2012

NATIONAL BURN REPOSITORY

REPORT OF DATA FROM 2002-2011

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National Burn Repository

2012 Report

Dataset Version 8.0

FIRE/FLAME INJURIES REPRESENT 44% 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 4% OF THE CASES IN THIS REPORT WITH A KNOWN ETIOLOGY

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

American Burn Association NBR Advisory Committee

American Burn Association Staff

Acknowledgements

The American Burn Association wishes to thank members of the National Burn Repository Committee, Palmer Q. Bessey, Christine Casavant, Linda Edelman, Nathan Kemalyan, Christopher Lentz, Cynthia Reigart, and Michael Schurr, for their invaluable assistance in the review and editing of this report.

The ABA is also grateful for the work provided by the staff from E-B Research, LLC, particularly Bart Phillips, in preparing this report.

The NBR Committee extends sincere thanks to the staff of the ABA Central Office who made this report possible. The guidance and support of Maureen Kiley, Susan Browning, and John Krichbaum was especially helpful.

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Introduction

We are pleased to present this 2012 Summary Report of the National Burn Repository (NBR) of the American Burn Association (ABA). The report summarizes many of the clinical characteristics and course of burn treatment for cases submitted to the NBR from specialized burn care facilities in Canada, the United States, and Sweden through the 2011 Call for Data. As in years past, this year's report includes patients admitted to these facilities over a ten year period, January 2002 through June 2011, and amounts to over 183,000 cases.

These cases constitute a large convenience sample of burn patients that received specialized burn care.They represent neither a random sample of all patients presenting to a hospital for burn treatment nor a sample of patients admitted to all burn centers.

There were 87 facilities that submitted data to the NBR this year in response to the Call for Data. This brought in 26,260 new cases. This report is based on over 183,036 records, some 19,000 more cases than were included in the 2011 Report. Although there may be some inherent biases in the data which affect the findings in this summary, it seems reasonable to assume that the data include many of the most challenging burn cases seen at specialized burn care facilities in the past decade and reflect, in large part, the best outcomes of contemporary burn care possible at the present time.

The NBR is a collaborative endeavor by Burn Care professionals and the ABA. It is the outgrowth of an idea for a National data base for burns that started at the University of Michigan in the early 1970s. Real clinical data from Burn Centers across the land would serve as a basis for burn quality improvement, regional health care planning, resource allocation, research, and prevention. This would clearly benefit patients, the profession, the public, and policymakers. The NBR is the descendent of that vision.

Although simple in concept, the realization of the vision has been difficult to attain. Institutional and regional variation and vagaries in definitions, technical details of data base architecture, coding languages, and interoperability, unknown 40 years ago, have emerged as barriers to be overcome. These, in addition to human factors and foibles familiar to us all, as well as the magnitude of the endeavor, have served to confound the development of a complete and assuredly reliable burn data base. The NBR is, thus, a work in progress. Like all data bases, it has imperfections.

The quality of the data in the NBR, however, has been improving steadily over the past seven years, as detailed in Appendix A (See Fig. 95). This year's report is based on the most complete and reliable burn data set yet. That has come about as the result of improvements in Burn Registry Software (over 75% of the submitting centers use the newest version of the Burn TRACS software, v 5.11) and increased vigilance by burn registrars. Yet, there is still room for improvement. Both the NBR Committee and the Burn Registry Committee of the ABA continue to work to improve the quality, completeness, and usefulness of the data collected by Burn facilities and submitted to the NBR. We welcome your observations and suggestions.

There are many who contributed to this report and deserve acknowledgement and thanks. I would first like to thank the members of the ABA and the Burn Centers who prepared and submitted data to the NBR. It is their belief in the rightness of this effort and their continued active and, sometimes noisy participation, that will maintain the growth and improvement of the NBR in the years ahead.

Special thanks go to Bart Phillips, Senior Consultant of E-B Research, Maureen Kiley, Susan Browning, and other staff of the ABA, the members of the NBR Committee, and the ABA Board of Trustees for their help and support of these efforts.

The report is divided into six sections, which are self-explanatory, and appendices:
Section 1 'Analysis of contributing hospitals'
Section 2 'Analysis of all records'
Section 3 'Analysis by age groups'
Section 4 'Analysis by etiology'
Section 5 'Hospital comparisons'
Section 6 'Analysis of Canadian records'
Appendix A describes the problem of missing data in the NBR, which is one measure of data quality.

On behalf of the NBR Committee, I hope you find the 2012 NBR Report of interest. We invite your comments and suggestions to the ABA, Maureen Kiley, kiley@ameriburn.org or call 312-642-9260.

Palmer Q. Bessey, MD, MS, FACS
Chair, NBR Committee

Summary of Findings

The 2012 National Burn Repository reviewed the combined data set of acute burn admissions for the time period between 2002 and 2011. Key findings included the following:

1. Ninety-one hospitals from 35 states, and the District of Columbia, contributed to this report, totaling 183,036 records. Seventy-five hospitals contributed more than 500 cases. Data are not dominated by any single center and appeared to represent a reasonable cross section of U.S. hospitals.

2. Nearly 70% of the burn patients were men. The mean age for all cases was 32 years old. Children under the age of 5 accounted for 19% of the cases, while patients age 60 or older represented 12% of the cases.

3. Seventy-two percent of the reported total burn sizes were less than 10% TBSA and these cases had a mortality rate of .6%. The mortality rate for all cases was 3.7% and 6.4% for fire/flame injuries.

4. The two most common reported etiologies were fire/flame and scalds, and accounted for almost 8 out of 10 reported. Scald injuries were most prevalent in children under 5, while fire/flame injuries dominated the remaining age categories. Sixteen percent of cases did not designate an etiology of injury.

5. Sixty-nine percent of the burn injuries, with known places of occurrence, were reported to have occurred in the home. Sixty-nine percent of cases, with known circumstances of injury, were identified as accident, non-work related.

6. During the ten year period from 2002 and 2011, the average length of stay for both females and males declined from roughly 11 and 10 days respectively to 8 days. The mortality rate decreased from 4.8% to roughly 3% for males and from 5.4% to 3.0% for females.

7. Deaths from burn injury increased with advancing age and burn size, and presence of inhalation injury. For patients under age 60 and with a TBSA between .1 and 19.9, the presence of inhalation injury increased the likelihood of death by 16 times.

8. Pneumonia was the most frequent clinically related complication and occurred in 6.1% of fire/flame injured patients. The frequency of pneumonia and respiratory failure was much greater in patients with 4 days or more of mechanical ventilation, than those with less than 4 days. The incidence of clinically related complications for patients with 0 days of mechanical ventilation increased with age and topped out at 20% for age 80 and over.

9. For survivors, the average length of stay was slightly greater than approximately 1 day per percent TBSA burned. For those who died, the total hospital days were roughly 3 weeks for burn patients with TBSA values below 70% and decreased from 3 weeks to 1 week for the larger burn categories.

10. Overall, the charges per case for a death were over 3 times greater than those charges for a survivor. Additionally, hospital charges per hospital day in patient deaths averaged near $11,000 more surviving patients.

All cases received from contributing hospitals (TRACS and non-TRACS users) that met the data structure requirements were initially accepted into the NBR. This report includes only cases with an admit year of 2002 – 2011, 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.

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

- Gender
- LOS < ICU days
- Discharge disposition

Summary of Findings

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
- ECODE
- 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

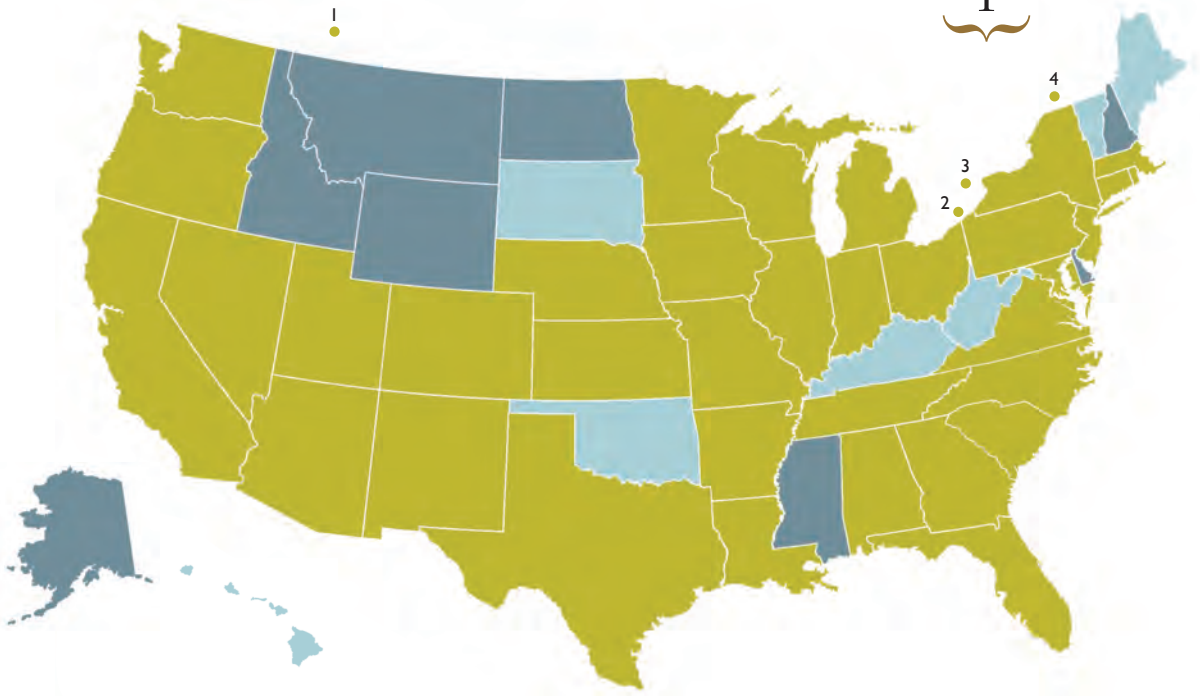
1

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 thirty-five states in the U.S., four Canadian burn centers, and two Swedish centers. Sixty of the reporting centers are ABA verified. 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.

Figure I

STATES THAT SUBMITTED TO THE NBR, 2002 TO 2011



- Have burn centers which have contributed to the NBR between 2002 to 2011
- Have burn centers that have not contributed data to the NBR
- Do not have burn centers

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, Sweden and Linkoping, Sweden.

Table I

BURN CENTER LOCATION AND PARTICIPATION BY REGION

Region	U.S. Burn Care Facilities*	U.S. Facilities in the Annual Report	ABA Verified Centers**	ABA Verified Centers in the Annual Report
East	28	22	14	14
North	39	27	21	21
South	32	21	13	13
West	26	21	12	12
Total	125	91	60	60

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

*ABA Burn Care Resource Directory, Edition April 2012
** ABA Verified Burn Centers, April 2012

Analysis of Contributing Hospitals

26,260 records used for this report were submitted by 87 burn centers during this year's Call for Data. This brings the total number of records in this report to 183,036. The north region, which has the largest number of burn centers, contributes the highest number of records.

