11.2
Other Government	7,975	3.9
Subtotal	77,174	37.6
Private/Commercial Insurance	41,758	20.4
Blue Cross/Blue Shield	16,505	8.0
Private-Foundation or Charity	3,489	1.7
Subtotal	61,752	30.1
Workers Compensation	18,264	8.9
Auto	813	0.4
Subtotal	19,077	9.3
Uninsured, including self pay	30,839	15.0
Subtotal	30,839	15.0
Unknown	16,191	7.9
TOTAL	205,033	100.0

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Analysis of All U.S. Records

Figure 22 and Table 15 show how the proportions of patients covered by Medicaid, Medicare, Workers' Compensation, and Self-pay categories have changed over the decade covered by this year's NBR Report. 2007-2008 seems to be the break point where each category declared a trend. Medicaid continues in a consistent upward trend and has doubled since 2007. Medicare, Uninsured and Worker's Compensation have remained in a steady trend with Medicare surpassing the Uninsured by 0.6% for the first time in this current NBR ten year report.

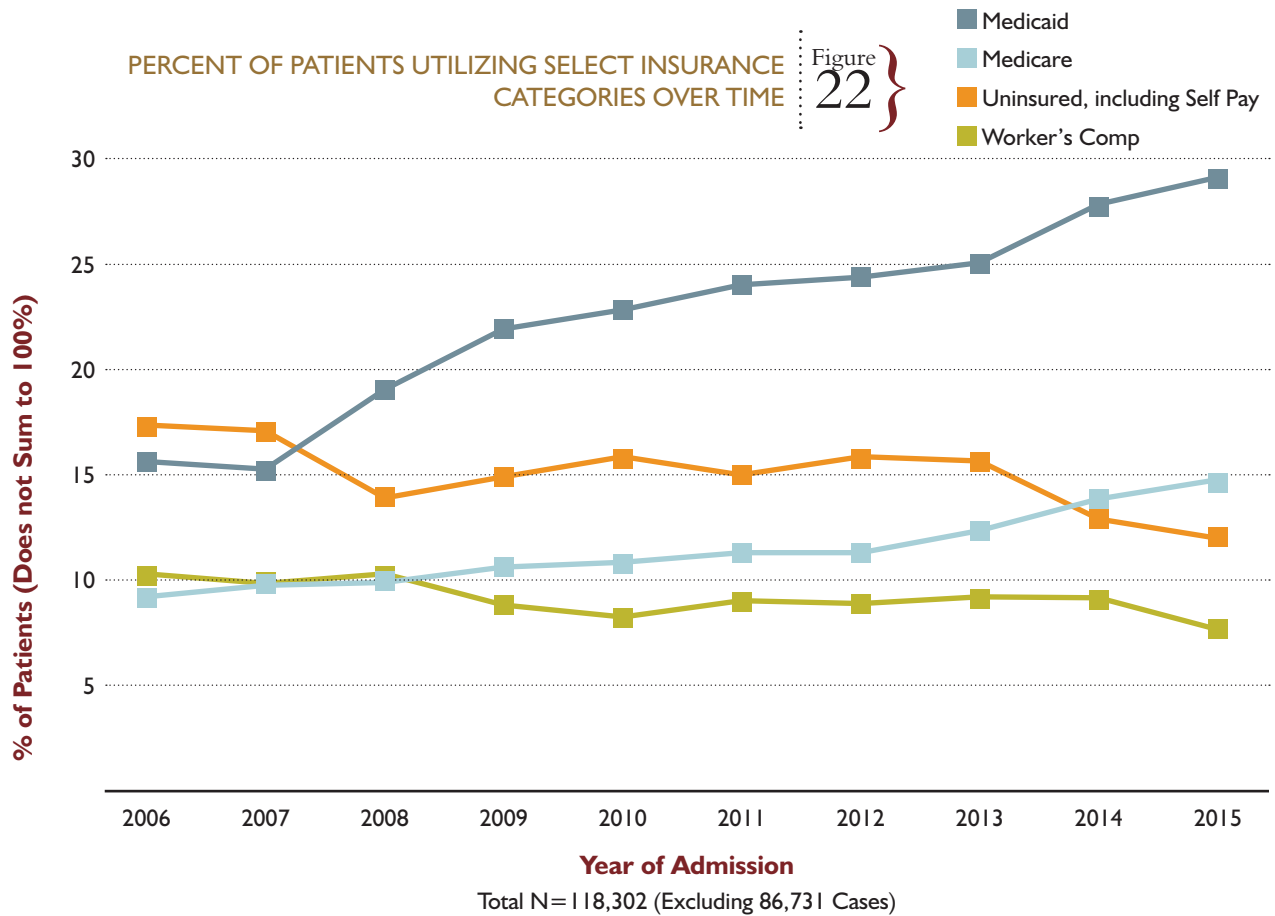


Table 15
CASE COUNT FOR SELECT INSURANCE CATEGORIES OVER TIME

Year of Admission	Select Insurance Categories								
	Medicaid		Medicare		Uninsured, including self pay		Workers Compensation		Total
	Cases	Row N %	Cases	Row N %	Cases	Row N %	Cases	Row N %	Count
2006	2,755	15.5	1,605	9.0	3,069	17.2	1,779	10.0	17,798
2007	2,579	15.3	1,638	9.7	2,863	17.0	1,617	9.6	16,819
2008	3,366	18.9	1,746	9.8	2,483	13.9	1,773	10.0	17,801
2009	4,648	21.8	2,219	10.4	3,156	14.8	1,833	8.6	21,349
2010	5,510	22.7	2,568	10.6	3,808	15.7	1,937	8.0	24,256
2011	5,655	24.0	2,619	11.1	3,516	14.9	2,108	8.9	23,574
2012	5,719	24.3	2,625	11.1	3,689	15.7	2,041	8.7	23,563
2013	6,281	25.0	3,051	12.2	3,904	15.6	2,258	9.0	25,096
2014	6,549	27.7	3,229	13.7	3,031	12.8	2,084	8.8	23,641
2015	3,227	29.0	1,610	14.5	1,320	11.9	834	7.5	11,136
Total	46,289	22.6	22,910	11.2	30,839	15.0	18,264	8.9	205,033

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Table 16 depicts the average length of hospital stay in days (LOS) for survivors and non-survivors in each decile of burn size. Non-survivors with burns of 20 %TBSA and greater have shorter LOS compared with survivors. The LOS for survivors in all categories of burn size was slightly greater than 1 day/%TBSA burn. The overall average LOS for survivors was 8.9 days and 16.9 days for non-survivors. This is slightly less than last year's NBR report.

Table 17 depicts hospital charges for survivors and non-survivors in each burn size decile. The average charges for survivors with a known %TBSA were slightly more than \$94,130 and \$309,656 for non-survivors.

Table
16

HOSPITAL DAYS: LIVED/DIED BY BURN SIZE GROUP

%TBSA	Total		Lived		Died	
	Cases	Mean +/- SEM	Cases	Mean +/- SEM	Cases	Mean +/- SEM
0.1 - 9.9	134,807	5.5+/-0.0	133,958	5.4+/-0.0	849	15.5+/-0.8
10 - 19.9	25,548	13.1+/-0.0	24,850	13+/-0.0	698	18.1+/-0.8
20 - 29.9	7,663	23.8+/-0.2	7,003	24.2+/-0.2	660	19.9+/-0.9
30 - 39.9	3,549	34.8+/-0.5	2,951	37.8+/-0.6	598	19.8+/-1.1
40 - 49.9	2,052	40.8+/-0.8	1,474	48.7+/-0.8	578	20.5+/-1.6
50 - 59.9	1,221	46.7+/-1.3	760	63.1+/-1.6	461	19.6+/-1.8
60 - 69.9	888	48.6+/-1.7	469	74.3+/-2.4	419	19.7+/-1.7
70 - 79.9	606	44.1+/-2.3	261	81.9+/-3.8	345	15.5+/-1.6
80 - 89.9	554	28.2+/-2.0	121	85.6+/-5.6	433	12.2+/-1.3
> 90	610	13.0+/-1.7	75	60.2+/-10.0	535	6.4+/-1.0
Subtotal	177,498	9.1+/-0.0	171,922	8.9+/-0.0	5,576	16.9+/-0.4
Missing or 0%	27,535	6.2+/-0.0	26,447	6.1+/-0.0	1,088	9.7+/-0.5
TOTAL	205,033		198,369		6,664	

Total N=205,033

Table
17

HOSPITAL CHARGES: LIVED/DIED BY BURN SIZE GROUP

%TBSA	Total		Lived		Died	
	Cases	Mean +/- SEM	Cases	Mean +/- SEM	Cases	Mean +/- SEM
0.1 - 9.9	53,165	\$47557+/-418	52,810	\$46585+/-404	355	\$192092+/-15762
10 - 19.9	11,045	\$132294+/-2090	10,764	\$128800+/-2055	281	\$266138+/-22077
20 - 29.9	3,283	\$295376+/-6849	2,979	\$290638+/-6997	304	\$341803+/-27631
30 - 39.9	1,474	\$492669+/-15604	1,222	\$516533+/-17406	252	\$376950+/-33859
40 - 49.9	841	\$657943+/-25757	590	\$754446+/-32263	251	\$431105+/-37564
50 - 59.9	492	\$787522+/-43478	286	\$1066254+/-62254	206	\$400544+/-45569
60 - 69.9	355	\$798355+/-48094	178	\$1168006+/-71389	177	\$426615+/-51095
70 - 79.9	270	\$701789+/-60027	105	\$1203410+/-116634	165	\$382576+/-50833
80 - 89.9	229	\$399227+/-47782	49	\$987917+/-143138	180	\$238972+/-39161
> 90	282	\$196866+/-33176	32	\$627717+/-192231	250	\$141717+/-26545
Subtotal	71,436	\$101435+/-994	69,015	\$94130+/-947	2,421	\$309656+/-10587
Missing or 0%	12,824	\$41919+/-976	12,284	\$39863+/-967	540	\$88680+/-6975
TOTAL	84,260	\$92377+/-859	81,299	\$85931+/-820	2,961	\$269356+/-8888

Total N=84,260 (Excluding 120,773 cases with Unknown/Missing charge data)

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Analysis of All U.S. Records

Table 18 lists the twenty most frequently recorded DRG codes and their associated hospital charges for both survivors and deaths.

HOSPITAL CHARGES: LIVED/DIED BY TOP 20 MS-DRGS

Table
18

Top 20 MS-DRG Codes	Total		Lived		Died	
	Cases	Mean +/- SEM	Cases	Mean +/- SEM	Cases	Mean +/- SEM
935 Non-extensive burns	32,839	\$30590 +/-334	32,737	\$30045 +/-314	102	\$205815 +/-34213
928 Full thickness burn w skin graft or inhal inj w CC/MCC	7,782	\$200912 +/-3465	7,532	\$196377 +/-3410	250	\$337532 +/-31699
929 Full thickness burn w skin graft or inhal inj w/o CC/MCC	7,761	\$100935 +/-1592	7,723	\$100265 +/-1575	38	\$236961 +/-53172
934 Full thickness burn w/o skin grft or inhal inj	4,343	\$40871 +/-1499	4,199	\$39831 +/-1516	144	\$71205 +/-9160
927 Extensive burns or full thickness burns w MV 96+ hrs w skin graft	2,698	\$53148 +/-12273	2,332	\$534859 +/-12902	366	\$669674 +/-37242
511 Shoulder,elbow or forearm proc,exc major joint proc w CC	1,600	\$19637 +/-888	1,599	\$19571 +/-886	1	\$124,906
507 Major shoulder or elbow joint procedures w CC/MCC	1,163	\$102933 +/-4737	1,151	\$99410 +/-4308	12	\$440856 +/-182195
933 Extensive burns or full thickness burns w MV 96+ hrs w/o skin graft	936	\$128421 +/-9325	290	\$209669 +/-24614	646	\$91947 +/-7358
3 ECMO or trach w MV 96+ hrs or PDX exc face, mouth & neck w maj O.R.	855	\$928950 +/-31629	695	\$948410 +/-36211	160	\$844422 +/-61627
506 Major thumb or joint procedures	687	\$178276 +/-11715	665	\$171445 +/-11347	22	\$384776 +/-121802
923 Other injury, poisoning & toxic effect diag w/o MCC	480	\$23426 +/-2034	475	\$23511 +/-2054	5	\$15364 +/-8789
918 Poisoning & toxic effects of drugs w/o MCC	249	\$27291 +/-2675	244	\$27096 +/-2673	5	\$36801 +/-29849
603 Cellulitis w/o MCC	215	\$23861 +/-6185	215	\$23861 +/-6185	0	
605 Trauma to the skin, subcut tiss & breast w/o MCC	205	\$27813 +/-2580	205	\$27813 +/-2580	0	
596 Major skin disorders w/o MCC	195	\$67375 +/-7639	191	\$67393 +/-7795	4	\$66536 +/-13576
577 Skin graft &/or debrid exc for skin ulcer or cellulitis w CC	134	\$94138 +/-12014	134	\$94138 +/-12014	0	
578 Skin graft &/or debrid exc for skin ulcer or cellulitis w/o CC/MCC	128	\$86633 +/-9878	128	\$86633 +/-9878	0	
595 Major skin disorders w MCC	122	\$123517 +/-13257	94	\$113572 +/-13619	28	\$156904 +/-35120
998 Principal diagnosis invalid as discharge diagnosis	35	\$5071 +/-1913	35	\$5071 +/-1913	0	
483 Major joint & limb reattachment proc of upper extremity w CC/MCC	33	\$165468 +/-55098	32	\$158768 +/-56425	1	\$379,865
Subtotal	62,460		60,676		1,784	
Unknown	14,591	\$57054 +/-1425	13,932	\$51004 +/-1322	659	\$184968 +/-13726
Unmappable	84,260	\$92377 +/-859	81,299	\$85931 +/-820	2,961	\$269356 +/-8888
Unknown	53	\$153410 +/-35354	47	\$159357 +/-39436	6	\$106830 +/-47568
Total	161,364		155,954		5,410	

Total N=84,260 (Excluding 120,773 cases with Unknown/Missing charge data)

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Table 19 combines several parameters of resource utilization for survivors and non-survivors listed by age category. These include mean LOS, mean LOS/Burn size (TBSA), mean total charges, and mean daily charges.

DAYS PER %TBSA AND CHARGES PER DAY BY AGE GROUPS AND SURVIVAL

Table
19

Age Groups	Cases		Days		Hospital Days / %TBSA		Hospital Charges		Hospital Charges / Hospital Days	
	Lived	Died	Lived	Died	Lived	Died	Lived	Died	Lived	Died
Birth - 0.9	1,322	2	5.27	10.50	1.61	0.35	\$35,296	\$151,928	\$6,318	\$14,610
+/- SEM			0.24	0.50	0.07	0.02	\$1,944	\$23,680	\$156	\$2,951
1 - 1.9	5,461	7	5.39	5.71	1.62	0.26	\$37,166	\$107,912	\$7,087	\$25,915
+/- SEM			0.67	1.94	0.14	0.11	\$1,137	\$36,017	\$107	\$8,619
2 - 4.9	4,889	33	6.39	10.73	1.70	1.10	\$51,365	\$149,162	\$7,358	\$21,594
+/- SEM			0.19	3.53	0.07	0.42	\$1,862	\$42,921	\$187	\$2,370
5 - 15.9	5,475	34	7.34	7.18	1.78	0.39	\$68,541	\$250,274	\$7,726	\$37,228
+/- SEM			0.19	2.20	0.06	0.18	\$2,719	\$85,911	\$123	\$5,877
16 - 19.9	3,152	25	7.73	18.48	1.74	0.52	\$73,891	\$522,098	\$7,611	\$35,593
+/- SEM			0.26	7.63	0.05	0.19	\$3,830	\$185,472	\$148	\$4,972
20 - 29.9	11,093	138	9.01	17.18	2.06	0.47	\$91,299	\$400,136	\$8,155	\$32,361
+/- SEM			0.16	2.46	0.05	0.09	\$2,499	\$57,911	\$78	\$3,436
30 - 39.9	9,324	196	10.06	14.74	2.37	0.40	\$102,753	\$351,190	\$8,501	\$34,549
+/- SEM			0.18	1.82	0.10	0.05	\$2,948	\$40,739	\$145	\$4,019
40 - 49.9	9,867	290	10.91	16.58	2.73	0.83	\$107,093	\$344,177	\$8,486	\$27,644
+/- SEM			0.18	1.84	0.07	0.14	\$2,742	\$32,068	\$105	\$2,173
50 - 59.9	9,034	432	12.25	20.95	3.13	1.51	\$121,606	\$418,869	\$8,591	\$26,140
+/- SEM			0.20	1.58	0.07	0.28	\$3,019	\$31,077	\$101	\$1,029
60 - 69.9	5,136	417	13.28	16.83	3.68	1.27	\$134,390	\$317,518	\$8,904	\$24,350
+/- SEM			0.27	1.19	0.15	0.14	\$4,103	\$23,723	\$121	\$1,097
70 - 79.9	2,670	405	13.82	14.54	3.80	1.24	\$135,977	\$263,031	\$8,964	\$19,518
+/- SEM			0.35	0.99	0.26	0.13	\$5,205	\$21,574	\$158	\$918
80 or greater	1,592	442	13.71	11.46	3.82	1.15	\$130,732	\$177,346	\$9,032	\$18,958
+/- SEM			0.40	0.81	0.21	0.16	\$5,876	\$14,529	\$251	\$1,550
Total	69,015	2,421	9.72	15.78	2.46	1.09	\$94,131	\$309,656	\$8,179	\$24,809
+/- SEM			0.08	0.52	0.03	0.07	\$948	\$10,587	\$39	\$637



3

Analysis

by Age Group



This year encompasses another decade of collected data ranging from 2006 to 2015. Age of the burn patient continues to be an important marker, having a dramatic effect on many of the attributes found in the National Burn Repository. As we improve our collection of data, it is interesting to note the stability of incidence of burns in each ten year report. Data continues to be very useful when contemplating prevention strategies, medical economics, and concerns about public health.

The figures in this Age Analysis Section provide detailed information for each of the following age categories: Birth to 0.9, 1 to 1.9, 2 to 4.9, 5 to 15.9, 16 to 19.9, 20 to 29.9, 30 to 39.9, 40 to 49.9, 50 to 59.9, 60 to 69.9, 70 to 79.9, and 80-and-over. These groupings were chosen based on prior collective experience about the relationship of certain ages to types of burn injury patterns, with an emphasis on accidental injuries of the very young. Each age category has six pages with four figures and eight tables that summarize the data in the National Burn Repository. Some highlights are abstracted below.

The race of burn victims continues to show a dramatic over-representation of minorities in children (age under 5 years) than would be expected based on national demographics. The same marked over-representation disappears in young adulthood. This has continued to perpetuate for the past several years, these minority communities might be at increased risk and in need of prevention initiatives.

Furthermore, scald and contact burns are very prevalent in the early age category when contemplating etiology. Fire/flame

continues to be the consistent, predominant etiology of burns in the adolescent and adult age groups. There continues to be a large amount of unspecified burns throughout all age groups; however, non-burns have seen a greater reporting value than in years past, especially in young adults. Improvement of data collection may impact these numbers bringing a better appreciation of the total data set.

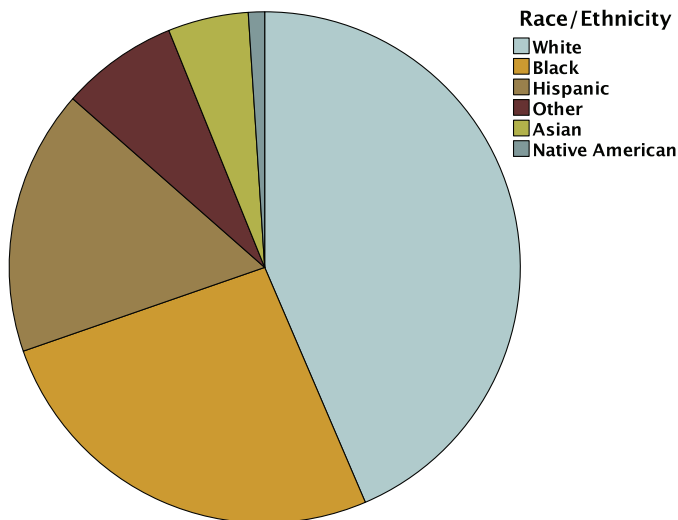
Inhalation injury is one of the most lethal characteristics of burn victims, and somewhat surprisingly, increases in incidence with age. Even though children are exposed to smoke in structure fires and even with the increase in fire/flame injuries in the lowest age group, the preponderance of scald and contact injuries continues to crowd out inhalation injuries in the young.

As a non-mandatory field, complication rates may be lacking. The most common complications are urinary tract infections (UTI), pneumonia and cellulitis as the top three complications in those patients under age 60. The number of complications observed to be increased with the increase of age.

As in previous years, the most frequently reported procedures continue to be excisional debridement of wound, infection, or burn (ICD-9-CM 86.22) and other skin graft to other site (ICD-9-CM 86.69). This is true of all age groups, and makes good intuitive sense, given that early excision and grafting of burns remains a durable standard of care. Another absolutely expected finding is the progression of mortality as a function of increasing age.

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Figure 23 RACE/ETHNICITY



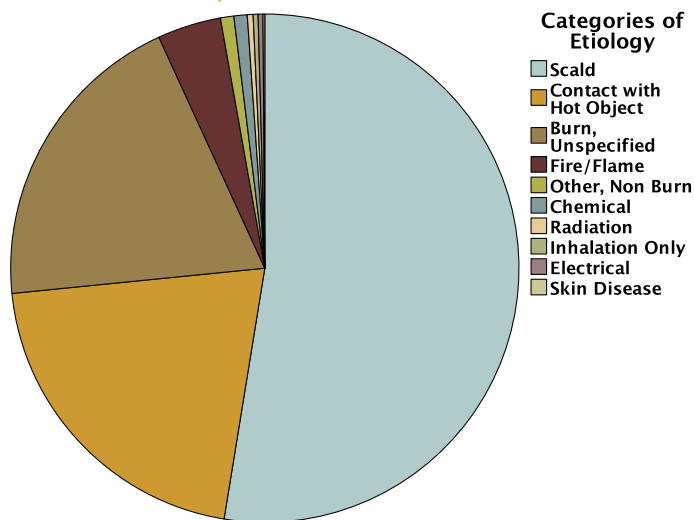
Total N=4,658 (Excluding 668 Unknown/Missing)

RACE/ETHNICITY

Table 20

Race	Cases	%Valid
White	2,029	43.6%
Black	1,217	26.1%
Hispanic	782	16.8%
Other	345	7.4%
Asian	237	5.1%
Native American	48	1.0%
Unknown	668	
TOTAL	5,326	

Figure 24 ETIOLOGY



Total N=5,184 (Excluding 142 Unknown/Missing)

ETIOLOGY

Table 21

Etiology	Cases	% Valid
Scald	2,725	52.6%
Contact with Hot Object	1,081	20.9%
Burn, Unspecified	1,023	19.7%
Fire/Flame	210	4.1%
Chemical	44	0.8%
Radiation	19	0.4%
Inhalation Only	16	0.3%
Electrical	16	0.3%
Burn Subtotal	5,134	99.0%
Other, Non Burn	44	0.8%
Skin Disease	6	0.1%
Non-Burn Subtotal	50	1.0%
Unknown	142	
TOTAL	5,326	

Table 22 HOSPITAL DAYS: LIVED/DIED BY INHALATION INJURY

Inhalation Injury	Total		Lived		Died	
	Cases	Mean +/- SEM	Cases	Mean +/- SEM	Cases	Mean +/- SEM
No	5,043	5.36+0.13	4,995	5.3+0.13	48	11.02+2.83
Yes	97	12.38+2.02	92	12.33+2.1	5	13.4+7.17
Subtotal	5,140	5.49+0.14	5,087	5.43+0.13	53	11.25+2.63
Missing	186	4.56+0.54	181	4.56+0.55	5	4.6+2.29
TOTAL	5,326	5.46+0.13	5,268	5.4+0.13	58	10.67+2.42

Total N=5,326

Table 23 TOP TEN COMPLICATIONS

Top Ten Complications	Count	Percent of All Complications	Percent of Patients with Complication
Urinary tract infection	80	9.5	1.5
Pneumonia	69	8.2	1.3
Respiratory failure	54	6.4	1.0
Other hematologic	53	6.3	1.0
ARDS	30	3.6	0.6
Wound infection (non-surgical)	29	3.4	0.5
Extubation, unintentional	29	3.4	0.5
Bacteremia	29	3.4	0.5
Shock	26	3.1	0.5
Arrhythmia	23	2.7	0.4
Total Complications	843		

Total N=5,302 (Excluding 24 cases from non ABA burn registry software centers)

Table 24 TOP TEN PROCEDURES

Top Ten Procedures Codes	Count	Percent of All Procedures
86.22 Excisional debridement of wound, infection, or burn	1,265	13.6
93.57 Application of other wound dressing	1,173	12.6
86.28 Nonexcisional debridement of wound, infection or burn	955	10.3
86.69 Other skin graft to other sites	567	6.1
38.93 Venous catheterization, not elsewhere classified	371	4.0
86.66 Homograft to skin	351	3.8
86.59 Closure of skin and subcutaneous tissue of other sites	284	3.1
86.65 Heterograft to skin	219	2.4
34.04 Insertion of intercostal catheter for drainage	148	1.6
38.91 Arterial catheterization	145	1.6
Total Procedures	9282	

Total N=5,326

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- 2
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Table 25 LIVED/DIED BY BURN GROUP SIZE (% TBSA)

%TBSA	Lived Cases	Died Cases	Mortality Rate
0.1 - 9.9	3,400	0	0.0
10 - 19.9	474	1	0.2
20 - 29.9	113	3	2.6
30 - 39.9	39	5	11.4
40 - 49.9	20	4	16.7
50 - 59.9	12	1	7.7
60 - 69.9	1	6	85.7
70 - 79.9	3	0	0.0
80 - 89.9	1	0	0.0
> 90	0	0	
Subtotal	4,063	20	0.5
Missing or 0%	1,205	38	3.1
TOTAL	5,268	58	1.1

Total N=5,326

Table 26 HOSPITAL DAYS BY BURN GROUP SIZE (% TBSA)

%TBSA	Cases	Mean +/- SEM
0.1 - 9.9	3,400	3.5+0.0
10 - 19.9	475	10.3+0.5
20 - 29.9	116	20.4+1.6
30 - 39.9	44	27.3+4.0
40 - 49.9	24	28.1+5.7
50 - 59.9	13	50.5+12.9
60 - 69.9	7	11.2+4.6
70 - 79.9	3	27+14.7
80 - 89.9	1	2+.
> 90	0	.+.
Subtotal	4,083	5.4+0.1
Missing or 0%	1,243	5.6+0.2
TOTAL	5,326	5.4+0.1

Total N=5,326

Table 27 MEAN CHARGES FOR TOP FIVE MS-DRGS

MS-DRG Code	Cases	Cases with Valid Charges	Mean +/- SEM
935 Non-extensive burns	2,302	2,302	22223+/-1088
929 Full thickness burn w skin graft or inhal inj w/o CC/MCC	253	253	82066+/-8544
934 Full thickness burn w/o skin grft or inhal inj	149	149	31702+/-4171
928 Full thickness burn w skin graft or inhal inj w CC/MCC	95	95	130663+/-15641
927 Extensive burns or full thickness burns w MV 96+ hrs w skin graft	43	43	345595+/-103512

Total N=2,842

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Figure 25 MEAN HOSPITAL DAYS FOR FIRE/FLAME, CONTACT WITH HOT OBJECT, AND SCALD BY ADMISSION YEAR

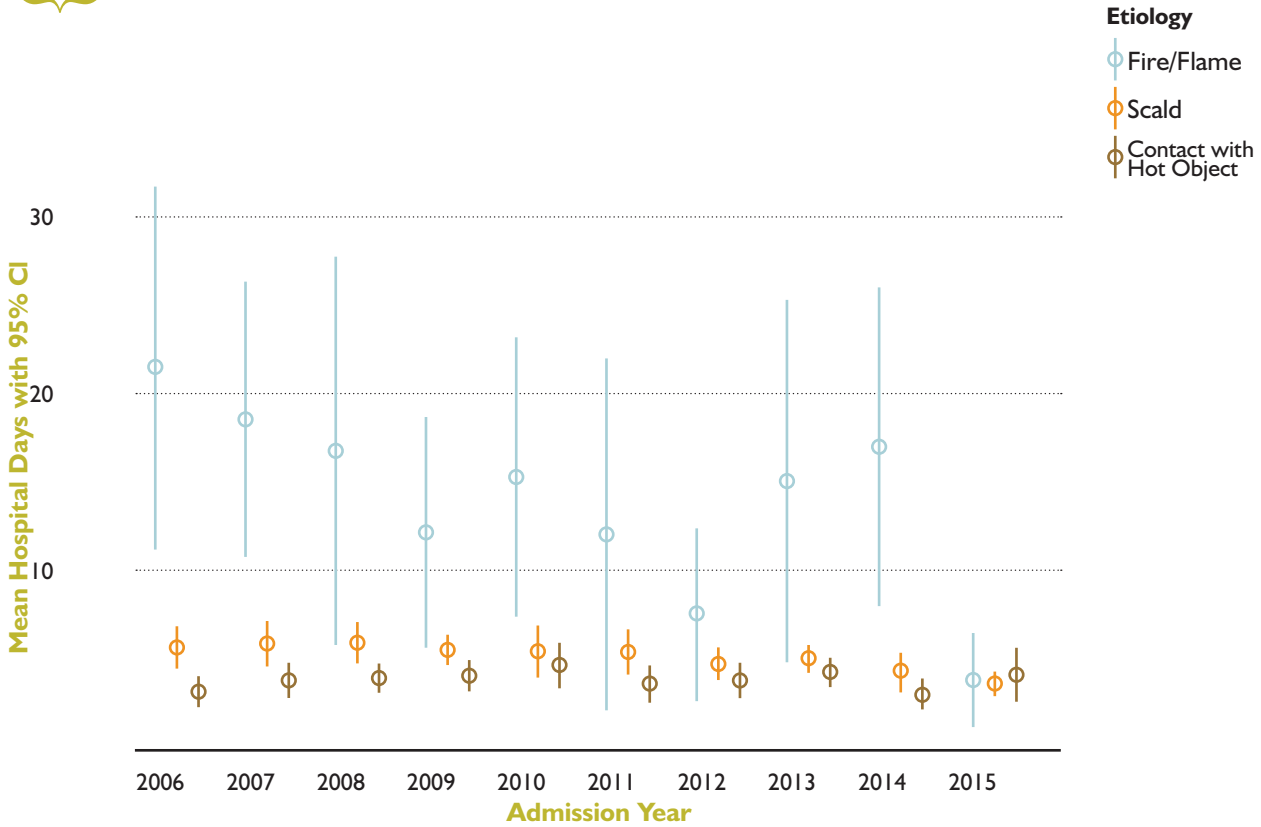
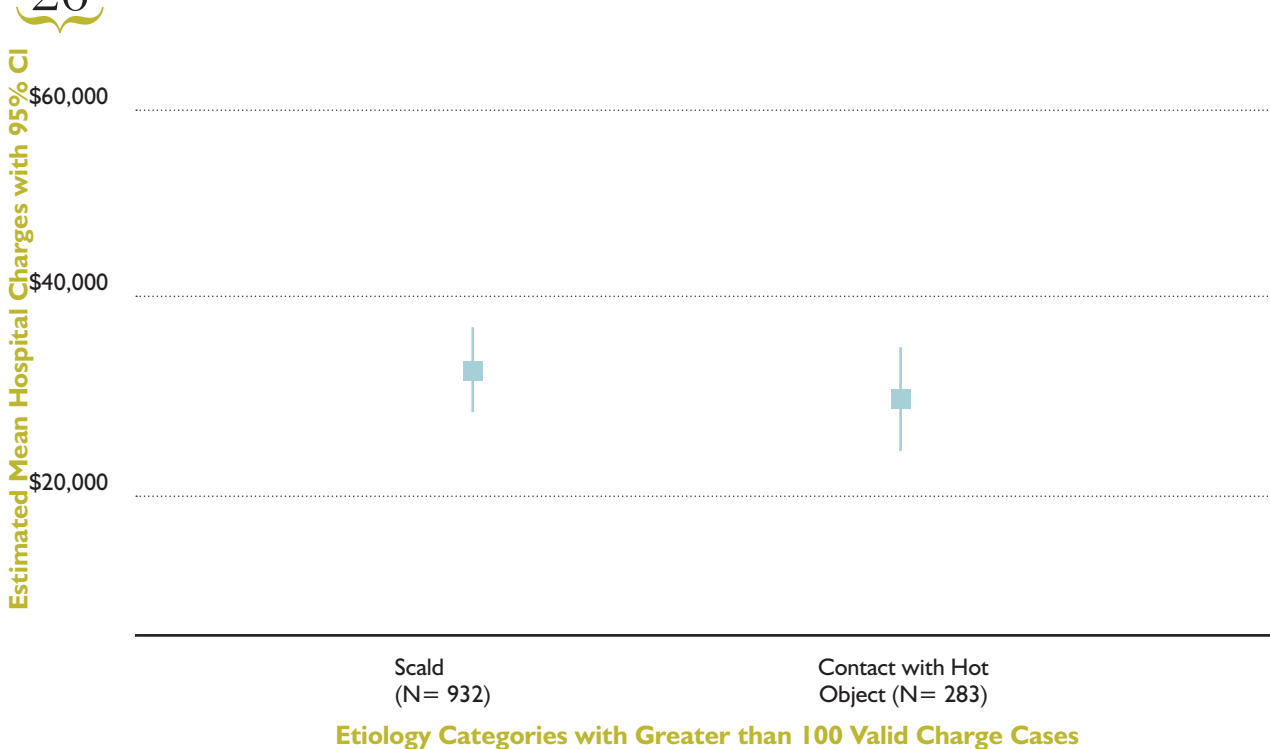


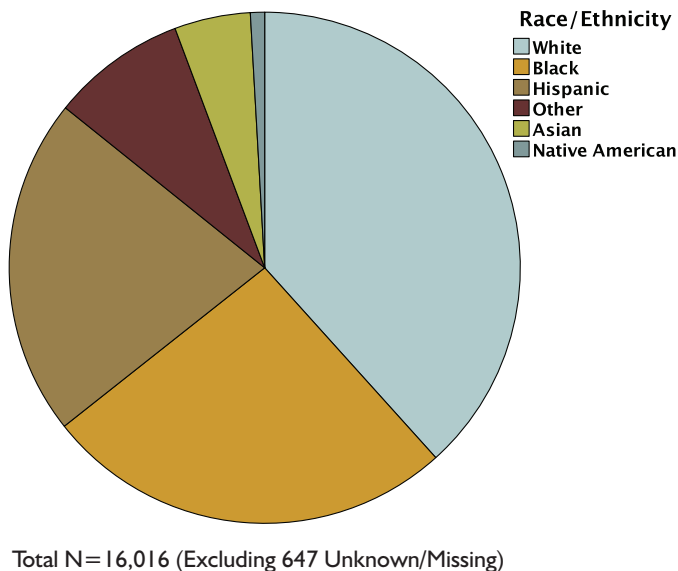
Figure 26 MEAN CHARGES FOR ETIOLOGY CATEGORIES WITH GREATER THAN 100 VALID CHARGE CASES



- 1 ANALYSIS OF CONTRIBUTING
- 2 ANALYSIS OF ALL U.S. RECORDS
- 3 ANALYSIS BY AGE GROUP
- 4 ANALYSIS BY AGE ETIOLOGY
- 5 HOSPITAL COMPARISONS
- 6 ANALYSIS OF CANADIAN AND INTL. RECORDS

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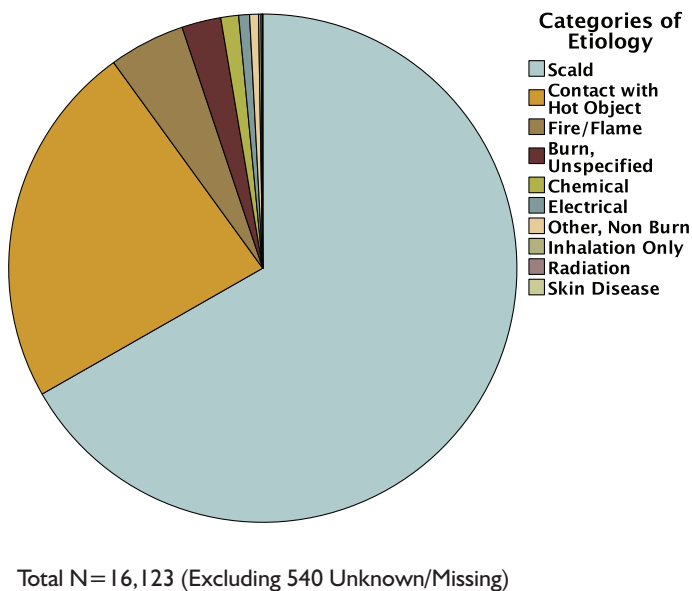
Figure 27 RACE/ETHNICITY



RACE/ETHNICITY Table 28

Race	Cases	% Valid
White	6,138	38.3%
Black	4,169	26.0%
Hispanic	3,429	21.4%
Other	1,366	8.5%
Asian	770	4.8%
Native American	144	0.9%
Unknown	647	
TOTAL	16,663	

Figure 28 ETIOLOGY



ETIOLOGY Table 29

Etiology	Cases	% Valid
Scald	10,762	66.7%
Contact with Hot Object	3,751	23.3%
Fire/Flame	781	4.8%
Burn, Unspecified	402	2.5%
Chemical	182	1.1%
Electrical	111	0.7%
Inhalation Only	25	0.2%
Radiation	16	0.1%
Burn Subtotal	16,030	99.4%
Other, Non Burn	91	0.6%
Skin Disease	2	0.0%
Non-Burn Subtotal	93	0.6%
Unknown	540	
TOTAL	16,663	

Table 30 HOSPITAL DAYS: LIVED/DIED BY INHALATION INJURY

Inhalation Injury	Total		Lived		Died	
	Cases	Mean +/- SEM	Cases	Mean +/- SEM	Cases	Mean +/- SEM
No	15,822	4.5+/-0.0	15,808	4.5+/-0.0	14	19.9+/-6.9
Yes	217	11.7+/-1.3	204	11.8+/-1.4	13	11.3+/-4.6
Subtotal	16,039	4.6+/-0.0	16,012	4.6+/-0.0	27	15.7+/-4.2
Missing	624	11.3+/-5.8	621	11.3+/-5.9	3	3.6+/-0.8
TOTAL	16,663	4.8+/-0.2	16,633	4.8+/-0.2	30	14.5+/-3.8

Total N= 16,663

Table 31 TOP TEN COMPLICATIONS

Top Ten Complications	Count	Percent of All Complications	Percent of Patients with Complication
Urinary tract infection	91	10.8	0.6
Cellulitis	64	7.6	0.4
Pneumonia	58	6.9	0.4
Wound infection (non-surgical)	51	6.0	0.3
Respiratory failure	47	5.6	0.3
Bacteremia	41	4.9	0.2
Other blood/systemic infection	30	3.6	0.2
Extubation, unintentional	28	3.3	0.2
Septicemia	27	3.2	0.2
Catheter-related bloodstream infection	26	3.1	0.2
Total Complications	844		

Total N= 16,487 (Excluding 176 cases from non ABA burn registry software centers)

Table 32 TOP TEN PROCEDURES

Top Ten Procedures Codes	Count	Percent of All Procedures
93.57 Application of other wound dressing	5,457	23.3
86.28 Nonexcisional debridement of wound, infection or burn	4,193	17.9
86.22 Excisional debridement of wound, infection, or burn	3,292	14.0
86.69 Other skin graft to other sites	1,860	7.9
86.66 Homograft to skin	1,623	6.9
86.65 Heterograft to skin	1,062	4.5
86.67 Dermal regenerative graft	592	2.5
38.93 Venous catheterization, not elsewhere classified	513	2.2
99.04 Transfusion of packed cells	363	1.5
86.62 Other skin graft to hand	352	1.5
Total Procedures	23449	