Figure 2

VOLUME OF RECORD SUBMISSION BY GEOGRAPHIC REGION

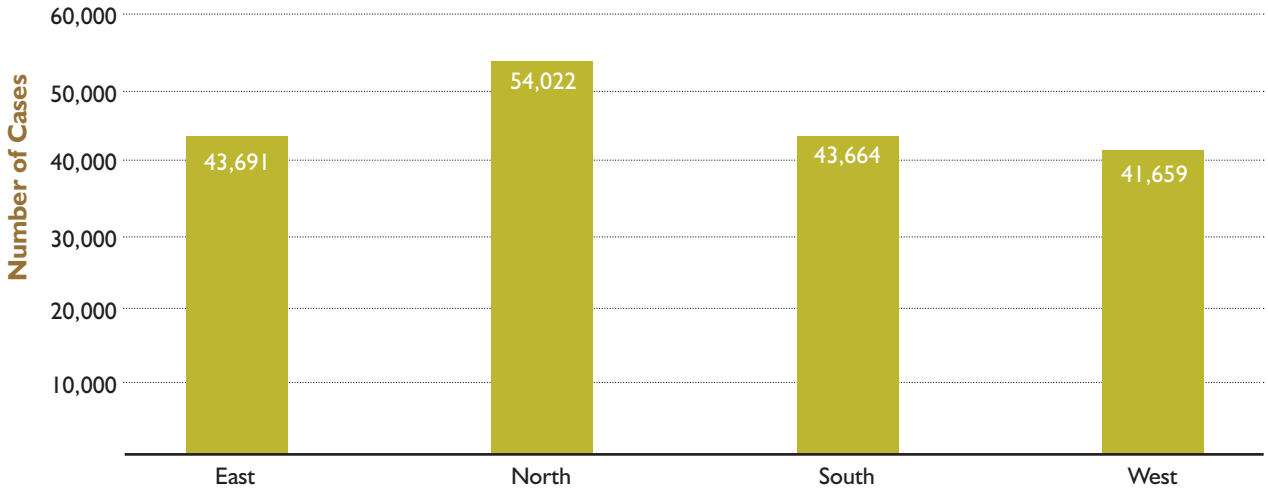
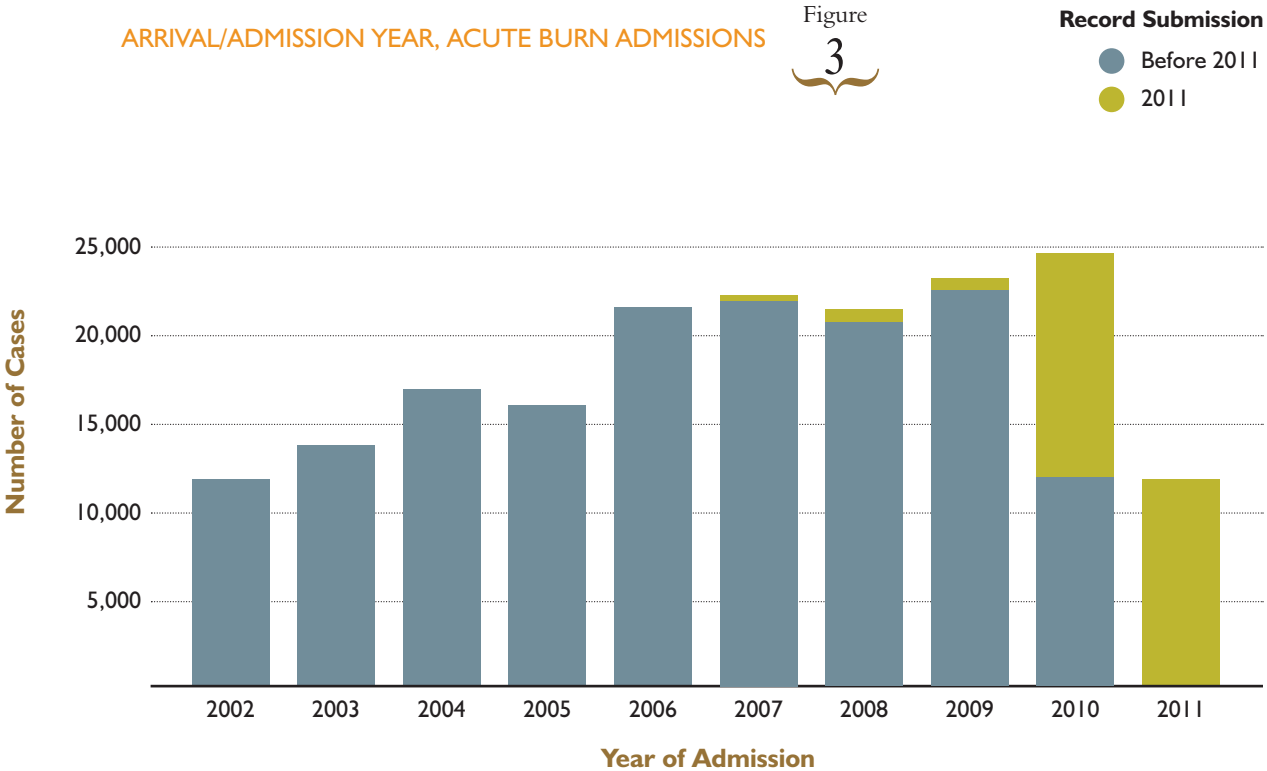


Figure 3

ARRIVAL/ADMISSION YEAR, ACUTE BURN ADMISSIONS



26,260 records were submitted in 2011 for this report
183,036 records are included in this report

Analysis of Contributing Hospitals

Two groups of Burn Centers continue to contribute the largest number of records. Programs in hospitals with greater than 500 beds lead the way. However, the next largest group continues to come from hospitals in the 200-299 bed range. The majority of records submitted came from non-governmental, not-for-profit hospitals.

Figure 4

CONTRIBUTING U.S. HOSPITALS BY HOSPITAL BED SIZE CATEGORY

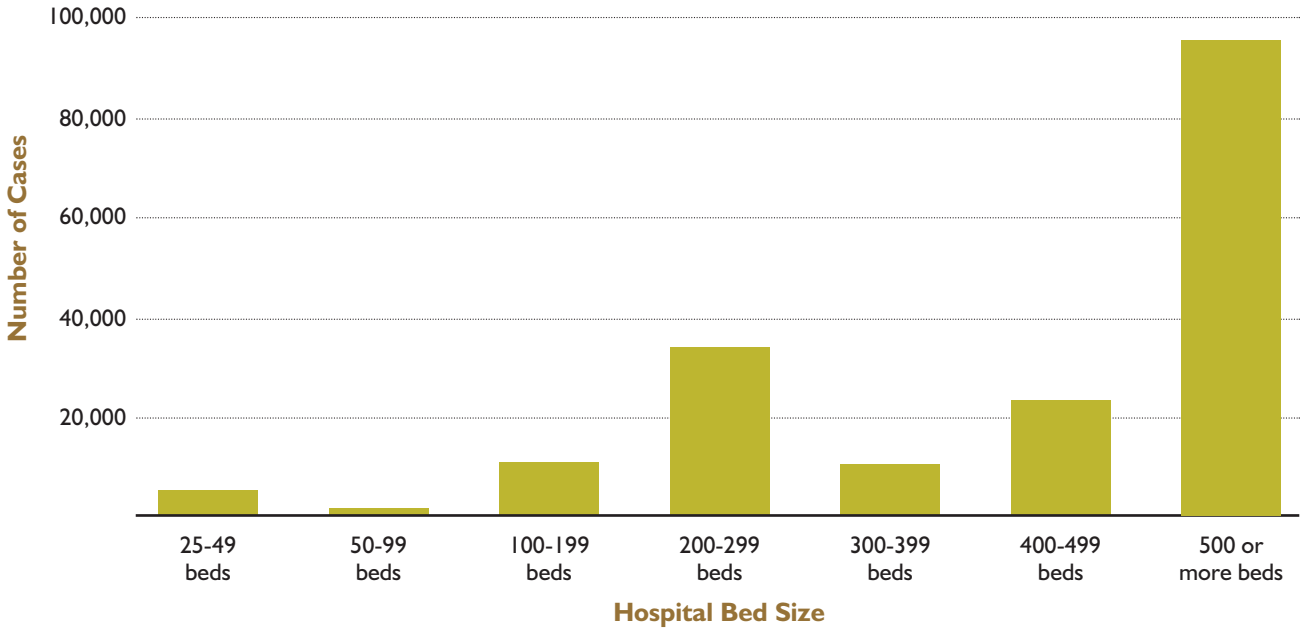
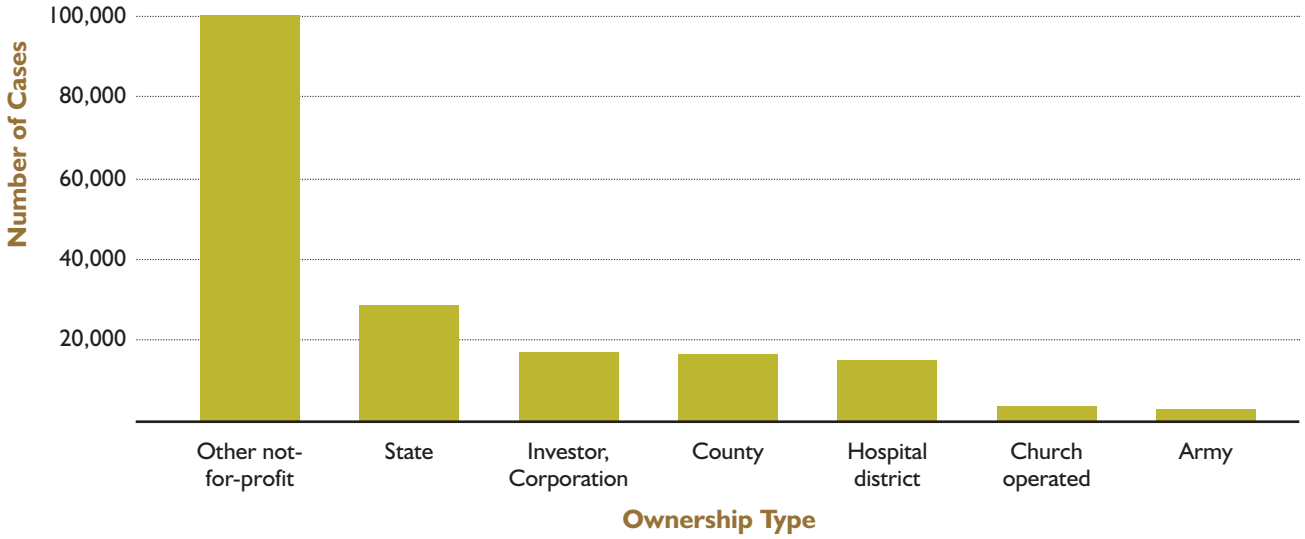


Figure 5

CONTRIBUTING U.S. HOSPITALS BY HOSPITAL OWNERSHIP TYPE



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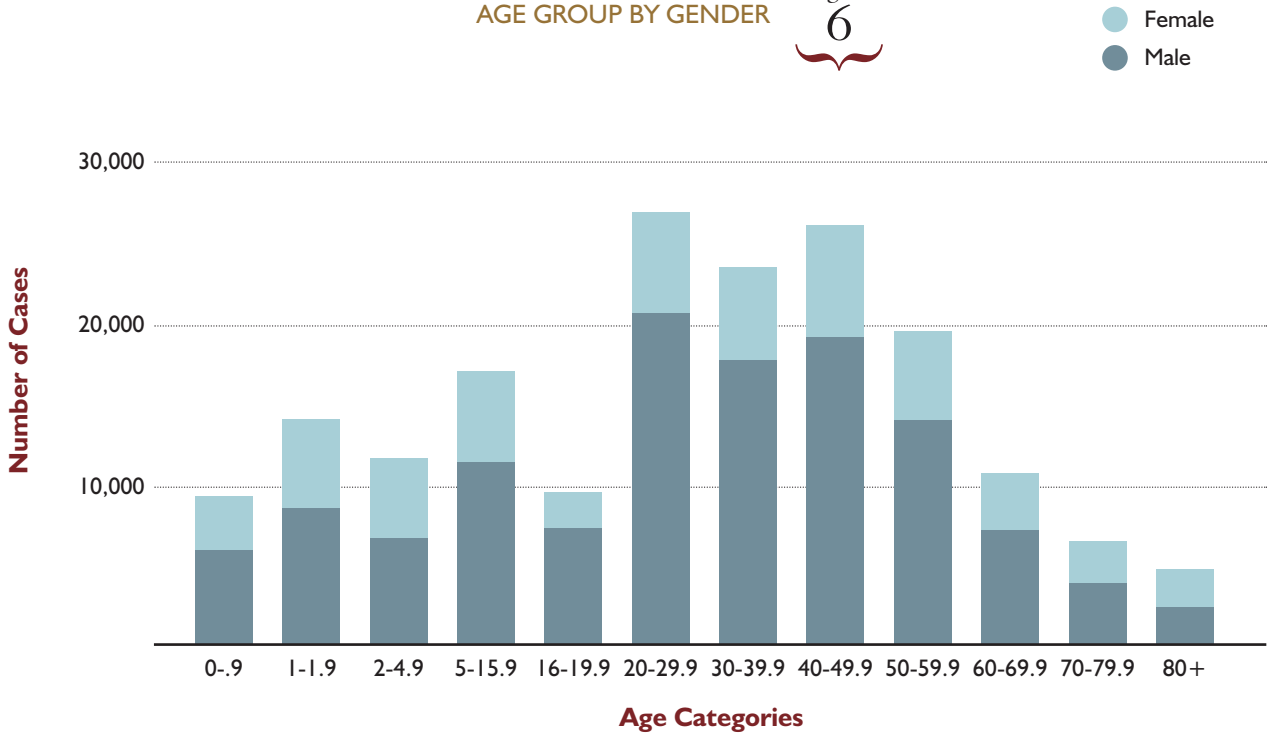
Analysis of All U.S. Records

2

Figure 6 and Table 2 show the number of cases in various categories of age. Each column shows the total number of cases and the gender distribution within a specific age category. Males outnumber females in almost all categories, except in the oldest group (those 80 years and older) in which women account for 51% of the cases. Children less than 16 make up 29% of all patients, but the age groups with the highest prevalence are those in the working years of life, ages 20 – 60. Of all records in the NBR, only 1.4 % did not include the age of the patient.

AGE GROUP BY GENDER

Figure 6



Total N=180,437 (Excluding 2,599 Unknown/Missing)

AGE GROUP BY GENDER

Table 2

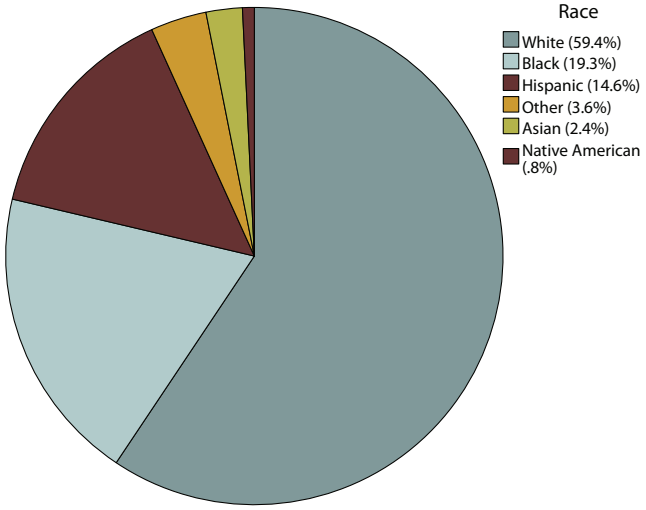
	Gender					
	Total		Female		Male	
Age Categories	Count	Column N %	Count	Column N %	Count	Column N %
0-.9	9,406	5.1	3,431	6.1	5,975	4.7
1-1.9	14,096	7.7	5,564	9.9	8,532	6.7
2-4.9	11,671	6.4	5,024	9.0	6,647	5.2
5-15.9	17,070	9.3	5,561	9.9	11,509	9.1
16-19.9	9,690	5.3	2,401	4.3	7,289	5.7
20-29.9	27,084	14.8	6,370	11.4	20,714	16.3
30-39.9	23,656	12.9	5,840	10.4	17,816	14.0
40-49.9	26,140	14.3	6,927	12.4	19,213	15.1
50-59.9	19,587	10.7	5,530	9.9	14,057	11.1
60-69.9	10,770	5.9	3,575	6.4	7,195	5.7
70-79.9	6,515	3.6	2,639	4.7	3,876	3.1
80 and over	4,752	2.6	2,428	4.3	2,324	1.8
Subtotal	**180,437**	**98.6**	**55,290**	**98.7**	**125,147**	**98.5**
Missing	2,599	1.4	731	1.3	1,868	1.5
Total	**183,036**	**100.0**	**56,021**	**100.0**	**127,015**	**100.0**

Figure 7 and Table 3 depict the distribution of cases in the NBR by race. The table shows that 4.7 % of records did not specify race. The figure is based on those records in which race was specified.

Figure 8 shows the number of cases of white and non-white patients in various age categories. Non-whites predominate in children, less than 5, admitted to burn centers. In all other age categories, however, there are more whites than non-whites. This suggests that racial factors may influence the occurrence of burn injuries and/or admission to a burn center differently as a function of age.

Figure 7

RACE/ETHNICITY



Total N=174,462 (Excluding 8,574 Unknown/Missing)

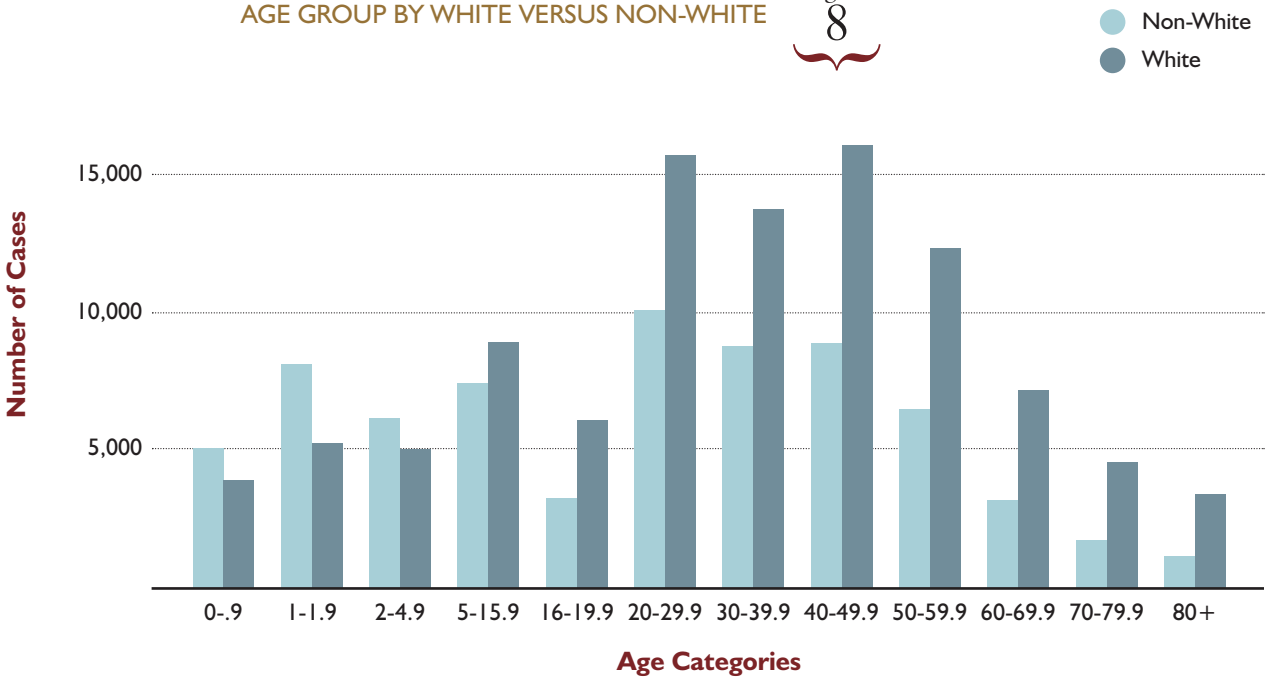
Table 3

RACE/ETHNICITY

Race	Cases
White	103,596
Black	33,671
Hispanic	25,385
Other	6,355
Asian	4,127
Native American	1,328
Unknown	8,574
Total	**183,036**

Figure 8

AGE GROUP BY WHITE VERSUS NON-WHITE



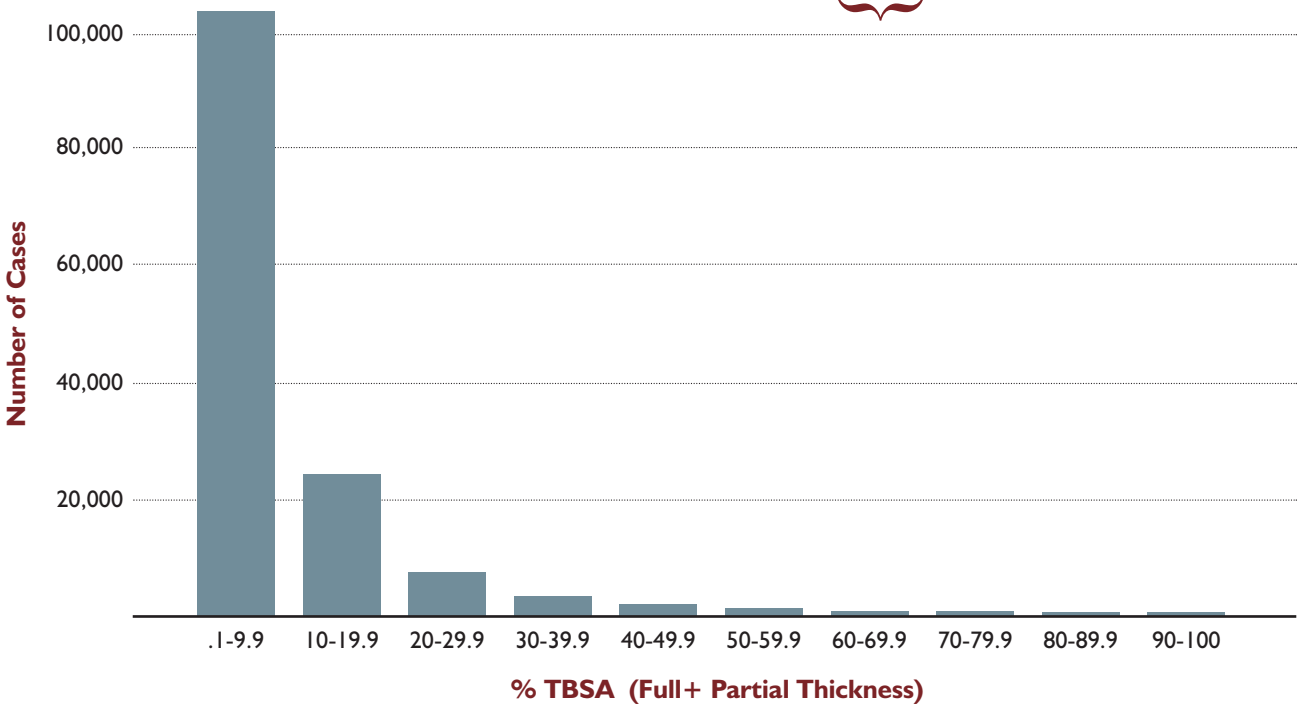
Total N=172,141 (Excluding 10,895 Unknown/Missing)

Figure 9 shows the distribution of cases in the NBR by burn size. The proportion of records with no value for burn size was 20.7 %. These presumably included both patients who truly had no burn or skin loss, e.g. pure inhalation injury, and those whose burn size was unknown or simply not recorded. Of those with a specified burn size, only a small proportion had large burns. Patients with a total burn size of 40% BSA or more accounted for only 4.0 % of cases.