Total N= 16,663

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Table 33 LIVED/DIED BY BURN GROUP SIZE (% TBSA)

	Lived	Died	
%TBSA	Cases	Cases	Mortality Rate
0.1 - 9.9	12,921	0	0.0
10 - 19.9	1,990	6	0.3
20 - 29.9	320	1	0.3
30 - 39.9	110	0	0.0
40 - 49.9	47	3	6.0
50 - 59.9	16	4	20.0
60 - 69.9	17	5	22.7
70 - 79.9	9	1	10.0
80 - 89.9	3	1	25.0
> 90	1	2	66.7
Subtotal	15,434	23	0.1
Missing or 0%	1,199	7	0.6
TOTAL	16,633	30	0.2

Total N=16,663

Table 34 HOSPITAL DAYS BY BURN GROUP SIZE (% TBSA)

%TBSA	Cases	Mean +/- SEM
0.1 - 9.9	12,921	3.7+/-0.2
10 - 19.9	1,996	7.8+/-0.1
20 - 29.9	321	16.7+/-0.8
30 - 39.9	110	33.0+/-2.8
40 - 49.9	50	30.8+/-3.2
50 - 59.9	20	38.4+/-7.1
60 - 69.9	22	50.5+/-11.6
70 - 79.9	10	34.5+/-10.6
80 - 89.9	4	62.5+/-22.4
> 90	3	22+/-17.1
Subtotal	15,457	5+/-0.2
Missing or 0%	1,206	3.2+/-0.1
TOTAL	16,663	4.8+/-0.2

Total N=16,663

Table 35 MEAN CHARGES FOR TOP FIVE MS-DRGS

MS-DRG Code	Cases	Cases with Valid Charges	Mean +/- SEM
935 Non-extensive burns	8,956	3,655	\$23537+/-711
929 Full thickness burn w skin graft or inhal inj w/o CC/MCC	1,084	334	\$92816+/-4664
934 Full thickness burn w/o skin grft or inhal inj	552	274	\$33466+/-2618
928 Full thickness burn w skin graft or inhal inj w CC/MCC	358	167	\$156269+/-9599
927 Extensive burns or full thickness burns w MV 96+ hrs w skin graft	350	45	\$425106+/-77638

Total N=11,300

1

ANALYSIS OF CONTRIBUTING

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ANALYSIS OF ALL U.S. RECORDS

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ANALYSIS BY AGE GROUP

4

ANALYSIS BY AGE ETIOLOGY

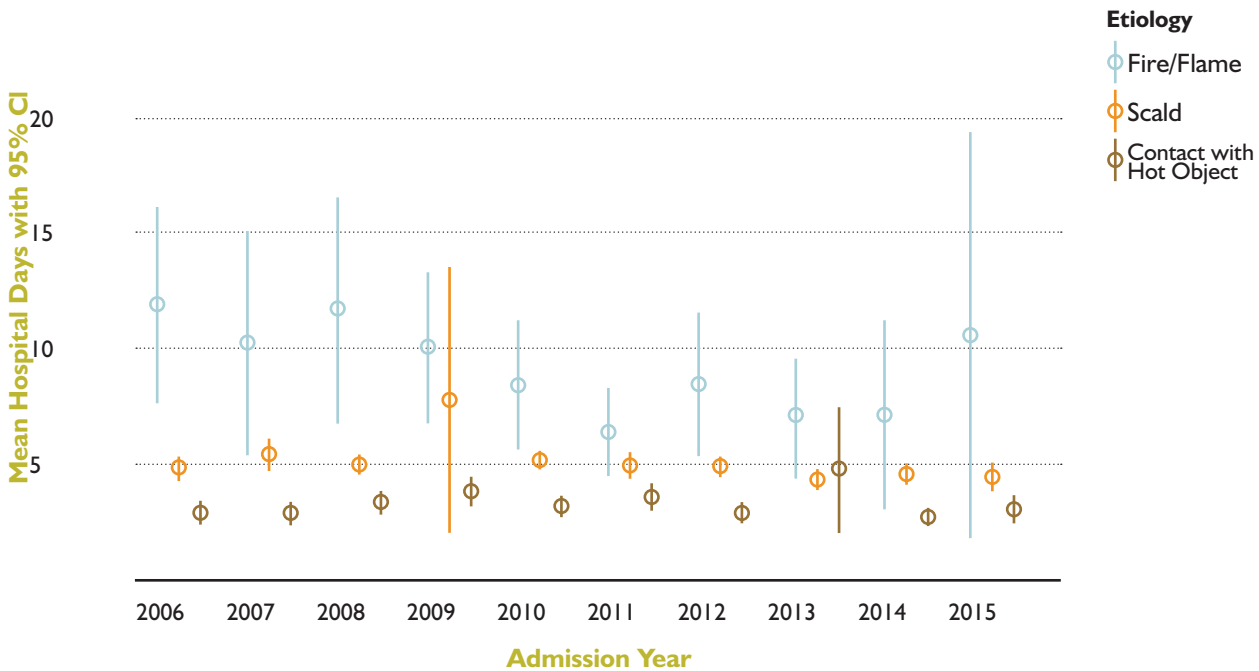
5

HOSPITAL COMPARISONS

6

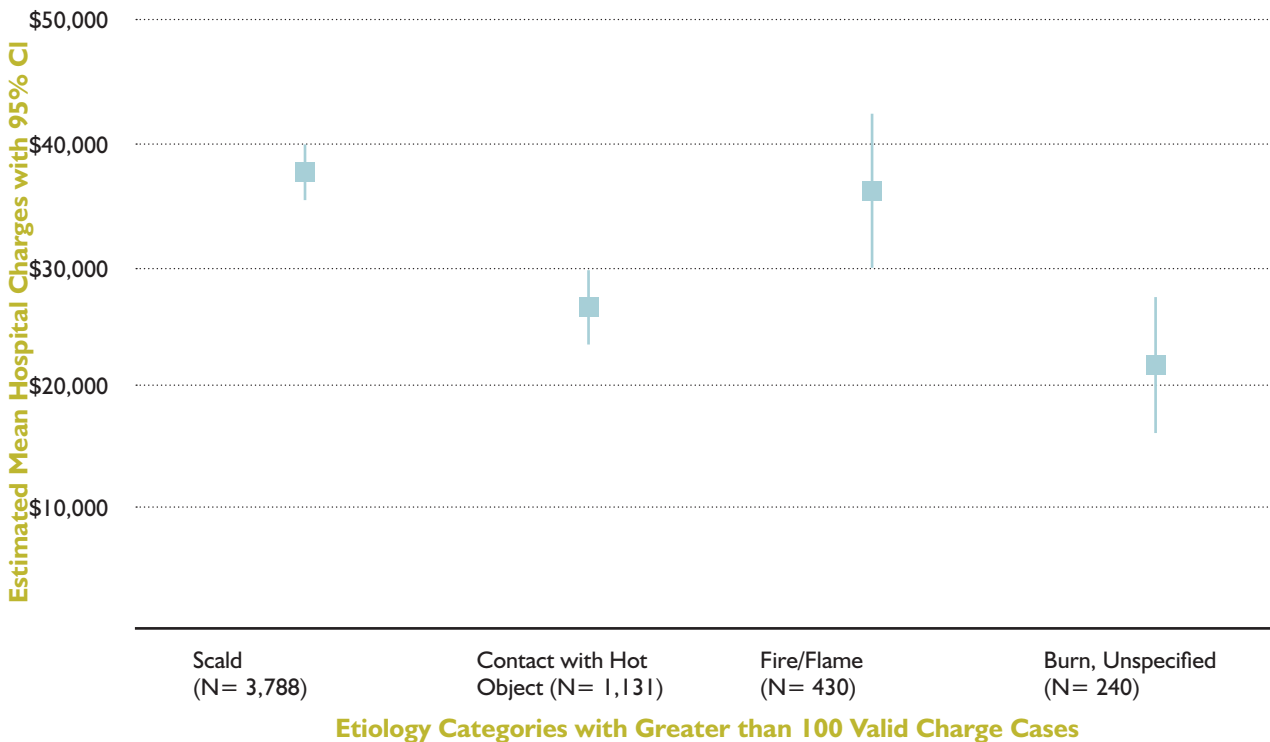
ANALYSIS OF CANADIAN AND INTL. RECORDS

Figure 29 MEAN HOSPITAL DAYS FOR FIRE/FLAME, CONTACT WITH HOT OBJECT, AND SCALD BY ADMISSION YEAR



Total N=16,663

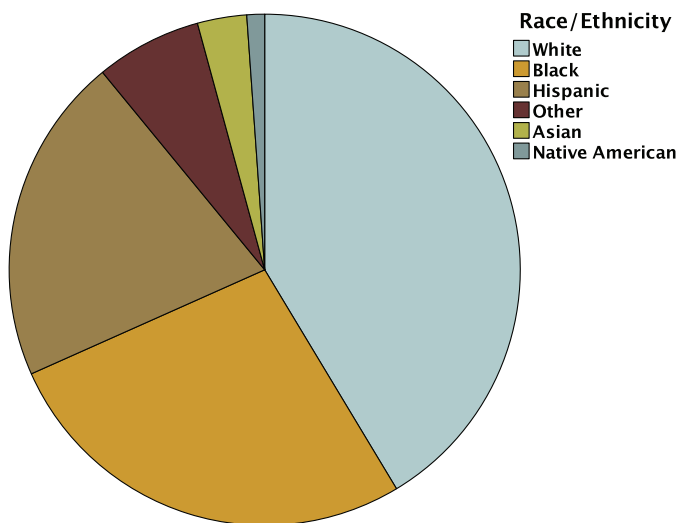
Figure 30 MEAN CHARGES FOR ETIOLOGY CATEGORIES WITH GREATER THAN 100 VALID CHARGE CASES



Total N=5,589

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Figure 31 RACE/ETHNICITY

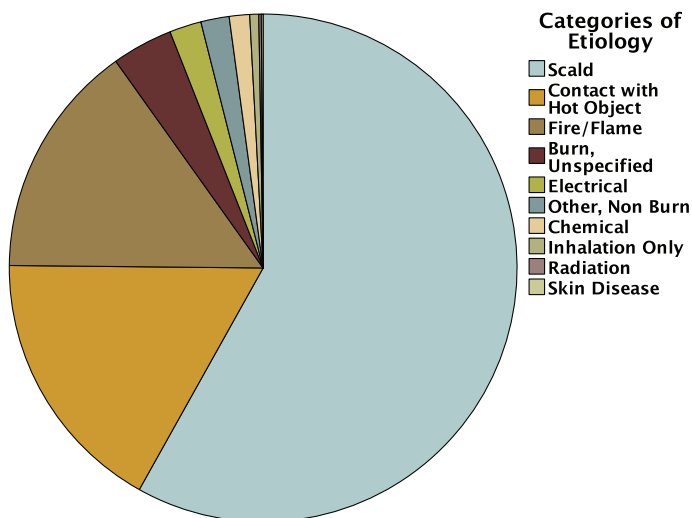


Total N=14,942 (Excluding 524 Unknown/Missing)

RACE/ETHNICITY Table 36

Race	Cases	% Valid
White	6,182	41.4%
Black	4,027	27.0%
Hispanic	3,098	20.7%
Other	1,001	6.7%
Asian	466	3.1%
Native American	168	1.1%
Unknown	524	
TOTAL	15,466	

Figure 32 ETIOLOGY



Total N=14,910 (Excluding 556 Unknown/Missing)

ETIOLOGY Table 37

Etiology	Cases	% Valid
Scald	8,664	58.1%
Contact with Hot Object	2,542	17.0%
Fire/Flame	2,234	15.0%
Burn, Unspecified	579	3.9%
Electrical	303	2.0%
Chemical	193	1.3%
Inhalation Only	85	0.6%
Radiation	24	0.2%
Burn Subtotal	14,624	98.1%
Other, Non Burn	269	1.8%
Skin Disease	17	0.1%
Non-Burn Subtotal	286	1.9%
Unknown	556	
TOTAL	15,466	

1 ANALYSIS OF CONTRIBUTING FACTORS

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3 ANALYSIS BY AGE GROUP

4 ANALYSIS BY AGE ETIOLOGY

5 HOSPITAL COMPARISONS

6 ANALYSIS OF CANADIAN AND INTL. RECORDS

Table 38 HOSPITAL DAYS: LIVED/DIED BY INHALATION INJURY

Inhalation Injury	Total		Lived		Died	
	Cases	Mean +/- SEM	Cases	Mean +/- SEM	Cases	Mean +/- SEM
No	14,444	5.6+/-0.1	14,412	5.6+/-0.1	32	9.9+/-2.4
Yes	449	20.8+/-1.6	377	22.4+/-1.7	72	12.7+/-4.1
Subtotal	14,893	6.1+/-0.1	14,789	6.0+/-0.1	104	11.8+/-2.9
Missing	573	6.4+/-0.7	563	6.5+/-0.7	10	1.1+/-0.1
TOTAL	15,466	6.1+/-0.1	15,352	6.0+/-0.1	114	10.9+/-2.7

Total N= 15,466

Table 39 TOP TEN COMPLICATIONS

Top Ten Complications	Count	Percent of All Complications	Percent of Patients with Complication
Urinary tract infection	152	12.4	1.0
Pneumonia	87	7.1	0.6
Wound infection (non-surgical)	80	6.5	0.5
Cellulitis	68	5.5	0.4
Septicemia	62	5.0	0.4
Bacteremia	58	4.7	0.4
Other blood/systemic infection	58	4.7	0.4
Respiratory failure	57	4.6	0.4
Extubation, unintentional	43	3.5	0.3
Skin graft loss, other	36	2.9	0.2
Total Complications	1,230		

Total N= 15,327 (Excluding 139 cases from non ABA burn registry software centers)

Table 40 TOP TEN PROCEDURES

Top Ten Procedures Codes	Count	Percent of All Procedures
93.57 Application of other wound dressing	5,486	16.9
86.22 Excisional debridement of wound, infection, or burn	5,139	15.9
86.28 Nonexcisional debridement of wound, infection or burn	4,384	13.5
86.69 Other skin graft to other sites	3,328	10.3
86.66 Homograft to skin	2,597	8.0
86.65 Heterograft to skin	1,242	3.8
38.93 Venous catheterization, not elsewhere classified	919	2.8
99.04 Transfusion of packed cells	798	2.5
86.67 Dermal regenerative graft	593	1.8
86.62 Other skin graft to hand	519	1.6
Total Procedures	32419	

Total N= 15,466

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- ANALYSIS OF CONTRIBUTING
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Table 41 LIVED/DIED BY BURN GROUP SIZE (% TBSA)

	Lived	Died	
%TBSA	Cases	Cases	Mortality Rate
0.1 - 9.9	11,239	14	0.1
10 - 19.9	1,785	4	0.2
20 - 29.9	424	4	0.9
30 - 39.9	197	6	3.0
40 - 49.9	96	9	8.6
50 - 59.9	58	12	17.1
60 - 69.9	35	13	27.1
70 - 79.9	15	4	21.1
80 - 89.9	9	12	57.1
> 90	9	12	57.1
Subtotal	13,867	90	0.6
Missing or 0%	1,485	24	1.6
TOTAL	15,352	114	0.7

Total N=15,466

HOSPITAL DAYS BY BURN GROUP SIZE (% TBSA) Table 42

%TBSA	Cases	Mean +/- SEM
0.1 - 9.9	11,253	3.9+/-0.1
10 - 19.9	1,789	9.5+/-0.3
20 - 29.9	428	18.2+/-0.6
30 - 39.9	203	29.3+/-1.5
40 - 49.9	105	41.5+/-3.4
50 - 59.9	70	39.7+/-3.5
60 - 69.9	48	52.8+/-7.2
70 - 79.9	19	80.8+/-15.3
80 - 89.9	21	47.8+/-10.4
> 90	21	33.8+/-13.8
Subtotal	13,957	6.3+/-0.1
Missing or 0%	1,509	4.4+/-0.2
TOTAL	15,466	6.1+/-0.1

Total N=15,466

Table 43 MEAN CHARGES FOR TOP FIVE MS-DRGS

MS-DRG Code	Cases	Cases with Valid Charges	Mean +/- SEM
935 Non-extensive burns	7,259	3,051	\$25269+/-976
929 Full thickness burn w skin graft or inhal inj w/o CC/MCC	1,114	377	\$104228+/-6707
934 Full thickness burn w/o skin grft or inhal inj	516	256	\$38393+/-3364
928 Full thickness burn w skin graft or inhal inj w CC/MCC	459	226	\$212923+/-19054
927 Extensive burns or full thickness burns w MV 96+ hrs w skin graft	337	78	\$412872+/-44093

Total N=9,685

1 ANALYSIS OF CONTRIBUTING FACTORS

2 ANALYSIS OF ALL U.S. RECORDS

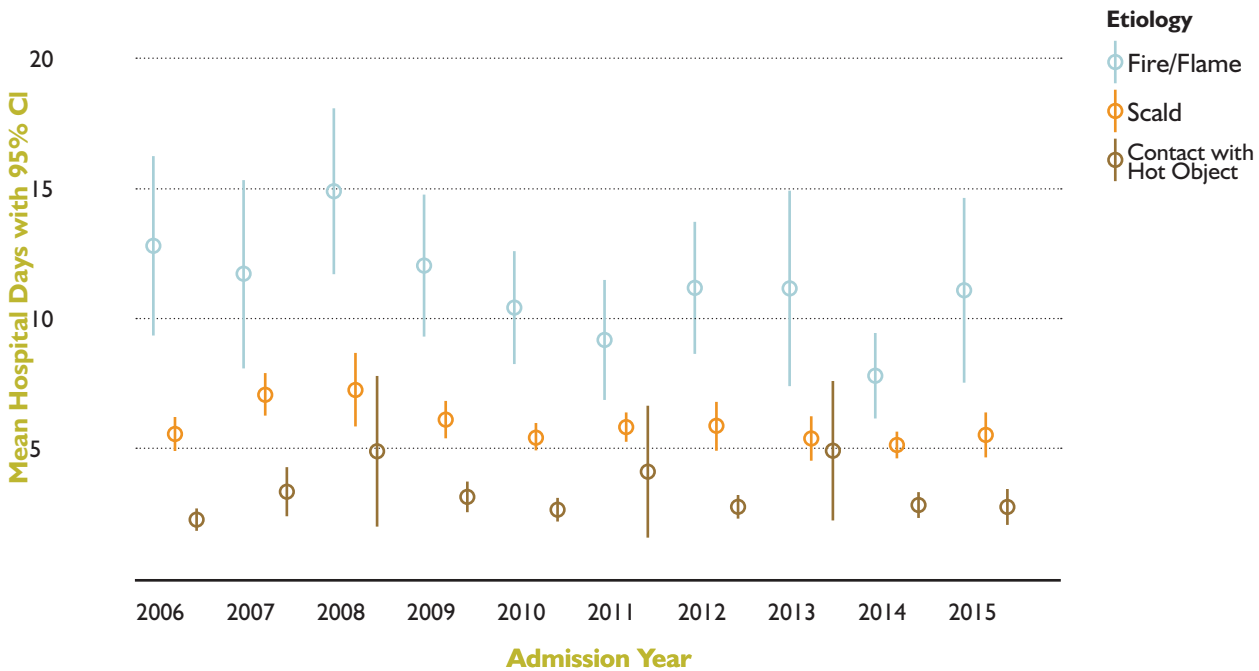
3 ANALYSIS BY AGE GROUP

4 ANALYSIS BY AGE ETIOLOGY

5 HOSPITAL COMPARISONS

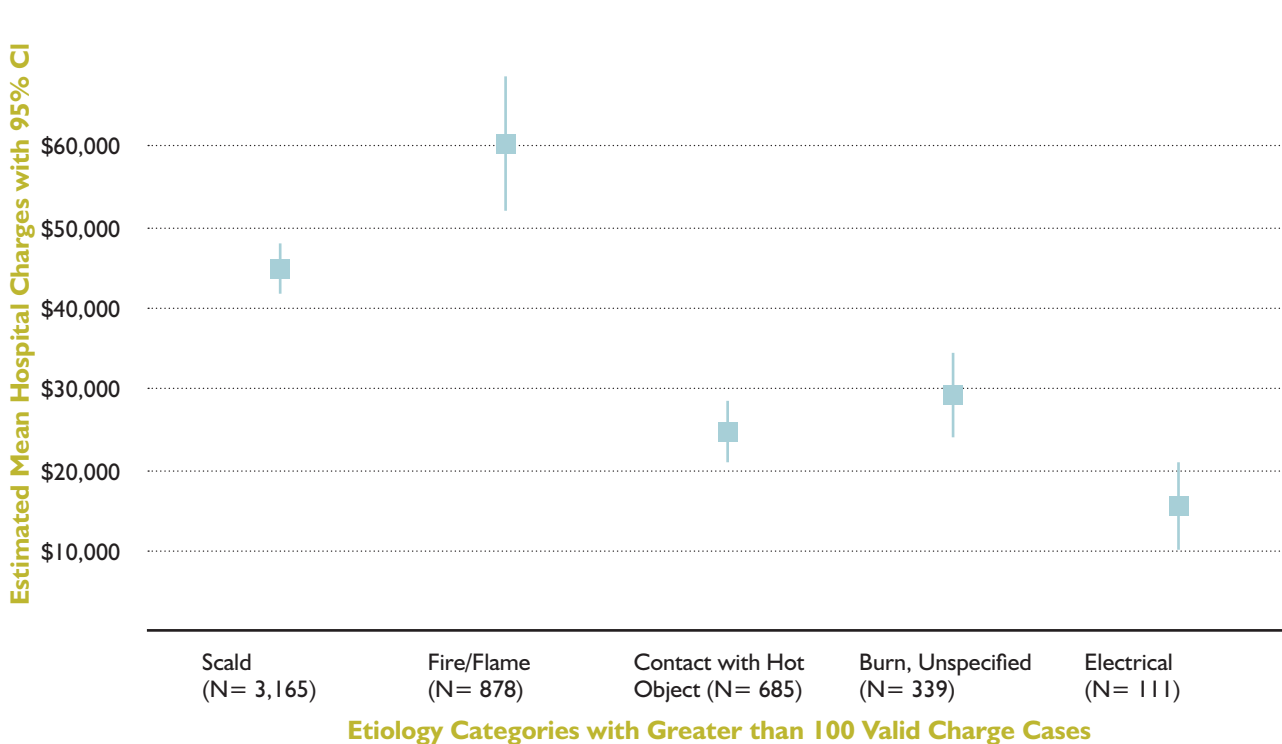
6 ANALYSIS OF CANADIAN AND INTL. RECORDS

Figure 33 MEAN HOSPITAL DAYS FOR FIRE/FLAME, CONTACT WITH HOT OBJECT, AND SCALD BY ADMISSION YEAR



Total N=15,466

Figure 34 MEAN CHARGES FOR ETIOLOGY CATEGORIES WITH GREATER THAN 100 VALID CHARGE CASES

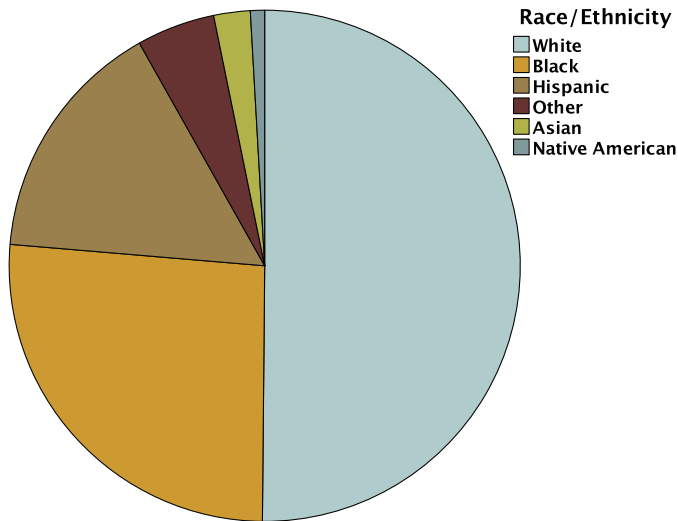


Total N=5,178

- 1
- ANALYSIS OF CONTRIBUTING
- 2
- ANALYSIS OF ALL U.S. RECORDS
- 3
- ANALYSIS BY AGE GROUP
- 4
- ANALYSIS BY AGE ETIOLOGY
- 5
- HOSPITAL COMPARISONS
- 6
- ANALYSIS OF CANADIAN AND INTL. RECORDS

- 1
- ANALYSIS OF CONTRIBUTING
- 2
- ANALYSIS OF ALL U.S. RECORDS
- 3
- ANALYSIS BY AGE GROUP
- 4
- ANALYSIS BY AGE ETIOLOGY
- 5
- HOSPITAL COMPARISONS
- 6
- ANALYSIS OF CANADIAN AND INTL. RECORDS

Figure 35 RACE/ETHNICITY

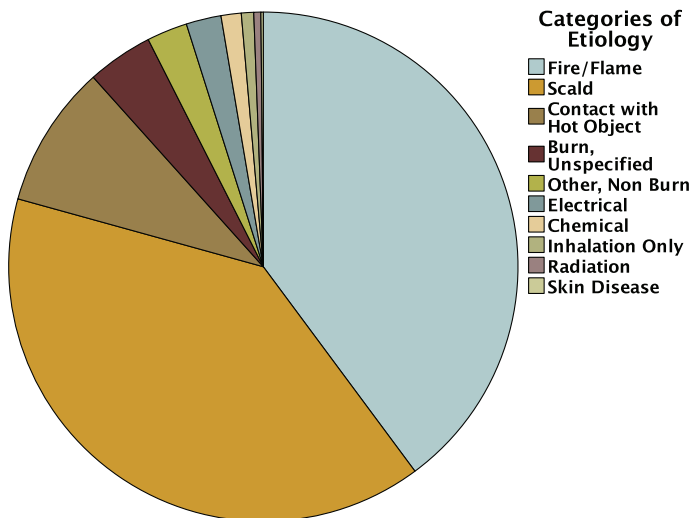


Total N=17,891 (Excluding 619 Unknown/Missing)

RACE/ETHNICITY Table 44

Race	Cases	% Valid
White	8,971	50.1%
Black	4,687	26.2%
Hispanic	2,773	15.5%
Other	886	5.0%
Asian	413	2.3%
Native American	161	0.9%
Unknown	619	
TOTAL	18,510	

Figure 36 ETIOLOGY



Total N=17,709 (Excluding 801 Unknown/Missing)

ETIOLOGY Table 45

Etiology	Cases	% Valid
Fire/Flame	7,056	39.8%
Scald	6,986	39.4%
Contact with Hot Object	1,606	9.1%
Burn, Unspecified	739	4.2%
Electrical	393	2.2%
Chemical	227	1.3%
Inhalation Only	139	0.8%
Radiation	79	0.4%
Burn Subtotal	17,225	97.3%
Other, Non Burn	457	2.6%
Skin Disease	27	0.2%
Non-Burn Subtotal	484	2.7%
Unknown	801	
TOTAL	18,510	

Table 46 HOSPITAL DAYS: LIVED/DIED BY INHALATION INJURY

Inhalation Injury	Total		Lived		Died	
	Cases	Mean +/- SEM	Cases	Mean +/- SEM	Cases	Mean +/- SEM
No	16,864	6.4+/-0.1	16,823	6.4+/-0.1	41	9.2+/-1.9
Yes	894	21.0+/-1.1	812	21.8+/-1.1	82	12.8+/-3.7
Subtotal	17,758	7.1+/-0.1	17,635	7.1+/-0.1	123	11.6+/-2.6
Missing	752	6.5+/-0.4	742	6.5+/-0.4	10	10.4+/-6.3
TOTAL	18,510	7.1+/-0.1	18,377	7.1+/-0.1	133	11.5+/-2.4

Total N=18,510

Table 47 TOP TEN COMPLICATIONS

Top Ten Complications	Count	Percent of All Complications	Percent of Patients with Complication
Urinary tract infection	195	10.5	1.1
Pneumonia	166	9.0	0.9
Wound infection (non-surgical)	152	8.2	0.8
Cellulitis	122	6.6	0.7
Respiratory failure	89	4.8	0.5
Septicemia	85	4.6	0.5
Bacteremia	72	3.9	0.4
Catheter-related bloodstream infection	70	3.8	0.4
Skin graft loss, other	55	3.0	0.3
Other blood/systemic infection	46	2.5	0.3
Total Complications	1,849		

Total N=18,310 (Excluding 200 cases from non ABA burn registry software centers)

Table 48 TOP TEN PROCEDURES

Top Ten Procedures Codes	Count	Percent of All Procedures
86.22 Excisional debridement of wound, infection, or burn	8,489	17.2
93.57 Application of other wound dressing	6,233	12.6
86.69 Other skin graft to other sites	6,101	12.3
86.28 Nonexcisional debridement of wound, infection or burn	4,922	10.0
86.66 Homograft to skin	3,974	8.0
86.65 Heterograft to skin	1,904	3.9
99.04 Transfusion of packed cells	1,748	3.5
38.93 Venous catheterization, not elsewhere classified	1,379	2.8
86.62 Other skin graft to hand	902	1.8
86.67 Dermal regenerative graft	833	1.7
Total Procedures	49404	

Total N=18,510

- 1
- ANALYSIS OF CONTRIBUTING
- 2
- ANALYSIS OF ALL
- 3
- ANALYSIS BY AGE GROUP
- 4
- ANALYSIS BY AGE ETIOLOGY
- 5
- HOSPITAL COMPARISONS
- 6
- ANALYSIS OF CANADIAN AND INTL. RECORDS

Table 49 LIVED/DIED BY BURN GROUP SIZE (% TBSA)

	Lived	Died	
%TBSA	Cases	Cases	Mortality Rate
0.1 - 9.9	12,985	11	0.1
10 - 19.9	2,073	7	0.3
20 - 29.9	590	6	1.0
30 - 39.9	294	3	1.0
40 - 49.9	166	10	5.7
50 - 59.9	88	6	6.4
60 - 69.9	69	8	10.4
70 - 79.9	51	8	13.6
80 - 89.9	23	21	47.7
> 90	7	15	68.2
Subtotal	16,346	95	0.6
Missing or 0%	2,031	38	1.8
TOTAL	18377.0	133.0	0.7

Total N=18,510

Table 50 HOSPITAL DAYS BY BURN GROUP SIZE (% TBSA)

%TBSA	Cases	Mean +/- SEM
0.1 - 9.9	12,996	3.8+/-0.0
10 - 19.9	2,080	11.1+/-0.2
20 - 29.9	596	23.1+/-0.7
30 - 39.9	297	37.6+/-1.5
40 - 49.9	176	42.8+/-2.0
50 - 59.9	94	55.2+/-4.5
60 - 69.9	77	67.9+/-5.3
70 - 79.9	59	60.6+/-6.6
80 - 89.9	44	60.0+/-9.6
> 90	22	29.1+/-13.9
Subtotal	16,441	7.4+/-0.1
Missing or 0%	2,069	4.6+/-0.2
TOTAL	18,510	7.1+/-0.1

Total N=18,510

Table 51 MEAN CHARGES FOR TOP FIVE MS-DRGS

MS-DRG Code	Cases	Cases with Valid Charges	Mean +/- SEM
935 Non-extensive burns	7,392	2,954	\$25703 +/-752
929 Full thickness burn w skin graft or inhal inj w/o CC/MCC	1,866	646	\$92921 +/-3940
928 Full thickness burn w skin graft or inhal inj w CC/MCC	744	356	\$183763 +/-15729
927 Extensive burns or full thickness burns w MV 96+ hrs w skin graft	618	170	\$529195 +/-51130
934 Full thickness burn w/o skin grft or inhal inj	540	280	\$30251 +/-2499

Total N=11,160

1 ANALYSIS OF CONTRIBUTING

2 ANALYSIS OF ALL U.S. RECORDS

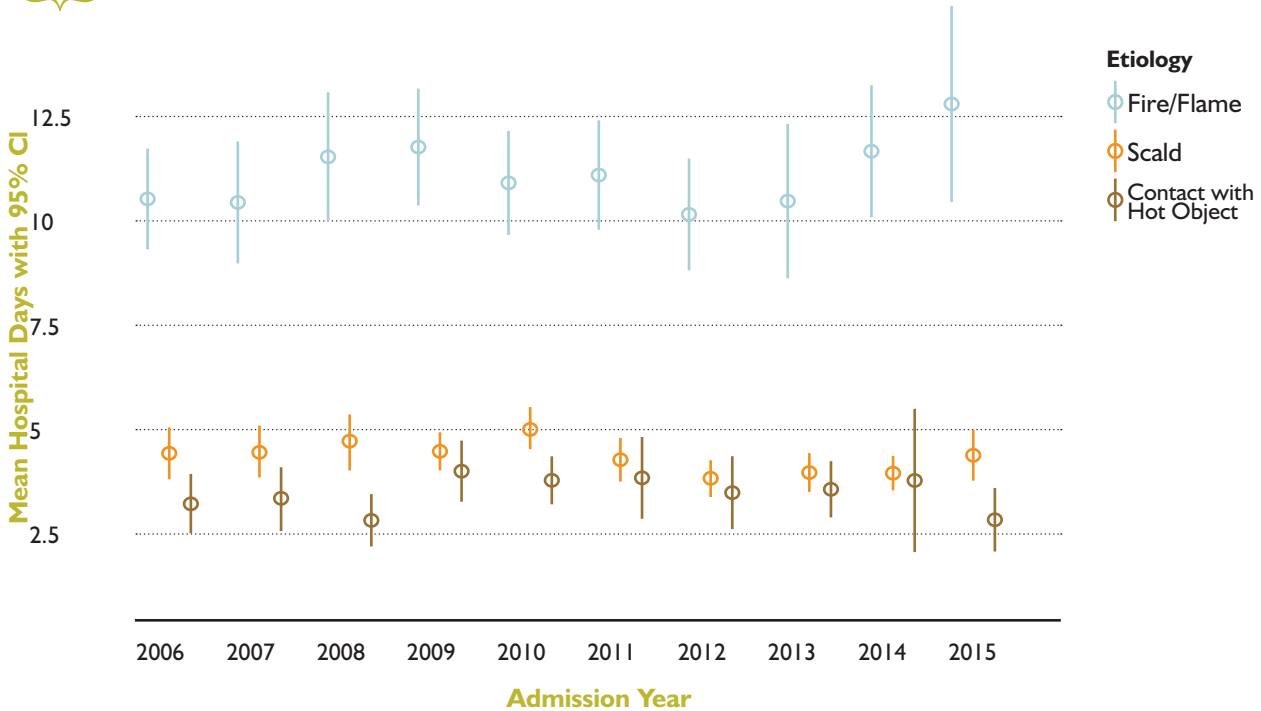
3 ANALYSIS BY AGE GROUP

4 ANALYSIS BY AGE ETIOLOGY

5 HOSPITAL COMPARISONS

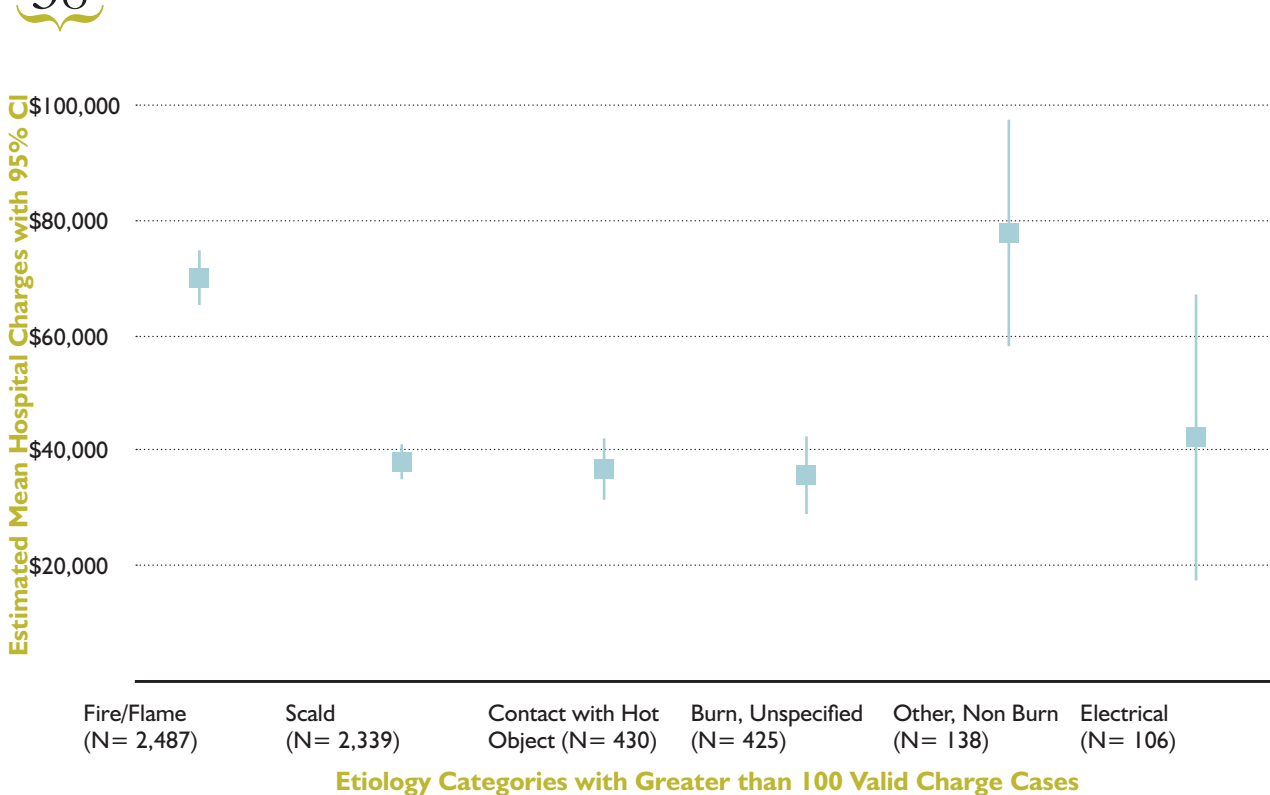
6 ANALYSIS OF CANADIAN AND INTL. RECORDS

Figure 37 MEAN HOSPITAL DAYS FOR FIRE/FLAME, CONTACT WITH HOT OBJECT, AND SCALD BY ADMISSION YEAR



Total N=18,510

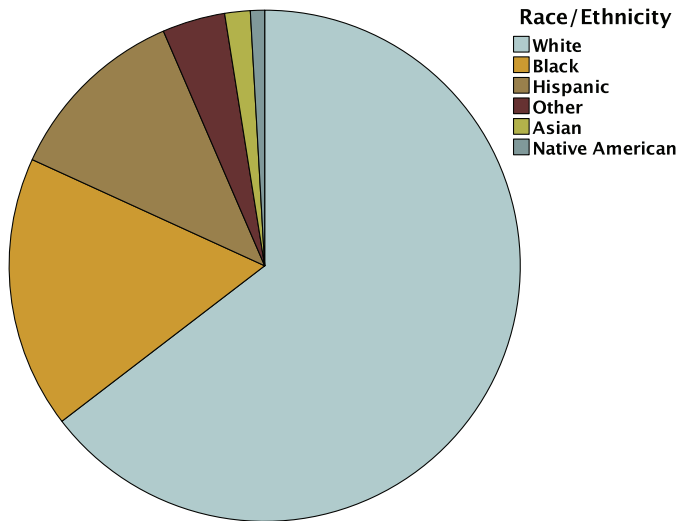
Figure 38 MEAN CHARGES FOR ETIOLOGY CATEGORIES WITH GREATER THAN 100 VALID CHARGE CASES



Total N=5,925

- 1
- ANALYSIS OF CONTRIBUTING
- 2
- ANALYSIS OF ALL U.S. RECORDS
- 3
- ANALYSIS BY AGE GROUP
- 4
- ANALYSIS BY AGE ETIOLOGY
- 5
- HOSPITAL COMPARISONS
- 6
- ANALYSIS OF CANADIAN AND INTL. RECORDS

Figure 39 RACE/ETHNICITY

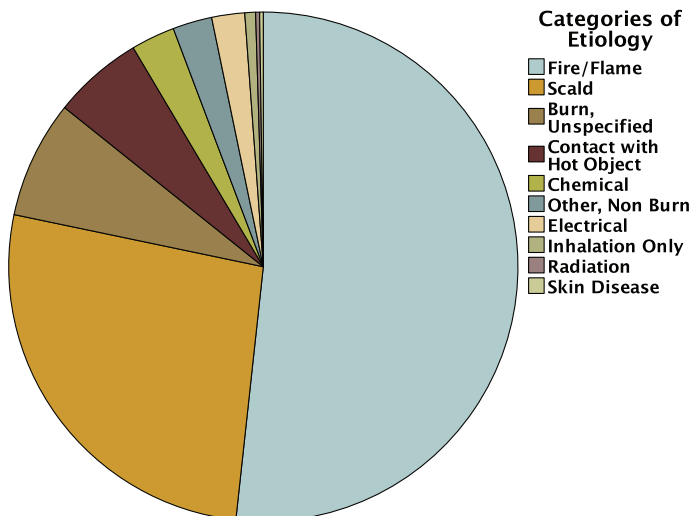


Total N=9,328 (Excluding 309 Unknown/Missing)

RACE/ETHNICITY Table 52

Race	Cases	% Valid
White	6,025	64.6%
Black	1,607	17.2%
Hispanic	1,091	11.7%
Other	371	4.0%
Asian	150	1.6%
Native American	84	0.9%
Unknown	309	
TOTAL	9,637	

Figure 40 ETIOLOGY



Total N=9,093 (Excluding 544 Unknown/Missing)

ETIOLOGY Table 53

Etiology	Cases	% Valid
Fire/Flame	4,703	51.7%
Scald	2,415	26.6%
Burn, Unspecified	679	7.5%
Contact with Hot Object	520	5.7%
Chemical	253	2.8%
Electrical	190	2.1%
Inhalation Only	62	0.7%
Radiation	23	0.3%
Burn Subtotal	8,845	97.3%
Other, Non Burn	227	2.5%
Skin Disease	21	0.2%
Non-Burn Subtotal	248	2.7%
Unknown	544	
TOTAL	9,637	

1 ANALYSIS OF CONTRIBUTING FACTORS

2 ANALYSIS OF ALL U.S. RECORDS

3 ANALYSIS BY AGE GROUP

4 ANALYSIS BY AGE ETIOLOGY

5 HOSPITAL COMPARISONS

6 ANALYSIS OF CANADIAN AND INTL. RECORDS

Table 54 HOSPITAL DAYS: LIVED/DIED BY INHALATION INJURY

Inhalation Injury	Total		Lived		Died	
	Cases	Mean +/- SEM	Cases	Mean +/- SEM	Cases	Mean +/- SEM
No	8,570	6.3+/-0.1	8,522	6.3+/-0.1	48	15.9+/-5.2
Yes	528	18.9+/-1.3	468	19.9+/-1.4	60	11.8+/-3.7
Subtotal	9,098	7.1+/-0.1	8,990	7.0+/-0.1	108	13.6+/-3.1
Missing	539	6.9+/-0.6	528	6.9+/-0.6	11	6.4+/-3.3
TOTAL	9,637	7.1+/-0.1	9,518	7.0+/-0.1	119	12.9+/-2.8

Total N=9,637

Table 55 TOP TEN COMPLICATIONS

Top Ten Complications	Count	Percent of All Complications	Percent of Patients with Complication
Pneumonia	169	11.2	1.8
Urinary tract infection	124	8.2	1.3
Cellulitis	118	7.8	1.3
Wound infection (non-surgical)	99	6.6	1.0
Respiratory failure	83	5.5	0.9
Septicemia	78	5.2	0.8
Bacteremia	48	3.2	0.5
Other hematologic	40	2.7	0.4
Other blood/systemic infection	39	2.6	0.4
Catheter-related bloodstream infection	37	2.5	0.4
Total Complications	1,507		

Total N=9,431 (Excluding 206 cases from non ABA burn registry software centers)

Table 56 TOP TEN PROCEDURES

Top Ten Procedures Codes	Count	Percent of All Procedures
86.22 Excisional debridement of wound, infection, or burn	4,221	16.9
86.69 Other skin graft to other sites	2,805	11.3
86.28 Nonexcisional debridement of wound, infection or burn	2,134	8.6
93.57 Application of other wound dressing	1,881	7.6
86.66 Homograft to skin	1,653	6.6
86.65 Heterograft to skin	1,122	4.5
86.62 Other skin graft to hand	668	2.7
38.93 Venous catheterization, not elsewhere classified	624	2.5
99.04 Transfusion of packed cells	603	2.4
86.67 Dermal regenerative graft	424	1.7
Total Procedures	24903	

Total N=9,637

- 1
- ANALYSIS OF CONTRIBUTING
- 2
- ANALYSIS OF ALL
- 3
- ANALYSIS BY AGE GROUP
- 4
- ANALYSIS BY AGE ETIOLOGY
- 5
- HOSPITAL COMPARISONS
- 6
- ANALYSIS OF CANADIAN AND INTL. RECORDS

Table 57 LIVED/DIED BY BURN GROUP SIZE (% TBSA)

	Lived	Died	
%TBSA	Cases	Cases	Mortality Rate
0.1 - 9.9	5,691	8	0.1
10 - 19.9	1,208	5	0.4
20 - 29.9	377	4	1.0
30 - 39.9	153	6	3.8
40 - 49.9	112	5	4.3
50 - 59.9	55	7	11.3
60 - 69.9	34	7	17.1
70 - 79.9	23	5	17.9
80 - 89.9	12	15	55.6
> 90	10	25	71.4
Subtotal	7,675	87	1.1
Missing or 0%	1,179	19	1.6
TOTAL	8,854	106	1.2

Total N=9,637

Table 58 HOSPITAL DAYS BY BURN GROUP SIZE (% TBSA)

%TBSA	Cases	Mean +/- SEM
0.1 - 9.9	6,388	4.0+/-0.0
10 - 19.9	1,151	9.5+/-0.2
20 - 29.9	365	20.5+/-1.0
30 - 39.9	146	28.4+/-1.7
40 - 49.9	98	37.7+/-2.7
50 - 59.9	60	60.8+/-6.7
60 - 69.9	44	56.4+/-7.2
70 - 79.9	26	55.5+/-9.7
80 - 89.9	19	44.2+/-12.2
> 90	37	39.6+/-9.8
Subtotal	8,334	7.4+/-0.1
Missing or 0%	1,303	5.0+/-0.3
TOTAL	9,637	7.1+/-0.1

Total N=9,637

Table 59 MEAN CHARGES FOR TOP FIVE MS-DRGS

MS-DRG Code	Cases	Cases with Valid Charges	Mean +/- SEM
935 Non-extensive burns	3,557	1,542	\$23678+/-1992
929 Full thickness burn w skin graft or inhal inj w/o CC/MCC	880	364	\$80749+/-4930
928 Full thickness burn w skin graft or inhal inj w CC/MCC	471	244	\$169128+/-15339
934 Full thickness burn w/o skin grft or inhal inj	364	199	\$36050+/-4580
927 Extensive burns or full thickness burns w MV 96+ hrs w skin graft	245	102	\$499331+/-70238

Total N=5,517

1 ANALYSIS OF CONTRIBUTING

2 ANALYSIS OF ALL U.S. RECORDS

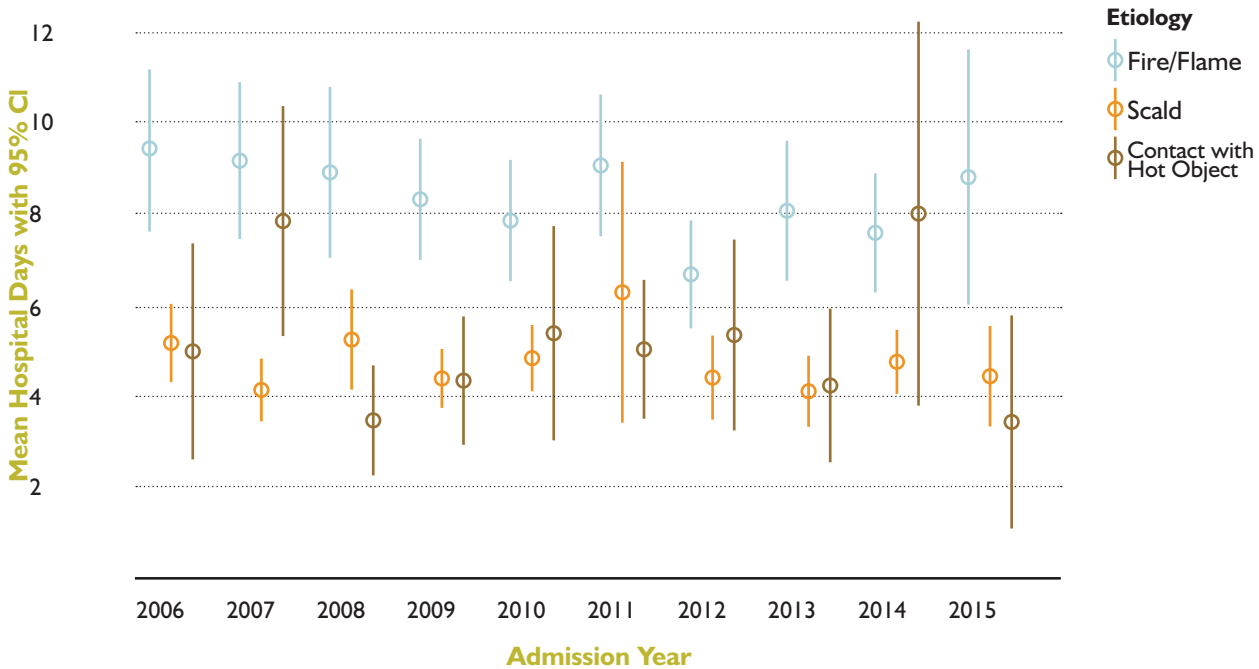
3 ANALYSIS BY AGE GROUP

4 ANALYSIS BY AGE ETIOLOGY

5 HOSPITAL COMPARISONS

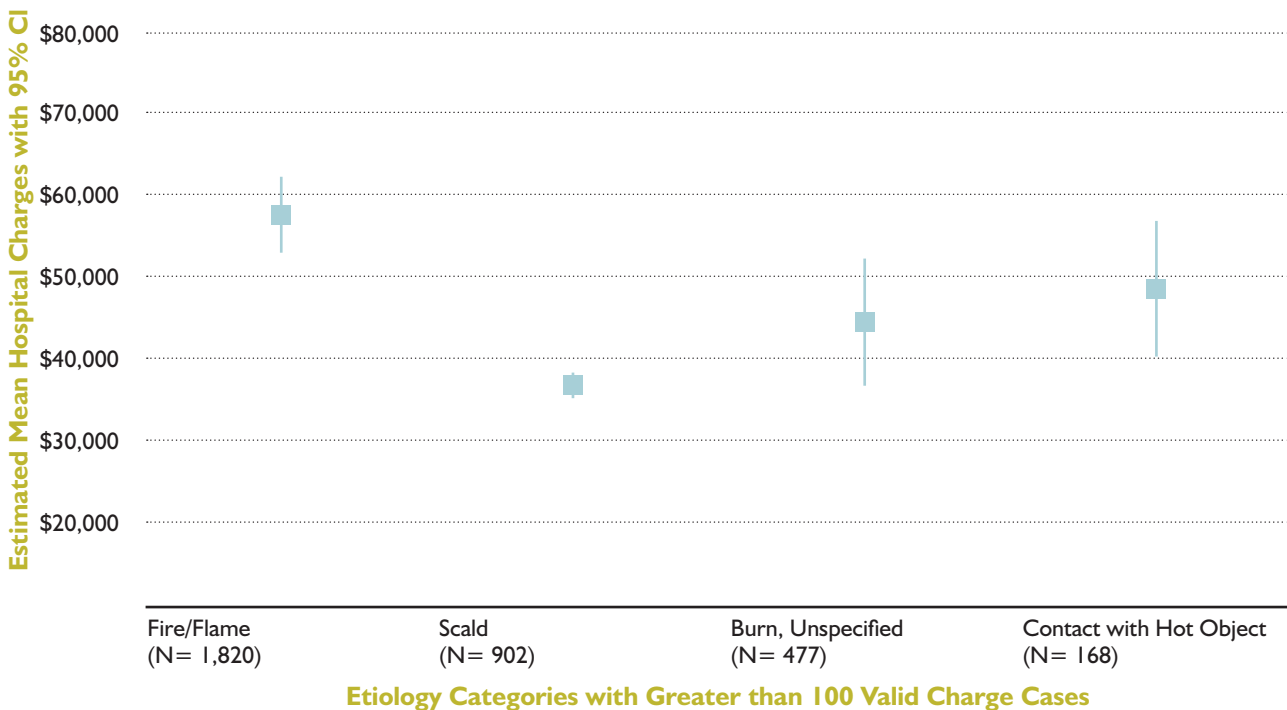
6 ANALYSIS OF CANADIAN AND INTL. RECORDS

Figure 41 MEAN HOSPITAL DAYS FOR FIRE/FLAME, CONTACT WITH HOT OBJECT, AND SCALD BY ADMISSION YEAR



Total N=9,637

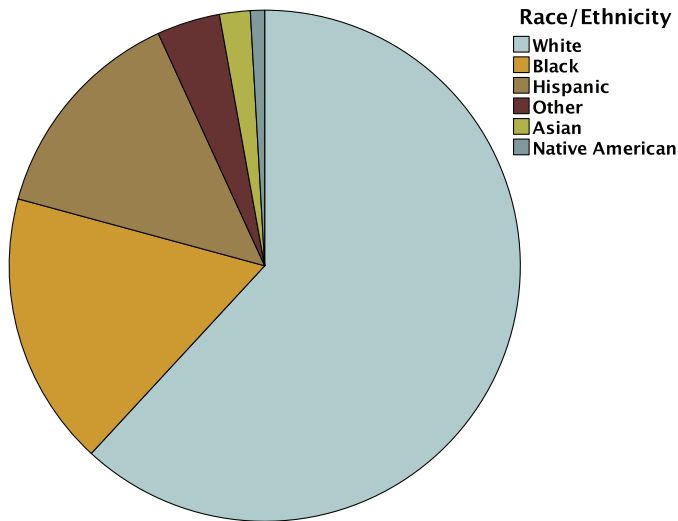
Figure 42 MEAN CHARGES FOR ETIOLOGY CATEGORIES WITH GREATER THAN 100 VALID CHARGE CASES



Total N=3,367

- 1
- ANALYSIS OF CONTRIBUTING
- 2
- ANALYSIS OF ALL U.S. RECORDS
- 3
- ANALYSIS BY AGE GROUP
- 4
- ANALYSIS BY AGE ETIOLOGY
- 5
- HOSPITAL COMPARISONS
- 6
- ANALYSIS OF CANADIAN AND INTL. RECORDS

Figure 43 RACE/ETHNICITY

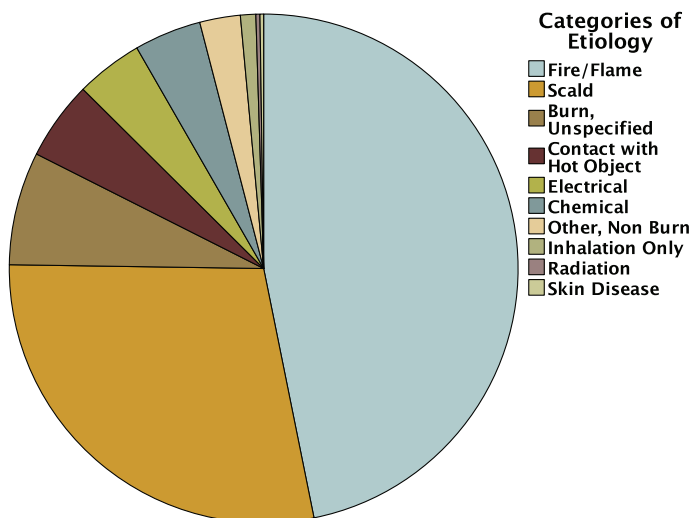


Total N=29,499 (Excluding 1,108 Unknown/Missing)

RACE/ETHNICITY Table 60

Race	Cases	% Valid
White	18,251	61.9%
Black	5,118	17.3%
Hispanic	4,113	13.9%
Other	1,178	4.0%
Asian	573	1.9%
Native American	266	0.9%
Unknown	1,108	
TOTAL	30,607	

Figure 44 ETIOLOGY



Total N=28,845 (Excluding 1,762 Unknown/Missing)

ETIOLOGY Table 61

Etiology	Cases	% Valid
Fire/Flame	13,508	46.8%
Scald	8,194	28.4%
Burn, Unspecified	2,075	7.2%
Contact with Hot Object	1,444	5.0%
Electrical	1,229	4.3%
Chemical	1,228	4.3%
Inhalation Only	280	1.0%
Radiation	75	0.3%
Burn Subtotal	28,033	97.2%
Other, Non Burn	745	2.6%
Skin Disease	67	0.2%
Non-Burn Subtotal	812	2.8%
Unknown	1,762	
TOTAL	30,607	

1 ANALYSIS OF CONTRIBUTING FACTORS

2 ANALYSIS OF ALL U.S. RECORDS

3 ANALYSIS BY AGE GROUP

4 ANALYSIS BY AGE ETIOLOGY

5 HOSPITAL COMPARISONS

6 ANALYSIS OF CANADIAN AND INTL. RECORDS

Table 62 HOSPITAL DAYS: LIVED/DIED BY INHALATION INJURY

Inhalation Injury	Total		Lived		Died	
	Cases	Mean +/- SEM	Cases	Mean +/- SEM	Cases	Mean +/- SEM
No	26,983	6.9+/-0.0	26,774	6.8+/-0.0	209	15.3+/-2.9
Yes	2,080	20.1+/-0.7	1,860	19.9+/-0.7	220	22.1+/-3.7
Subtotal	29,063	7.8+/-0.1	28,634	7.7+/-0.0	429	18.8+/-2.3
Missing	1,544	7.2+/-0.4	1,507	6.8+/-0.4	37	20.7+/-6.7
TOTAL	30,607	7.8+/-0.1	30,141	7.6+/-0.0	466	#VALUE

Total N=30,607

Table 63 TOP TEN COMPLICATIONS

Top Ten Complications	Count	Percent of All Complications	Percent of Patients with Complication
Pneumonia	667	11.1	2.2
Cellulitis	648	10.8	2.2
Urinary tract infection	437	7.3	1.5
Wound infection (non-surgical)	384	6.4	1.3
Respiratory failure	366	6.1	1.2
Septicemia	327	5.5	1.1
Catheter-related bloodstream infection	166	2.8	0.6
Bacteremia	160	2.7	0.5
Renal failure (requiring CVVH/dialysis)	149	2.5	0.5
Other hematologic	147	2.5	0.5
Total Complications	5,988		

Total N=29,816 (Excluding 791 cases from non ABA burn registry software centers)

Table 64 TOP TEN PROCEDURES

Top Ten Procedures Codes	Count	Percent of All Procedures
86.22 Excisional debridement of wound, infection, or burn	13,222	16.9
86.69 Other skin graft to other sites	8,695	11.1
86.28 Nonexcisional debridement of wound, infection or burn	6,233	8.0
93.57 Application of other wound dressing	5,455	7.0
86.66 Homograft to skin	5,069	6.5
86.65 Heterograft to skin	4,111	5.3
86.62 Other skin graft to hand	2,117	2.7
38.93 Venous catheterization, not elsewhere classified	2,075	2.7
86.67 Dermal regenerative graft	1,292	1.7
86.6 Free skin graft	1,271	1.6
Total Procedures	78194	

Total N=30,607

- 1
- ANALYSIS OF CONTRIBUTING
- 2
- ANALYSIS OF ALL
- 3
- ANALYSIS BY AGE GROUP
- 4
- ANALYSIS BY AGE ETIOLOGY
- 5
- HOSPITAL COMPARISONS
- 6
- ANALYSIS OF CANADIAN AND INTL. RECORDS

Table 65 LIVED/DIED BY BURN GROUP SIZE (% TBSA)

	Lived	Died	
%TBSA	Cases	Cases	Mortality Rate
0.1 - 9.9	19,895	31	0.2
10 - 19.9	3,861	21	0.5
20 - 29.9	1,215	16	1.3
30 - 39.9	454	19	4.0
40 - 49.9	245	26	9.6
50 - 59.9	132	22	14.3
60 - 69.9	104	36	25.7
70 - 79.9	51	44	46.3
80 - 89.9	28	51	64.6
> 90	15	83	84.7
Subtotal	26,000	349	1.3
Missing or 0%	4,141	117	2.7
TOTAL	30,141	466	1.5

Total N=30,607

Table 66 HOSPITAL DAYS BY BURN GROUP SIZE (% TBSA)

%TBSA	Cases	Mean +/- SEM
0.1 - 9.9	19,926	4.6+/-0.0
10 - 19.9	3,882	11.0+/-0.2
20 - 29.9	1,231	19.5+/-0.5
30 - 39.9	473	33.1+/-1.4
40 - 49.9	271	47.3+/-2.8
50 - 59.9	154	65.2+/-4.8
60 - 69.9	140	58.4+/-4.6
70 - 79.9	95	61.8+/-6.7
80 - 89.9	79	51.8+/-6.8
> 90	98	18.9+/-4.8
Subtotal	26,349	8.2+/-0.1
Missing or 0%	4,258	5.2+/-0.1
TOTAL	30,607	7.8+/-0.1

Total N=30,607

Table 67 MEAN CHARGES FOR TOP FIVE MS-DRGS

MS-DRG Code	Cases	Cases with Valid Charges	Mean +/- SEM
935 Non-extensive burns	11,229	5,267	\$27606 +/-709
929 Full thickness burn w skin graft or inhal inj w/o CC/MCC	3,145	1,333	\$94260 +/-3803
928 Full thickness burn w skin graft or inhal inj w CC/MCC	1,947	1,015	\$208231 +/-12106
934 Full thickness burn w/o skin grft or inhal inj	1,174	697	\$31541 +/-1804
927 Extensive burns or full thickness burns w MV 96+ hrs w skin graft	817	434	\$548197 +/-29630

Total N=18,312

1 ANALYSIS OF CONTRIBUTING FACTORS

2 ANALYSIS OF ALL U.S. RECORDS

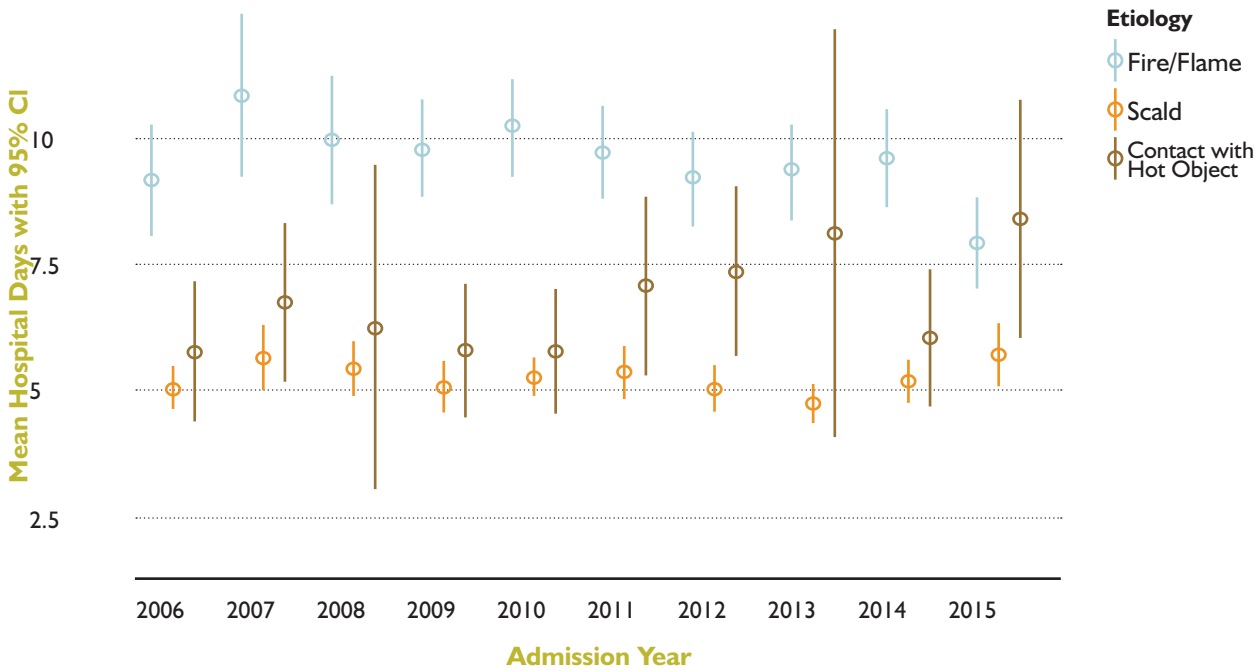
3 ANALYSIS BY AGE GROUP

4 ANALYSIS BY AGE ETIOLOGY

5 HOSPITAL COMPARISONS

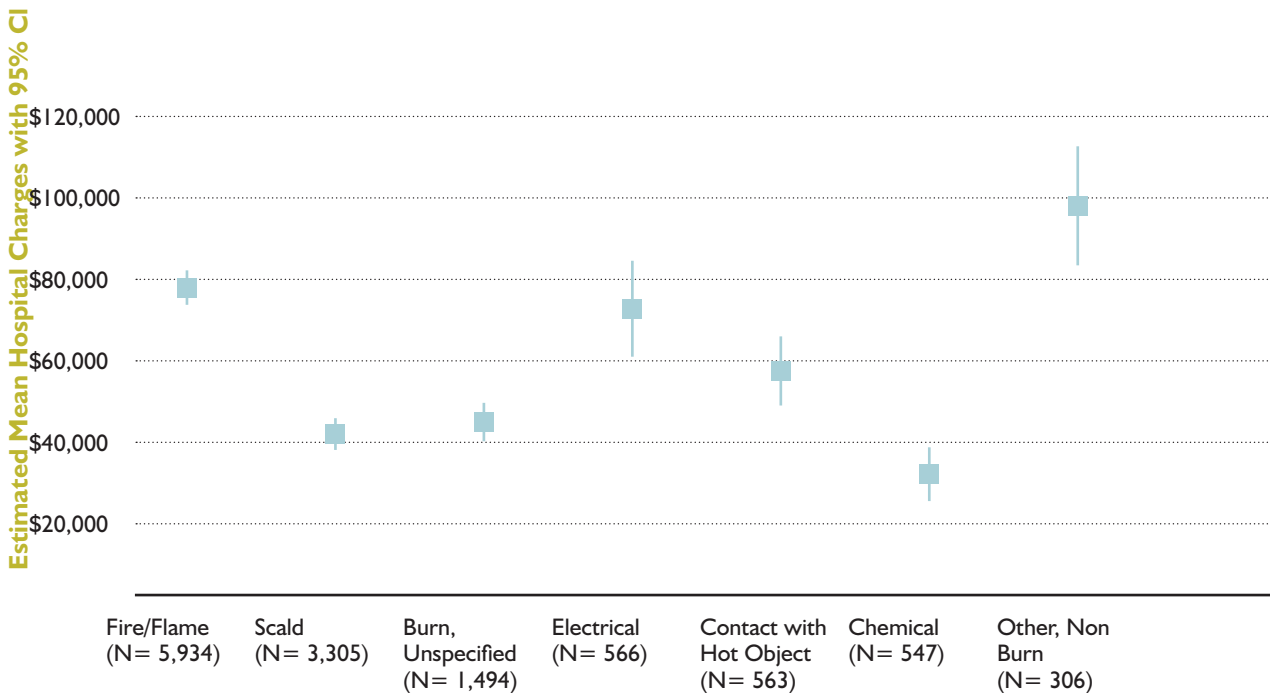
6 ANALYSIS OF CANADIAN AND INTL. RECORDS

Figure 45 MEAN HOSPITAL DAYS FOR FIRE/FLAME, CONTACT WITH HOT OBJECT, AND SCALD BY ADMISSION YEAR



Total N=30,607

Figure 46 MEAN CHARGES FOR ETIOLOGY CATEGORIES WITH GREATER THAN 100 VALID CHARGE CASES

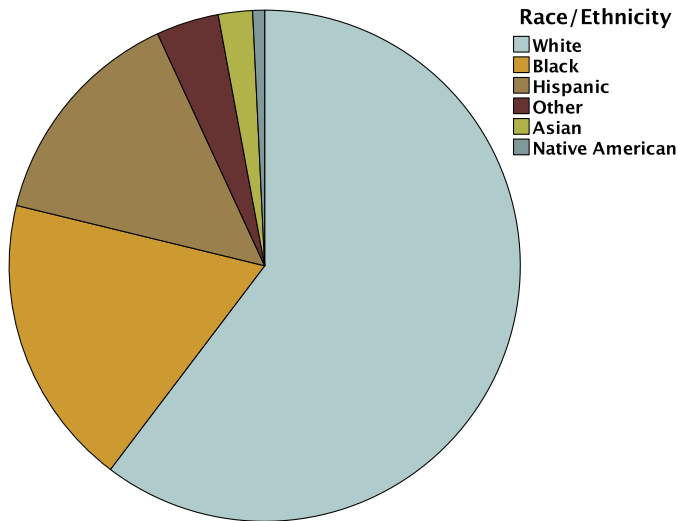


Etiology Categories with Greater than 100 Valid Charge Cases

Total N=12,715

- 1
- ANALYSIS OF CONTRIBUTING
- 2
- ANALYSIS OF ALL U.S. RECORDS
- 3
- ANALYSIS BY AGE GROUP
- 4
- ANALYSIS BY AGE ETIOLOGY
- 5
- HOSPITAL COMPARISONS
- 6
- ANALYSIS OF CANADIAN AND INTL. RECORDS

Figure 47 RACE/ETHNICITY

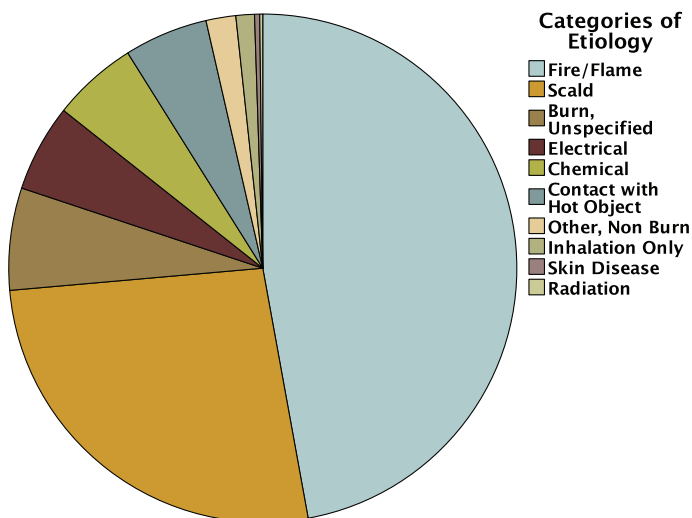


Total N=25,321 (Excluding 893 Unknown/Missing)

RACE/ETHNICITY Table 68

Race	Cases	% Valid
White	15,273	60.3%
Black	4,680	18.5%
Hispanic	3,625	14.3%
Other	1,004	4.0%
Asian	548	2.2%
Native American	191	0.8%
Unknown	893	
TOTAL	26,214	

Figure 48 ETIOLOGY



Total N=24,785 (Excluding 1,429 Unknown/Missing)

ETIOLOGY Table 69

Etiology	Cases	% Valid
Fire/Flame	11,684	47.1%
Scald	6,559	26.5%
Burn, Unspecified	1,612	6.5%
Electrical	1,375	5.5%
Chemical	1,345	5.4%
Contact with Hot Object	1,320	5.3%
Inhalation Only	292	1.2%
Radiation	48	0.2%
Burn Subtotal	24,235	97.8%
Other, Non Burn	469	1.9%
Skin Disease	81	0.3%
Non-Burn Subtotal	550	2.2%
Unknown	1429	
TOTAL	26,214	

1 ANALYSIS OF CONTRIBUTING FACTORS

2 ANALYSIS OF ALL U.S. RECORDS

3 ANALYSIS BY AGE GROUP

4 ANALYSIS BY AGE ETIOLOGY

5 HOSPITAL COMPARISONS

6 ANALYSIS OF CANADIAN AND INTL. RECORDS

Table 70 HOSPITAL DAYS: LIVED/DIED BY INHALATION INJURY

Inhalation Injury	Total		Lived		Died	
	Cases	Mean +/- SEM	Cases	Mean +/- SEM	Cases	Mean +/- SEM
No	22,555	7.7+/-0.1	22,339	7.6+/-0.1	216	16.4+/-2.4
Yes	2,184	19.5+/-0.6	1,915	20.5+/-0.7	269	12.6+/-1.2
Subtotal	24,739	8.7+/-0.1	24,254	8.6+/-0.1	485	14.3+/-1.2
Missing	1,475	8.4+/-0.5	1,422	8.1+/-0.4	53	17.4+/-5.8
TOTAL	26,214	8.7+/-0.1	25,676	8.6+/-0.1	538	14.6+/-1.2

Total N=26,214

Table 71 TOP TEN COMPLICATIONS

Top Ten Complications	Count	Percent of All Complications	Percent of Patients with Complication
Pneumonia	766	11.6	3.0
Cellulitis	628	9.5	2.5
Urinary tract infection	460	6.9	1.8
Wound infection (non-surgical)	414	6.3	1.6
Respiratory failure	379	5.7	1.5
Septicemia	351	5.3	1.4
Other blood/systemic infection	201	3.0	0.8
Bacteremia	195	2.9	0.8
Other hematologic	181	2.7	0.7
Renal failure (requiring CVVH/dialysis)	166	2.5	0.6
Total Complications	6,623		

Total N=25,544 (Excluding 670 cases from non ABA burn registry software centers)

Table 72 TOP TEN PROCEDURES

Top Ten Procedures Codes	Count	Percent of All Procedures
86.22 Excisional debridement of wound, infection, or burn	12,394	17.1
86.69 Other skin graft to other sites	8,260	11.4
86.28 Nonexcisional debridement of wound, infection or burn	5,235	7.2
86.66 Homograft to skin	4,766	6.6
93.57 Application of other wound dressing	4,675	6.5
86.65 Heterograft to skin	3,616	5.0
38.93 Venous catheterization, not elsewhere classified	2,105	2.9
86.62 Other skin graft to hand	1,969	2.7
86.6 Free skin graft	1,276	1.8
89.91 Excision of skin for graft	1,262	1.7
Total Procedures	72334	

Total N=26,214

- 1
- ANALYSIS OF CONTRIBUTING
- 2
- ANALYSIS OF ALL
- 3
- ANALYSIS BY AGE GROUP
- 4
- ANALYSIS BY AGE ETIOLOGY
- 5
- HOSPITAL COMPARISONS
- 6
- ANALYSIS OF CANADIAN AND INTL. RECORDS

Table 73 LIVED/DIED BY BURN GROUP SIZE (% TBSA)

	Lived	Died	
%TBSA	Cases	Cases	Mortality Rate
0.1 - 9.9	16,479	36	0.2
10 - 19.9	3,311	36	1.1
20 - 29.9	1,034	24	2.3
30 - 39.9	479	36	7.0
40 - 49.9	258	31	10.7
50 - 59.9	135	29	17.7
60 - 69.9	75	48	39.0
70 - 79.9	55	42	43.3
80 - 89.9	16	62	79.5
> 90	11	84	88.4
Subtotal	21,853	428	1.9
Missing or 0%	3,823	110	2.8
TOTAL	25,676	538	2.1

Total N=26,214

Table 74 HOSPITAL DAYS BY BURN GROUP SIZE (% TBSA)

%TBSA	Cases	Mean +/- SEM
0.1 - 9.9	16,515	5.2+/-0.0
10 - 19.9	3,347	11.5+/-0.2
20 - 29.9	1,058	21.5+/-0.5
30 - 39.9	515	35.3+/-1.9
40 - 49.9	289	47.4+/-2.0
50 - 59.9	164	57.2+/-3.3
60 - 69.9	123	62+/-5.2
70 - 79.9	97	57.5+/-6.5
80 - 89.9	78	33.6+/-6.1
> 90	95	18.2+/-6.3
Subtotal	22,281	9.2+/-0.1
Missing or 0%	3,933	5.5+/-0.1
TOTAL	26,214	8.7+/-0.1

Total N=26,214

Table 75 MEAN CHARGES FOR TOP FIVE MS-DRGS

MS-DRG Code	Cases	Cases with Valid Charges	Mean +/- SEM
935 Non-extensive burns	9,004	4,164	\$30066+/-878
929 Full thickness burn w skin graft or inhal inj w/o CC/MCC	2,739	1,179	\$101623+/-5491
928 Full thickness burn w skin graft or inhal inj w CC/MCC	1,997	1,079	\$189172+/-10318
934 Full thickness burn w/o skin grft or inhal inj	1,008	589	\$41007+/-3560
927 Extensive burns or full thickness burns w MV 96+ hrs w skin graft	791	419	\$514948+/-28306