Table 4 shows the proportion of patients in each category of total burn size who died, and the Case Fatality rate. This clearly increased with burn size. The burn size associated with a 50% Case Fatality (LA-50) appears to be approximately 70 % TBSA.

Figure 9

BURN SIZE GROUP (% TBSA)



Total N=145,183 (Excluding 37,853 Unknown/Missing)

Table 4

LIVED/DIED BY BURN GROUP SIZE (%TBSA)

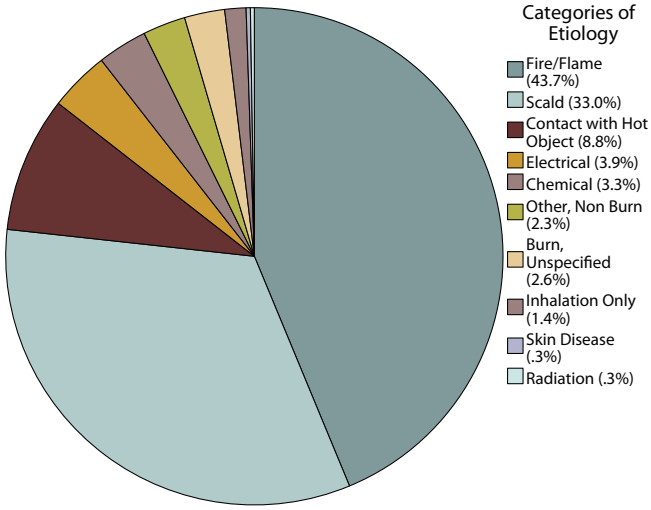
	Lived	Died	
%TBSA	**Cases**	**Cases**	**Mortality Rate**
0.1 - 9.9	103,266	648	0.6
10 - 19.9	23,565	696	2.9
20 - 29.9	6,959	651	8.6
30 - 39.9	2,972	580	16.3
40 - 49.9	1,464	491	25.1
50 - 59.9	772	461	37.4
60 - 69.9	511	382	42.8
70 - 79.9	254	334	56.8
80 - 89.9	150	393	72.4
> 90	96	538	84.9
Subtotal	**140,009**	**5,174**	**3.6**
Missing or 0%	36,205	1,648	4.4
TOTAL	**176,214**	**6,822**	**3.7**

Total N=183,036 (Excluding 0 Unknown/Missing)

Table 10 and Figure 5 depict the distribution of different burn etiologies amongst the cases in which one was specified. The table documents that 16 % 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 hospitals that were caused by one of the four most common burn etiologies or mechanisms in various age groups. Burns due to Fire/Flame predominated in all cases five years and older. Scalds were most frequent in children less than five.

Figure 10 ETIOLOGY



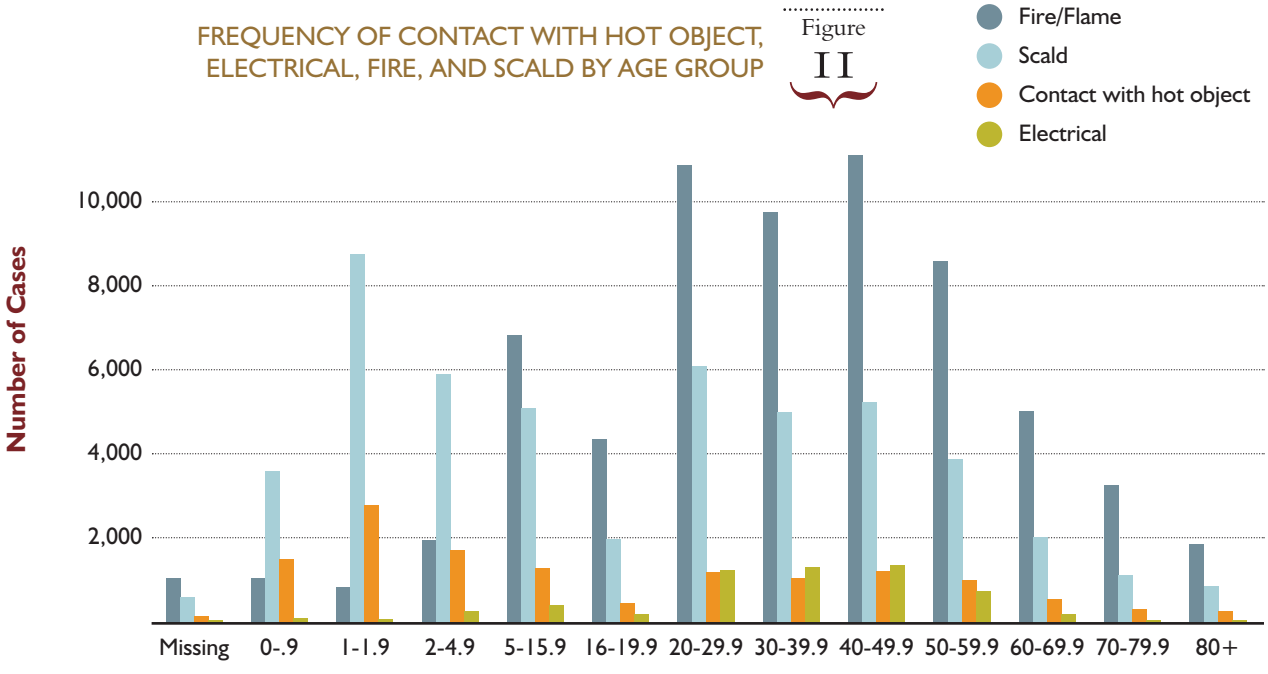
Total N=153,646 (Excluding 29,390 Unknown/Missing)

Table 5 ETIOLOGY

Etiology	Cases
Fire/Flame	67,216
Scald	50,674
Contact with Hot Object	13,556
Electrical	5,999
Chemical	4,976
Other, Non Burn	4,271
Burn, Unspecified	4,014
Inhalation Only	2,126
Skin Disease	421
Radiation	393
Unknown	29,390
Total	**183,036**

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

Figure 11



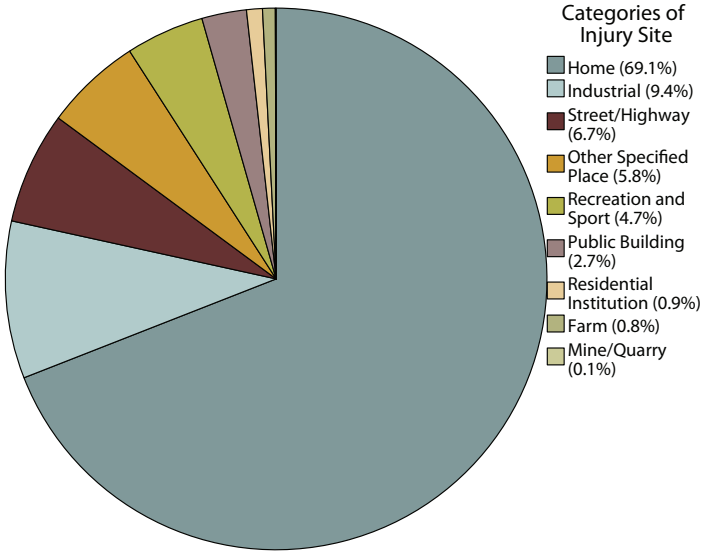
Total N=137,445 (Excluding 45,591 Cases)

Figure 12 and Table 6 depict the distribution of cases in the NBR by the place of occurrence. The table shows that 13.9 % of records did not specify a place of occurrence. The figure is based on those records in which a place of occurrence was specified. Slightly over 69 % of burn injuries cared for in burn centers occurred in the home.

Figure 13 and Table 7 depict the distribution of cases in the NBR by the circumstances of the injury. The table shows that 17.9 % of records did not specify the circumstances in which the burn injury occurred. The figure is based on those records in which these circumstances were specified. Almost 93 % of burns seen at burn centers were considered accidental, and only 16.3 % of these were related to work.

Figure 12

PLACE OF OCCURRENCE - E849 CODE



Total N=157,674 (Excluding 25,362 Unknown/Missing)

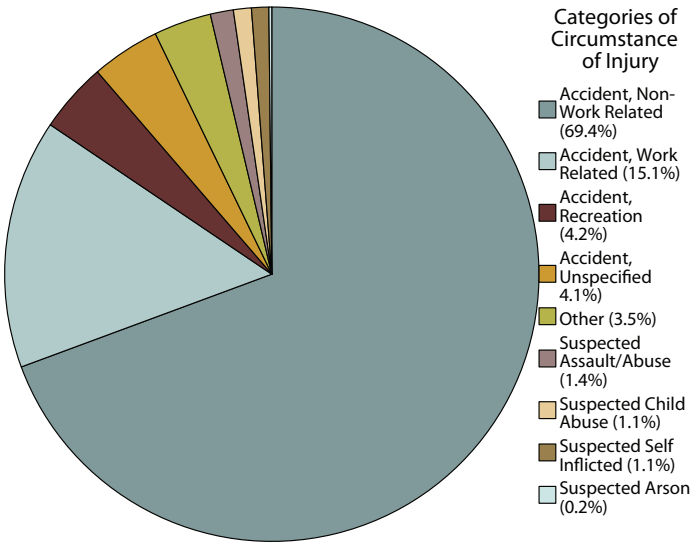
Table 6

PLACE OF OCCURRENCE - E849 CODE

Place of Occurrence	Cases
Home	108,877
Industrial	14,801
Street/Highway	10,539
Other Specified Place	9,117
Recreation and Sport	7,370
Public Building	4,207
Residential Institution	1,492
Farm	1,191
Mine/Quarry	80
Unspecified	**25,362**
Total	**183,036**

Figure 13

CIRCUMSTANCE OF INJURY



Total N=150,327 (Excluding 32,709 Unknown/Missing)

Table 7

CIRCUMSTANCE OF INJURY

Circumstance of Injury	Cases
Accident, Non-Work Related	104,258
Accident, Work Related	22,685
Accident, Recreation	6,361
Other	5,227
Accident, Unspecified	6,233
Suspected Assault/Abuse	2,100
Suspected Self Inflicted	1,568
Suspected Child Abuse	1,635
Suspected Arson	260
Unknown	**32,709**
Total	**183,036**

Figure 14 depicts the proportion of patients in the NBR that died. Since outcome is a criterion for inclusion in the NBR, there were no records in which the outcome was missing.

Table 8 shows the numbers and proportions of various types of discharge dispsition for all cases included in the NBR. Almost 85 % of cases were discharged from the burn center to home.