Total N= 15,539

1 ANALYSIS OF CONTRIBUTING

2 ANALYSIS OF ALL U.S. RECORDS

3 ANALYSIS BY AGE GROUP

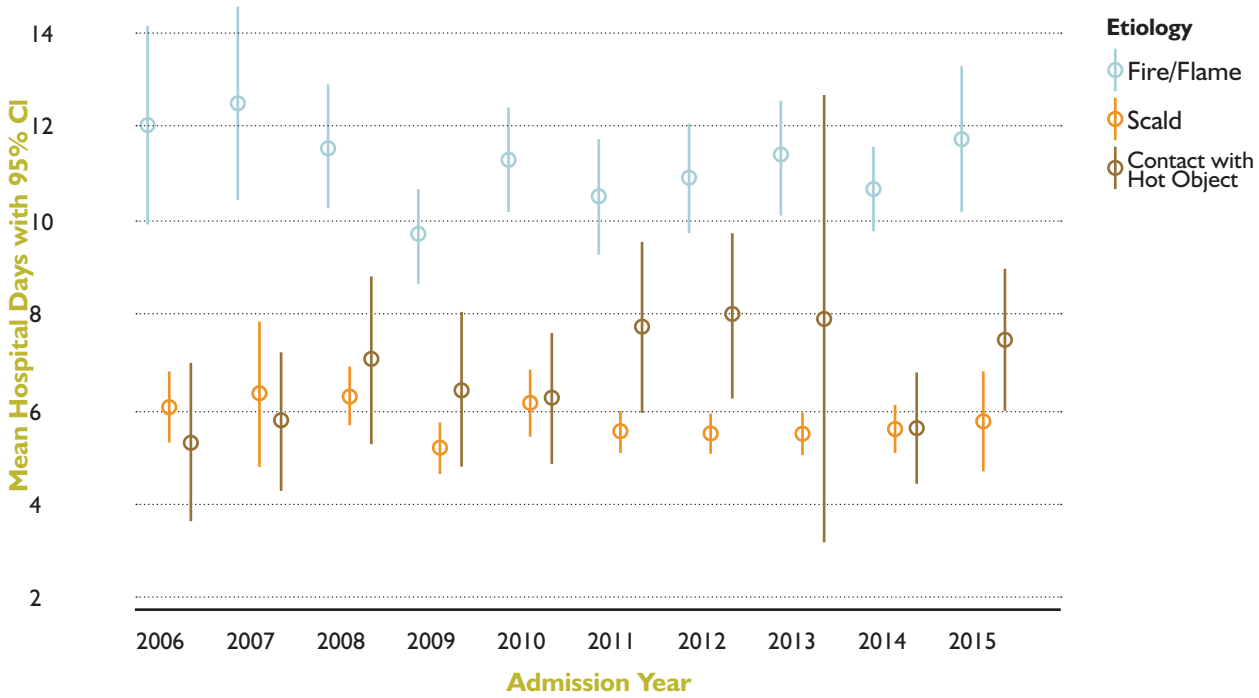
4 ANALYSIS BY AGE ETIOLOGY

5 HOSPITAL COMPARISONS

6 ANALYSIS OF CANADIAN AND INTL. RECORDS

Figure 49

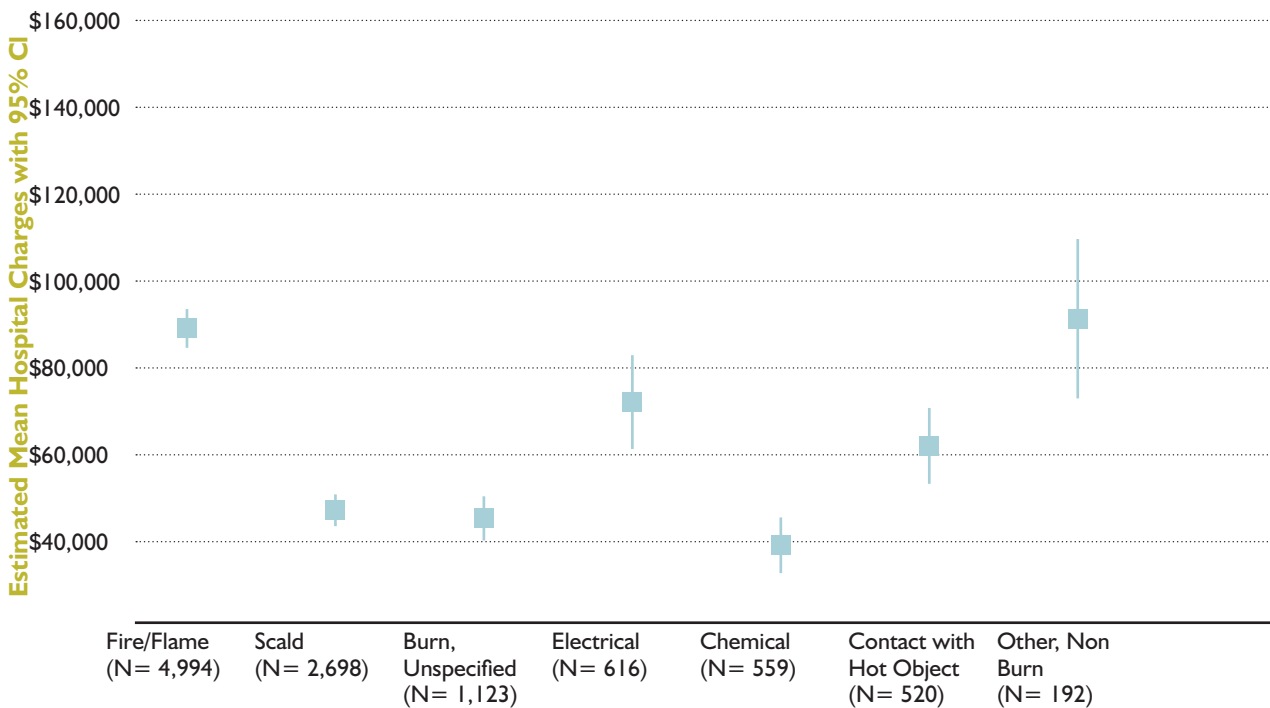
MEAN HOSPITAL DAYS FOR FIRE/FLAME, CONTACT WITH HOT OBJECT, AND SCALD BY ADMISSION YEAR



Total N=26,214

Figure 50

MEAN CHARGES FOR ETIOLOGY CATEGORIES WITH GREATER THAN 100 VALID CHARGE CASES

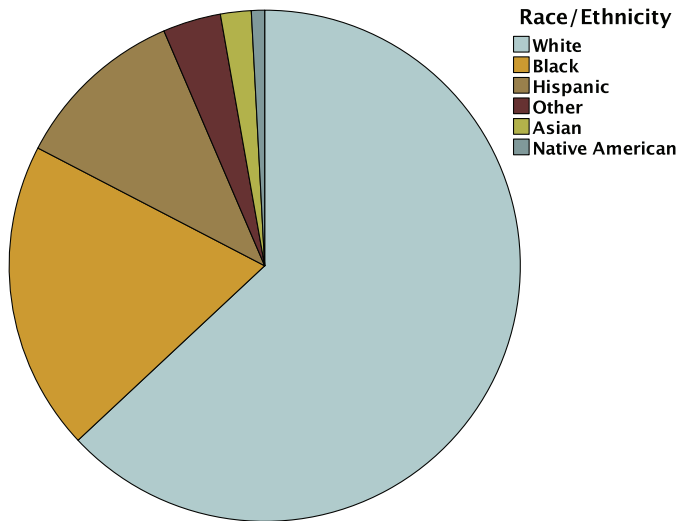


Etiology Categories with Greater than 100 Valid Charge Cases

Total N= 10,702

- 1
- ANALYSIS OF CONTRIBUTING
- 2
- ANALYSIS OF ALL U.S. RECORDS
- 3
- ANALYSIS BY AGE GROUP
- 4
- ANALYSIS BY AGE ETIOLOGY
- 5
- HOSPITAL COMPARISONS
- 6
- ANALYSIS OF CANADIAN AND INTL. RECORDS

Figure 51 RACE/ETHNICITY

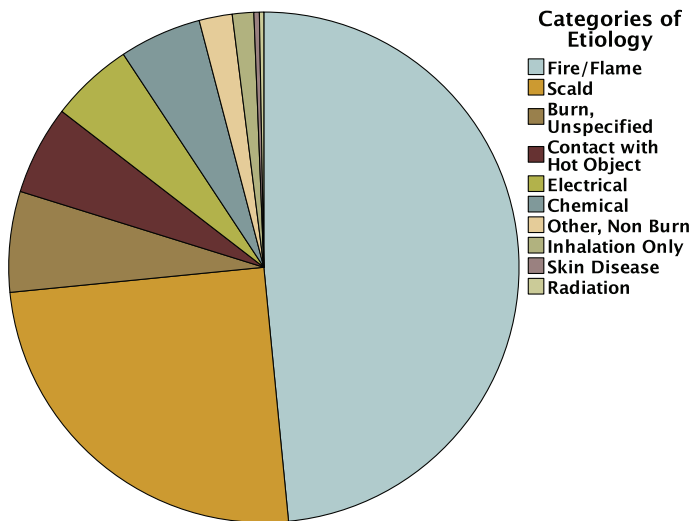


Total N=27,406 (Excluding 942 Unknown/Missing)

RACE/ETHNICITY Table 76

Race	Cases	% Valid
White	17,277	63.0%
Black	5,367	19.6%
Hispanic	2,994	10.9%
Other	1,006	3.7%
Asian	533	1.9%
Native American	229	0.8%
Unknown	942	
TOTAL	28,348	

Figure 52 ETIOLOGY



Total N=26,844 (Excluding 1,504 Unknown/Missing)

ETIOLOGY Table 77

Etiology	Cases	% Valid
Fire/Flame	13,008	48.5%
Scald	6,703	25.0%
Burn, Unspecified	1,713	6.4%
Contact with Hot Object	1,518	5.7%
Electrical	1,411	5.3%
Chemical	1,396	5.2%
Inhalation Only	364	1.4%
Radiation	75	0.3%
Burn Subtotal	26,188	97.6%
Other, Non Burn	563	2.1%
Skin Disease	93	0.3%
Non-Burn Subtotal	656	2.4%
Unknown	1504	
TOTAL	28,348	

1 ANALYSIS OF CONTRIBUTING FACTORS

2 ANALYSIS OF ALL U.S. RECORDS

3 ANALYSIS BY AGE GROUP

4 ANALYSIS BY AGE ETIOLOGY

5 HOSPITAL COMPARISONS

6 ANALYSIS OF CANADIAN AND INTL. RECORDS

Table 78 HOSPITAL DAYS: LIVED/DIED BY INHALATION INJURY

Inhalation Injury	Total		Lived		Died	
	Cases	Mean +/- SEM	Cases	Mean +/- SEM	Cases	Mean +/- SEM
No	23,983	8.5 +/- 0.1	23,656	8.3 +/- 0.0	327	21.2 +/- 1.8
Yes	2,687	19.2 +/- 0.5	2,296	20.1 +/- 0.6	391	14.2 +/- 1.3
Subtotal	26,670	9.6 +/- 0.1	25,952	9.3 +/- 0.1	718	17.4 +/- 1.1
Missing	1,678	9.1 +/- 0.5	1,607	8.7 +/- 0.5	71	16.9 +/- 3.2
TOTAL	28,348	9.5 +/- 0.1	27,559	9.3 +/- 0.1	789	17.4 +/- 1.0

Total N=28,348

Table 79 TOP TEN COMPLICATIONS

Top Ten Complications	Count	Percent of All Complications	Percent of Patients with Complication
Pneumonia	933	10.8	3.4
Cellulitis	827	9.6	3.0
Urinary tract infection	630	7.3	2.3
Respiratory failure	549	6.4	2.0
Wound infection (non-surgical)	440	5.1	1.6
Septicemia	410	4.8	1.5
Renal failure (requiring CVVH/dialysis)	279	3.2	1.0
Other blood/systemic infection	250	2.9	0.9
Bacteremia	238	2.8	0.9
Other hematologic	224	2.6	0.8
Total Complications	8,614		

Total N=27,723 (Excluding 625 cases from non ABA burn registry software centers)

Table 80 TOP TEN PROCEDURES

Top Ten Procedures Codes	Count	Percent of All Procedures
86.22 Excisional debridement of wound, infection, or burn	14,140	17.1
86.69 Other skin graft to other sites	9,523	11.5
86.28 Nonexcisional debridement of wound, infection or burn	5,495	6.7
86.66 Homograft to skin	5,119	6.2
93.57 Application of other wound dressing	5,021	6.1
86.65 Heterograft to skin	3,700	4.5
38.93 Venous catheterization, not elsewhere classified	2,604	3.2
86.62 Other skin graft to hand	2,089	2.5
86.6 Free skin graft	1,452	1.8
96.04 Insertion of endotracheal tube	1,442	1.7
Total Procedures	82,500	

Total N=28,348

- 1
- ANALYSIS OF CONTRIBUTING
- 2
- ANALYSIS OF ALL
- 3
- ANALYSIS BY AGE GROUP
- 4
- ANALYSIS BY AGE ETIOLOGY
- 5
- HOSPITAL COMPARISONS
- 6
- ANALYSIS OF CANADIAN AND INTL. RECORDS

Table 81 LIVED/DIED BY BURN GROUP SIZE (% TBSA)

	Lived	Died	
%TBSA	Cases	Cases	Mortality Rate
0.1 - 9.9	17,749	73	0.4
10 - 19.9	3,617	50	1.4
20 - 29.9	1,127	54	4.6
30 - 39.9	508	60	10.6
40 - 49.9	234	70	23.0
50 - 59.9	116	70	37.6
60 - 69.9	74	57	43.5
70 - 79.9	25	44	63.8
80 - 89.9	17	81	82.7
> 90	8	98	92.5
Subtotal	23,475	657	2.7
Missing or 0%	4,084	132	3.1
TOTAL	27,559	789	2.8

Total N=28,348

Table 82 HOSPITAL DAYS BY BURN GROUP SIZE (% TBSA)

%TBSA	Cases	Mean +/- SEM
0.1 - 9.9	17,822	6.0+/-0.0
10 - 19.9	3,667	13.3+/-0.2
20 - 29.9	1,181	23.7+/-0.6
30 - 39.9	568	36.6+/-1.2
40 - 49.9	304	48.7+/-2.3
50 - 59.9	186	47.2+/-2.9
60 - 69.9	131	64.3+/-5.3
70 - 79.9	69	52.4+/-7.8
80 - 89.9	98	26.1+/-4.9
> 90	106	6.4+/-2.5
Subtotal	24,132	10.1+/-0.1
Missing or 0%	4,216	6.4+/-0.2
TOTAL	28,348	9.5+/-0.1

Total N=28,348

Table 83 MEAN CHARGES FOR TOP FIVE MS-DRGS

MS-DRG Code	Cases	Cases with Valid Charges	Mean +/- SEM
935 Non-extensive burns	9,159	4,157	\$33350+/-1020
929 Full thickness burn w skin graft or inhal inj w/o CC/MCC	2,936	1,217	\$93566+/-3179
928 Full thickness burn w skin graft or inhal inj w CC/MCC	2,643	1,352	\$188908+/-7914
934 Full thickness burn w/o skin grft or inhal inj	1,044	618	\$36398+/-2189
927 Extensive burns or full thickness burns w MV 96+ hrs w skin graft	919	438	\$580674+/-32124

Total N=16,701

1 ANALYSIS OF CONTRIBUTING FACTORS

2 ANALYSIS OF ALL U.S. RECORDS

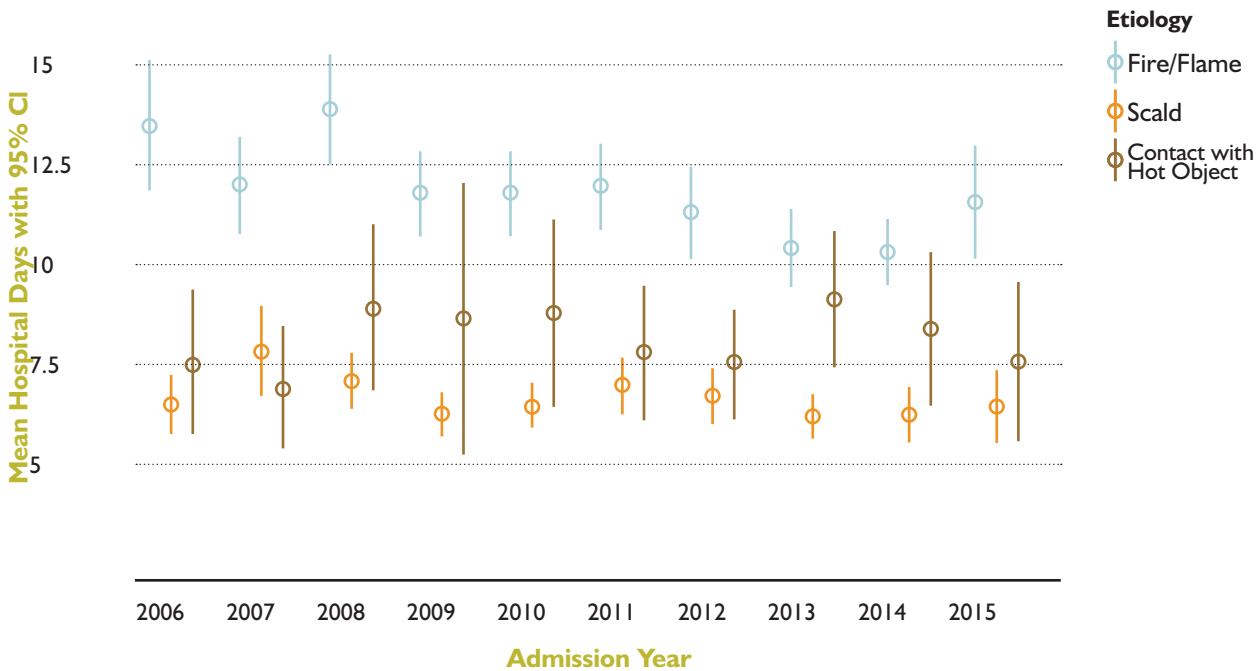
3 ANALYSIS BY AGE GROUP

4 ANALYSIS BY AGE ETIOLOGY

5 HOSPITAL COMPARISONS

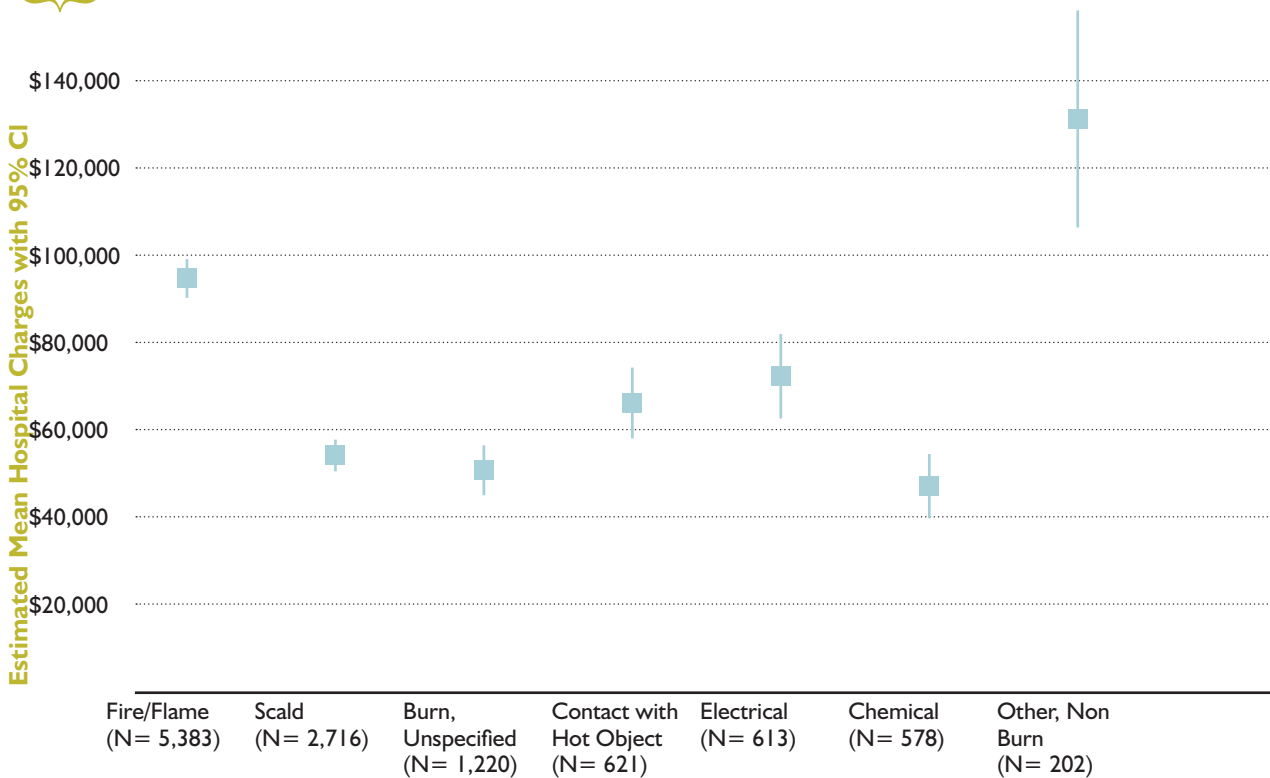
6 ANALYSIS OF CANADIAN AND INTL. RECORDS

Figure 53 MEAN HOSPITAL DAYS FOR FIRE/FLAME, CONTACT WITH HOT OBJECT, AND SCALD BY ADMISSION YEAR



Total N=28,348

Figure 54 MEAN CHARGES FOR ETIOLOGY CATEGORIES WITH GREATER THAN 100 VALID CHARGE CASES

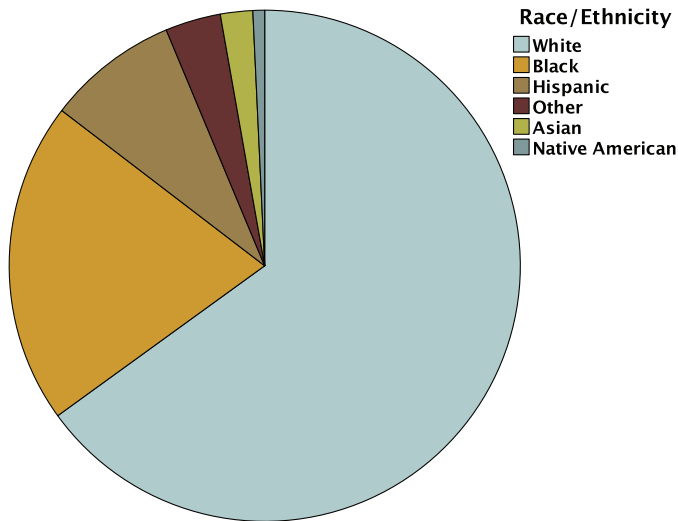


Etiology Categories with Greater than 100 Valid Charge Cases

Total N= 11,333

- 1
- ANALYSIS OF CONTRIBUTING
- 2
- ANALYSIS OF ALL U.S. RECORDS
- 3
- ANALYSIS BY AGE GROUP
- 4
- ANALYSIS BY AGE ETIOLOGY
- 5
- HOSPITAL COMPARISONS
- 6
- ANALYSIS OF CANADIAN AND INTL. RECORDS

Figure 55 RACE/ETHNICITY

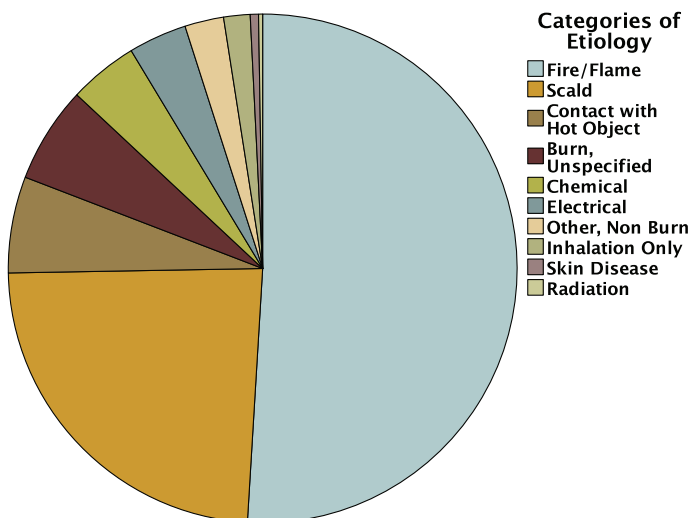


Total N=24,755 (Excluding 842 Unknown/Missing)

RACE/ETHNICITY Table 84

Race	Cases	% Valid
White	16,096	65.0%
Black	5,044	20.4%
Hispanic	2,057	8.3%
Other	869	3.5%
Asian	506	2.0%
Native American	183	0.7%
Unknown	842	
TOTAL	25,597	

Figure 56 ETIOLOGY



Total N=24,173 (Excluding 1,424 Unknown/Missing)

ETIOLOGY Table 85

Etiology	Cases	% Valid
Fire/Flame	12,319	51.0%
Scald	5,743	23.8%
Contact with Hot Object	1,480	6.1%
Burn, Unspecified	1,479	6.1%
Chemical	1,063	4.4%
Electrical	896	3.7%
Inhalation Only	407	1.7%
Radiation	62	0.3%
Burn Subtotal	23,449	97.0%
Other, Non Burn	597	2.5%
Skin Disease	127	0.5%
Non-Burn Subtotal	724	3.0%
Unknown	1,424	
TOTAL	25,597	

1 ANALYSIS OF CONTRIBUTING FACTORS

2 ANALYSIS OF ALL U.S. RECORDS

3 ANALYSIS BY AGE GROUP

4 ANALYSIS BY AGE ETIOLOGY

5 HOSPITAL COMPARISONS

6 ANALYSIS OF CANADIAN AND INTL. RECORDS

Table 86 HOSPITAL DAYS: LIVED/DIED BY INHALATION INJURY

Inhalation Injury	Total		Lived		Died	
	Cases	Mean +/- SEM	Cases	Mean +/- SEM	Cases	Mean +/- SEM
No	21,087	9.8+/-0.1	20,596	9.6+/-0.1	491	21.4+/-1.5
Yes	3,110	19.9+/-0.5	2,542	20.3+/-0.5	568	18.0+/-1.3
Subtotal	24,197	11.1+/-0.1	23,138	10.7+/-0.1	1,059	19.6+/-1.0
Missing	1,400	12.0+/-0.6	1,316	11.8+/-0.6	84	15.2+/-2.5
TOTAL	25,597	11.2+/-0.1	24,454	10.8+/-0.1	1,143	19.3+/-0.9

Total N=25,597

Table 87 TOP TEN COMPLICATIONS

Top Ten Complications	Count	Percent of All Complications	Percent of Patients with Complication
Pneumonia	1063	10.5	4.3
Urinary tract infection	749	7.4	3.0
Cellulitis	748	7.4	3.0
Respiratory failure	629	6.2	2.5
Wound infection (non-surgical)	543	5.4	2.2
Septicemia	457	4.5	1.8
Renal failure (requiring CVVH/dialysis)	369	3.7	1.5
Other hematologic	276	2.7	1.1
Arrhythmia	262	2.6	1.0
Bacteremia	261	2.6	1.0
Total Complications	10,092		

Total N=24,992 (Excluding 605 cases from non TRACS centers)

Table 88 TOP TEN PROCEDURES

Top Ten Procedures Codes	Count	Percent of All Procedures
86.22 Excisional debridement of wound, infection, or burn	13,704	16.6
86.69 Other skin graft to other sites	9,421	11.4
86.66 Homograft to skin	5,240	6.3
86.28 Nonexcisional debridement of wound, infection or burn	4,974	6.0
93.57 Application of other wound dressing	4,641	5.6
86.65 Heterograft to skin	3,156	3.8
38.93 Venous catheterization, not elsewhere classified	3,006	3.6
86.62 Other skin graft to hand	1,896	2.3
96.04 Insertion of endotracheal tube	1,510	1.8
86.6 Free skin graft	1,347	1.6
Total Procedures	82765	100.0

Total N=25,597

- 1
- ANALYSIS OF CONTRIBUTING
- 2
- ANALYSIS OF ALL
- 3
- ANALYSIS BY AGE GROUP
- 4
- ANALYSIS BY AGE ETIOLOGY
- 5
- HOSPITAL COMPARISONS
- 6
- ANALYSIS OF CANADIAN AND INTL. RECORDS

Table 89 LIVED/DIED BY BURN GROUP SIZE (% TBSA)

	Lived	Died	
%TBSA	Cases	Cases	Mortality Rate
0.1 - 9.9	16,023	129	0.8
10 - 19.9	3,197	101	3.1
20 - 29.9	935	103	9.9
30 - 39.9	388	97	20.0
40 - 49.9	188	118	38.6
50 - 59.9	96	94	49.5
60 - 69.9	44	78	63.9
70 - 79.9	26	75	74.3
80 - 89.9	9	90	90.9
> 90	6	95	94.1
Subtotal	20,912	980	4.5
Missing or 0%	3,542	163	4.4
TOTAL	24,454	1,143	4.5

Total N=25,597

Table 90 HOSPITAL DAYS BY BURN GROUP SIZE (% TBSA)

%TBSA	Cases	Mean +/- SEM
0.1 - 9.9	16,152	7.3+/-0.0
10 - 19.9	3,298	16.2+/-0.3
20 - 29.9	1,038	29.5+/-0.8
30 - 39.9	485	40.5+/-1.6
40 - 49.9	306	44.5+/-2.1
50 - 59.9	190	54.0+/-4
60 - 69.9	122	43.0+/-4.2
70 - 79.9	101	38.4+/-5.1
80 - 89.9	99	13.1+/-3.2
> 90	101	4.9+/-1.7
Subtotal	21,892	11.7+/-0.1
Missing or 0%	3,705	7.9+/-0.2
TOTAL	25,597	11.2+/-0.1

Total N=25,597

Table 91 MEAN CHARGES FOR TOP FIVE MS-DRGS

MS-DRG Code	Cases	Cases with Valid Charges	Mean +/- SEM
935 Non-extensive burns	7,987	3,758	\$37634+/-1173
928 Full thickness burn w skin graft or inhal inj w CC/MCC	2,748	1,424	\$202746+/-7804
929 Full thickness burn w skin graft or inhal inj w/o CC/MCC	2,703	1,109	\$112869+/-4622
934 Full thickness burn w/o skin grft or inhal inj	1,070	594	\$46363+/-3577
927 Extensive burns or full thickness burns w MV 96+ hrs w skin graft	931	455	\$623385+/-35006

Total N=15,439

1 ANALYSIS OF CONTRIBUTING

2 ANALYSIS OF ALL U.S. RECORDS

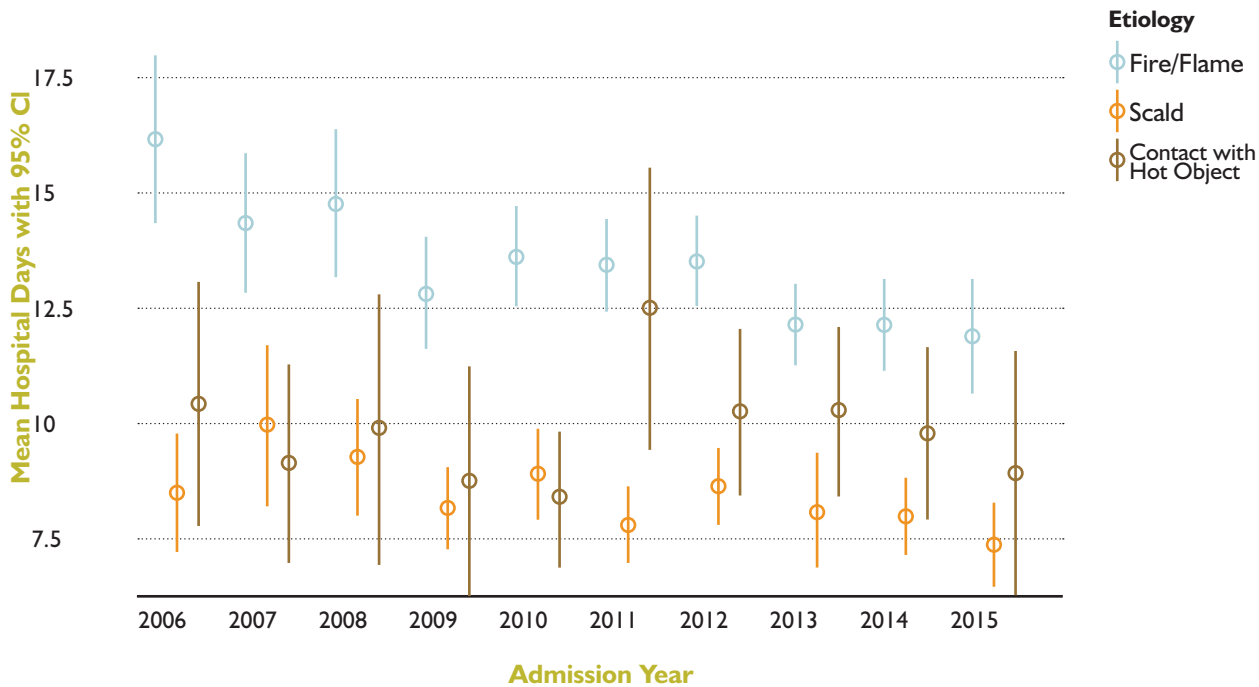
3 ANALYSIS BY AGE GROUP

4 ANALYSIS BY AGE ETIOLOGY

5 HOSPITAL COMPARISONS

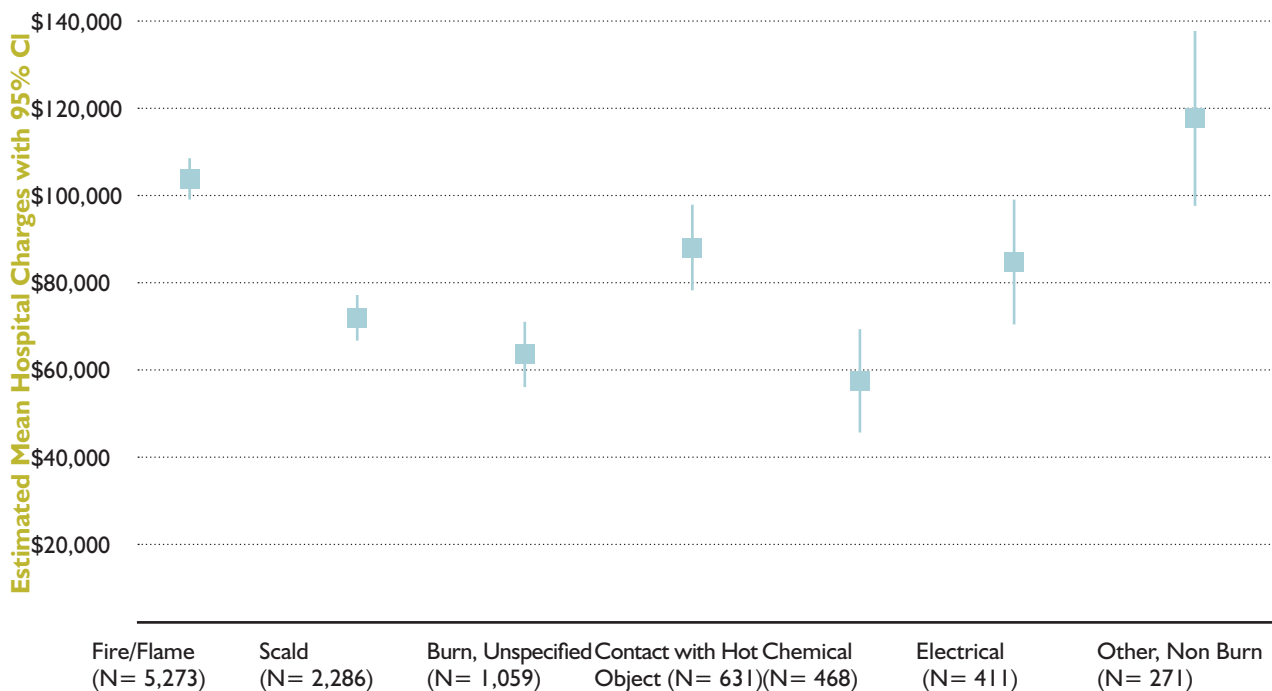
6 ANALYSIS OF CANADIAN AND INTL. RECORDS

Figure 57 MEAN HOSPITAL DAYS FOR FIRE/FLAME, CONTACT WITH HOT OBJECT, AND SCALD BY ADMISSION YEAR



Total N=25,597

Figure 58 MEAN CHARGES FOR ETIOLOGY CATEGORIES WITH GREATER THAN 100 VALID CHARGE CASES

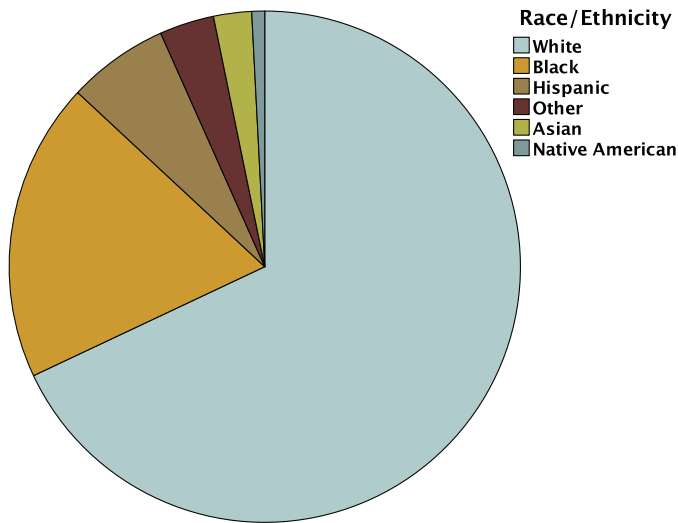


Etiology Categories with Greater than 100 Valid Charge Cases

Total N=10,511

- 1
- ANALYSIS OF CONTRIBUTING
- 2
- ANALYSIS OF ALL U.S. RECORDS
- 3
- ANALYSIS BY AGE GROUP
- 4
- ANALYSIS BY AGE ETIOLOGY
- 5
- HOSPITAL COMPARISONS
- 6
- ANALYSIS OF CANADIAN AND INTL. RECORDS

Figure 59 RACE/ETHNICITY

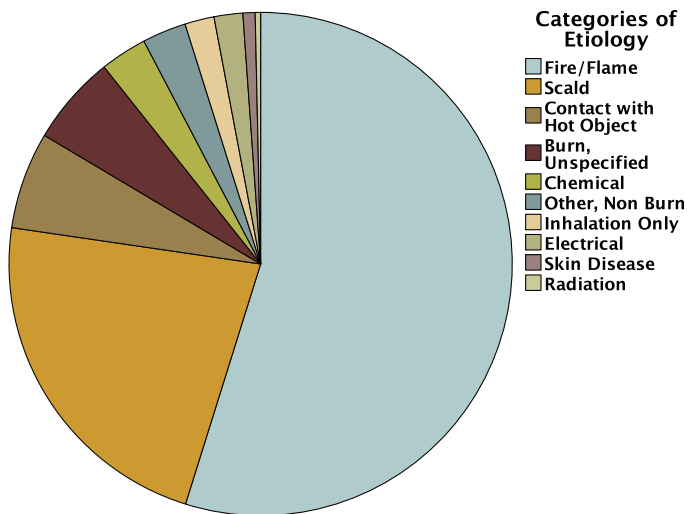


Total N=14,360 (Excluding 576 Unknown/Missing)

RACE/ETHNICITY Table 92

Race	Cases	% Valid
White	9,764	68.0%
Black	2,720	18.9%
Hispanic	918	6.4%
Other	495	3.4%
Asian	346	2.4%
Native American	117	0.8%
Unknown	576	
TOTAL	14,936	

Figure 60 ETIOLOGY



Total N=14,085 (Excluding 851 Unknown/Missing)

ETIOLOGY Table 93

Etiology	Cases	% Valid
Fire/Flame	7,723	54.8%
Scald	3,166	22.5%
Contact with Hot Object	877	6.2%
Burn, Unspecified	814	5.8%
Chemical	424	3.0%
Inhalation Only	265	1.9%
Electrical	260	1.8%
Radiation	49	0.3%
Burn Subtotal	13,578	96.4%
Other, Non Burn	397	2.8%
Skin Disease	110	0.8%
Non-Burn Subtotal	507	3.6%
Unknown	851	
TOTAL	14,936	

1 ANALYSIS OF CONTRIBUTING FACTORS

2 ANALYSIS OF ALL U.S. RECORDS

3 ANALYSIS BY AGE GROUP

4 ANALYSIS BY AGE ETIOLOGY

5 HOSPITAL COMPARISONS

6 ANALYSIS OF CANADIAN AND INTL. RECORDS

Table 94 HOSPITAL DAYS: LIVED/DIED BY INHALATION INJURY

Inhalation Injury	Total		Lived		Died	
	Cases	Mean +/- SEM	Cases	Mean +/- SEM	Cases	Mean +/- SEM
No	12,134	11.3+/-0.1	11,625	11+/-0.1	509	19.6+/-1.1
Yes	2,090	17.4+/-0.5	1,578	18.6+/-0.6	512	13.5+/-1
Subtotal	14,224	12.2+/-0.1	13,203	11.9+/-0.1	1,021	16.5+/-0.7
Missing	712	11.7+/-0.7	652	11.8+/-0.7	60	11.2+/-2.5
TOTAL	14,936	12.2+/-0.1	13,855	11.9+/-0.1	1,081	16.2+/-0.7

Total N= 14,936

Table 95 TOP TEN COMPLICATIONS

Top Ten Complications	Count	Percent of All Complications	Percent of Patients with Complication
Pneumonia	819	10.9	5.6
Urinary tract infection	639	8.5	4.4
Respiratory failure	500	6.7	3.4
Cellulitis	416	5.6	2.9
Septicemia	347	4.6	2.4
Renal failure (requiring CVVH/dialysis)	328	4.4	2.3
Wound infection (non-surgical)	327	4.4	2.2
Arrhythmia	299	4.0	2.1
Cardiac arrest	203	2.7	1.4
Bacteremia	187	2.5	1.3
Total Complications	7,493		

Total N= 14,558 (Excluding 378 cases from non ABA burn registry software centers)

Table 96 TOP TEN PROCEDURES

Top Ten Procedures Codes	Count	Percent of All Procedures
86.22 Excisional debridement of wound, infection, or burn	7,826	15.0
86.69 Other skin graft to other sites	5,580	10.7
86.66 Homograft to skin	3,114	6.0
86.28 Nonexcisional debridement of wound, infection or burn	2,782	5.3
93.57 Application of other wound dressing	2,580	4.9
38.93 Venous catheterization, not elsewhere classified	2,213	4.2
86.65 Heterograft to skin	1,660	3.2
87.44 X-ray of chest	1,171	2.2
33.22 Fiber-optic bronchoscopy	1,080	2.1
38.91 Arterial catheterization	1,048	2.0
Total Procedures	52142	