HOSPITAL DISPOSITION

Figure 14

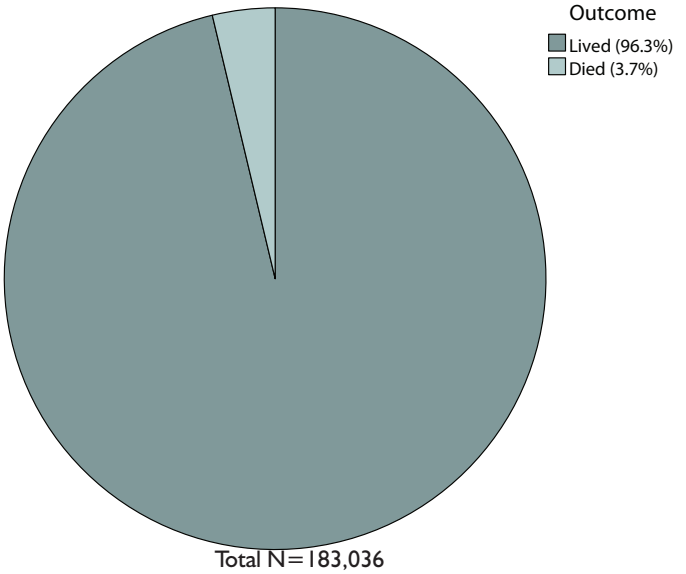


Table 8 HOSPITAL DISPOSITION

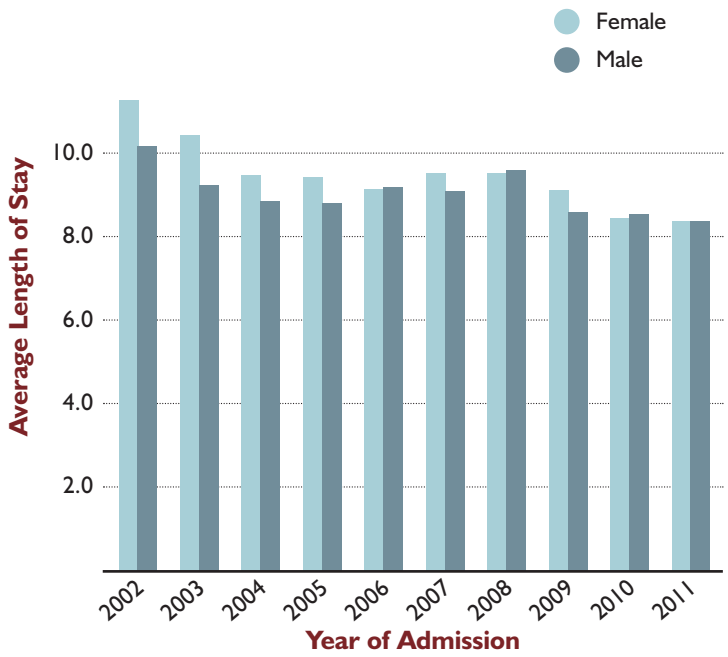
Discharge Disposition	Cases	Valid Pct.
Discharged Home, No Home Health	113,589	62.1
Discharged Home	33,746	18.4
Discharged Home, With Home Health	7,887	4.3
Death	6,822	3.7
Rehabilitation Facility	5,517	3.0
Transfer to another hospital	3,534	1.9
Nursing home/skilled nursing facility (SNF)	3,571	2.0
Other	2,051	1.1
Transfer to another service	1,116	0.6
Jail or Prison	1,022	0.6
Unable to Complete Treatment	768	0.4
Discharged to foster care	720	0.4
Psychiatry, inpatient	596	0.3
Discharged to extended care facility (ECF)	794	0.4
Transfer to an acute burn facility	419	0.2
Discharged to alternate caregiver	521	0.3
Transfer, unspecified	206	0.1
Against Medical Advice	157	0.1
Total	**183,036**	100.0

Figure 15 depicts the average total duration of hospitalization (Total Hospital Days, Length of Stay or LOS) for both men and women by year. LOS decreased for both genders over the decade (18 % and 26 %). Although LOS was substantially greater for women than men at the beginning of the decade depicted, in the latest year LOS for the two genders has been essentially equivalent.

Figure 16 depicts the proportion of patients in the NBR who died in the hospital (Case Fatality) by gender and year. Case Fatality decreased by over 40 % for both women and men between 2002 and 2011. Case Fatality was substantially greater for women than men at the beginning of the decade depicted, but that difference has narrowed. In the 2011 cases reported to date, the Case Fatality for both genders is almost the same.

AVERAGE HOSPITAL LENGTH OF STAY BY GENDER, 2002-2011

Figure 15

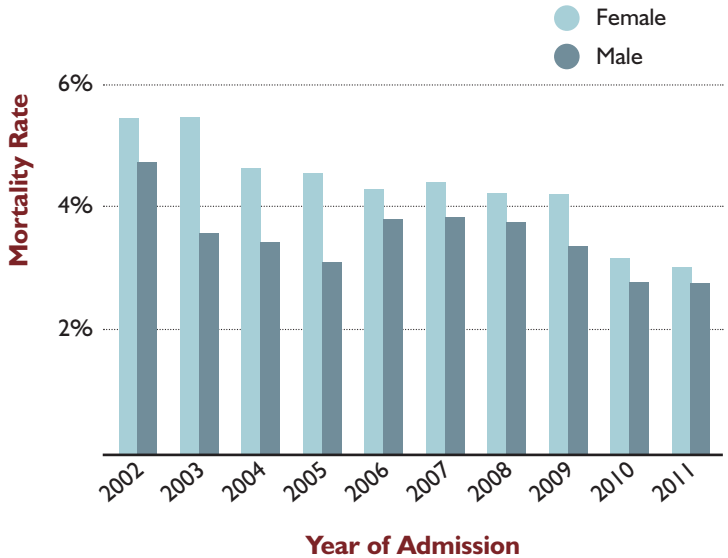


Total N=181,833 (Excluding 1,203 Unknown/Missing)

	Female	Male
Admission Year	Mean +/- SEM	Mean +/- SEM
2002	11.3+/-0.3	10.2+/-0.2
2003	10.5+/-0.1	9.29+/-0.1
2004	9.51+/-0.1	8.86+/-0.1
2005	9.4+/-0.1	8.8+/-0.1
2006	9.1+/-0.1	9.2+/-0.1
2007	9.5+/-0.1	9.1+/-0.1
2008	9.5+/-0.1	9.6+/-0.1
2009	9.1+/-0.1	8.6+/-0.1
2010	8.4+/-0.1	8.5+/-0.1
2011	8.4+/-0.1	8.4+/-0.1

MORTALITY RATE BY GENDER, 2002-2011

Figure 16



Total N=183,036

	Mortality Rate	
Admission Year	Female	Male
2002	5.4	4.8
2003	5.5	3.6
2004	4.6	3.4
2005	4.5	3.1
2006	4.3	3.8
2007	4.4	3.9
2008	4.2	3.7
2009	4.2	3.4
2010	3.2	2.8
2011	3.0	2.8

Table 9 depicts the Case Fatality for each decile of total burn size in each of several age categories. As age and/or burn size increased, so did Case Fatality. The numbers of cases used to determine these values (proportion of cases in each group that died) 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.

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)

	Burn Size (% TBSA)										
Age Group	**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**	**Total**
Birth - .9	0.3	1.8	6.9	9.4	24.7	28.8	44.9	50.0	70.4	91.7	2.9
Died/Total	15/5558	26/1456	30/435	21/224	24/97	21/73	22/49	21/42	19/27	33/36	232/7997
1 - 1.9	0.0	0.4	0.6	2.7	8.5	16.7	28.6	20.0	25.0	75.0	0.2
Died/Total	0/10136	7/1998	2/338	3/112	4/47	3/18	6/21	2/10	1/4	3/4	31/12688
2 - 4.9	0.1	0.2	0.8	5.3	7.9	19.7	9.3	25.0	60.0	45.5	0.8
Died/Total	9/7687	3/1575	3/379	10/190	8/101	13/66	4/43	7/28	18/30	10/22	85/10121
5 - 15.9	0.1	0.3	1.1	2.3	4.3	5.1	11.6	13.8	49.0	60.0	0.7
Died/Total	8/10524	6/2134	7/640	7/301	8/186	6/117	10/86	8/58	24/49	21/35	105/14130
16 - 19.9	0.1	0.4	1.1	3.3	5.2	9.4	14.3	18.5	58.3	66.7	1.1
Died/Total	7/5404	5/1190	4/370	5/152	6/115	6/64	6/42	5/27	14/24	22/33	80/7421
20 - 29.9	0.2	0.6	1.6	6.2	12.4	19.5	25.2	43.5	60.0	77.0	1.6
Died/Total	23/14854	19/3368	18/1103	31/503	31/249	30/154	32/127	30/69	48/80	67/87	329/20594
30 - 39.9	0.3	0.9	2.9	6.7	11.0	25.3	34.7	51.1	68.9	94.3	2.3
Died/Total	35/12629	27/3057	29/993	32/479	29/264	40/158	41/118	46/90	51/74	82/87	412/17949
40 - 49.9	0.4	1.5	4.8	10.9	23.1	42.3	37.6	62.9	74.7	91.0	3.2
Died/Total	50/14033	51/3414	57/1179	65/596	74/321	85/201	53/141	44/70	65/87	101/111	645/20153
50 - 59.9	0.8	3.7	10.1	21.2	39.7	53.0	67.8	81.6	87.8	89.6	5.4
Died/Total	82/10463	96/2602	93/922	83/392	96/242	79/149	78/115	62/76	65/74	86/96	820/15131
60 - 69.9	2.0	6.5	19.1	42.9	52.5	67.0	85.7	90.2	100.0	89.6	8.3
Died/Total	115/5714	99/1533	96/502	100/233	63/120	61/91	42/49	46/51	30/30	43/48	695/8371
70 - 79.9	4.0	15.4	34.0	59.2	74.5	84.4	88.0	92.9	90.0	90.6	14.9
Died/Total	132/3268	138/898	119/350	109/184	73/98	54/64	44/50	26/28	18/20	29/32	742/4992
80 or Greater	6.9	28.7	63.9	77.2	89.0	96.7	86.7	93.5	97.1	100.0	24.9
Died/Total	154/2225	210/731	179/280	105/136	73/82	58/60	39/45	29/31	34/35	27/27	908/3652
Total	**0.6**	**2.9**	**8.5**	**16.3**	**25.4**	**37.5**	**42.6**	**56.2**	**72.5**	**84.8**	**3.6**
Died/Total	**630/102495**	**687/23956**	**637/7491**	**571/3502**	**489/1922**	**456/1215**	**377/886**	**326/580**	**387/534**	**524/618**	**5084/143199**

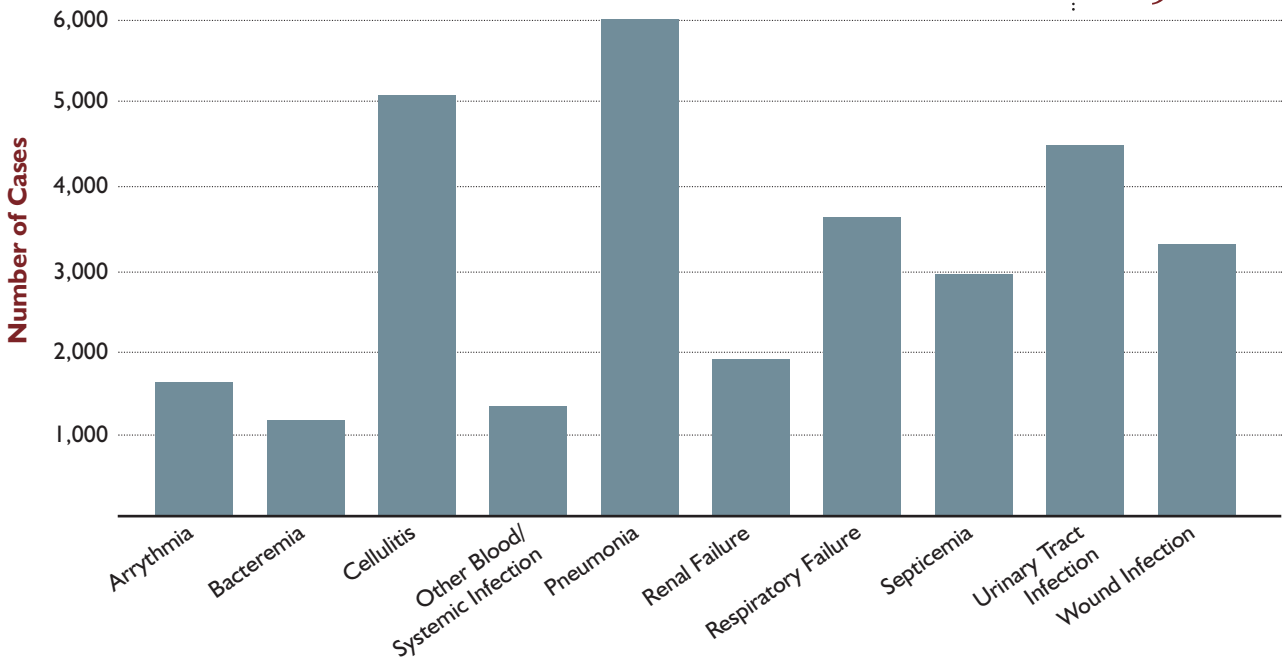
Total N=143,199 (Excluding 39,837 Unknown/Missing)

Figure 17 depicts the number of several complications in all NBR case records. Pneumonia, cellulitis, and urinary tract infections are the most prevalent complications recorded in burn center patients.

Figure 18 demonstrates the association of several complications and duration of mechanical ventilation. Except for cellulitis, 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.

COMPLICATIONS: FREQUENCY OF TOP TEN CLINICALLY RELEVANT COMPLICATIONS

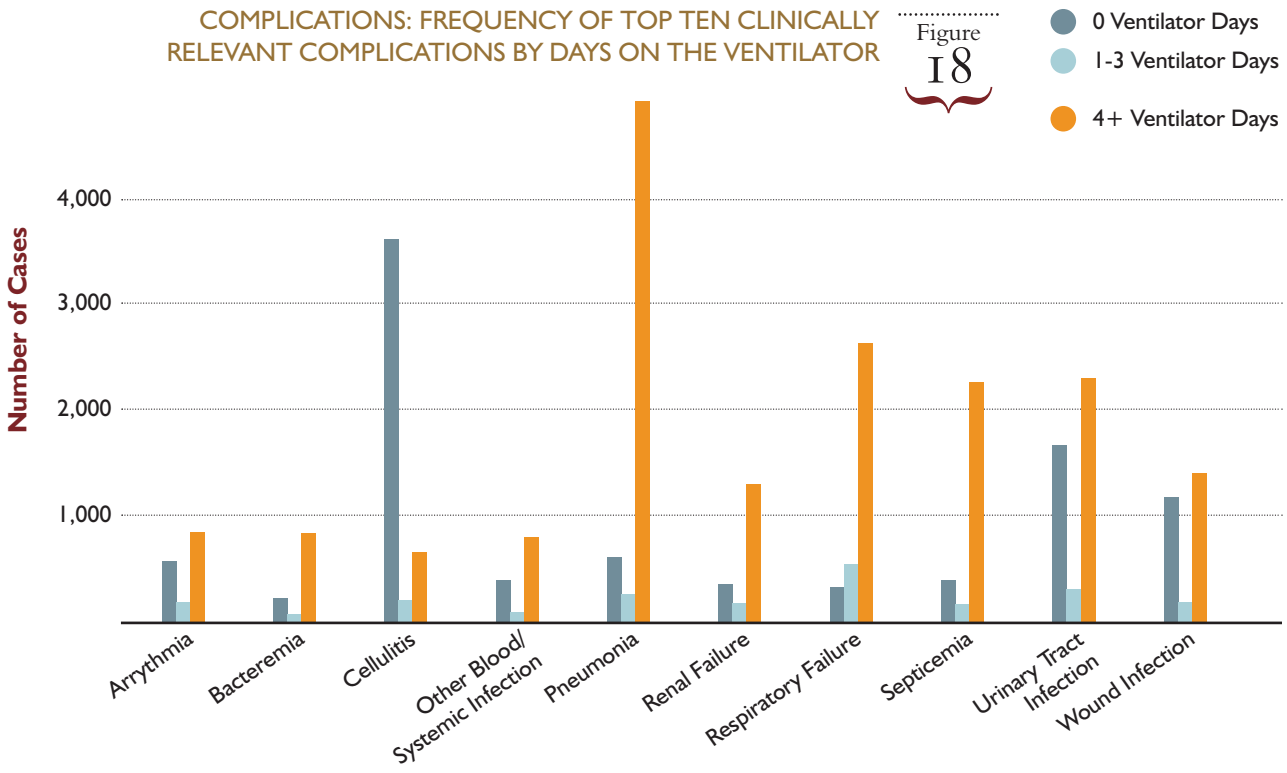
Figure 17



Total N=169,998 (Excluding 13,038 cases from non TRACS centers)

COMPLICATIONS: FREQUENCY OF TOP TEN CLINICALLY RELEVANT COMPLICATIONS BY DAYS ON THE VENTILATOR

Figure 18

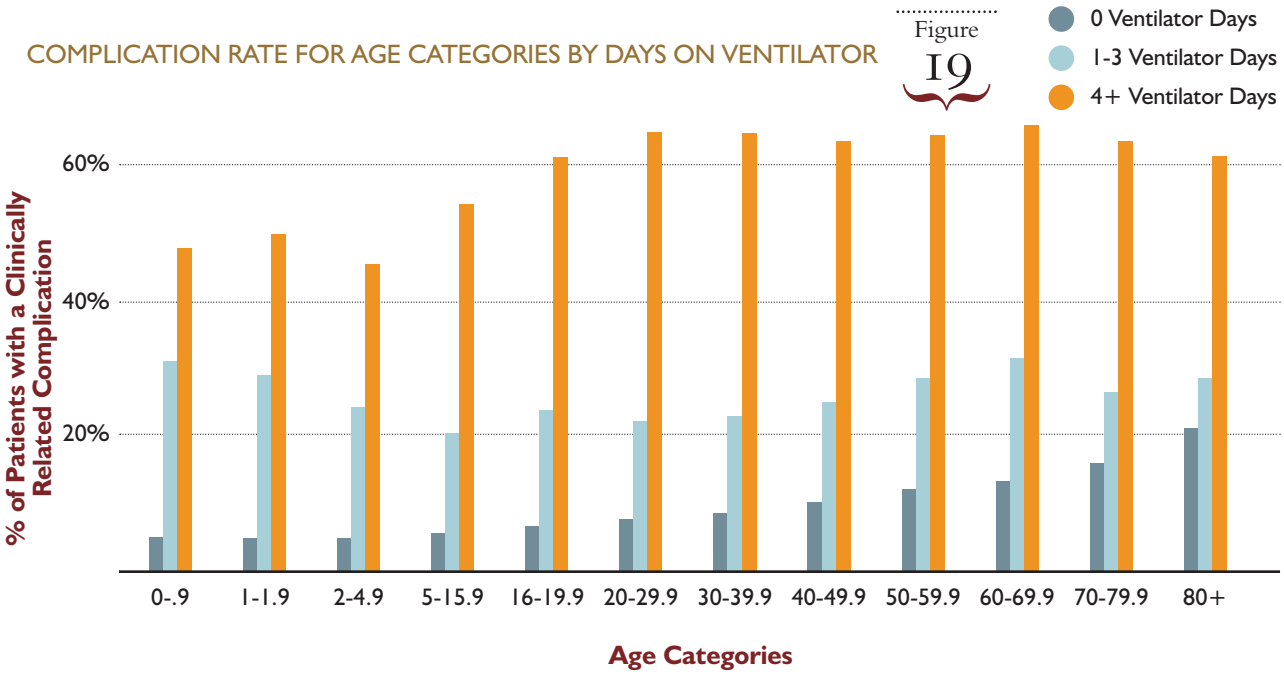


Total N=169,998 (Excluding 13,038 cases from non TRACS centers)

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.

COMPLICATION RATE FOR AGE CATEGORIES BY DAYS ON VENTILATOR

Figure 19



Total N=143,948 (Excluding 39,088 cases from non TRACS centers or unknown/missing age or ventilator days)

COMPLICATION COUNT FOR AGE CATEGORIES BY DAYS ON VENTILATOR

Table 10

	Ventilator Days							
	0 Ventilator Days		1-3 Ventilator Days		4 or More Ventalitor Days		Total	
	Complication		Complication		Complication		Complication	
Age Categories	No	Yes	No	Yes	No	Yes	No	Yes
0-.9	4,393	227	83	37	104	94	4,580	358
1-1.9	11,350	539	94	38	141	139	11,585	716
2-4.9	9,029	454	169	54	239	197	9,437	705
5-15.9	12,494	708	425	107	394	461	13,313	1,276
16-19.9	6,197	431	373	115	178	277	6,748	823
20-29.9	16,976	1,402	1,048	296	512	938	18,536	2,636
30-39.9	14,518	1,374	970	285	564	1,016	16,052	2,675
40-49.9	15,501	1,756	1,054	350	762	1,314	17,317	3,420
50-59.9	11,117	1,472	899	354	681	1,221	12,697	3,047
60-69.9	5,782	887	582	260	441	839	6,805	1,986
70-79.9	3,153	594	450	161	347	599	3,950	1,354
80 and over	2,139	564	387	153	251	395	2,777	1,112
Subtotal	**112,649**	**10,408**	**6,534**	**2,210**	**4,614**	**7,490**	**123,797**	**20,108**
Missing	327	40	120	21	143	86	590	147
Total	**112,976**	**10,448**	**6,654**	**2,231**	**4,757**	**7,576**	**124,387**	**20,255**

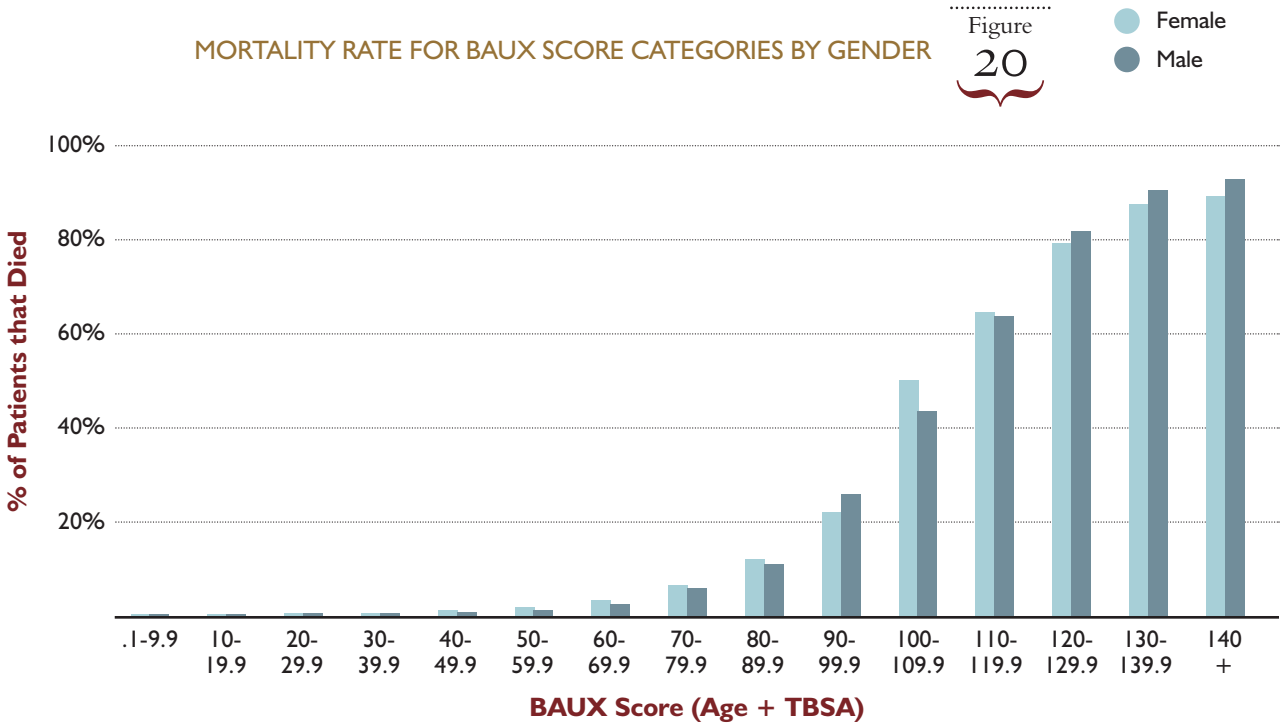
Total N=144,642 (Excluding 38,394 cases from non TRACS centers or unknown/missing ventilator days)

The data table in Table 9, on page 15, demonstrated the relationship between death, increasing age, and burn size. Figure 20 depicts the data shown in table 11 graphically and demonstrates a similar relationship. 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 so called Baux Score.