Total N= 14,936

- 1
- ANALYSIS OF CONTRIBUTING
- 2
- ANALYSIS OF ALL
- 3
- ANALYSIS BY AGE GROUP
- 4
- ANALYSIS BY AGE ETIOLOGY
- 5
- HOSPITAL COMPARISONS
- 6
- ANALYSIS OF CANADIAN AND INTL. RECORDS

Table 97 LIVED/DIED BY BURN GROUP SIZE (% TBSA)

	Lived	Died	
%TBSA	Cases	Cases	Mortality Rate
0.1 - 9.9	9,199	167	1.8
10 - 19.9	1,855	112	5.7
20 - 29.9	534	121	18.5
30 - 39.9	200	117	36.9
40 - 49.9	78	111	58.7
50 - 59.9	41	95	69.9
60 - 69.9	9	73	89.0
70 - 79.9	4	56	93.3
80 - 89.9	1	43	97.7
> 90	4	52	92.9
Subtotal	11,925	947	7.4
Missing or 0%	1,930	134	6.5
TOTAL	13,855	1,081	7.2

Total N=14,936

Table 98 HOSPITAL DAYS BY BURN GROUP SIZE (% TBSA)

%TBSA	Cases	Mean +/- SEM
0.1 - 9.9	9,366	8.4+/-0.1
10 - 19.9	1,967	19.0+/-0.4
20 - 29.9	655	32.4+/-1.0
30 - 39.9	317	40.7+/-1.9
40 - 49.9	189	34.9+/-2.7
50 - 59.9	136	32.7+/-3.7
60 - 69.9	82	19.1+/-3.6
70 - 79.9	60	10.7+/-3.2
80 - 89.9	44	5.3+/-2.2
> 90	56	3.2+/-1.0
Subtotal	12,872	12.7+/-0.1
Missing or 0%	2,064	8.9+/-0.3
TOTAL	14,936	12.2+/-0.1

Total N=14,936

Table 99 MEAN CHARGES FOR TOP FIVE MS-DRGS

MS-DRG Code	Cases	Cases with Valid Charges	Mean +/- SEM
935 Non-extensive burns	4,308	1,989	\$42186+/-1747
928 Full thickness burn w skin graft or inhal inj w CC/MCC	1,851	909	\$224815+/-9966
929 Full thickness burn w skin graft or inhal inj w/o CC/MCC	1,548	610	\$114868+/-5939
934 Full thickness burn w/o skin grft or inhal inj	595	326	\$62229+/-15286
927 Extensive burns or full thickness burns w MV 96+ hrs w skin graft	568	286	\$578525+/-36758

Total N=8,870

1 ANALYSIS OF CONTRIBUTING FACTORS

2 ANALYSIS OF ALL U.S. RECORDS

3 ANALYSIS BY AGE GROUP

4 ANALYSIS BY AGE ETIOLOGY

5 HOSPITAL COMPARISONS

6 ANALYSIS OF CANADIAN AND INTL. RECORDS

Figure 61 MEAN HOSPITAL DAYS FOR FIRE/FLAME, CONTACT WITH HOT OBJECT, AND SCALD BY ADMISSION YEAR

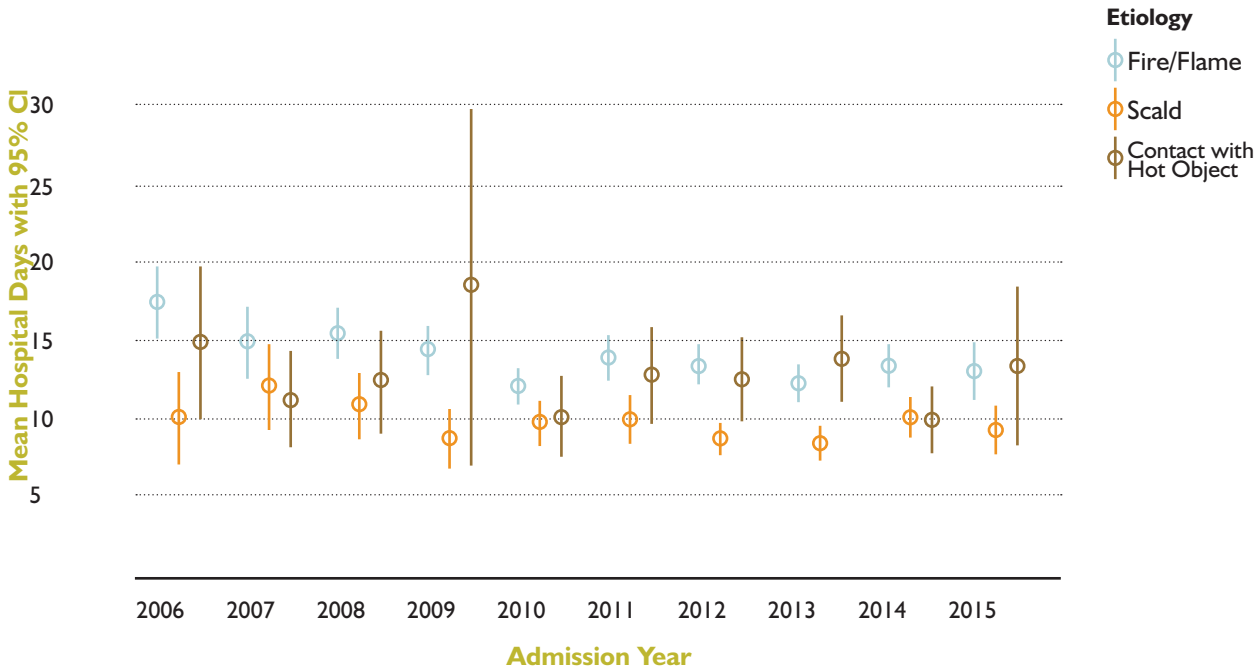
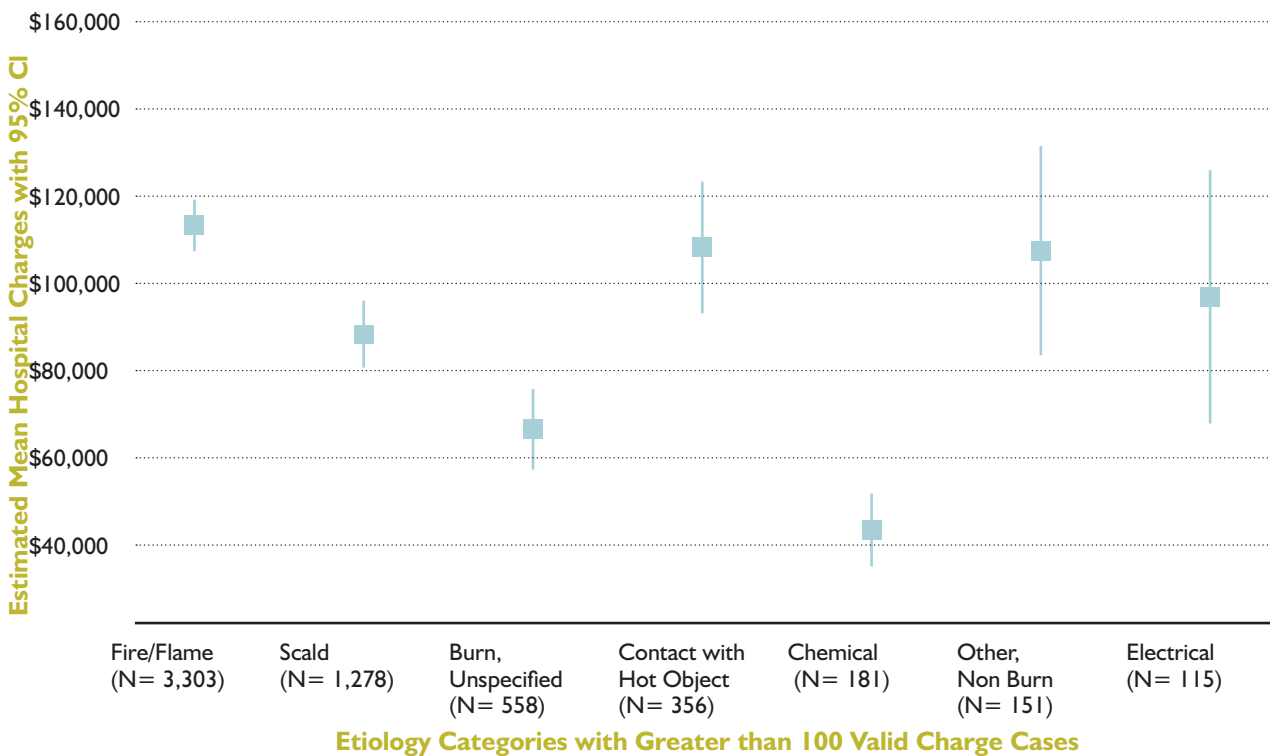


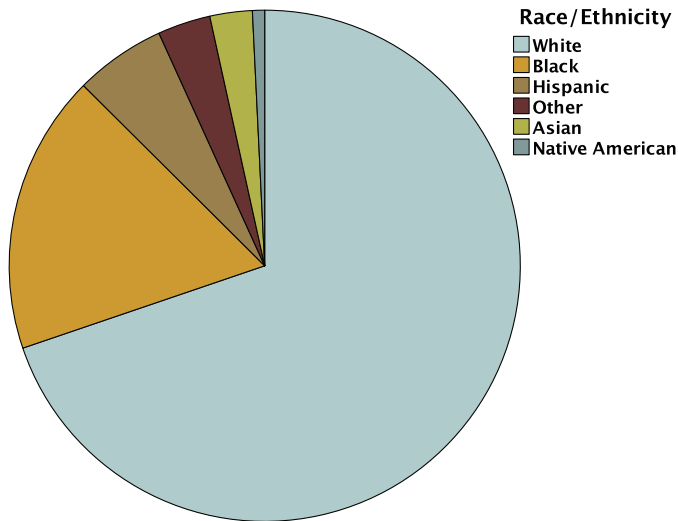
Figure 62 MEAN CHARGES FOR ETIOLOGY CATEGORIES WITH GREATER THAN 100 VALID CHARGE CASES



Total N=5,942

- 1
- ANALYSIS OF CONTRIBUTING
- 2
- ANALYSIS OF ALL U.S. RECORDS
- 3
- ANALYSIS BY AGE GROUP
- 4
- ANALYSIS BY AGE ETIOLOGY
- 5
- HOSPITAL COMPARISONS
- 6
- ANALYSIS OF CANADIAN AND INTL. RECORDS

Figure 63 RACE/ETHNICITY

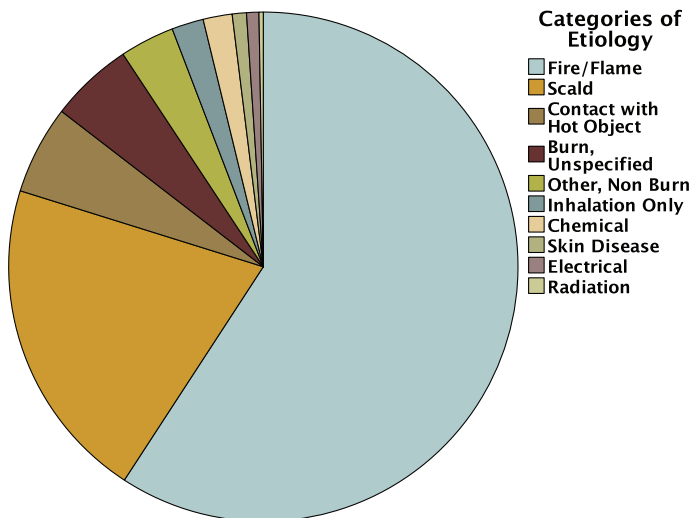


Total N=7,932 (Excluding 300 Unknown/Missing)

RACE/ETHNICITY Table 100

Race	Cases	% Valid
White	5,535	69.8%
Black	1,402	17.7%
Hispanic	456	5.7%
Other	265	3.3%
Asian	213	2.7%
Native American	61	0.8%
Unknown	300	
TOTAL	8,232	

Figure 64 ETIOLOGY



Total N=7,765 (Excluding 467 Unknown/Missing)

ETIOLOGY Table 101

Etiology	Cases	% Valid
Fire/Flame	4,596	59.2%
Scald	1,602	20.6%
Contact with Hot Object	437	5.6%
Burn, Unspecified	409	5.3%
Inhalation Only	157	2.0%
Chemical	143	1.8%
Electrical	61	0.8%
Radiation	21	0.3%
Burn Subtotal	7,426	95.6%
Other, Non Burn	269	3.5%
Skin Disease	70	0.9%
Non-Burn Subtotal	339	4.4%
Unknown	467	
TOTAL	8,232	

1 ANALYSIS OF CONTRIBUTING FACTORS

2 ANALYSIS OF ALL U.S. RECORDS

3 ANALYSIS BY AGE GROUP

4 ANALYSIS BY AGE ETIOLOGY

5 HOSPITAL COMPARISONS

6 ANALYSIS OF CANADIAN AND INTL. RECORDS

Table 102 HOSPITAL DAYS: LIVED/DIED BY INHALATION INJURY

Inhalation Injury	Total		Lived		Died	
	Cases	Mean +/- SEM	Cases	Mean +/- SEM	Cases	Mean +/- SEM
No	6,508	12.7+/-0.2	5,956	12.2+/-0.2	552	18.9+/-1.0
Yes	1,241	14.7+/-0.6	817	16.9+/-0.8	424	10.3+/-0.8
Subtotal	7,749	13.1 +/-0.2	6,773	12.7 +/-0.2	976	15.2 +/-0.7
Missing	483	15.3+/-1.1	404	15.0+/-1.2	79	17.1+/-2.9
TOTAL	8,232	13.2 +/-0.2	7,177	12.9 +/-0.2	1,055	15.3 +/-0.7

Total N=8,232

Table 103 TOP TEN COMPLICATIONS

Top Ten Complications	Count	Percent of All Complications	Percent of Patients with Complication
Pneumonia	551	10.7	6.9
Urinary tract infection	517	10.1	6.5
Respiratory failure	365	7.1	4.6
Arrythmia	250	4.9	3.1
Septicemia	242	4.7	3.0
Renal failure (requiring CVVH/dialysis)	215	4.2	2.7
Cellulitis	194	3.8	2.4
Wound infection (non-surgical)	190	3.7	2.4
Cardiac arrest	172	3.3	2.1
Other hematologic	134	2.6	1.7
Total Complications	5,142		

Total N=8,012 (Excluding 220 cases from non ABA burn registry software centers)

Table 104 TOP TEN PROCEDURES

Top Ten Procedures Codes	Count	Percent of All Procedures
86.22 Excisional debridement of wound, infection, or burn	4,359	14.8
86.69 Other skin graft to other sites	3,097	10.5
86.66 Homograft to skin	1,709	5.8
86.28 Nonexcisional debridement of wound, infection or burn	1,424	4.8
93.57 Application of other wound dressing	1,307	4.4
38.93 Venous catheterization, not elsewhere classified	1,273	4.3
86.65 Heterograft to skin	897	3.0
87.44 X-ray of chest	714	2.4
96.04 Insertion of endotracheal tube	694	2.4
38.91 Arterial catheterization	586	2.0
Total Procedures	29,509	100.0

Total N=8,232

- 1
- ANALYSIS OF CONTRIBUTING
- 2
- ANALYSIS OF ALL
- 3
- ANALYSIS BY AGE GROUP
- 4
- ANALYSIS BY AGE ETIOLOGY
- 5
- HOSPITAL COMPARISONS
- 6
- ANALYSIS OF CANADIAN AND INTL. RECORDS

Table 105 LIVED/DIED BY BURN GROUP SIZE (% TBSA)

	Lived	Died	
%TBSA	Cases	Cases	Mortality Rate
0.1 - 9.9	4,811	186	3.7
10 - 19.9	952	152	13.8
20 - 29.9	244	132	35.1
30 - 39.9	99	127	56.2
40 - 49.9	31	108	77.7
50 - 59.9	10	60	85.7
60 - 69.9	1	44	97.8
70 - 79.9	2	27	93.1
80 - 89.9	4	30	88.2
> 90	2	39	95.1
Subtotal	6,156	905	12.8
Missing or 0%	1,021	150	12.8
TOTAL	7,177	1,055	12.8

Total N=8,232

Table 106 HOSPITAL DAYS BY BURN GROUP SIZE (% TBSA)

%TBSA	Cases	Mean +/- SEM
0.1 - 9.9	4,997	9.5+/-0.1
10 - 19.9	1,104	21.8+/-0.6
20 - 29.9	376	34.3+/-1.7
30 - 39.9	226	32.6+/-2.4
40 - 49.9	139	24.2+/-3.1
50 - 59.9	70	12.2+/-3.1
60 - 69.9	45	9.4+/-3.0
70 - 79.9	29	3.3+/-0.8
80 - 89.9	34	2.0+/-0.4
> 90	41	1.9+/-0.6
Subtotal	7,061	13.7+/-0.2
Missing or 0%	1,171	10.1+/-0.4
TOTAL	8,232	13.2+/-0.2

Total N=8,232

Table 107 MEAN CHARGES FOR TOP FIVE MS-DRGS

MS-DRG Code	Cases	Cases with Valid Charges	Mean +/- SEM
935 Non-extensive burns	1,975	905	\$52082+/-3026
928 Full thickness burn w skin graft or inhal inj w CC/MCC	1,175	588	\$216563+/-10420
929 Full thickness burn w skin graft or inhal inj w/o CC/MCC	819	318	\$118476+/-8627
934 Full thickness burn w/o skin grft or inhal inj	374	213	\$52719+/-4834
927 Extensive burns or full thickness burns w MV 96+ hrs w skin graft	334	160	\$566188+/-43229

Total N=4,677

1 ANALYSIS OF CONTRIBUTING

2 ANALYSIS OF ALL U.S. RECORDS

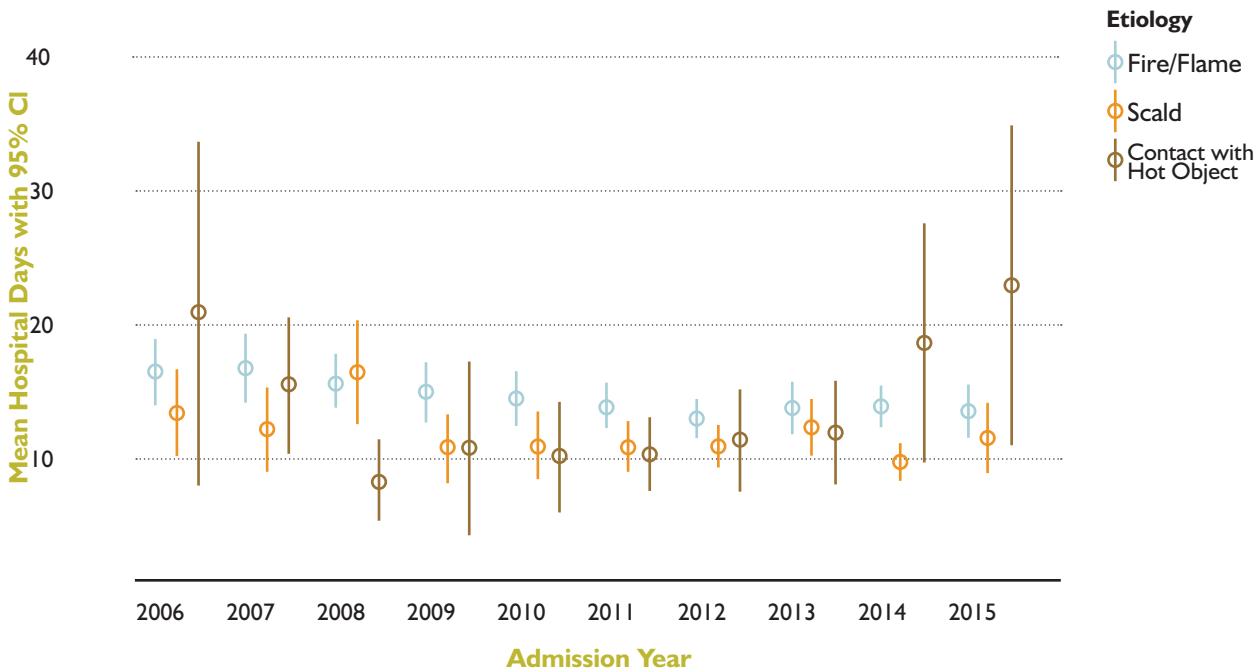
3 ANALYSIS BY AGE GROUP

4 ANALYSIS BY AGE ETIOLOGY

5 HOSPITAL COMPARISONS

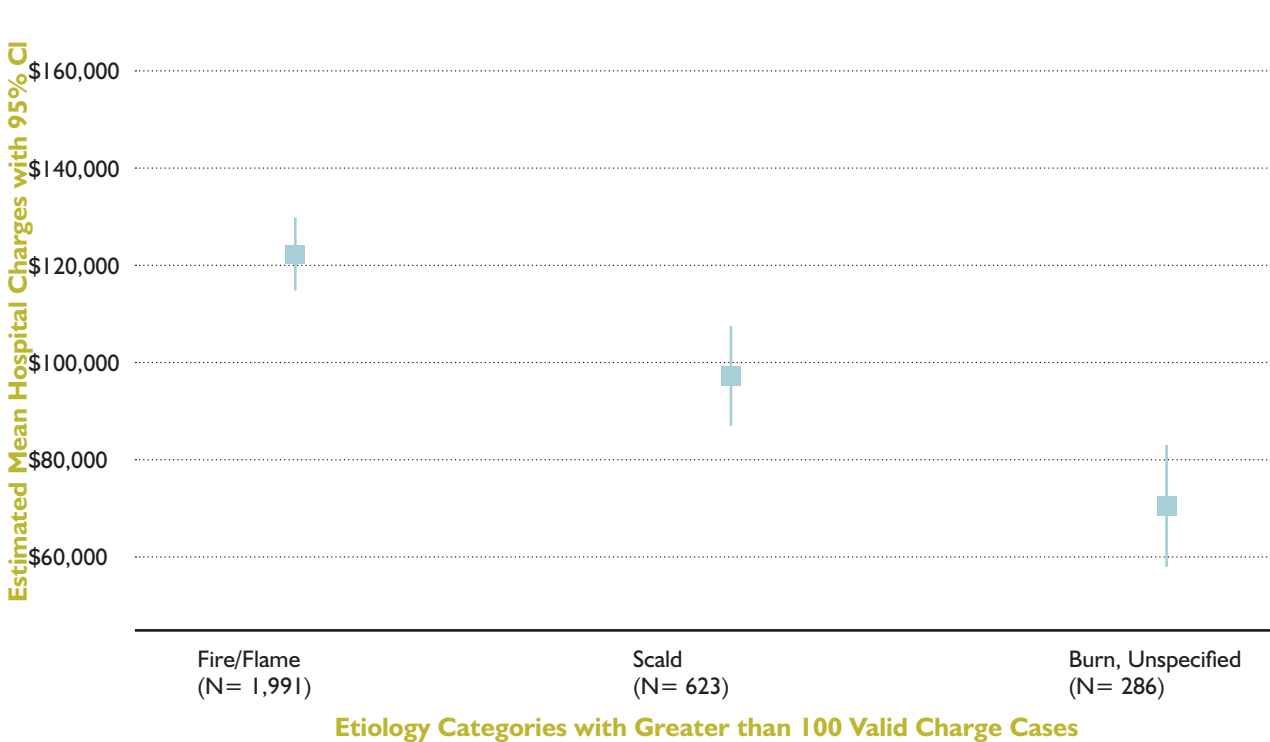
6 ANALYSIS OF CANADIAN AND INTL. RECORDS

Figure 65 MEAN HOSPITAL DAYS FOR FIRE/FLAME, CONTACT WITH HOT OBJECT, AND SCALD BY ADMISSION YEAR



Total N=8,232

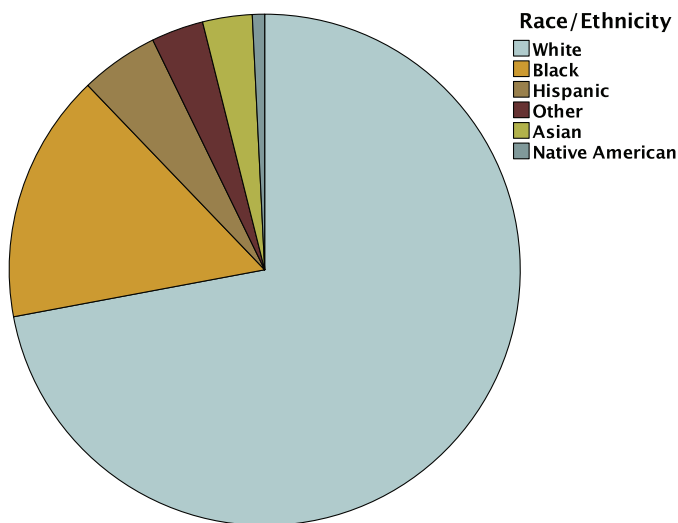
Figure 66 MEAN CHARGES FOR ETIOLOGY CATEGORIES WITH GREATER THAN 100 VALID CHARGE CASES



Total N=3,099

- 1
- ANALYSIS OF CONTRIBUTING
- 2
- ANALYSIS OF ALL U.S. RECORDS
- 3
- ANALYSIS BY AGE GROUP
- 4
- ANALYSIS BY AGE ETIOLOGY
- 5
- HOSPITAL COMPARISONS
- 6
- ANALYSIS OF CANADIAN AND INTL. RECORDS

Figure 67 RACE/ETHNICITY

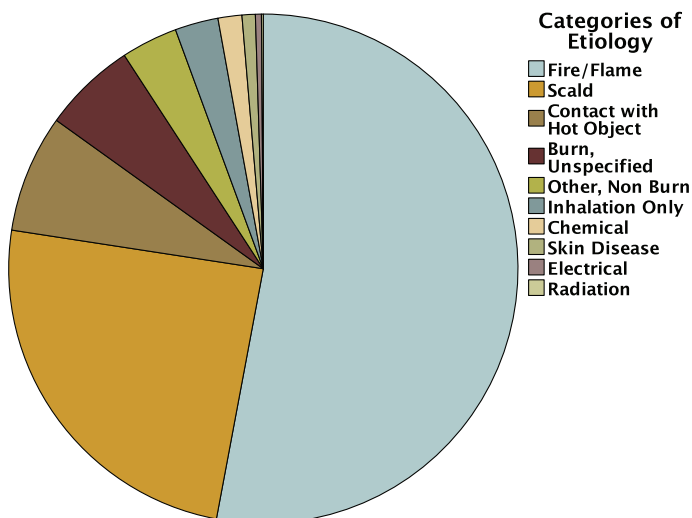


Total N=5,268 (Excluding 229 Unknown/Missing)

RACE/ETHNICITY Table 108

Race	Cases	% Valid
White	3,796	72.1%
Black	831	15.8%
Hispanic	261	5.0%
Other	174	3.3%
Asian	165	3.1%
Native American	41	0.8%
Unknown	229	
TOTAL	5,497	

Figure 68 ETIOLOGY



Total N=5,214 (Excluding 283 Unknown/Missing)

ETIOLOGY Table 109

Etiology	Cases	% Valid
Fire/Flame	2,761	53.0%
Scald	1,276	24.5%
Contact with Hot Object	390	7.5%
Burn, Unspecified	308	5.9%
Inhalation Only	143	2.7%
Chemical	79	1.5%
Electrical	20	0.4%
Radiation	6	0.1%
Burn Subtotal	4,983	95.6%
Other, Non Burn	187	3.6%
Skin Disease	44	0.8%
Non-Burn Subtotal	231	4.4%
Unknown	283	
TOTAL	5,497	

- 1 ANALYSIS OF CONTRIBUTING FACTORS
- 2 ANALYSIS OF ALL U.S. RECORDS
- 3 ANALYSIS BY AGE GROUP
- 4 ANALYSIS BY AGE ETIOLOGY
- 5 HOSPITAL COMPARISONS
- 6 ANALYSIS OF CANADIAN AND INTL. RECORDS

Table 110 HOSPITAL DAYS: LIVED/DIED BY INHALATION INJURY

Inhalation Injury	Total		Lived		Died	
	Cases	Mean +/- SEM	Cases	Mean +/- SEM	Cases	Mean +/- SEM
No	4,387	13.3+/-0.4	3,720	13.2+/-0.4	667	13.9+/-0.6
Yes	777	11.5+/-0.6	385	15.8+/-1.0	392	7.2+/-0.5
Subtotal	5,164	13.1 +/-0.3	4,105	13.5+/-0.4	1,059	11.5+/-0.4
Missing	333	12.9+/-0.8	254	13.0+/-0.9	79	12.3+/-2.0
TOTAL	5,497	13.0 +/-0.3	4,359	13.4+/-0.4	1,138	11.5+/-0.4

Total N=5,497

Table 111 TOP TEN COMPLICATIONS

Top Ten Complications	Count	Percent of All Complications	Percent of Patients with Complication
Urinary tract infection	423	11.8	7.9
Pneumonia	331	9.2	6.2
Respiratory failure	274	7.6	5.1
Arrhythmia	171	4.8	3.2
Cardiac arrest	170	4.7	3.2
Cellulitis	161	4.5	3.0
Septicemia	152	4.2	2.8
Renal failure (requiring CVVH/dialysis)	146	4.1	2.7
Wound infection (non-surgical)	107	3.0	2.0
Other cardiovascular	101	2.8	1.9
Total Complications	3,597		

Total N=5,365 (Excluding 132 cases from non ABA burn registry software centers)

Table 112 TOP TEN PROCEDURES

Top Ten Procedures Codes	Count	Percent of All Procedures
86.22 Excisional debridement of wound, infection, or burn	2,619	14.4
86.69 Other skin graft to other sites	1,892	10.4
93.57 Application of other wound dressing	924	5.1
86.66 Homograft to skin	912	5.0
38.93 Venous catheterization, not elsewhere classified	853	4.7
86.28 Nonexcisional debridement of wound, infection or burn	841	4.6
87.44 Routine chest x-ray, so described	563	3.1
96.04 Insertion of endotracheal tube	473	2.6
86.65 Heterograft to skin	453	2.5
38.91 Arterial catheterization	392	2.2
Total Procedures	18,191	

Total N=5,497

- 1
- ANALYSIS OF CONTRIBUTING
- 2
- ANALYSIS OF ALL
- 3
- ANALYSIS BY AGE GROUP
- 4
- ANALYSIS BY AGE ETIOLOGY
- 5
- HOSPITAL COMPARISONS
- 6
- ANALYSIS OF CANADIAN AND INTL. RECORDS

Table 113 LIVED/DIED BY BURN GROUP SIZE (% TBSA)

	Lived	Died	
%TBSA	Cases	Cases	Mortality Rate
0.1 - 9.9	2,882	189	6.2
10 - 19.9	589	203	25.6
20 - 29.9	108	190	63.8
30 - 39.9	40	125	75.8
40 - 49.9	15	86	85.1
50 - 59.9	2	62	96.9
60 - 69.9	4	43	91.5
70 - 79.9	2	36	94.7
80 - 89.9	1	32	97.0
> 90	0	30	100.0
Subtotal	3,643	996	21.5
Missing or 0%	716	142	16.6
TOTAL	4,359	1,138	20.7

Total N=5,497

Table 114 HOSPITAL DAYS BY BURN GROUP SIZE (% TBSA)

%TBSA	Cases	Mean +/- SEM
0.1 - 9.9	3,071	11.4+/-0.5
10 - 19.9	792	22.9+/-0.7
20 - 29.9	298	21+/-1.2
30 - 39.9	165	17.3+/-2.0
40 - 49.9	101	8.9+/-1.4
50 - 59.9	64	3.0+/-0.7
60 - 69.9	47	5.0+/-2.2
70 - 79.9	38	1.6+/-0.5
80 - 89.9	33	1.0+/-0.0
> 90	30	1.7+/-0.5
Subtotal	4,639	13.7+/-0.4
Missing or 0%	858	9.4+/-0.5
TOTAL	5,497	13.0+/-0.3

Total N=5,497

Table 115 MEAN CHARGES FOR TOP FIVE MS-DRGS

MS-DRG Code	Cases	Cases with Valid Charges	Mean +/- SEM
935 Non-extensive burns	1,145	527	\$53061 +/- 3811
928 Full thickness burn w skin graft or inhal inj w CC/MCC	776	379	\$226104 +/- 13515
929 Full thickness burn w skin graft or inhal inj w/o CC/MCC	550	207	\$125091 +/- 9346
934 Full thickness burn w/o skin grft or inhal inj	402	211	\$58996 +/- 5138
933 Extensive burns or full thickness burns w MV 96+ hrs w/o skin graft	292	150	\$58544 +/- 8460

Total N=3,165

1 ANALYSIS OF CONTRIBUTING FACTORS

2 ANALYSIS OF ALL U.S. RECORDS

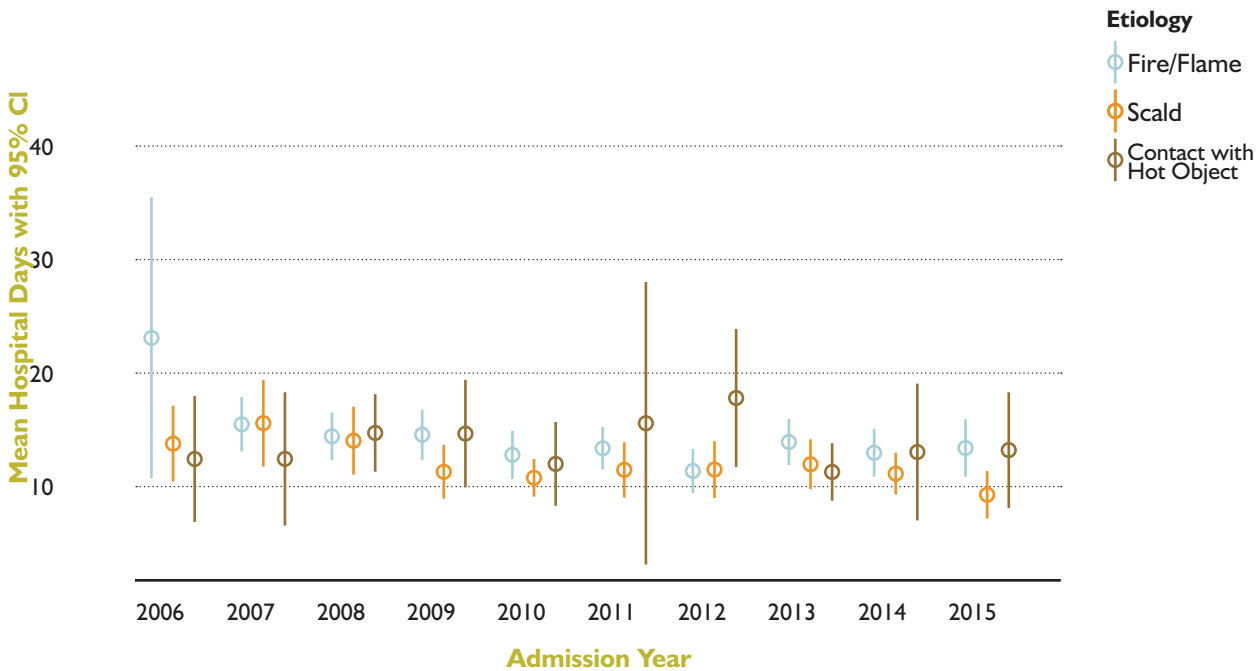
3 ANALYSIS BY AGE GROUP

4 ANALYSIS BY AGE ETIOLOGY

5 HOSPITAL COMPARISONS

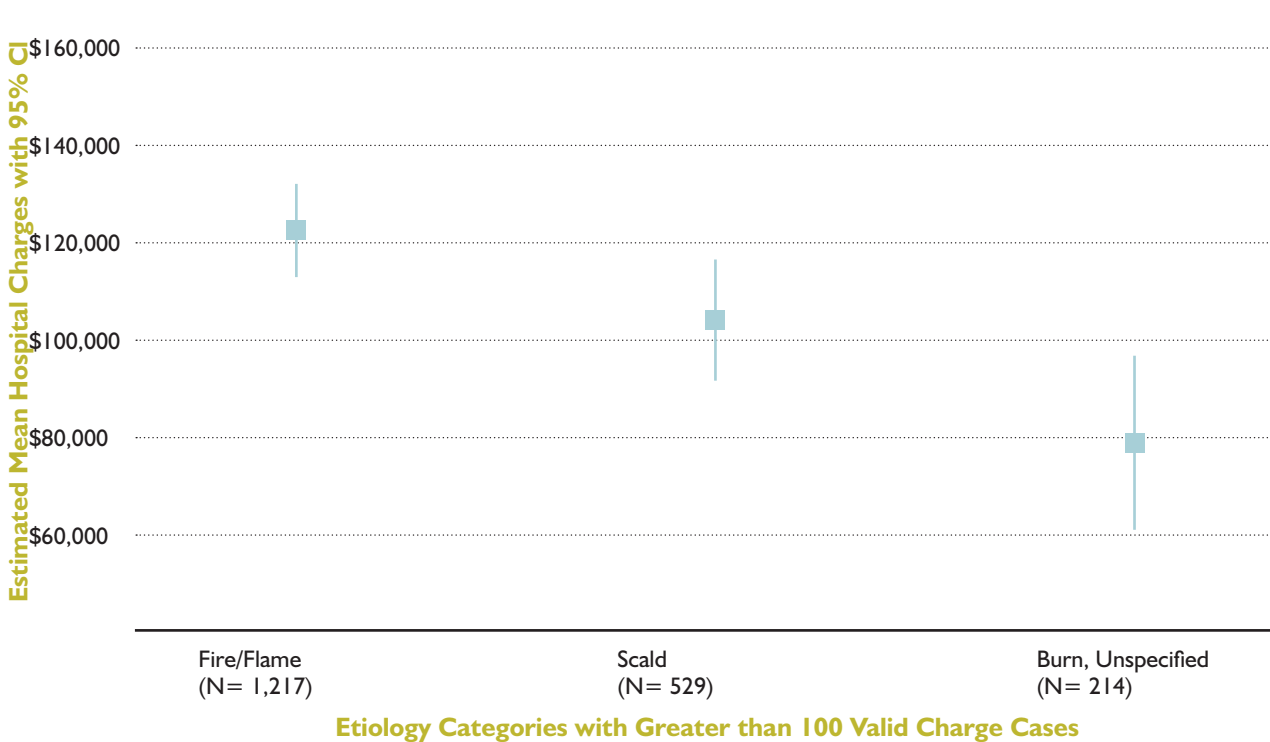
6 ANALYSIS OF CANADIAN AND INTL. RECORDS

Figure 69 MEAN HOSPITAL DAYS FOR FIRE/FLAME, CONTACT WITH HOT OBJECT, AND SCALD BY ADMISSION YEAR



Total N=5,497

Figure 70 MEAN CHARGES FOR ETIOLOGY CATEGORIES WITH GREATER THAN 100 VALID CHARGE CASES



Total N=2,141

- 1 ANALYSIS OF CONTRIBUTING
- 2 ANALYSIS OF ALL
- 3 ANALYSIS BY AGE GROUP
- 4 ANALYSIS BY AGE ETIOLOGY
- 5 HOSPITAL COMPARISONS
- 6 ANALYSIS OF CANADIAN AND INTL. RECORDS

4

Analysis by Etiology



Analysis of burn by etiology illuminates the predominant causes of burden of injury in the population. Flame and scald burns are by far the most common causes of burn injury. Contact burns are substantially less frequent. Chemical and electrical injuries are relatively uncommon causes of significant burn injury.

Flame burns are the most common type of burn represented in the database. The vast majority of these burns are accidental and the majority occur outside of the workplace, largely in and around the home.

1 ANALYSIS OF CONTRIBUTING FACTORS

2 ANALYSIS OF ALL U.S. RECORDS

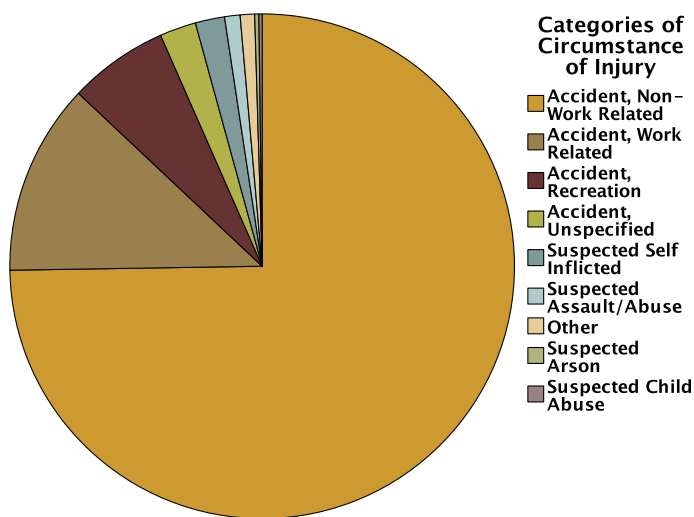
3 ANALYSIS BY AGE

4 ANALYSIS BY AGE ETIOLOGY

5 HOSPITAL COMPARISONS

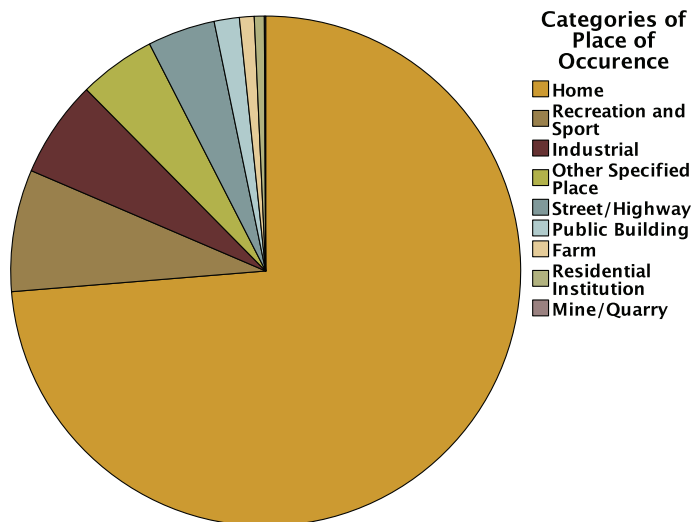
6 ANALYSIS OF CANADIAN AND INTL. RECORDS

Figure 71 CIRCUMSTANCE OF INJURY



Total N=76,275 (Excluding 4,308 Unknown/Missing)

Figure 72 PLACE OF OCCURRENCE - E849 CODE



Total N=72,021 (Excluding 8,562 Unknown/Missing)

Table 116 CIRCUMSTANCE OF INJURY

Circumstance of Injury	Cases	% Valid
Accident, Non-Work Related	57,017	74.8%
Accident, Work Related	9,356	12.3%
Accident, Recreation	4,874	6.4%
Accident, Unspecified	1,772	2.3%
Suspected Self Inflicted	1,432	1.9%
Suspected Assault/Abuse	759	1.0%
Other	701	0.9%
Suspected Arson	204	0.3%
Suspected Child Abuse	160	0.2%
Unknown	4,308	
Total	80,583	

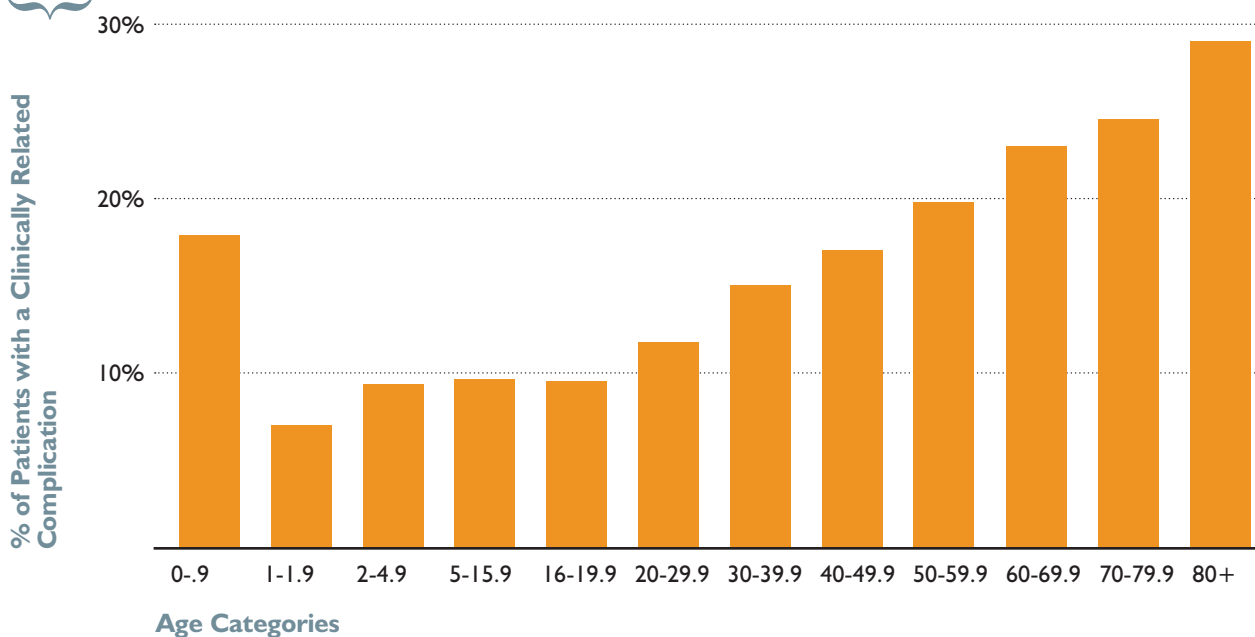
Table 117 PLACE OF OCCURRENCE - E849 CODE

Place of Occurrence	Cases	% Valid
Home	53,084	73.7%
Recreation and Sport	5,570	7.7%
Industrial	4,434	6.2%
Other Specified Place	3,515	4.9%
Street/Highway	3,081	4.3%
Public Building	1,149	1.6%
Farm	673	0.9%
Residential Institution	457	0.6%
Mine/Quarry	58	0.1%
Unspecified	8,562	
Total	80,583	

Complications of flame burns are high in infants, lowest in children and then increasingly common with advancing age.

Figure 73

PERCENT OF PATIENT WITH CLINICALLY RELEVANT COMPLICATIONS BY AGE GROUP



Total N=80,079 (Excluding 504 cases from non ABA burn registry software centers or missing/unknown age)

Table 118

COMPLICATION RATE BY AGE GROUP

Age Category	No Complication # of Cases	Complication # of Cases	Complication Rate
0-9	173	37	17.6
1-1.9	722	54	7.0
2-4.9	2,022	204	9.2
5-15.9	6,349	670	9.5
16-19.9	4,240	439	9.4
20-29.9	11,857	1,568	11.7
30-39.9	9,897	1,709	14.7
40-49.9	10,762	2,162	16.7
50-59.9	9,847	2,389	19.5
60-69.9	5,949	1,727	22.5
70-79.9	3,457	1,105	24.2
80 and Over	1,959	781	28.5
Subtotal	67,234	12,845	16.0
Missing	0	0	
Total	67,234	12,845	16.0

Total N=80,079 (Excluding 504 cases from non ABA burn registry software centers)

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Complications of flame burns are predominantly infectious in nature, followed by organ failure, most commonly respiratory and renal failure. Procedures performed for flame burns are largely surgeries to excise and graft the burn.

Table
119 TOP TEN COMPLICATIONS

Top Ten Complications	Count	Percent of All Complications	Percent of Patients with Complication
Pneumonia	4,318	12.3	5.4
Urinary tract infection	2,698	7.7	3.4
Respiratory failure	2,437	6.9	3.0
Cellulitis	1,958	5.6	2.4
Septicemia	1,865	5.3	2.3
Wound infection (non-surgical)	1,618	4.6	2.0
Renal failure (requiring CVVH/dialysis)	1,195	3.4	1.5
Bacteremia	1,005	2.9	1.3
Arrythmia	951	2.7	1.2
Other hematologic	908	2.6	1.1
Total Complications	35,198		

Total N=80,079 (Excluding 504 cases from non ABA burn registry software users)

Table
120 TOP TEN PROCEDURES

Top Ten Procedures Codes	Count	Percent of All Procedures
86.22 Excisional debridement of wound, infection, or burn	46,739	16.0
86.69 Free skin graft	32,422	11.1
86.66 Homograft to skin	20,318	7.0
86.28 Nonexcisional debridement of wound, infection or burn	17,660	6.1
93.57 Application of other wound dressing	16,700	5.7
86.65 Heterograft to skin	12,289	4.2
38.93 Venous catheterization, not elsewhere classified	12,198	4.2
86.62 Other skin graft to hand	7,044	2.4
38.91 Arterial catheterization	5,436	1.9
87.44 Routine chest x-ray, so described	5,138	1.8
Total Procedures	291,402	

Total N=80,583

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ANALYSIS OF CANADIAN AND INTL. RECORDS

Inhalation injury dramatically increases the mortality rate for flame burns. The mortality rate for flame burns rises steadily with increasing body surface area. For the entire population, a 60-69% burn confers a 50% mortality from flame burns.

Table 121 HOSPITAL DAYS: LIVED/DIED BY INHALATION INJURY

Inhalation Injury	Total		Lived		Died	
	Cases	Mean +/- SEM	Cases	Mean +/- SEM	Cases	Mean +/- SEM
No	62,939	9.9+/-0.0	61,197	9.7+/-0.0	1,742	19.4+/-0.7
Yes	12,595	20.3+/-0.2	10,050	21.9+/-0.3	2,545	13.8+/-0.5
Subtotal	75,534		71,247		4,287	
Missing	5,049	11.8+/-0.3	4,651	11.6+/-0.3	398	14.1+/-1.3
TOTAL	80,583		75,898		4,685	

Total N=80,583

Table 122 HOSPITAL DAYS: LIVED/DIED BY BURN SIZE GROUP (%TBSA)

% TBSA	Total		Lived		Died	
	Cases	Mean +/- SEM	Cases	Mean +/- SEM	Cases	Mean +/- SEM
0.1 - 9.9	46,340	6+/-0.1	45,859	5.9+/-0.0	481	12.0+/-0.8
10 - 19.9	13,310	14.8+/-0.1	12,835	14.6+/-0.1	475	18.7+/-1.1
20 - 29.9	4,831	26.2+/-0.3	4,330	26.9+/-0.3	501	19.9+/-1.0
30 - 39.9	2,475	37.1+/-0.7	2,000	41.0+/-0.8	475	20.3+/-1.2
40 - 49.9	1,511	43.9+/-1.0	1,051	54.0+/-1.0	460	20.8+/-1.9
50 - 59.9	918	49.3+/-1.6	543	69.6+/-1.9	375	19.9+/-2.2
60 - 69.9	697	50.4+/-2.0	342	82.9+/-2.8	355	19.1+/-1.9
70 - 79.9	471	45.4+/-2.7	177	95.6+/-4.4	294	15.2+/-1.8
80 - 89.9	440	27.3+/-2.2	74	105.6+/-5.8	366	11.5+/-1.4
> 90	484	13.2+/-2.0	29	116.9+/-21.1	455	6.6+/-1.2
Subtotal	71,477	12.3+/-0.0	67,240	12.0+/-0.0	4,237	16.5+/-0.4
Missing or 0%	9,106	6.8+/-0.1	8,658	6.6+/-0.1	448	10.6+/-1.1
TOTAL	80,583		75,898		4,685	

Total N=80,583

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- ANALYSIS OF CANADIAN AND INTL. RECORDS

Table 123 provides a more precise view of the relationship between age, burn size and the presence or absence of inhalation injury in mortality rates related to flame burns.

Table
123 MORTALITY RATE FOR MATRIX OF MAIN PREDICTORS

TBSA Category	Age	Inhalation Injury	Lived	Died	Mortality Rate
0.1-19.9	0-59.9	No	41,610	102	0.2
0.1-19.9	0-59.9	Yes	4,000	195	4.6
0.1-19.9	60 and Over	No	8,395	319	3.7
0.1-19.9	60 and Over	Yes	1,370	267	16.3
20-39.9	0-59.9	No	3,958	114	2.8
20-39.9	0-59.9	Yes	1,213	201	14.2
20-39.9	60 and Over	No	609	312	33.9
20-39.9	60 and Over	Yes	215	274	56.0
40-59.9	0-59.9	No	864	138	13.8
40-59.9	0-59.9	Yes	535	236	30.6
40-59.9	60 and Over	No	74	179	70.8
40-59.9	60 and Over	Yes	41	216	84.0
60 and Over	0-59.9	No	319	335	51.2
60 and Over	0-59.9	Yes	268	623	69.9
60 and Over	60 and Over	No	6	156	96.3
60 and Over	60 and Over	Yes	2	251	99.2
TOTAL			63,479	3,918	5.8

Total N=67,397 (Excluding 13,186 Unknown/Missing)

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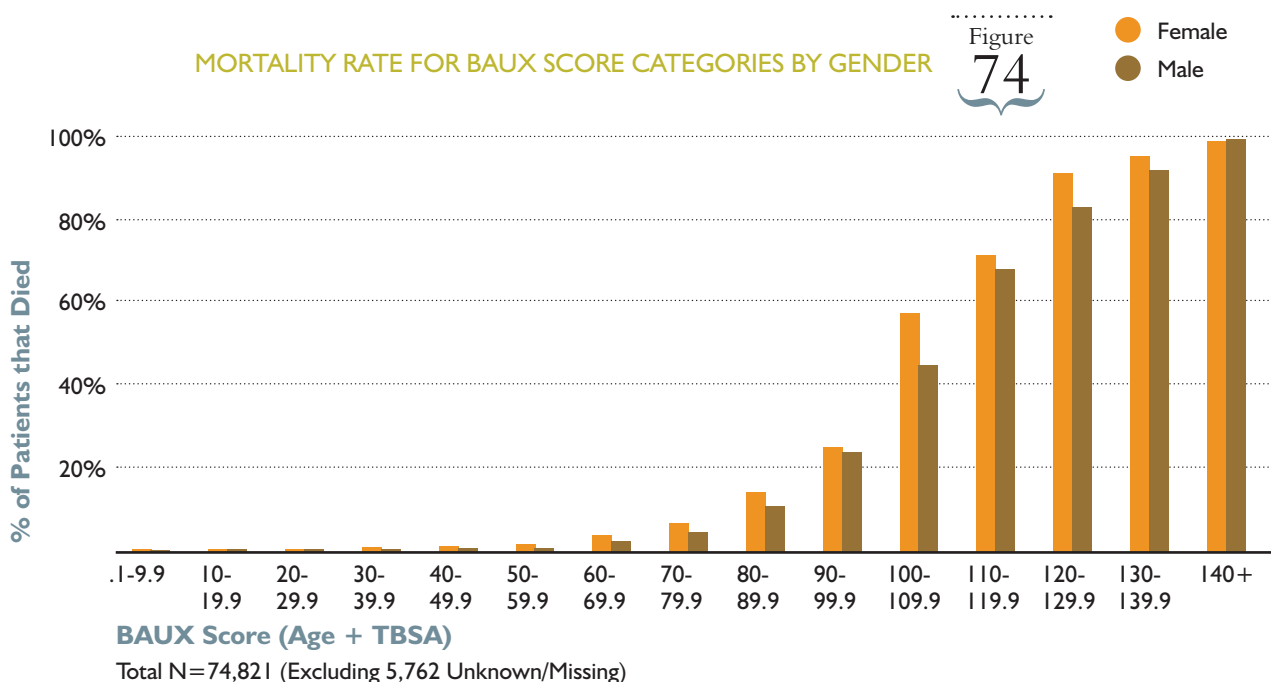
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ANALYSIS OF CANADIAN AND INTL. RECORDS

The Baux score illustrates the impact of age plus body surface area in predicting mortality. Mortality becomes significant at a Baux score greater or equal to 80. Survival is slightly favored for males based on the Baux score.



NUMBER OF CASES IN BAUX SCORE CATEGORIES BY GENDER

Table 124

BAUX Score (Age + TBSA)	Female		Male	
	Lived	Died	Lived	Died
0-9.9	975	8	1,550	6
10-19.9	1,119	10	3,898	10
20-29.9	1,700	13	7,783	23
30-39.9	1,954	25	8,128	27
40-49.9	2,333	34	8,122	63
50-59.9	2,724	53	8,661	76
60-69.9	2,305	99	6,854	158
70-79.9	1,689	118	4,367	222
80-89.9	1,068	181	2,577	322
90-99.9	542	182	1,155	366
100-109.9	158	215	444	362
110-119.9	68	167	172	359
120-129.9	14	137	64	304
130-139.9	5	105	19	222
140 and Over	2	158	3	343
Total	16,656	1,505	53,797	2,863

Total N=74,821 (Excluding 5,762 Unknown/Missing)

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ANALYSIS OF CONTRIBUTING

ANALYSIS OF ALL U.S. RECORDS

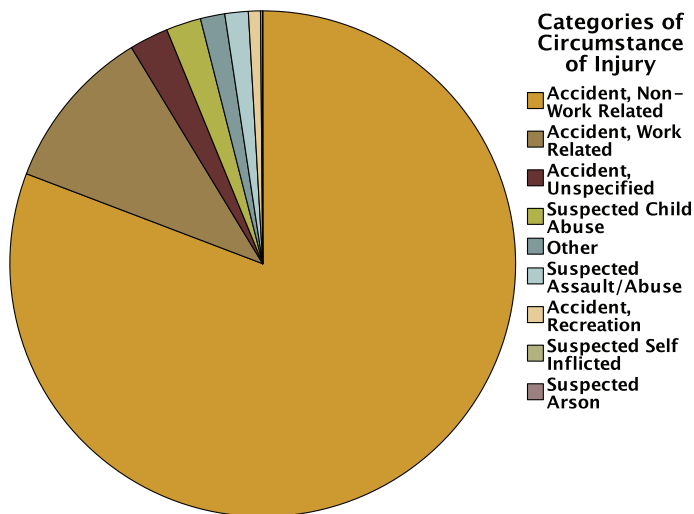
ANALYSIS BY AGE ETIOLOGY

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ANALYSIS OF CANADIAN AND INTL. RECORDS

Scald burns are the second most common etiology of burn injury in the National Burn Repository. They are predominantly accidental in nature and most scald burns occur in the home.

Figure 75 CIRCUMSTANCE OF INJURY

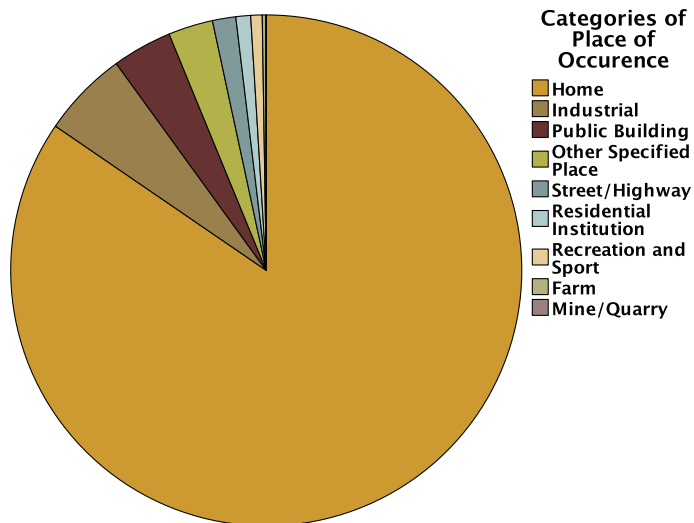


Total N=62,107 (Excluding 2,688 Unknown/Missing)

Table 125 CIRCUMSTANCE OF INJURY

Circumstance of Injury	Cases	% Valid
Accident, Non-Work Related	50,176	80.8%
Accident, Work Related	6,535	10.5%
Accident, Unspecified	1,551	2.5%
Suspected Child Abuse	1,385	2.2%
Other	968	1.6%
Suspected Assault/Abuse	928	1.5%
Accident, Recreation	477	0.8%
Suspected Self Inflicted	77	0.1%
Suspected Arson	10	0.0%
Unknown	2,688	
Total	64,795	

Figure 76 PLACE OF OCCURRENCE - E849 CODE



Total N=60,968 (Excluding 3,827 Unknown/Missing)

Table 126 PLACE OF OCCURRENCE - E849 CODE

Place of Occurrence	Cases	% Valid
Home	51,549	84.6%
Industrial	3,334	5.5%
Public Building	2,301	3.8%
Other Specified Place	1,726	2.8%
Street/Highway	897	1.5%
Residential Institution	569	0.9%
Recreation and Sport	439	0.7%
Farm	144	0.2%
Mine/Quarry	9	0.0%
Unspecified	3,827	
Total	64,795	

1 ANALYSIS OF CONTRIBUTING FACTORS

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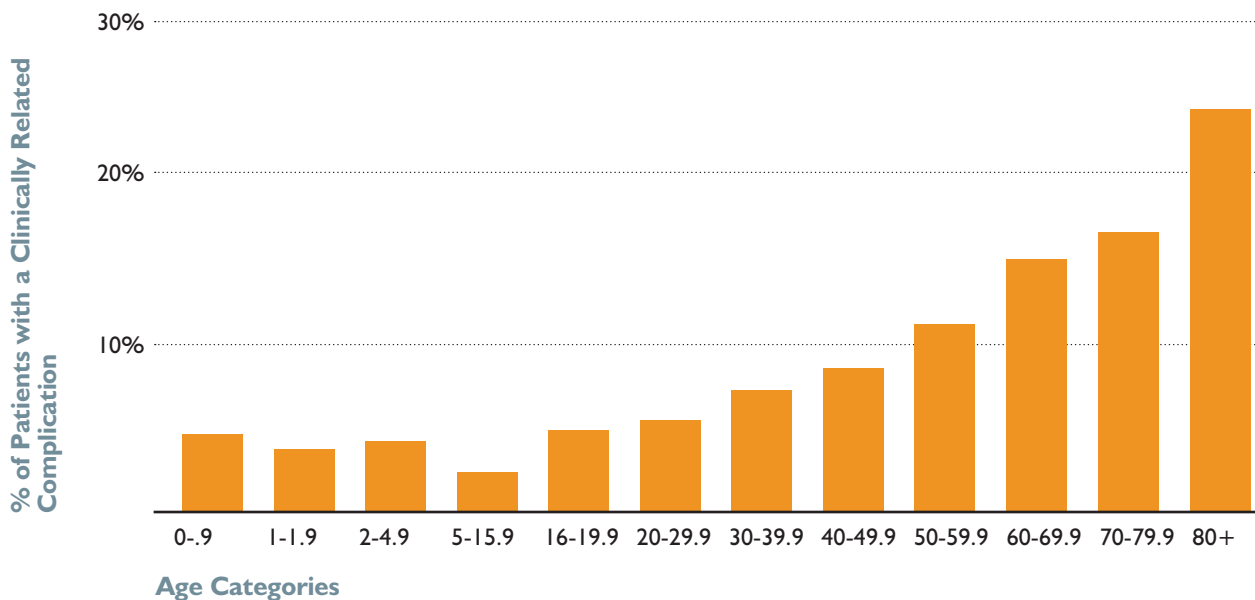
5 HOSPITAL COMPARISONS

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Complication rates for scald injuries are quite low in children and young adults and rise steadily with advancing age. The overall rate of complication for scald burns is quite low. However, a substantial fraction of scald injuries reported in the National Burn Repository received skin grafts.

Figure 77

PERCENT OF PATIENT WITH CLINICALLY RELEVANT COMPLICATIONS BY AGE GROUP



Total N=64,436 (Excluding 359 cases from non ABA burn registry software centers or missing/unknown age)

Table 127

COMPLICATION RATE BY AGE GROUP

Age Category	No Complication # of Cases	Complication # of Cases	Complication Rate
0-.9	2,582	124	4.6
1-1.9	10,289	395	3.7
2-4.9	8,263	353	4.1
5-15.9	6,795	160	2.3
16-19.9	2,281	116	4.8
20-29.9	7,723	438	5.4
30-39.9	6,060	466	7.1
40-49.9	6,113	560	8.4
50-59.9	5,084	629	11.0
60-69.9	2,683	465	14.8
70-79.9	1,329	259	16.3
80 and Over	970	299	23.6
Subtotal	60,172	4,264	6.6
Missing	0	0	
Total	60,172	4,264	6.6

Total N=64,436 (Excluding 359 cases from non ABA burn registry software centers)

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Most complications are infectious in nature. Scald burns rarely result in organ failure. Most procedures performed in the setting of scald injury are wound management and surgery to excise and graft the burn.

Table
128 TOP TEN COMPLICATIONS

Top Ten Complications	Count	Percent of All Complications	Percent of Patients with Complication
Cellulitis	1255	17.1	1.9
Urinary tract infection	855	11.7	1.3
Wound infection (non-surgical)	487	6.7	0.8
Pneumonia	411	5.6	0.6
Respiratory failure	260	3.6	0.4
Septicemia	217	3.0	0.3
Bacteremia	196	2.7	0.3
Other blood/systemic infection	186	2.5	0.3
Skin graft loss, other	180	2.5	0.3
Readmission, unscheduled	179	2.4	0.3
Total Complications	7,321		

Total N=64,436 (Excluding 359 cases from non ABA burn registry software centers)

Table
129 TOP TEN PROCEDURES

Top Ten Procedures Codes	Count	Percent of All Procedures
86.22 Excisional debridement of wound, infection, or burn	20,115	18.1
93.57 Application of other wound dressing	16,110	14.5
86.28 Nonexcisional debridement of wound, infection or burn	14,945	13.5
86.69 Other skin graft to other sites	12,795	11.5
86.66 Homograft to skin	7,866	7.1
86.65 Heterograft to skin	6,772	6.1
86.62 Other skin graft to hand	2,481	2.2
38.93 Venous catheterization, not elsewhere classified	2,207	2.0
86.67 Dermal regenerative graft	1,962	1.8
86.6 Free skin graft	1,922	1.7
Total Procedures	111,011	100

Total N=64,795

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ANALYSIS OF CANADIAN AND INTL. RECORDS

Most scald burns are of relatively small size and have minimal associated mortality. However, mortality for the relatively uncommon large surface area scald burns rivals that of flame burns.

Table 130 HOSPITAL DAYS: LIVED/DIED BY BURN SIZE GROUP (%TBSA)

% TBSA	Total		Lived		Dead	
	Cases	Mean +/- SEM	Cases	Mean +/- SEM	Cases	Mean +/- SEM
0.1 - 9.9	49,784	4.9+/-0.0	49,677	4.9+/-0.0	107	26.7+/-3.5
10 - 19.9	7,888	10.0+/-0.1	7,802	9.9+/-0.1	86	21.0+/-2.2
20 - 29.9	1,526	18.0+/-0.3	1,470	17.8+/-0.3	56	23.1+/-3.6
30 - 39.9	476	29.1+/-1.0	438	30.3+/-1.1	38	15.1+/-3.3
40 - 49.9	181	32.8+/-1.9	151	35.3+/-2.1	30	19.8+/-4.3
50 - 59.9	77	39.0+/-3.6	62	42.4+/-4.0	15	25+/-7.9
60 - 69.9	47	48.5+/-7.8	35	58.9+/-9.6	12	18.4+/-8.5
70 - 79.9	25	39.2+/-7.0	16	53.1+/-8.4	9	14.5+/-7.4
80 - 89.9	11	33.6+/-16.6	3	33.3+/-16.7	8	33.7+/-22.7
> 90	7	41.5+/-13.8	5	56.6+/-14.3	2	#VALUE
Subtotal	60,022	6.3+/-0.0	59,659	6.2+/-0.0	363	22.4+/-1.5
Missing or 0%	4,414	4.2+/-0.1	4,393	4.1+/-0.1	21	20.6+/-4.3
TOTAL	64,436		64,052		384	

Total N=64,795

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The Baux score illustrates the relationship between age and body surface area burn in mortality. Mortality from scald burns become significant with a Baux score of greater than 100.

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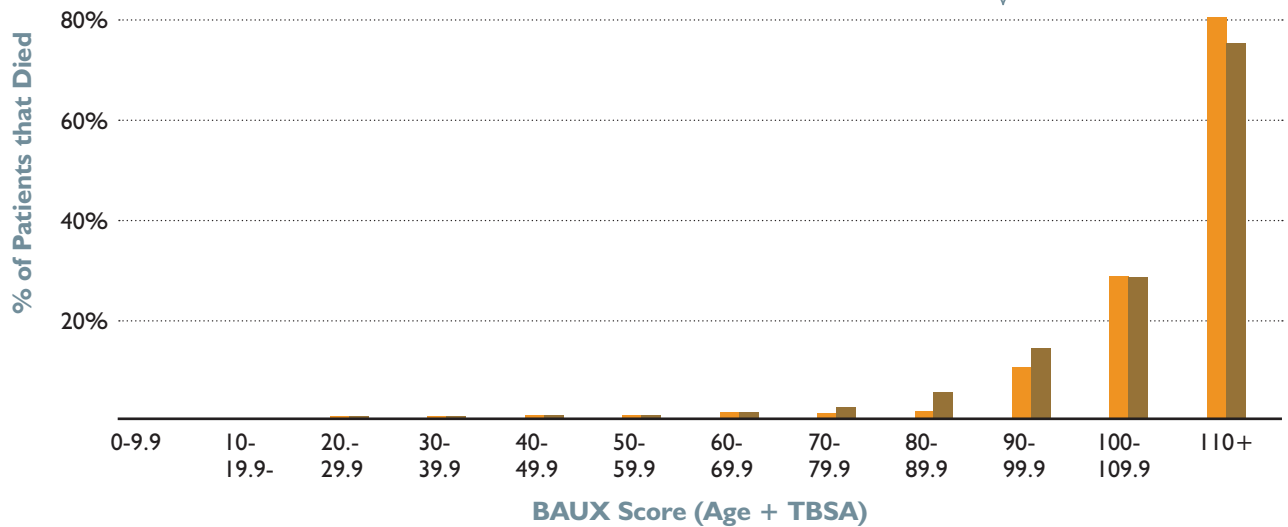
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MORTALITY RATE FOR BAUX SCORE CATEGORIES BY GENDER

Figure 78
● Female
● Male



Total N=61,862 (Excluding 2,933 Unknown/Missing)

NUMBER OF CASES IN BAUX SCORE CATEGORIES BY GENDER

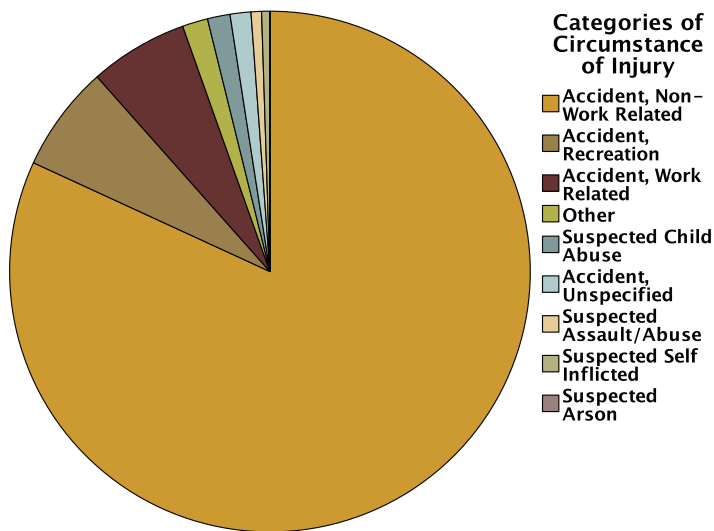
Table 131

BAUX Score (Age + TBSA)	Female		Male	
	Lived	Died	Lived	Died
0-9.9	7,320	0	9,506	0
10-19.9	4,605	3	5,131	2
20-29.9	3,091	1	4,631	3
30-39.9	2,723	4	4,064	2
40-49.9	2,601	11	3,708	8
50-59.9	2,393	7	3,605	10
60-69.9	1,737	17	2,227	19
70-79.9	1,040	14	1,137	27
80-89.9	692	11	546	29
90-99.9	370	41	213	35
100-109.9	79	31	49	19
110- and Over	12	48	10	30
Total	26,663	188	34,827	184

Total N=61,862 (Excluding 2,933 Unknown/Missing)

Contact burns occur mainly in the home and nearly always are accidental.

Figure 79 CIRCUMSTANCE OF INJURY

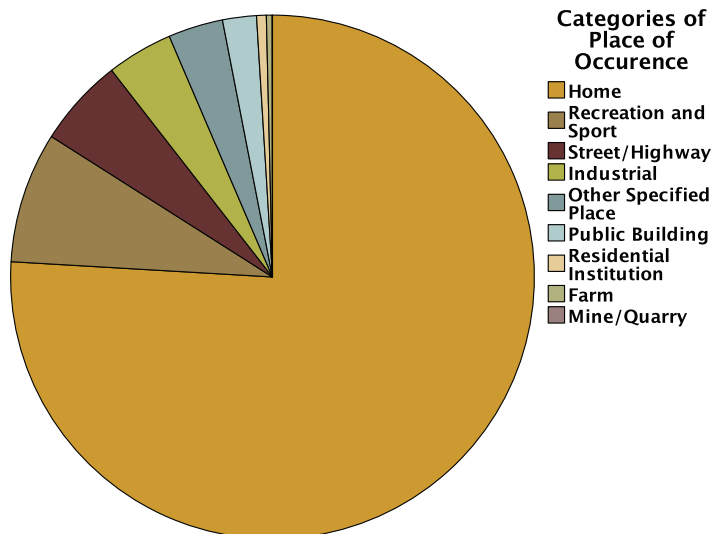


Total N= 16,247 (Excluding 719 Unknown/Missing)

Table 132 CIRCUMSTANCE OF INJURY

Circumstance of Injury	Cases	% Valid
Accident, Non-Work Related	13,300	81.9%
Accident, Work Related	994	6.1%
Accident, Recreation	1,070	6.6%
Other	256	1.6%
Accident, Unspecified	210	1.3%
Suspected Child Abuse	228	1.4%
Suspected Assault/Abuse	106	0.7%
Suspected Self Inflicted	82	0.5%
Suspected Arson	1	0.0%
Unknown	719	
Total	16,966	

Figure 80 PLACE OF OCCURRENCE - E849 CODE



Total N= 15,684 (Excluding 1,282 Unknown/Missing)

Table 133 PLACE OF OCCURRENCE - E849 CODE

Place of Occurrence	Cases	% Valid
Home	11,909	75.9%
Recreation and Sport	1,267	8.1%
Street/Highway	857	5.5%
Industrial	640	4.1%
Other Specified Place	531	3.4%
Public Building	328	2.1%
Residential Institution	94	0.6%
Farm	56	0.4%
Mine/Quarry	2	0.0%
Unspecified	1,282	
Total	16,966	

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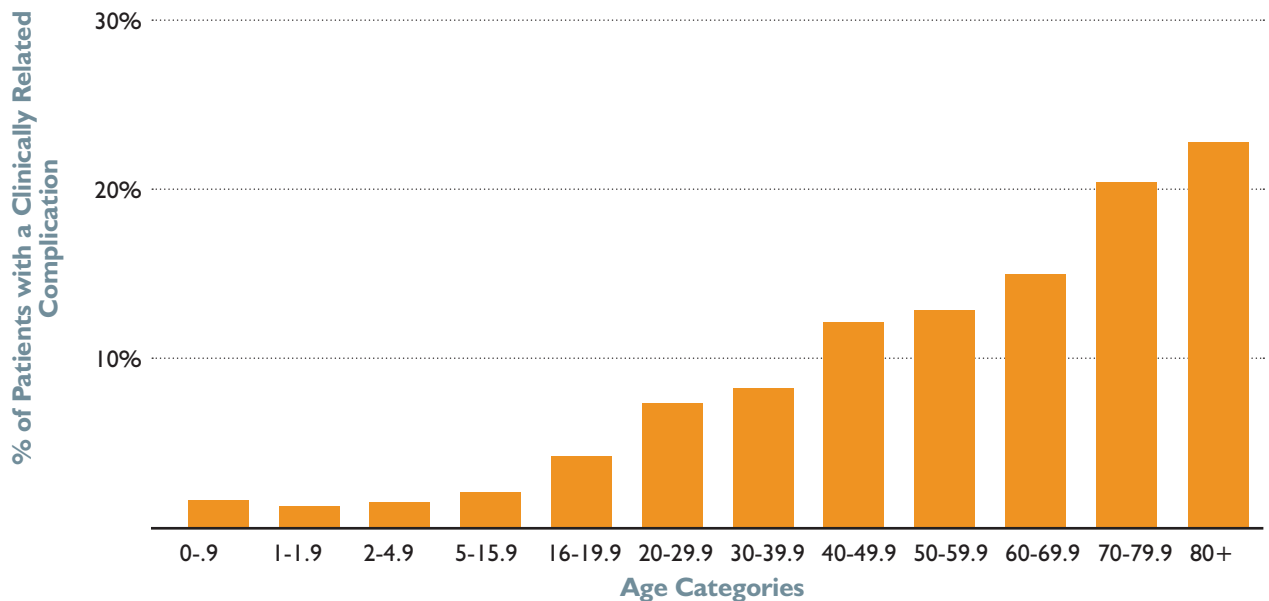
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ANALYSIS OF CANADIAN AND INTL. RECORDS

The rate of complications from contact burn rises steadily with advancing age.

Figure 81

PERCENT OF PATIENT WITH CLINICALLY RELEVANT COMPLICATIONS BY AGE GROUP



Total N= 16,890 (Excluding 76 cases from non ABA burn registry software centers or missing/unknown age)

Table 134

COMPLICATION RATE BY AGE GROUP

Age Category	No Complication # of Cases	Complication # of Cases	Complication Rate
0-.9	1,062	18	1.7
1-1.9	3,677	48	1.3
2-4.9	2,491	40	1.6
5-15.9	1,561	34	2.1
16-19.9	498	22	4.2
20-29.9	1,334	105	7.3
30-39.9	1,203	107	8.2
40-49.9	1,333	183	12.1
50-59.9	1,287	188	12.7
60-69.9	743	130	14.9
70-79.9	348	88	20.2
80 and Over	302	88	22.6
Subtotal	15,839	1,051	6.2
Missing	0	0	
Total	15,839	1,051	6.2

Total N= 16,890 (Excluding 76 cases from non ABA burn registry software centers)

1 ANALYSIS OF CONTRIBUTING

2 ANALYSIS OF ALL U.S. RECORDS

3 ANALYSIS BY AGE

4 ANALYSIS BY AGE ETIOLOGY

5 HOSPITAL COMPARISONS

6 ANALYSIS OF CANADIAN AND INTL. RECORDS

As with other types of burn injury, the majority of complications are infectious in nature and the primary procedures performed for victims of contact burns are surgeries to excise and graft the burn.

Table 135 TOP TEN COMPLICATIONS

Top Ten Complications	Count	Percent of All Complications	Percent of Patients with Complication
Cellulitis	127	16.7	0.8
Urinary tract infection	54	7.1	0.3
Wound infection (non-surgical)	51	6.7	0.3
Pneumonia	50	6.6	0.3
Respiratory failure	50	6.6	0.3
Septicemia	30	3.9	0.2
Other hematologic	23	3.0	0.1
Other blood/systemic infection	21	2.8	0.1
Arrythmia	20	2.6	0.1
Fluid/electrolyte	19	2.5	0.1
Total Complications	762		

Total N= 16,890 (Excluding 76 cases from non ABA burn registry software centers)

Table 136 TOP TEN PROCEDURES

Top Ten Procedures Codes	Count	Percent of All Procedures
86.22 Excisional debridement of wound, infection, or burn	6,190	19.6
93.57 Application of other wound dressing	4,370	13.8
86.69 Other skin graft to other sites	3,727	11.8
86.28 Nonexcisional debridement of wound, infection or burn	3,267	10.3
86.66 Homograft to skin	2,320	7.3
86.65 Heterograft to skin	913	2.9
86.62 Other skin graft to hand	681	2.2
86.67 Dermal regenerative graft	636	2.0
38.93 Venous catheterization, not elsewhere classified	496	1.6
86.91 Excision of skin for graft	442	1.4

Total N= 16,966

1

ANALYSIS OF CONTRIBUTING

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ANALYSIS OF ALL U.S. RECORDS

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HOSPITAL COMPARISONS

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ANALYSIS OF CANADIAN AND INTL. RECORDS

Contact burns tend to be quite small and are rarely lethal.