There is a strong association between BAUX score and Case Fatality for both men and women. Overall, women had a higher Case Fatality than men (4.20% vs 3.48%, P<0.01). The sum of age and burn size (Baux Score) associated with a Case Fatality of 50% (P 50) was 108. There was no significant difference between genders.

Figure 20

MORTALITY RATE FOR BAUX SCORE CATEGORIES BY GENDER



Total N=169,915 (Excluding 13,121 Unknown/Missing)

Table 11

NUMBER OF CASES IN BAUX SCORE CATEGORIES BY GENDER

	Female		Male	
BAUX Score (Age + TBSA)	**Lived**	**Died**	**Lived**	**Died**
0-9.9	10,874	46	16,479	68
10-19.9	6,503	40	12,243	87
20-29.9	5,689	55	17,107	169
30-39.9	5,367	52	16,151	153
40-49.9	5,735	85	16,597	215
50-59.9	5,453	115	14,610	232
60-69.9	3,882	151	9,618	295
70-79.9	2,683	199	5,711	377
80-89.9	2,033	281	3,259	415
90-99.9	972	280	1,376	485
100-109.9	278	279	511	393
110-119.9	95	173	211	370
120-129.9	40	152	66	295
130-139.9	15	105	26	239
140 and Over	19	162	25	319
Total	**49,638**	**2,175**	**113,990**	**4,112**

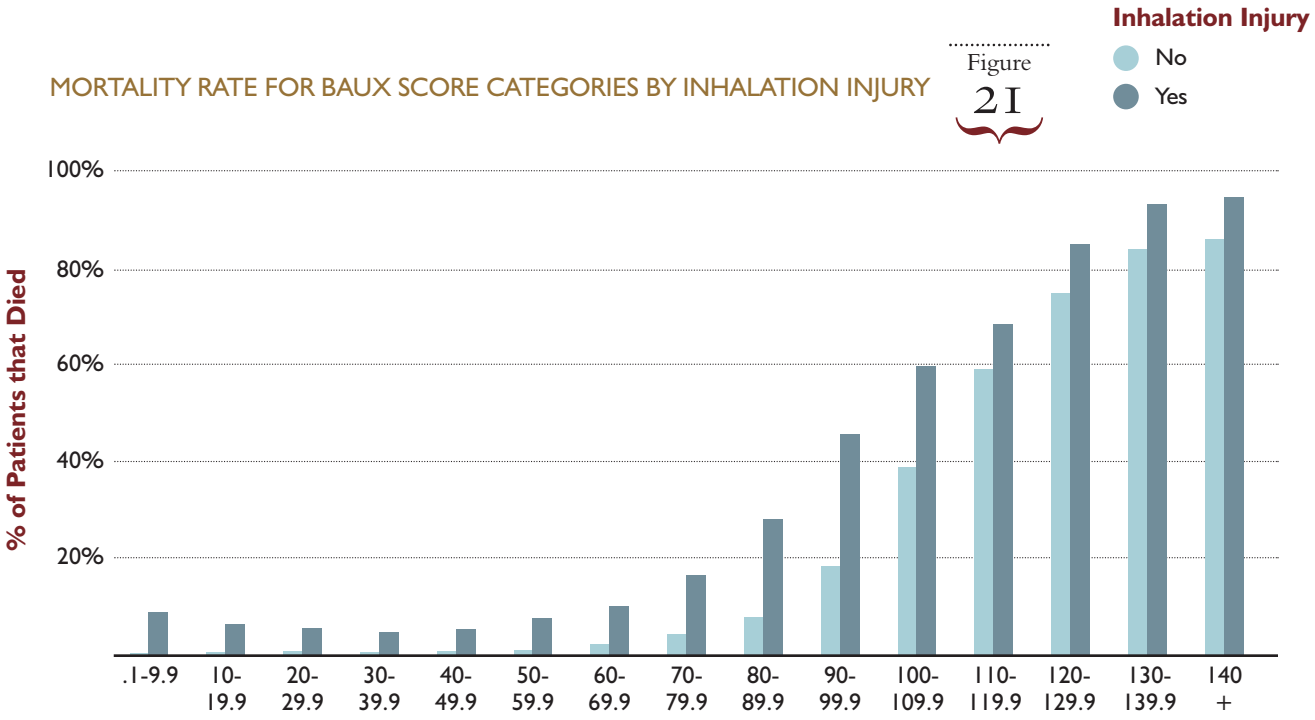
Total N=169,915 (Excluding 13,121 Unknown/Missing)

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.

For patients with an inhalation injury, the sum of age and burn size associated with Case Fatality of 50% was 93, compared with 105 for those with no inhalation injury.

MORTALITY RATE FOR BAUX SCORE CATEGORIES BY INHALATION INJURY

Figure 21



Total N=156,113 (Excluding 26,923 Unknown/Missing)

NUMBER OF CASES IN BAUX SCORE CATEGORIES BY INHALATION INJURY

Table 12

	No Inhalation Injury		Inhalation Injury	
BAUX Score (Age + TBSA)	**Lived**	**Died**	**Lived**	**Died**
0-9.9	24,947	73	367	37
10-19.9	16,909	97	318	22
20-29.9	20,053	157	729	46
30-39.9	18,902	143	949	50
40-49.9	19,212	198	1,235	74
50-59.9	17,009	202	1,425	116
60-69.9	11,156	259	1,216	142
70-79.9	6,664	318	1,055	210
80-89.9	4,142	362	703	279
90-99.9	1,796	410	351	299
100-109.9	536	344	182	274
110-119.9	168	245	117	257
120-129.9	67	202	36	211
130-139.9	26	142	12	185
140 and Over	30	187	13	247
Total	**141,617**	**3,339**	**8,708**	**2,449**

Total N=156,113 (Excluding 26,923 Unknown/Missing)

Major predictors of Case Fatality in burns include burn size, age, and the presence of inhalation injury. This table 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: under 60 and 60 and older; and two categories of presence of inhalation injury: No and Yes.

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	99,497	258	0.3
0.1-19.9	0-59.9	Yes	3,526	180	4.9
0.1-19.9	60 and Over	No	11,420	542	4.5
0.1-19.9	60 and Over	Yes	1,022	245	19.3
20-39.9	0-59.9	No	6,756	215	3.1
20-39.9	0-59.9	Yes	1,353	241	15.1
20-39.9	60 and Over	No	710	411	36.7
20-39.9	60 and Over	Yes	191	250	56.7
40-59.9	0-59.9	No	1,282	219	14.6
40-59.9	0-59.9	Yes	621	292	31.0
40-59.9	60 and Over	No	85	184	68.4
40-59.9	60 and Over	Yes	42	170	80.2
60 and Over	0-59.9	No	540	446	45.2
60 and Over	0-59.9	Yes	364	665	64.6
60 and Over	60 and Over	No	25	158	86.3
60 and Over	60 and Over	Yes	11	210	95.0
		TOTAL	**127,445**	**4,686**	**3.5**

Total N=132,104 (Excluding 50,932 Unknown/Missing)

Table 14 lists the number and proportion of cases in the NBR that were covered by several forms of payment. Over 16% of the records did not include payment information. Of those that did include this data, almost one third (30.7%) were covered by Medicaid or uninsured.

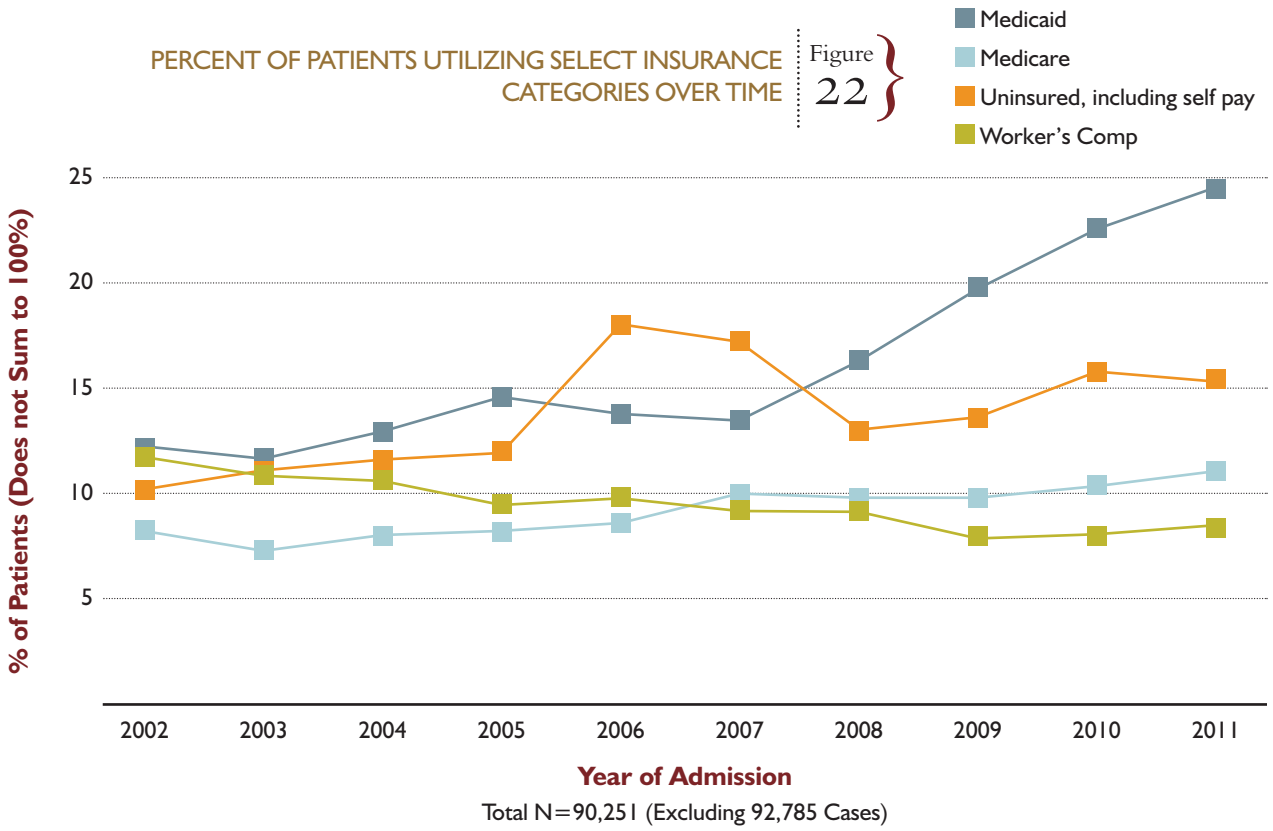
Table 14 PRIMARY INSURANCE PAYOR

Insurance	Cases	Pct.
Government-Medicaid	30,023	16.4
Government-Medicare	17,063	9.3
Other Government	5,296	2.9
Subtotal	**52,382**	**28.6**
Private/Commercial Insurance	42,649	23.3
Blue Cross/Blue Shield	10,240	5.6
Other Insurance-Not Named	372	0.2
Private-Foundation or Charity	3,515	1.9
Subtotal	**56,776**	**31.0**
Workers Compensation	17,069	9.3
Auto	986	0.5
Subtotal	**18,055**	**9.9**
No Insurance Information Provided	27,665	15.1
Uninsured, including self pay	26,096	14.3
Subtotal	**53,761**	**29.4**
Unidentified Insurance Labels	2,062	1.1
TOTAL	**183,036**	**100.0**

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. The prevalence of patients covered by Workers' Compensation has decreased. This could reflect improved safety in the work place, and/or it could reflect changes in coverage eligibility.