Table
137 HOSPITAL DAYS: LIVED/DIED BY BURN SIZE GROUP (%TBSA)

% TBSA	Total		Lived		Died	
	Cases	Mean +/- SEM	Cases	Mean +/- SEM	Cases	Mean +/- SEM
0.1 - 9.9	15,149	5.6+/-0.1	15,080	5.5+/-0.1	69	22.9+/-3.4
10 - 19.9	439	20.0+/-0.9	419	20.0+/-0.9	20	19.1+/-4.7
20 - 29.9	50	27.8+/-3.9	42	32.3+/-4.3	8	4.6+/-1.6
30 - 39.9	14	43.2+/-9.0	10	52.8+/-10.8	4	19.5+/-9.2
40 - 49.9	3	33+/-19.3	2	45.5+/-25.5	1	8
50 - 59.9	3	69.0+/-25.9	2	93.0+/-17.0	1	21.0+/-0.0
60 - 69.9	1	37.0+/-0.0	0		1	37.0+/-0.0
70 - 79.9	3	67+/-4	3	67+/-4	0	
80 - 89.9	0		0		0	
> 90	0		0		0	
Subtotal	15,662	6.1 +/-0.1	15,558	6.0 +/-0.1	104	20.6 +/-2.5
Missing or 0%	1,304	4.0+/-0.2	1,299	4+/-0.2	5	19.6+/-9.6
TOTAL	16,966		16,857		109	

Total N= 16,966

1

ANALYSIS OF CONTRIBUTING

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ANALYSIS BY AGE ETIOLOGY

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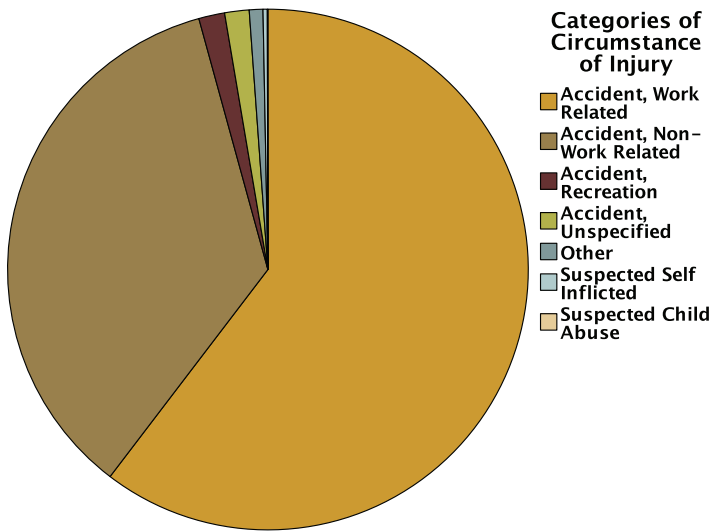
HOSPITAL COMPARISONS

6

ANALYSIS OF CANADIAN AND INTL. RECORDS

Electrical injuries are roughly equally distributed between work and non-work related environments. They are almost exclusively accidental in nature.

Figure 82 CIRCUMSTANCE OF INJURY

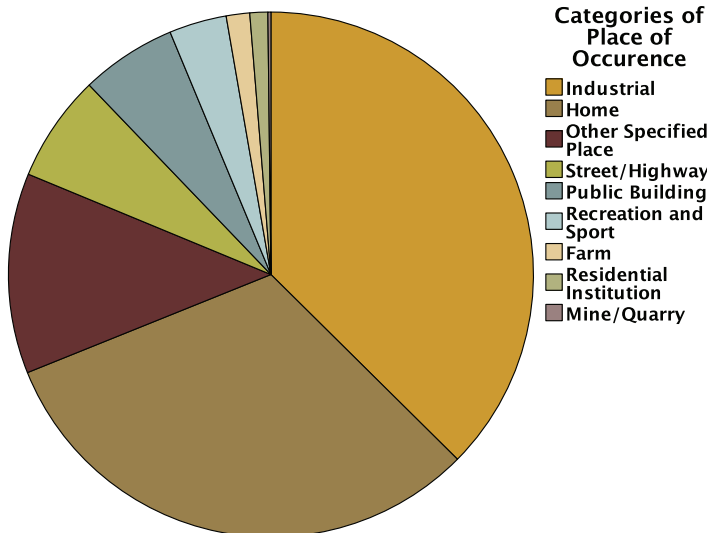


Total N=5,922 (Excluding 343 Unknown/Missing)

Table 138 CIRCUMSTANCE OF INJURY

Circumstance of Injury	Cases	% Valid
Accident, Work Related	3,575	60.4%
Accident, Non-Work Related	2,094	35.4%
Accident, Recreation	95	1.6%
Accident, Unspecified	90	1.5%
Other	50	0.8%
Suspected Self Inflicted	16	0.3%
Suspected Child Abuse	2	0.0%
Unknown	343	
Total	6,265	

Figure 83 PLACE OF OCCURRENCE - E849 CODE



Total N=5,342 (Excluding 923 Unknown/Missing)

Table 139 PLACE OF OCCURRENCE - E849 CODE

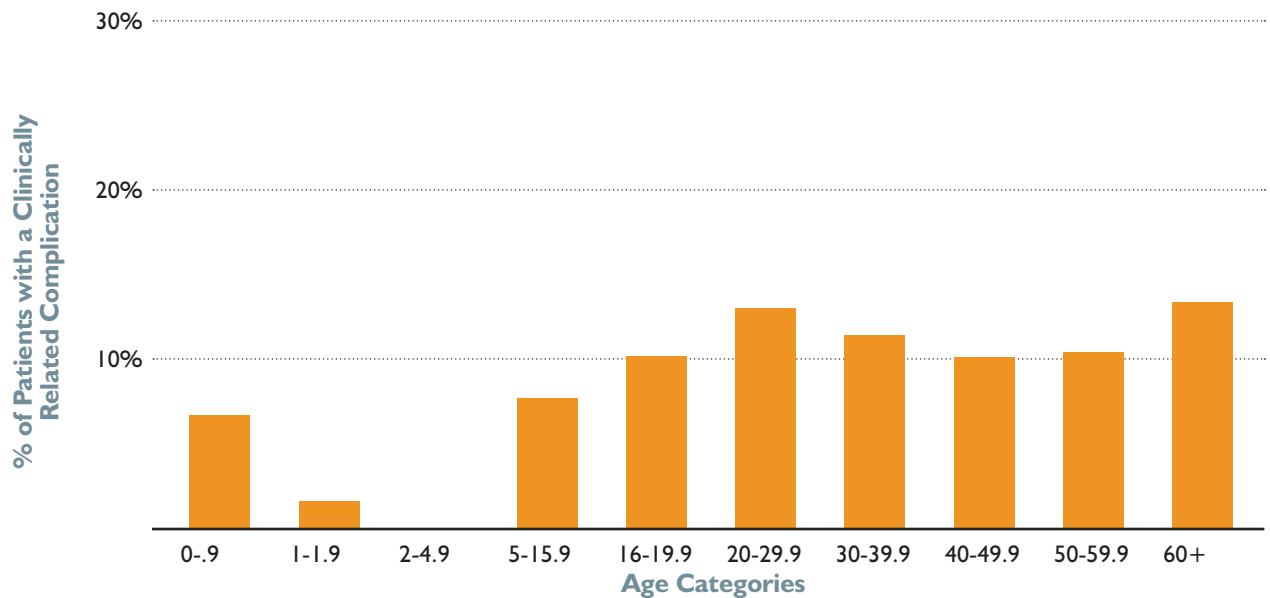
Place of Occurrence	Cases	% Valid
Industrial	1,999	37.4%
Home	1,682	31.5%
Other Specified Place	659	12.3%
Street/Highway	352	6.6%
Public Building	315	5.9%
Recreation and Sport	189	3.5%
Farm	77	1.4%
Residential Institution	59	1.1%
Mine/Quarry	10	0.2%
Unspecified	923	
Total	6,265	

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Electrical injuries occur mostly in adults and complication rates are relatively low.

Figure
84

PERCENT OF PATIENT WITH CLINICALLY RELEVANT COMPLICATIONS BY AGE GROUP



Total N=6,244 (Excluding 21 cases from non ABA burn registry software centers or missing/unknown age)

Table
140

COMPLICATION RATE BY AGE GROUP

Age Category	No Complication # of Cases	Complication # of Cases	Complication Rate
0-9	15	1	6.3
1-1.9	106	5	4.5
2-4.9	303	0	0.0
5-15.9	364	26	6.7
16-19.9	165	25	13.2
20-29.9	1,092	132	10.8
30-39.9	1,215	157	11.4
40-49.9	1,261	145	10.3
50-59.9	817	76	8.5
60 and Over	295	44	13.0
Subtotal	5,633	611	9.8
Missing	0	0	
Total	5,633	611	9.8

Total N=6,244 (Excluding 21 cases from non ABA burn registry software centers)

- 1
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ANALYSIS OF CANADIAN AND INTL. RECORDS

Complications include infections, organ failure and complications of surgery, in order of frequency. As with other etiologies of burn injury, most procedures performed for electrical injury are surgeries to excise and graft the burns.

Table
141 TOP TEN COMPLICATIONS

Top Ten Complications	Count	Percent of All Complications	Percent of Patients with Complication
Pneumonia	139	7.0	2.2
Septicemia	85	4.3	1.4
Wound infection (non-surgical)	79	4.0	1.3
Cellulitis	78	3.9	1.2
Respiratory failure	71	3.6	1.1
Urinary tract infection	49	2.5	0.8
Renal failure (requiring CVVH/dialysis)	46	2.3	0.7
Arrythmia	41	2.1	0.7
Skin graft loss, other	35	1.8	0.6
Readmission, unscheduled	34	1.7	0.5
Total Complications	1,992		

Total N=6,244 (Excluding 21 cases from non ABA burn registry software centers)

Table
142 TOP TEN PROCEDURES

Top Ten Procedures Codes	Count	Percent of All Procedures
86.22 Excisional debridement of wound, infection, or burn	3,254	16.3
86.69 Other skin graft to other sites	1,737	8.7
86.66 Homograft to skin	1,158	5.8
93.57 Application of other wound dressing	1,132	5.7
86.28 Nonexcisional debridement of wound, infection or burn	1,069	5.3
38.93 Venous catheterization, not elsewhere classified	587	2.9
86.65 Heterograft to skin	554	2.8
86.62 Other skin graft to hand	477	2.4
86.67 Dermal regenerative graft	341	1.7
83.14 Fasciotomy	337	1.7
Total Procedures	19990	

Total N=6,265

1	ANALYSIS OF CONTRIBUTING
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4	ANALYSIS BY AGE ETIOLOGY
5	HOSPITAL COMPARISONS
6	ANALYSIS OF CANADIAN AND INTL. RECORDS

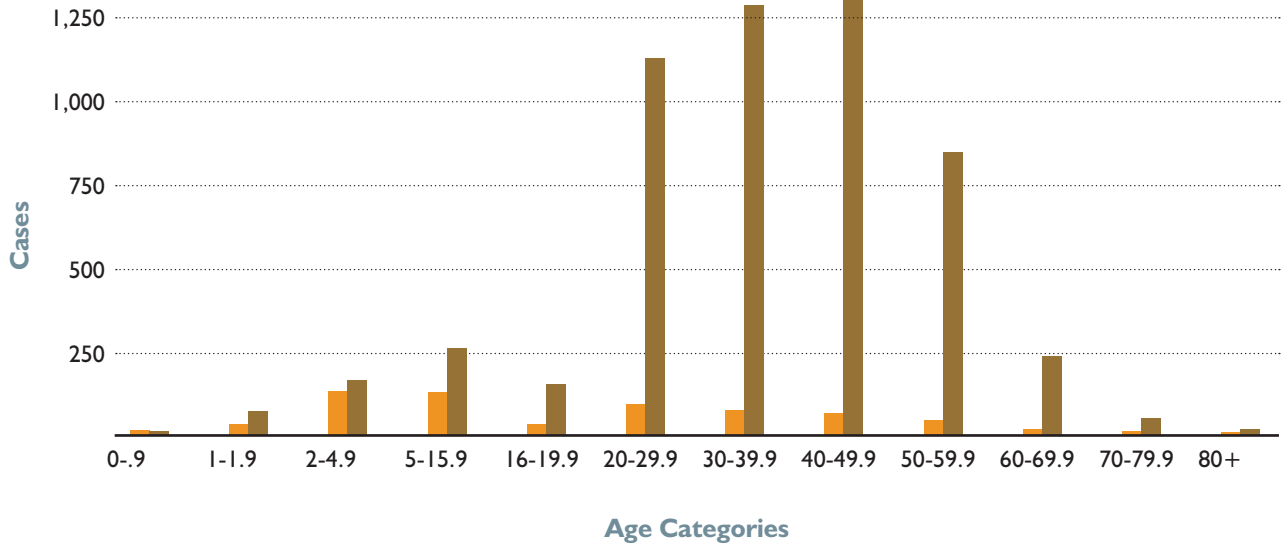
Electrical injuries occur predominantly to adult males.

- 1
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FREQUENCY OF RECORDS BY AGE CATEGORIES AND GENDER

Figure 85

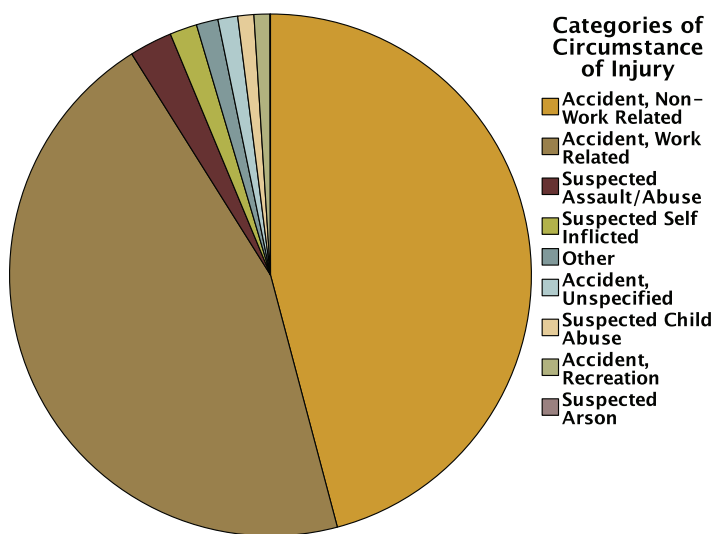
Female
Male



Total N=6,265 (Excluding 0 Unknown/Missing)

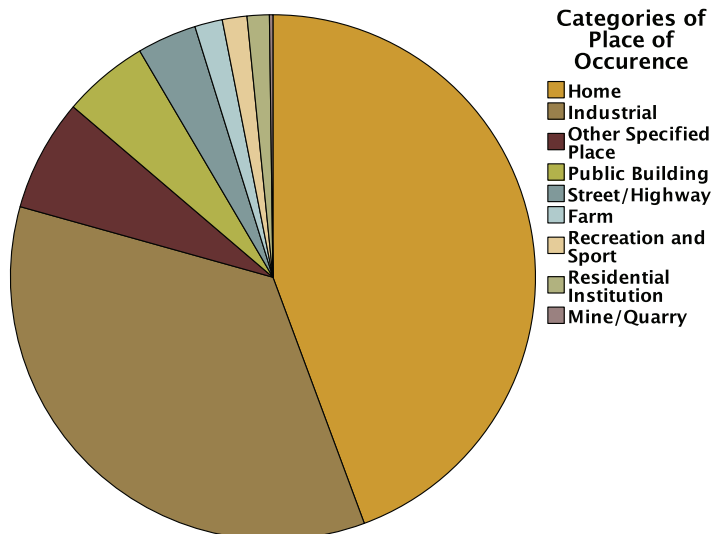
Chemical injuries make up a very small fraction of burn injuries within the database. Nearly half of these injuries occur within the home. The vast majority are accidental.

Figure 86 CIRCUMSTANCE OF INJURY



Total N=6,221 (Excluding 356 Unknown/Missing)

Figure 87 PLACE OF OCCURRENCE - E849 CODE



Total N=5,690 (Excluding 887 Unknown/Missing)

CIRCUMSTANCE OF INJURY

Table 143

Circumstance of Injury	Cases	% Valid
Accident, Non-Work Related	2,854	45.9%
Accident, Work Related	2,812	45.2%
Suspected Assault/Abuse	165	2.7%
Suspected Self Inflicted	105	1.7%
Other	84	1.4%
Accident, Unspecified	76	1.2%
Suspected Child Abuse	62	1.0%
Accident, Recreation	61	1.0%
Suspected Arson	2	0.0%
Unknown	356	
Total	6,577	

PLACE OF OCCURRENCE - E849 CODE

Table 144

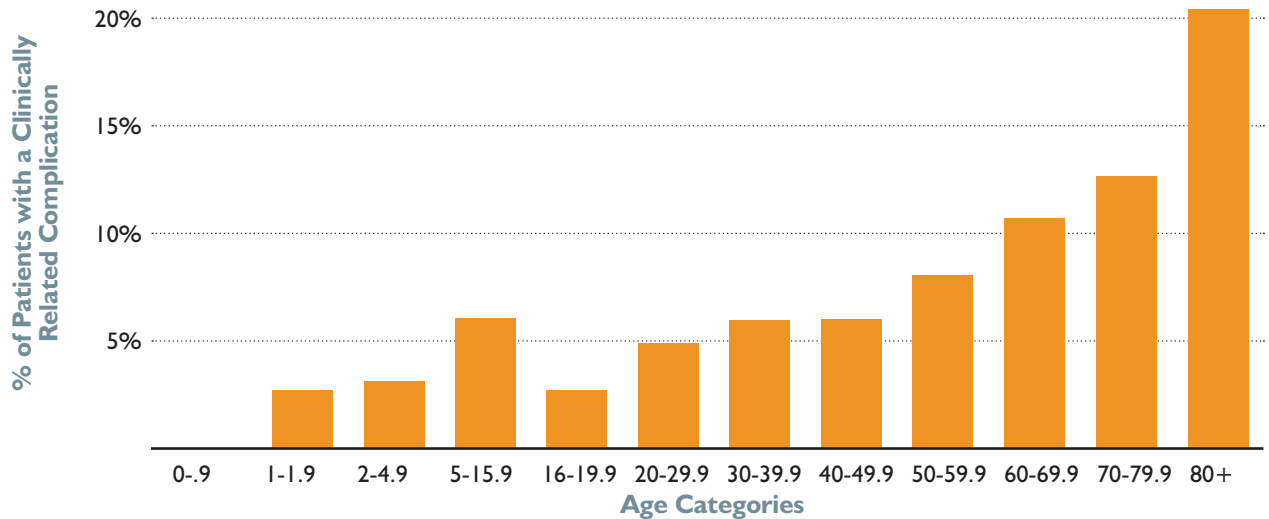
Place of Occurrence	Cases	% Valid
Home	2,523	44.3%
Industrial	1,991	35.0%
Other Specified Place	393	6.9%
Public Building	301	5.3%
Street/Highway	209	3.7%
Farm	97	1.7%
Recreation and Sport	86	1.5%
Residential Institution	78	1.4%
Mine/Quarry	12	0.2%
Unspecified	887	
Total	6,577	

- 1
- ANALYSIS OF CONTRIBUTING
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Chemical injuries are associated with a relatively low rate of complications under 60 years of age, as with other categories of burn injury, complication rates rise with age.

Figure 88

PERCENT OF PATIENT WITH CLINICALLY RELEVANT COMPLICATIONS BY AGE GROUP



Total N=6,520 (Excluding 57 cases from non ABA burn registry software centers or missing/unknown age)

Table 145

COMPLICATION RATE BY AGE GROUP

Age Category	No Complication		Complication	
	# of Cases	# of Cases	# of Cases	Complication Rate
0-9	44	0	0	0.0
1-1.9	175	5	5	2.8
2-4.9	187	6	6	3.1
5-15.9	213	14	14	6.2
16-19.9	245	7	7	2.8
20-29.9	1,160	61	61	5.0
30-39.9	1,248	80	80	6.0
40-49.9	1,298	84	84	6.1
50-59.9	970	85	85	8.1
60-69.9	373	45	45	10.8
70-79.9	124	18	18	12.7
80 and over	62	16	16	20.5
Subtotal	6,099	421	421	6.5
Missing	0	0	0	
Total	6,099	421	421	6.5

Total N=6,520 (Excluding 57 cases from non ABA burn registry software centers)

1 ANALYSIS OF CONTRIBUTING

2 ANALYSIS OF ALL U.S. RECORDS

3 ANALYSIS BY AGE

4 ANALYSIS BY AGE ETIOLOGY

5 HOSPITAL COMPARISONS

6 ANALYSIS OF CANADIAN AND INTL. RECORDS

Consistent with other types of burn injury, infections make up the large majority of complications of chemical burns. The vast majority of procedures performed for chemical burns are surgeries to excise and graft the burn injury.

Table
146 TOP TEN COMPLICATIONS

Top Ten Complications	Count	Percent of All Complications	Percent of Patients with Complication
Cellulitis	127	11.2	1.9
Urinary tract infection	54	4.8	0.8
Wound infection (non-surgical)	51	4.5	0.8
Pneumonia	50	4.4	0.8
Respiratory failure	50	4.4	0.8
Septicemia	30	2.6	0.5
Other hematologic	23	2.0	0.4
Other blood/systemic infection	21	1.9	0.3
Arrythmia	20	1.8	0.3
Fluid/electrolyte	19	1.7	0.3
Total Complications	1,134		

Total N=6,520 (Excluding 57 cases from non ABA burn registry software centers)

Table
147 TOP TEN PROCEDURES

Top Ten Procedures Codes	Count	Percent of All Procedures
86.22 Excisional debridement of wound, infection, or burn	1,784	17.2
86.69 Other skin graft to other sites	1,226	11.8
93.57 Application of other wound dressing	983	9.5
86.28 Nonexcisional debridement of wound, infection or burn	962	9.3
86.66 Homograft to skin	742	7.2
86.65 Heterograft to skin	421	4.1
38.93 Venous catheterization, not elsewhere classified	240	2.3
87.44 Routine chest x-ray, so described	193	1.9
86.6 Free skin graft	160	1.5
86.67 Dermal regenerative graft	143	1.4
Total Procedures	10,370	

Total N=6,577

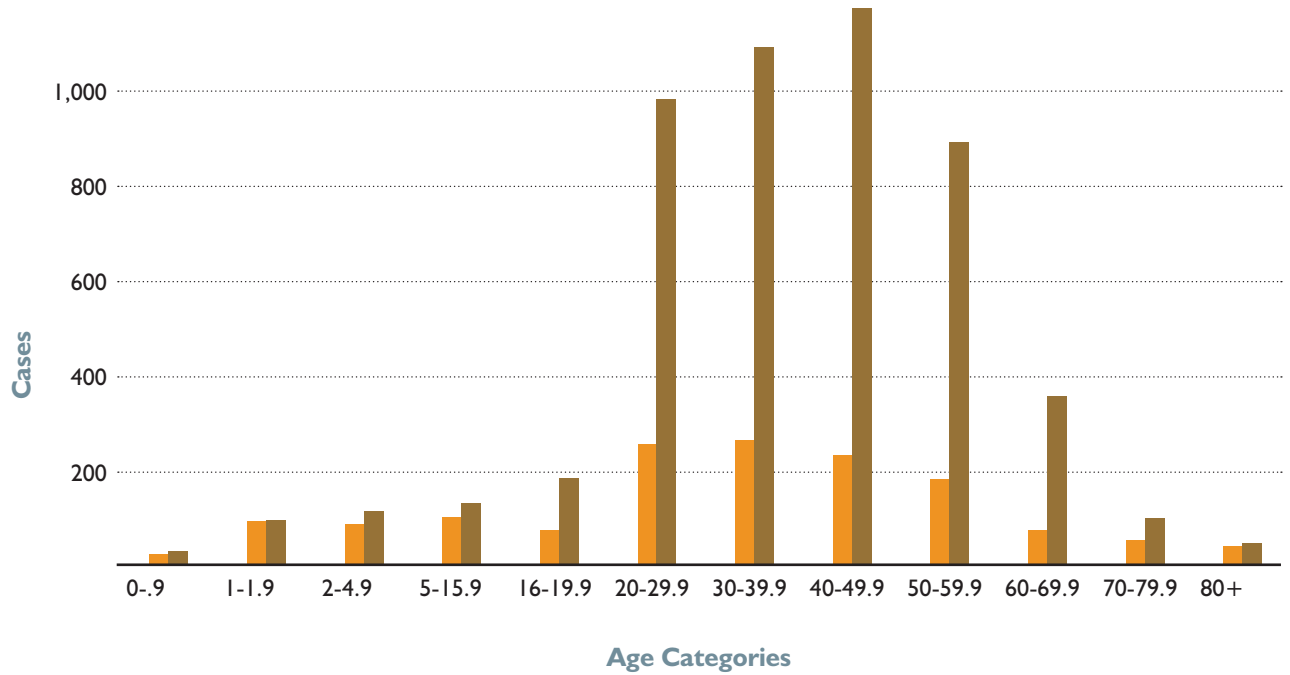
1	ANALYSIS OF CONTRIBUTING
2	ANALYSIS OF ALL U.S. RECORDS
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5	HOSPITAL COMPARISONS
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Chemical burns occur mostly to adults. Adult males make up the majority of victims of chemical burns.

FREQUENCY OF RECORDS BY AGE CATEGORIES AND GENDER

Figure 89

Female
Male



Total N=6,577 (Excluding 0 Unknown/Missing)

1
ANALYSIS OF CONTRIBUTING

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ANALYSIS OF ALL U.S. RECORDS

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ANALYSIS OF CANADIAN AND INTL. RECORDS

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1	ANALYSIS OF CONTRIBUTING
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Hospital Comparisons



The analyses on the next four pages provide comparisons for treatment of fire/flame injuries in participating burn centers. The figures compare unadjusted mortality, charges and length of stay across participating centers.

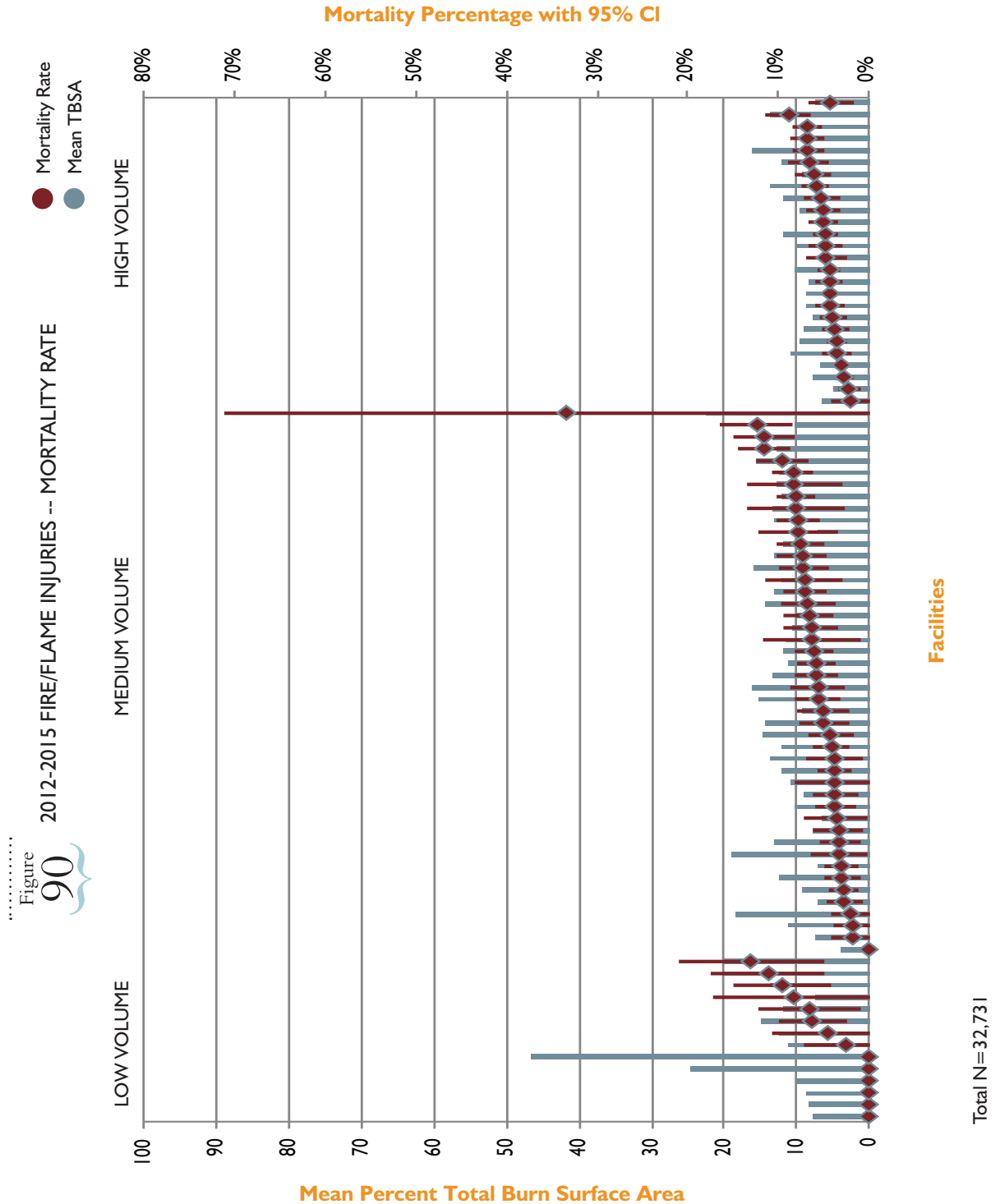
The centers are grouped into three categories based on the annual volume of submitted cases in 2012–2015. Low volume centers reported an average of less than 100 initial admissions per year (n=20); medium volume centers reported an average of 100–300 initial admissions per year (n=48) and high volume centers reported greater than 300 initial admissions per year (n=26). Ninety-four hospitals are represented in total. All data are de-identified to protect against direct comparison between centers. The data are unadjusted, and thus, do not take into consideration other patient characteristics that have been widely

accepted to impact outcomes. Without risk adjustment, comparative analysis may have limited value.

The nature of the registry is such that data is not strictly standardized and the data entry is not independently audited. This also limits the comparative value of the data. However, this data suggests that significant variability in practice, mortality and cost of care may exist and should provide impetus to investigators to explore the causes of such variability. Much work remains to bring the collection of data into a context where risk adjustment is possible and definitions are standardized, to allow reliable comparisons as well as benchmarking of the performance of individual centers. These analyses are a beginning, and they point the way to the delivery of more precise and actionable information in the future.

Hospital Comparisons

Figure 90 compares the raw mortality rates for fire/flame cases admitted from 2012-2015. Each blue bar represents the mean percent TBSA for fire/flame burns from one burn center. The left y-axis depicts the percent TBSA. The right y-axis depicts the percent mortality scale. The red dots represent the mortality rate for each burn center. The red lines represent the 95% confidence interval for the mortality rate. Although the data is not risk-adjusted, it suggests that while mean percent TBSA does not significantly differ between the three groups of hospitals (low, medium and high volume hospitals) a significant difference in mortality rates does exist. The data suggests an inverse relationship, lower mortality rates are seen in hospitals with higher volume of admissions. In addition, higher volume hospitals have less variability in mortality rates when compared to medium and low volume hospitals.



1 ANALYSIS OF CONTRIBUTING FACTORS

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5 HOSPITAL COMPARISONS

6 ANALYSIS OF CANADIAN AND INTL. RECORDS

Hospital Comparisons

Figure 91 depicts hospital charges for fire/flame cases admitted from 2012–2015. Since some centers do not report charge information a smaller size is present (i.e., fewer blue bars). The left y-axis depicts the mean percent TBSA scale. The right y-axis depicts total charges. Red dots represent the mean total charges per case. The red lines depict the 95% confidence interval for mean charges. Outliers are not shown in this graph, but were used in the calculation of estimated means for each center. Charges are not adjusted for mean burn size. The data suggests that significant differences in charges may exist between hospital group (low, medium and high volume hospital); and charges may be independent of mean percent TBSA.



.....
Figure 91
2012-2015 FIRE/FLAME INJURIES -- MEAN CHARGES

1	ANALYSIS OF CONTRIBUTING
2	ANALYSIS OF ALL U.S. RECORDS
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Hospital Comparisons

Figure 92 depicts mean (hospital) length of stay (LOS) for fire/flame cases admitted between 2012–2015. The left y-axis depicts mean percent TBSA. The right y-axis depicts LOS. Red dots represent mean LOS for each facility. Red bars represent the 95% confidence interval for each mean LOS. LOS varies significantly more amongst low volume burn centers when compared to medium and high volume burn centers. Outliers may have significant impact on estimated mean LOS. The effect of outliers may be more pronounced in centers with lower reported admission volumes. Outliers are not shown in this graph.

1 ANALYSIS OF CONTRIBUTING FACTORS

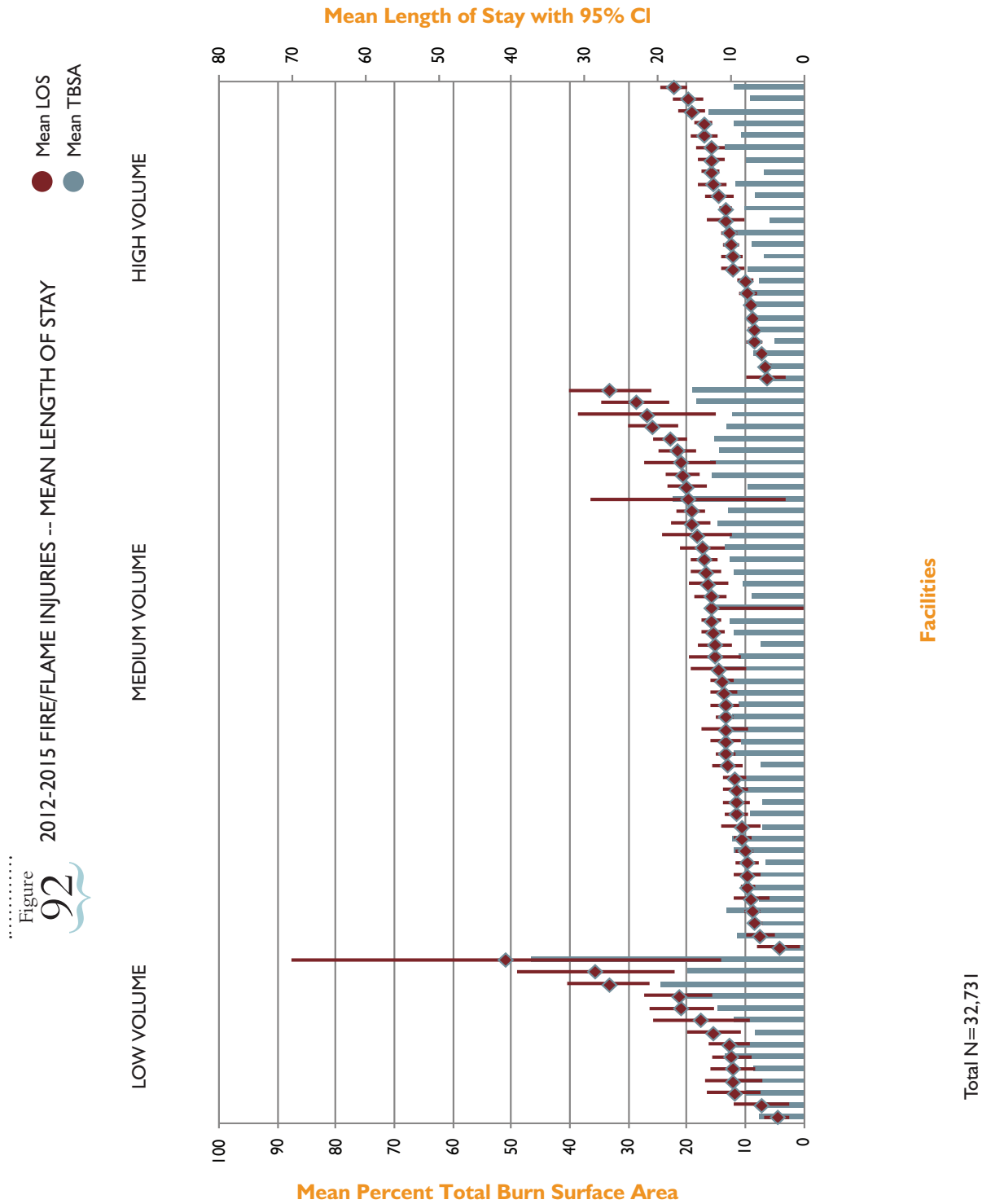
2 ANALYSIS OF ALL U.S. RECORDS

3 ANALYSIS BY AGE

4 ANALYSIS BY AGE

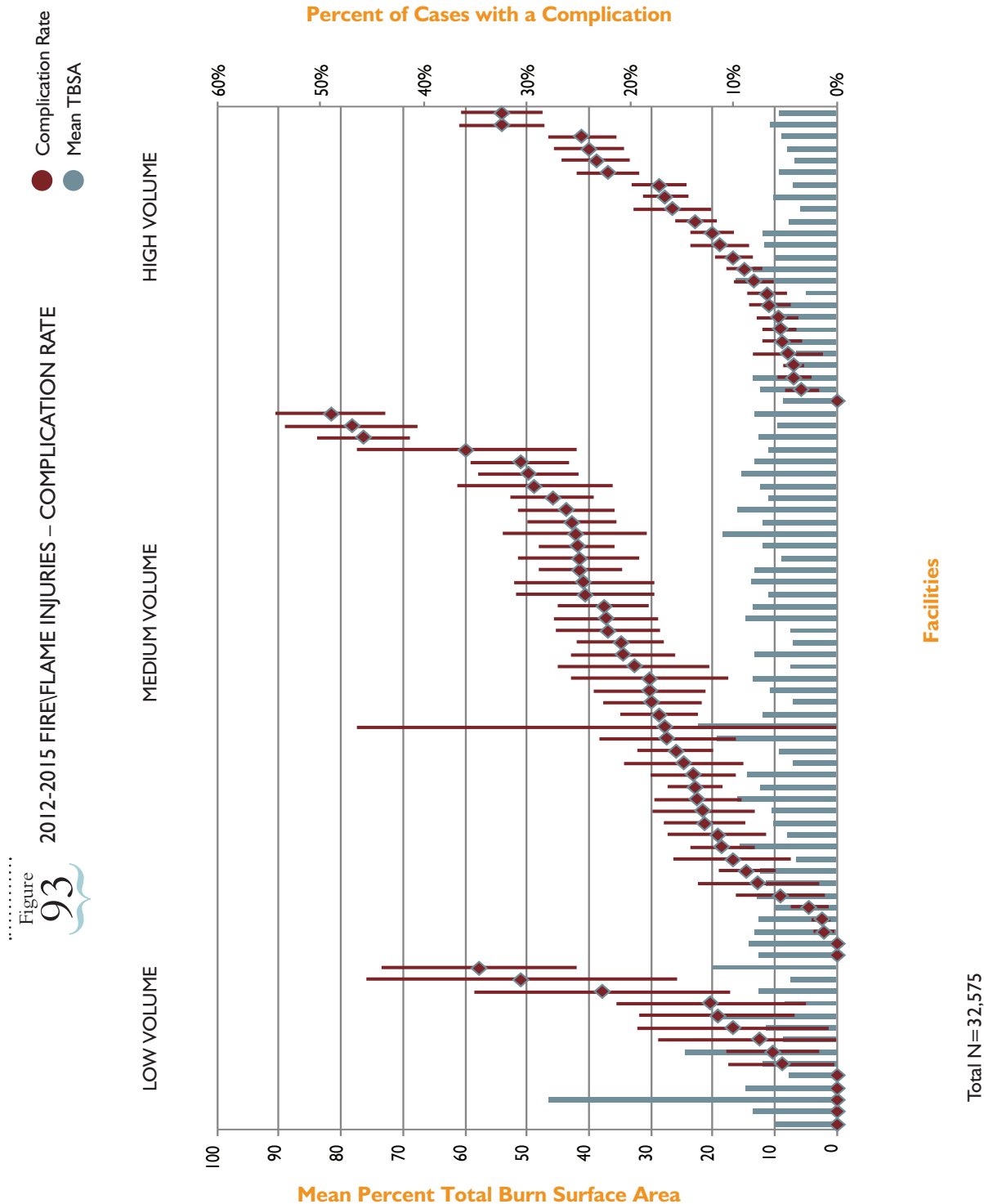
5 HOSPITAL COMPARISONS

6 ANALYSIS OF CANADIAN AND INTL. RECORDS



Hospital Comparisons

Figure 93 depicts complication rates for fire/flame cases submitted between 2012-2015. The left y-axis depicts mean percent TBSA. The right y-axis depicts the complication rate. Red dots represent the complication rate for each center. Red bars represent the 95% confidence interval for complication rates. Since the reporting of complications is unaudited it may be the least valid and reliable reported data. Standard definitions of complication and rigorous application of those definitions are warranted to ensure comparable data and broad comparisons. In spite of these limitations, there appears to be significant variability in reported complication rates that is largely independent of both mean burn size and admission volume.



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Analysis
of All Records

Analysis
by Age Group

Analysis
by Etiology

Hospital
Comparisons

Analysis
of Canadian Records

Analysis of International Burn Centers



This year's NBR report includes 3,522 International records, which represent the cumulative admissions between 2006 and 2015 that met all ABA edit check criteria. This year's report includes 468 more records than the previous year's report.

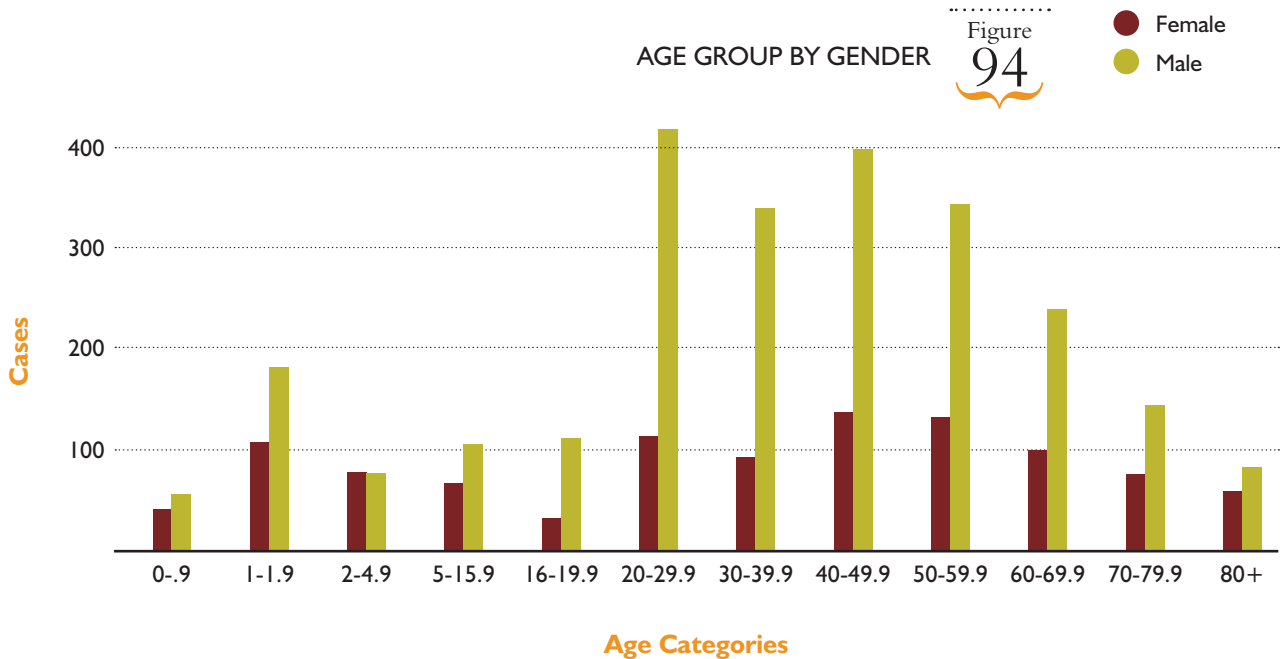
Four Canadian, two Swedish centers, and one Swiss center have submitted data to the NBR between 2006 and 2015. These International centers are typically smaller than U.S. centers and have an average volume of 120 admissions annually. Additionally, not all International burn centers have submitted on a yearly basis.

The ABA has members throughout the world and the NBR encourages all participating burn centers to submit their data to the registry.



Analysis of International Records

Figure 94 and Table 148 show the number of admissions by age and sex. Males outnumber females across the board (71% of all records are male). Twenty-four percent of the records account for individuals under the age of 20 years.



Total N=3,522 (Excluding 0 Unknown/Missing)

Table 148
AGE GROUP BY GENDER

Age Categories	Gender					
	Total		Female		Male	
	Cases	Column N %	Cases	Column N %	Cases	Column N %
0-.9	96	2.7	40	3.9	56	2.2
1-1.9	290	8.2	107	10.4	183	7.3
2-4.9	154	4.4	77	7.5	77	3.1
5-15.9	171	4.9	66	6.4	105	4.2
16-19.9	143	4.1	32	3.1	111	4.5
20-29.9	529	15.0	112	10.9	417	16.7
30-39.9	431	12.2	92	8.9	339	13.6
40-49.9	533	15.1	136	13.2	397	15.9
50-59.9	475	13.5	132	12.8	343	13.8
60-69.9	338	9.6	99	9.6	239	9.6
70-79.9	220	6.2	76	7.4	144	5.8
80 and over	142	4.0	59	5.7	83	3.3
Subtotal	3,522	100.0	1,028	100.0	2,494	100.0
Missing	0	0.0	0	0.0	0	0.0
Total	3,522	100.0	1,028	100.0	2,494	100.0

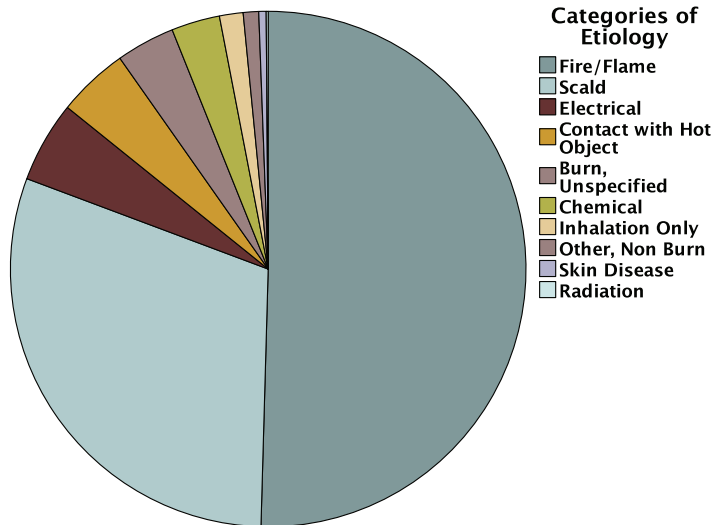
Total N=3,522

Analysis of International Records

Etiology is similar to the United States as shown in Figure 95 and Table 149. Fire/flame is the cause of over half of all burns, and scalds account for an additional 30%.

Electrical injuries are higher in the International group (5.1% vs. 3.2%). There are very few cases of isolated inhalation injuries or skin diseases reported.

Figure 95 ETIOLOGY



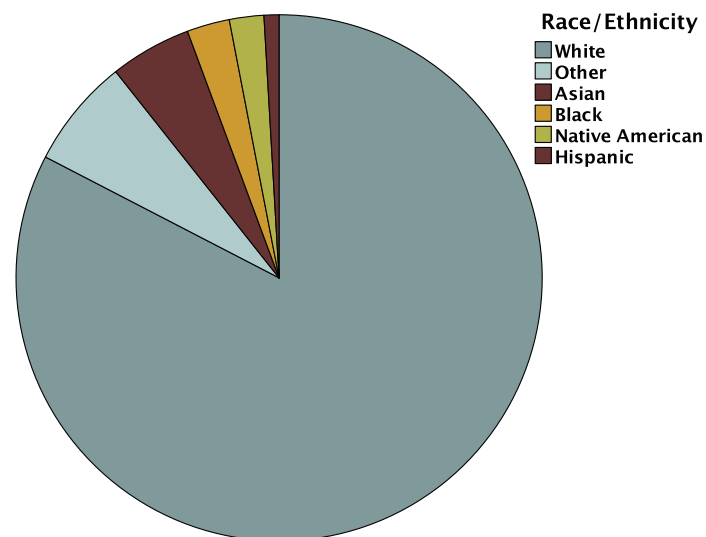
Total N=3,229 (Excluding 293 Unknown/Missing)

ETIOLOGY Table 149

Etiology	Cases	% Valid
Fire/Flame	1629	50.4%
Scald	977	30.3%
Electrical	164	5.1%
Contact with Hot Object	144	4.5%
Burn, Unspecified	119	3.7%
Chemical	98	3.0%
Inhalation Only	48	1.5%
Other, Non Burn	31	1.0%
Skin Disease	15	0.5%
Radiation	4	0.1%
Unknown	293	
TOTAL	3,522	

Total N=3,522

Figure 96 RACE/ETHNICITY



Total N=3,161 (Excluding 361 Unknown/Missing)

RACE/ETHNICITY Table 150

Race	Cases	% of Valid
White	2,611	82.6%
Other	213	6.7%
Asian	158	5.0%
Black	83	2.6%
Native American	67	2.1%
Hispanic	29	0.9%
Unknown	361	
Total	3,522	

Total N=3,522

1

ANALYSIS OF CONTRIBUTING FACTORS

2

ANALYSIS OF ALL U.S. RECORDS

3

ANALYSIS BY AGE

4

ANALYSIS BY GENDER

5

HOSPITAL COMPARISONS

6

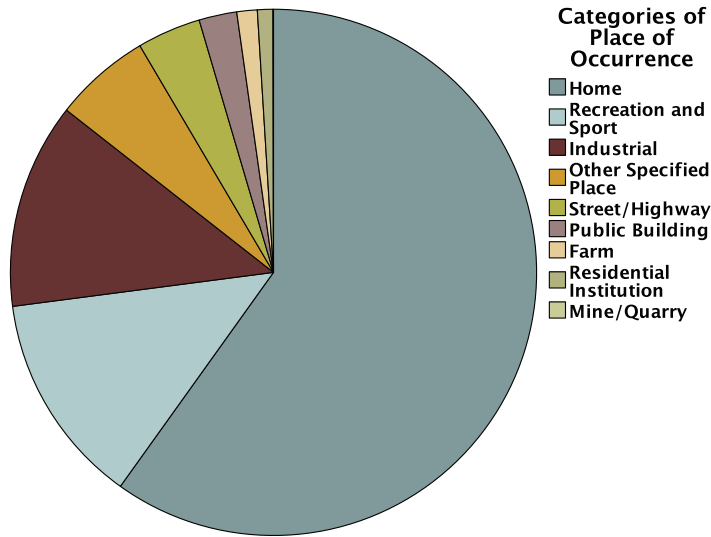
ANALYSIS OF CANADIAN AND INTL. RECORDS

Analysis of International Records

Figure 97 and Table 151 show the distribution of cases by the place of occurrence. The table shows that 7.3% of records did not specify a place of occurrence. One again, the majority of events continue to occur at home.

Figure 98 and Table 152 depict the distribution of cases by the circumstances surrounding the injury. Four hundred and fifteen cases did not denote injury circumstances and they were excluded. Five percent were the result of a suicide attempt or a suspected criminal act.

Figure 97
PLACE OF OCCURRENCE
- E849 CODE



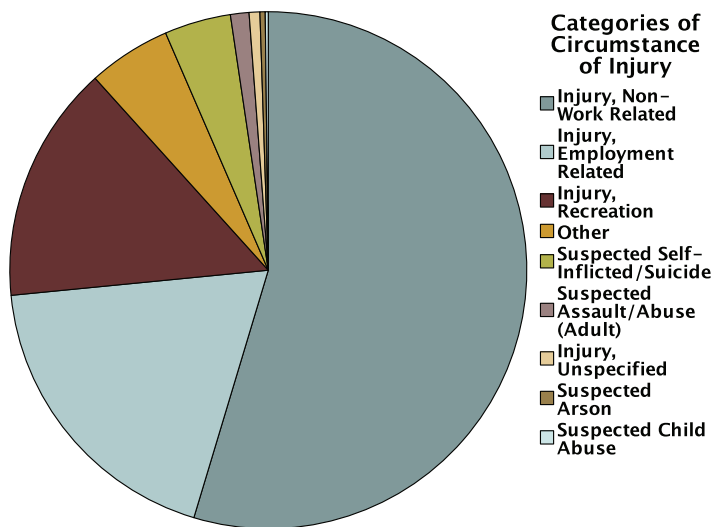
Total N=3,266 (Excluding 256 Unknown/Missing)

PLACE OF OCCURRENCE
- E849 CODE
Table 151

Place of Occurrence	Cases	% of Valid
Home	1,956	59.9%
Recreation and Sport	426	13.0%
Industrial	413	12.6%
Other Specified Place	194	5.9%
Street/Highway	128	3.9%
Public Building	76	2.3%
Farm	41	1.3%
Residential Institution	31	0.9%
Mine/Quarry	1	0.0%
Unspecified	256	
Total	3,522	

Total N=3,522

Figure 98
CIRCUMSTANCE OF INJURY



Total N=3,107 (Excluding 415 Unknown/Missing)

CIRCUMSTANCE OF INJURY
Table 152

Circumstance of Injury	Cases	% of Valid
Accident, Non-Work Related	1,698	54.7%
Accident, Work Related	584	18.8%
Accident, Recreation	462	14.9%
Other	161	5.2%
Suspected Self Inflicted	129	4.2%
Suspected Assault/Abuse	36	1.2%
Accident, Unspecified	21	0.7%
Suspected Arson	10	0.3%
Suspected Child Abuse	6	0.2%
Unknown	415	
Total	3,522	

Total N=3,522

1 ANALYSIS OF CONTRIBUTING FACTORS

2 ANALYSIS OF ALL U.S. RECORDS

3 ANALYSIS BY AGE

4 ANALYSIS BY AGE

5 HOSPITAL COMPARE

6 ANALYSIS OF CANADIAN AND INTL. RECORDS

Analysis

of International Records

The BAUX score (Age + %TBSA burned) has been a standard to estimate the mortality of burn patients for decades. Table 153 demonstrates that increasing BAUX score is associated with a higher mortality and LD50 around 110. The effect of gender is also noted in the table, as females experience a higher mortality rate at nearly all burn sizes.

Table 153 MORTALITY RATE FOR BAUX SCORE CATEGORIES BY GENDER

BAUX Score (Age + TBSA)	Female			Male		
	Lived	Died	Mortality Rate	Lived	Died	Mortality Rate
0-9.9	120	0	0.0	155	0	0.0
10-19.9	79	0	0.0	124	0	0.0
20-29.9	77	0	0.0	251	0	0.0
30-39.9	91	0	0.0	284	0	0.0
40-49.9	84	0	0.0	326	0	0.0
50-59.9	119	2	1.7	321	5	1.5
60-69.9	87	2	2.2	264	3	1.1
70-79.9	86	4	4.4	203	3	1.5
80-89.9	64	8	11.1	145	6	4.0
90-99.9	33	9	21.4	77	9	10.5
100-109.9	17	12	41.4	39	15	27.8
110 and Over	12	18	60.0	28	65	69.9
Total	869	55	6.0	2,217	106	4.6

Total N=3,247 (Excluding 275 Unknown/Missing)

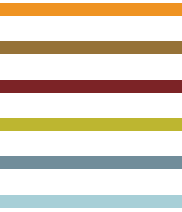
Table 154 LIVED/DIED BY BURN GROUP SIZE (%TBSA)

%TBSA	Lived	Died	Mortality Rate
	Cases	Cases	
0.1 - 9.9	1,923	14	0.7
10 - 19.9	619	19	3.0
20 - 29.9	233	23	9.0
30 - 39.9	123	22	15.2
40 - 49.9	69	16	18.8
50 - 59.9	45	12	21.1
60 - 69.9	19	12	38.7
70 - 79.9	15	15	50.0
80 - 89.9	1	10	90.9
> 90	1	17	94.4
Subtotal	3,048	160	5.0
Missing or 0%	311	3	1.0
TOTAL	3,359	163	4.6

Total N=3,522

1	ANALYSIS OF CONTRIBUTING
2	ANALYSIS OF ALL U.S. RECORDS
3	ANALYSIS BY AGE
4	ANALYSIS BY AGE
5	HOSPITAL COMPARISONS
6	ANALYSIS OF CANADIAN AND INTL. RECORDS

Appendix



Improving the data quality in the NBR has been a focal point for the past few years. The launch of ABA burn registry software Version 5.0 and the subsequent v5.11 upgrade has done a great deal toward standardizing the data submitted to the NBR. Furthermore, a Minimum Data Standard has been established that should improve the completeness of the records submitted. The Minimum Data Standard requires the records included in the NBR, must have known values for the variables listed below.

- *Reporting hospital number*
- *Number of operating room visits*
- *Number of procedures performed*
- *Patient sex (gender)*
- Cause of death
- State in which injury occurred
- *Patient age (for patients younger than 90 years)*
- Year of injury
- *Year of arrival at reporting hospital*
- Description of event (free text)
- Site at which injury occurred (E 849 code)
- Etiology of injury code (E-code)
- *Body areas injured (Lund and Browder 19 areas x 6 age categories)*
- Total burn size
- Total deep burn
- Inhalation injury
- *ICD-9 diagnosis codes*
- *Total hospital days*
- *Hospital discharge disposition*
- Primary payor source
- MS-DRG code
- Circumstances of injury
- Discharge status (alive or dead)
- Year of discharge or death
- Total ICU days
- Interhospital transfer to your hospital

The italicized variables were not included in the analysis of missing variables on cases used in this Annual Report on the subsequent pages. Age, gender, hospital disposition and reporting hospital number are required fields for a case to be included in the Annual Report. The remaining italicized variables were excluded from analysis because they are not uniformly reported by non ABA burn registry software centers.

Appendix A

This table represents the common data elements missing from submitted burn center records.

DATA COMPLETENESS BY VARIABLE } Table
155

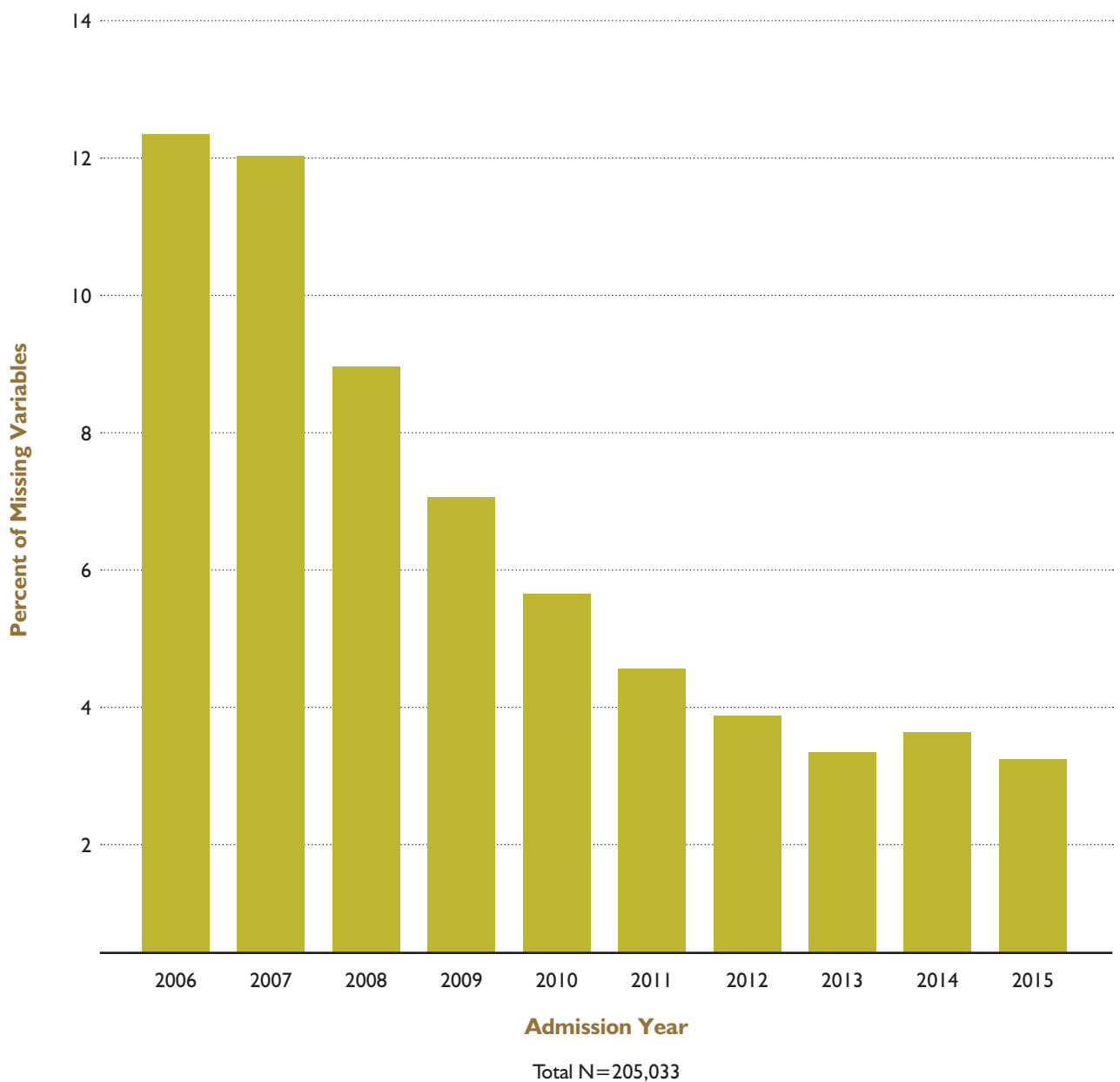
	Valid	Missing	Pct. Missing
Total deep burn	205,033	76,067	37.1
Cause of Death	4,482	2,182	32.7
DRG Code	205,033	54,973	21.1
Total burn size	205,033	18,945	7.6
Site at which injury occurred (E 849 code)	205,033	20,856	9.2
Interhospital transfer to hospital	205,033	19,394	8.6
State in which injury occurred	205,033	18,864	8.4
Description of event	205,033	18,367	8.2
Primary payor source	205,033	16,191	7.3
Circumstances of Injury	205,033	15,164	6.9
Inhalation Injury	205,033	10,299	4.8
Year of Injury	205,033	8,271	3.9
Year of discharge or death	205,033	2,996	1.4
Total ICU days	205,033	1,555	0.8
Etiology of injury code (E-code)	205,033	987	0.5
Discharge status (alive or dead)	205,033	910	0.4

Appendix A

This is a graphic representation of the improvement of submitted data by year. It is possible that the emphasis on having more accurate patient care data in the United States has driven this improvement in data.

DATA QUALITY EXPRESSED AS MEAN PERCENT OF MISSING VARIABLES FROM MINIMUM DATA SET PER RECORD BY ADMISSION YEAR

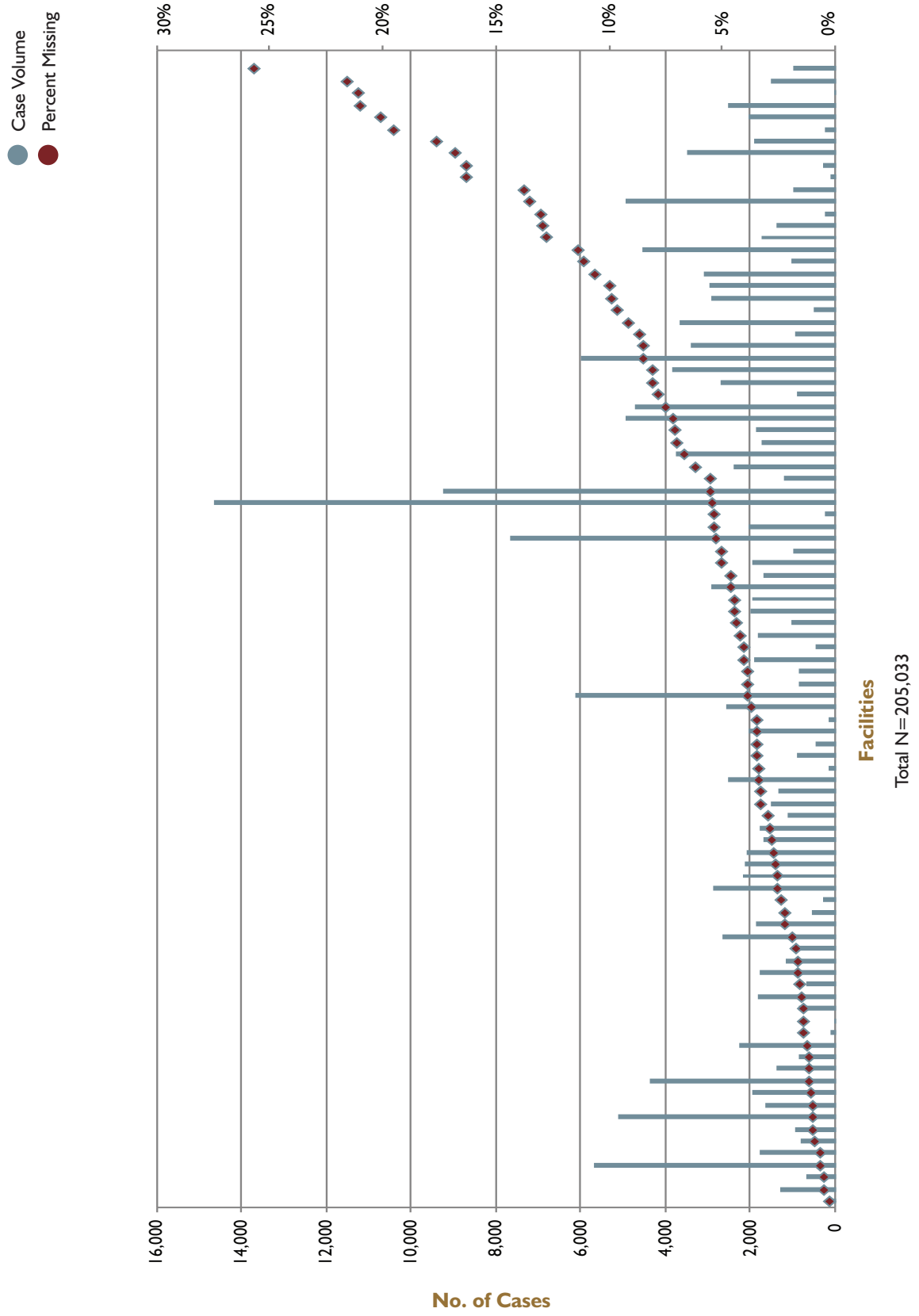
Figure 99 }



Appendix A

The graph depicts the individual burn centers submission volume and the percent of missing records. Over two thirds of burn centers have less than 10% of key variables missing. Volume does not appear to have linear relationship with data quality.

Figure 100
DATA QUALITY EXPRESSED AS MEAN PERCENT OF MISSING VARIABLES OF THE MINIMUM DATA STANDARD PER RECORD BY FACILITY



Appendix B

The following list of hospitals have contributed to the NBR in any given year. We extend our thanks for their contribution and ongoing support of this significant endeavor.

Alabama

Children's Hospital, Birmingham
UAB Burn Center
University of South Alabama Regional Burn and Wound Center

Arizona

Arizona Burn Center at Maricopa Medical Center

Arkansas

The Burn Center at Arkansas Children's Hospital

California

Bothin Burn Center, St. Francis Memorial Hospital, Dignity Health
Community Regional Leon S. Peters Burn Center
Inland Counties Regional Burn Center at Arrowhead Regional Medical Center
Orange County Burn Center
Santa Clara Valley Medical Center Regional Burn Center
Shriners Hospital for Children-Northern California
Southern California Regional Burn Center at LAC & USC Medical Center
Torrance Memorial Burn Center
UC Davis Regional Burn Center
UCI Regional Burn Center
UCSD Regional Burn Center
The Grossman Burn Center at San Joaquin Community Hospital
The Grossman Burn Center - West Hills

Colorado

The Children's Hospital Burn Center
University of Colorado Hospital Burn Center, UC Health
Western States Burn Center, Banner Health

Connecticut

Connecticut Burn Center, Panettieri, Bridgeport Hospital

District of Columbia

Children's National Medical Center
The Burn Center at Medstar Washington Hospital Center

Florida

Orlando Regional Medical Center
Shands Burn Center at the University of Florida
Tampa General Hospital Regional Burn Center
University of Miami/Jackson Memorial Burn Center

Georgia

Grady Memorial Hospital Burn Center
The Joseph M. Still Burn Center at Doctors' Hospital

Illinois

Loyola University Medical Center
Memorial Medical Center Regional Burn Center
Sumner L. Koch Burn Center, Stroger Hospital
University of Chicago Burn Center

Indiana

Indiana University, Riley Hospital for Children
St. Joseph's Burn Center
Eskenazi Health, Richard M. Fairbanks Burn Center

Iowa

University of Iowa Burn Center

Appendix B

Kansas

KUHA-Burnett Burn Center
Via Christi Regional Medical Center

Louisiana

Baton Rouge General Adult Burn Center Mid-City
Louisiana State University Health Sciences Center-Shreveport
Our Lady of Lourdes Regional Medical Center

Maryland

Johns Hopkins Bayview Medical Center Burn Center
Johns Hopkins Pediatric Burn Center

Massachusetts

Brigham and Women's Hospital Burn Center
MGH Sumner Redstone Burn Center
Shriners Hospital for Children-Boston
University of Massachusetts Memorial

Michigan

Children's Hospital of Michigan
Detroit Receiving Hospital Burn Center
Spectrum Health Regional Burn Center
University of Michigan Health Systems

Minnesota

Dwan Burn Center
Hennepin County Medical Center Burn Center
The Burn Center-Regions Hospital

Mississippi

Delta Regional Medical Center

Missouri

George David Peak Memorial Burn and Wound Center
Mercy Hospital Springfield
Mercy Hospital St. Louis

Nebraska

Nebraska Medicine
St. Elizabeth Regional Burn Center

Nevada

Lion's Burn Center

New Jersey

The Burn Center at Saint Barnabas

New Mexico

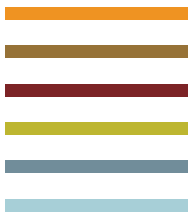
New Mexico Regional Burn Center

New York

Clark Burn Center
Nassau University Medical Center Burn Center
Roger W. Seibel MD Burn Treatment Center
Kessler Burn Center, University of Rochester Medical Center
Westchester Medical Center Burn Center
William R. Hearst Burn Center, New York Presbyterian Hospital, Weill Cornell Medical Center

North Carolina

North Carolina Jaycee Burn Center
Wake Forest Baptist Medical Center Burn Center



Appendix B

Ohio

Children's Hospital Medical Center of Akron
MetroHealth Medical Center
Nationwide Children's Hospital
Shriners Hospital for Children-Cincinnati
The Ohio State University Wexner Medical Center
The University Hospital Burn Center-Cincinnati

Oregon

Oregon Burn Center, Legacy Emmanuel Medical Center

Pennsylvania

Lehigh Valley Hospital Burn Center
Stuart J. Hulnick Burn Center, St. Christopher's Hospital for Children
Temple University Hospital Burn Center
The Nathan Speare Regional Burn Treatment Center, Crozer Chester Medical Center
The Western Pennsylvania Hospital Burn Center
UPMC Mercy Burn Center

Rhode Island

Rhode Island Hospital Burn Center

South Carolina

Medical University of South Carolina Children's Hospital

Tennessee

Erlanger Health Systems Burn Center
Firefighters Regional Burn Center, Regional One Health
Vanderbilt Regional Burn Center

Texas

John S. Dunn, Sr. Burn Center
Parkland Health and Hospital System, Regional Burn Center
Shriners Hospital for Children-Galveston
Timothy J. Harnar Burn Center
University of Texas Medical Branch
U.S. Army Institute of Surgical Research

Utah

University of Utah Hospital Burn Center

Virginia

VCU Evans-Haynes Burn Center

Washington

UW Medicine Regional Burn Center at Harborview Medical Center

Wisconsin

Columbia St. Mary's Hospital Regional Burn Center
University of Wisconsin Hospitals and Clinics

International Contributors

Firefighters' Burn Treatment Unit, Edmonton, Alberta, Canada
Hamilton Firefighters Burn Unit Hamilton Health Sciences, Hamilton, Ontario
Hospital for Sick Children, Toronto, Ontario
Hotel-Dieu du CHUM, Montreal, Quebec
Lassaine University Hospital, Switzerland
Linköping University Hospital, Linköping, Sweden
Ross Tilley Burn Centre, Sunnybrook and Women's College Health Sciences Centre, Toronto, Ontario
Uppsala University Hospital, Uppsala, Sweden

Appendix C

Selected List of Peer-Reviewed Publications Utilizing NBR Data

- Ajami S, Lamoochi P. Comparative study on National Burn Registry in America, England, Australia and Iran. *J Educ Health Promot.* 2014 Nov 29;3:106
- Assimacopoulos EM, Liao J, Heard JP, Kluesner KM, Wilson J, Wibbenmeyer LA. The national incidence and resource utilization of burn injuries sustained while smoking on home oxygen therapy. *Journal of Burn Care & Research.* 2016 Jan 1;37(1):25-31.
- Baqui Z, Li W, Zakhary E, Buchanan P, Boakye EA, Jacobs D. Inferior Vena Cava Filter Utilization for Burn Patients in the United States: Analysis of the National Burn Repository. *Journal of Vascular Surgery.* 2015 Jan 6;61(6):103S-4S.
- Bell C, Slim J, Flaten HK, Lindberg G, Arek W, Monte AA. Butane Hash Oil Burns Associated with Marijuana Liberalization in Colorado. *J Med Toxicol.* 2015 Dec;11(4):422-5.
- Bessey PQ, Phillips BD, Lentz CW, Edelman LS, Faraklas I, Finocchiaro MA, Kemalyan NA, Klein MB, Miller SF, Mosier MJ, Potenza BM. Synopsis of the 2013 annual report of the national burn repository. *Journal of Burn Care & Research.* 2014 May 1;35:S218-34.
- Blaisdell LL, Chace R, Hallagan LD, Clark DE. A half-century of burn epidemiology and burn care in a rural state. *J Burn Care Res.* 2012 May-Jun;33(3):347-53
- Bloemsma GC, Dokter J, Boxma H, Oen IMM. Mortality and causes of death in a burn centre. *Burns.* 2008 Dec; 34 (8): 1103-1107.
- Burton KR, Sharma VK, Harrop R, Lindsay R. Burns. A population-based study of the epidemiology of acute adult burn injuries in the Calgary Health Region and factors associated with mortality and hospital length of stay from 1995 to 2004. *Burns.* Jun 2009; 35 (4): 572-579.
- Carpenter AM, Hollett LP, Jeng JC, Wu J, Turner DG, Jordan MH. How long a shadow does epidemic obesity cast in the burn unit? A dietitian's analysis of the strengths and weaknesses of the available data in the National Burn Repository. *J Burn Care Res.* 2008 Jan-Feb;29(1):97-101.
- Carr JA, Phillips BD, Bowling WM. The Utility of Bronchoscopy After Inhalation Injury Complicated by Pneumonia in Burn Patients: Results From the National Burn Repository. *J Burn Care Res.* 2009 Nov-Dec; 30(6):967-974.
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- Chung JY, Kowal-Vern A, Latenser BA, Lewis RW 2nd. Cement-related injuries: review of a series, the National Burn Repository, and the prevailing literature. *J Burn Care Res.* 2007 Nov-Dec;28(6):827-34. Review.
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- Guagliardo MF, Jeng JC, Browning S, Bilodeau ME, Dimick A, Hickerson W, Miller S, Peck M. Admissions across state lines: harnessing the insight of the National Burn Repository for the healthcare accessibility, fiscal, and legislative concerns facing the American Burn Association. *J Burn Care Res.* 2008 Jan-Feb;29(1):151-7.
- Harpole BG, Wibbenmeyer LA, Erickson BA. Genital burns in the national burn repository: incidence, etiology, and impact on morbidity and mortality. *Urology.* 2014 Feb; 83(2):298-303.
- Heard JP, McDonald KM, Xing Y, Kluesner KM, Liao J, Wibbenmeyer LA. Regional and National Review of Factors Associated With Burn Wound Cellulitis. *Journal of Burn Care & Research.* 2015 Jan 1;36(1):23-32.
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- Hodgman EI, Saeman MR, Subramanian M, Wolf SE. The effect of burn center volume on mortality in a pediatric population: an analysis of the National Burn Repository. *Journal of Burn Care & Research.* 2016 Jan;37(1):32.
- Holmes JH. Critical Issues in Burn Care. *J Burn Care Res.* 2008 Nov-Dec; 29(6):S180-S187.
- Howard PA, Jeng JC, Miller SF. Is the glass really half empty? A closer look at the TBSA data in the National Burn Repository. *J Burn Care Res.* 2007 Jul-Aug;28(4):542-3.
- Hranjec T, Turrentine FE, Stukenborg G, Young JS, Sawyer RG, Calland JF. Burn-center quality improvement: are burn outcomes dependent on admitting facilities and is there a volume-outcome sweet-spot?" *Am Surg.* 2012 May;78(5):559-66.
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- Jehle CC Jr, Nazir N, Bhavsar D. The rapidly increasing trend of cannabis use in burn injury. *J Burn Care Res.* 2015 Jan-Feb;36(1):e12-7.
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- Jeng JC, Miller SF. From the burn unit's perspective, it's lethal not being gainfully employed outside the home! A glimmer from the National Burn Repository. *J Burn Care Res.* 2007 Jan-Feb;28(1):142.

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- Jeng JC, Miller SF. How patients enter the burn care system is changing: a glimmer from the National Burn Repository. *J Burn Care Res.* 2007 Mar-Apr;28(2):220-1.
- Jeng JC, Parks J, Phillips BL. Warding Off Burn Injuries, Warding Off Database Fishing Expeditions: The ABA Burn Prevention Committee Takes a Turn With a Glimmer From the National Burn Repository. *J Burn Care Res.* 2008 Apr.
- Jeng JC, Phillips B. Improving on "It Is What It Is": Stepping Up the Quality as a Consequence of New Version 5 Collection Software-A Glimmer From the National Burn Repository. *J Burn Care Res.* 2008 Mar-Apr;29(2):291-292.
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- Mason AD. Invited Critique: The 2007 NBR Report: A Synopsis of the 2007 Call for Data. *J Burn Care Res.* 2008 Nov-Dec; 29(6):871.
- Mandell SP, Robinson EF, Cooper CL, Klein MB, Gibran NS. Patient safety measures in burn care: do National reporting systems accurately reflect quality of burn care? *J Burn Care Res.* 2010 Jan-Feb;31(1):125-9.
- Matt SE, Shupp JW, Carter EA, Shaw JD, Jordan, MH. Comparing a Single Institution's Experience with Electrical Injuries to the Data Recorded in the National Burn Repository. *J Burn Care Res.* 2012 Sept-Oct; 33(5):606-611.
- Matt SE, Shupp JW, Carter EA, Flanagan KE, Jordan MH. When a Hero Becomes a Patient: Firefighter Burn Injuries in the National Burn Repository. *J Burn Care Res.* 2012 Jan-Feb; 33(1):147-151.
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Appendix C

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