PERCENT OF PATIENTS UTILIZING SELECT INSURANCE CATEGORIES OVER TIME

Figure 22



Total N=90,251 (Excluding 92,785 Cases)

CASE COUNT FOR SELECT INSURANCE CATEGORIES OVER TIME

Table 15

	Select Insurance Categories								
	Medicaid		Medicare		Uninsured, including self pay		Workers Compensation		Total
Year of Admission	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count
2002	1,433	12.2	978	8.3	1,217	10.3	1,379	11.7	11,769
2003	1,592	11.7	1,000	7.3	1,533	11.2	1,491	10.9	13,665
2004	2,172	12.9	1,362	8.1	1,968	11.7	1,783	10.6	16,875
2005	2,334	14.6	1,319	8.3	1,917	12.0	1,513	9.5	15,939
2006	2,979	13.8	1,879	8.7	3,942	18.2	2,120	9.8	21,654
2007	2,977	13.4	2,264	10.2	3,857	17.3	2,052	9.2	22,247
2008	3,483	16.3	2,097	9.8	2,760	12.9	1,951	9.1	21,398
2009	4,583	19.8	2,265	9.8	3,171	13.7	1,834	7.9	23,166
2010	5,595	22.7	2,598	10.5	3,926	15.9	1,967	8.0	24,639
2011	2,875	24.6	1,301	11.1	1,805	15.4	979	8.4	11,684
Total	**30,023**	**16.4**	**17,063**	**9.3**	**26,096**	**14.3**	**17,069**	**9.3**	**183,036**

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 approximately 1 day for each percent BSA burn.

Less than 40% of the cases reviewed in this year's NBR report included data on hospital charges. Tables 17, 18, and 19 are based on those records. Table 17 depicts hospital charges for survivors and non-survivors in each burn size decile. Note that charge data was provided in only 30% of all records.

Table 16

HOSPITAL DAYS: LIVED/DIED BY BURN SIZE GROUP

	Total		Lived		Dead	
%TBSA	**Cases**	**Mean +/- SEM**	**Cases**	**Mean +/- SEM**	**Cases**	**Mean +/- SEM**
0.1 - 9.9	103,914	5.6+/-0.0	103,266	5.5+/-0.0	648	17.4+/-1.0
10 - 19.9	24,261	12.6+/-0.0	23,565	12.4+/-0.0	696	20.6+/-1.0
20 - 29.9	7,610	22.5+/-0.2	6,959	22.7+/-0.2	651	20.1+/-0.9
30 - 39.9	3,552	33.6+/-0.5	2,972	36.2+/-0.5	580	20.3+/-1.1
40 - 49.9	1,955	41.3+/-0.8	1,464	48.2+/-0.9	491	20.8+/-1.7
50 - 59.9	1,233	45.5+/-1.3	772	60.6+/-1.5	461	20.1+/-1.8
60 - 69.9	893	48.8+/-1.7	511	71.1+/-2.3	382	19.0+/-1.8
70 - 79.9	588	44.0+/-2.4	254	84.1+/-4.0	334	13.4+/-1.6
80 - 89.9	543	30.8+/-2.3	150	80.7+/-5.7	393	11.9+/-1.5
> 90	634	15.9+/-1.9	96	64.8+/-9.9	538	7.4+/-1.0
Subtotal	**145,183**	**9.7+/-0.0**	**140,009**	**9.4+/-0.0**	**5,174**	**17.5+/-0.4**
Missing or 0%	37,853	6.9+/-0.0	36,205	6.7+/-0.0	1,648	10.3+/-0.5
TOTAL	**183,036**		**176,214**		**6,822**	

Total N=183,036

Table 17

HOSPITAL CHARGES: LIVED/DIED BY BURN SIZE GROUP

	Total		Lived		Dead	
%TBSA	**Cases**	**Mean +/- SEM**	**Cases**	**Mean +/- SEM**	**Cases**	**Mean +/- SEM**
0.1 - 9.9	39,088	$36351+/-441	38,830	$35627+/-433	258	$145316+/-13201
10 - 19.9	9,431	$103737+/-2209	9,135	$99939+/-2136	296	$220970+/-23685
20 - 29.9	2,984	$218957+/-5903	2,685	$214603+/-6151	299	$258057+/-20389
30 - 39.9	1,323	$353246+/-11522	1,094	$369066+/-12884	229	$277666+/-24800
40 - 49.9	696	$507140+/-24892	500	$576098+/-31562	196	$331226+/-33440
50 - 59.9	455	$601666+/-41043	256	$831193+/-63615	199	$306396+/-36665
60 - 69.9	319	$603931+/-48256	165	$851970+/-68135	154	$338176+/-61656
70 - 79.9	224	$623429+/-69624	87	$1227612+/-142168	137	$239752+/-45749
80 - 89.9	206	$377646+/-61317	44	$1068444+/-244024	162	$190021+/-27282
> 90	248	$146598+/-28641	25	$432746+/-143614	223	$114519+/-26816
Subtotal	**54,974**	**$83551+/-1039**	**52,821**	**$77287+/-1001**	**2,153**	**$237242+/-9517**
Missing or 0%	15,155	$44215+/-1196	14,421	$40657+/-1152	734	$114121+/-9515
TOTAL	**70,129**	**$75051+/-857**	**67,242**	**$69431+/-826**	**2,887**	**$205940+/-7564**

Total N=70,129 (Excluding 112,907 cases with Unknown/Missing charge data)

Table 18 lists the 20 most frequently recorded MS-DRG codes and their associated hospital charges for both survivors and deaths.

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

Table 18

	Total		Lived		Died	
Top 20 MS-DRG Codes	**Cases**	**Mean +/- SEM**	**Cases**	**Mean +/- SEM**	**Cases**	**Mean +/- SEM**
3 ECMO or trach w MV 96+ hrs or PDX exc face, mouth & neck w maj O.R.	621	$793128+/-39000	525	$790727+/-42950	96	$806260+/-92547
463 Wnd debrid & skn grft exc hand, for musculo-conn tiss dis w MCC	223	$102793+/-12464	219	$93947+/-9794	4	$587149+/-423867
483 Major joint & limb reattachment proc of upper extremity w CC/MCC	94	$175205+/-38686	81	$179596+/-43621	13	$147847+/-68953
506 Major thumb or joint procedures	921	$123032+/-7544	896	$115778+/-6926	25	$383012+/-115620
507 Major shoulder or elbow joint procedures w CC/MCC	1,651	$92635+/-4020	1,635	$89718+/-3765	16	$390623+/-140249
510 Shoulder,elbow or forearm proc,exc major joint proc w MCC	302	$50846+/-5627	297	$45151+/-4593	5	$389113+/-148705
511 Shoulder,elbow or forearm proc,exc major joint proc w CC	952	$19743+/-1265	950	$19591+/-1262	2	$92304+/-32601
577 Skin graft &/or debrid exc for skin ulcer or cellulitis w CC	214	$45831+/-3414	214	$45831+/-3414	0	
595 Major skin disorders w MCC	182	$82500+/-7345	132	$82015+/-9010	50	$83781+/-12347
605 Trauma to the skin, subcut tiss & breast w/o MCC	138	$22063+/-2919	138	$22063+/-2919	0	
906 Hand procedures for injuries	148	$33823+/-2159	148	$33823+/-2159	0	
918 Poisoning & toxic effects of drugs w/o MCC	274	$26960+/-3311	266	$27054+/-3369	8	$23849+/-18918
923 Other injury, poisoning & toxic effect diag w/o MCC	343	$15279+/-1285	337	$14572+/-1131	6	$55001+/-36113
927 Extensive burns or full thickness burns w MV 96+ hrs w skin graft	2,079	$413250+/-12336	1,791	$400493+/-13253	288	$492582+/-33408
928 Full thickness burn w skin graft or inhal inj w CC/MCC	5,342	$168123+/-3643	5,116	$163708+/-3595	226	$268066+/-2739
929 Full thickness burn w skin graft or inhal inj w/o CC/MCC	5,261	$96694+/-2526	5,206	$94143+/-2479	55	$338150+/-47874
933 Extensive burns or full thickness burns w MV 96+ hrs w/o skin graft	731	$91897+/-6973	198	$154903+/-19912	533	$68491+/-5759
934 Full thickness burn w/o skin grft or inhal inj	3,217	$35130+/-1883	3,080	$33813+/-1910	137	$64761+/-10247
935 Non-extensive burns	27,001	$26144+/-546	26,834	$25480+/-537	167	$132922+/-16415
998 Principal diagnosis invalid as discharge diagnosis	27	$2657+/-985	27	$2657+/-985	0	
Subtotal	**49,721**		**48,090**		**1,631**	
Other	6,180	$81574+/-2947	5,749	$72905+/-2709	431	$197208+/-21155
Unmappable	2,073	$156226+/-6661	1,915	$139568+/-6472	158	$358120+/-34821
Unknown	12,155	$33341+/-1079	11,488	$30053+/-1054	667	$89971+/-7242
Total	**70,129**		**67,242**		**2,887**	

Total N=70,129 (Excluding 112,907 cases with Unknown/Missing charge data)

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

	Cases		Days		Hospital Days / %TBSA		Hospital Charges		Hospital Charges / Hospital Days	
Age Groups	**Lived**	**Died**	**Lived**	**Died**	**Lived**	**Died**	**Lived**	**Died**	**Lived**	**Died**
Birth - 0.9	4,530	212	10.68	16.75	1.77	0.72	$45,515.00	$58,527.00	$3,543.00	$5,572.00
+/- SEM			0.32	2.48	0.11	0.12	$2,921.00	$11,953.00	$117.00	$802.00
1 - 1.9	4,189	9	5.88	8.44	1.61	0.26	$31,575.00	$133,071.00	$5,501.00	$19,982.00
+/- SEM			0.88	5.63	0.18	0.13	$908.00	$72,149.00	$99.00	$2,484.00
2 - 4.9	3,391	24	6.78	11.08	1.67	1.13	$46,562.00	$130,005.00	$5,890.00	$18,202.00
+/- SEM			0.22	3.80	0.07	0.55	$3,342.00	$42,056.00	$229.00	$2,747.00
5 - 15.9	4,288	32	7.60	6.47	1.82	0.24	$58,305.00	$213,332.00	$6,202.00	$37,294.00
+/- SEM			0.21	2.75	0.10	0.08	$2,947.00	$87,570.00	$269.00	$6,749.00
16 - 19.9	2,614	29	8.10	12.41	1.63	0.36	$65,437.00	$199,056.00	$5,822.00	$23,353.00
+/- SEM			0.31	6.11	0.05	0.14	$3,820.00	$83,817.00	$109.00	$3,468.00
20 - 29.9	7,676	121	9.13	21.77	1.94	0.48	$80,209.00	$373,451.00	$6,476.00	$23,650.00
+/- SEM			0.19	3.96	0.05	0.07	$3,171.00	$49,435.00	$110.00	$1,672.00
30 - 39.9	6,459	148	9.95	17.36	2.16	0.56	$83,717.00	$323,780.00	$6,450.00	$23,615.00
+/- SEM			0.21	2.67	0.10	0.09	$2,947.00	$47,152.00	$97.00	$1,304.00
40 - 49.9	7,282	245	11.57	17.86	2.47	0.63	$97,260.00	$307,572.00	$6,730.00	$21,807.00
+/- SEM			0.23	2.01	0.08	0.08	$2,954.00	$31,480.00	$112.00	$1,269.00
50 - 59.9	5,367	335	12.83	19.90	2.83	1.06	$108,569.00	$314,754.00	$7,184.00	$20,364.00
+/- SEM			0.27	1.65	0.07	0.17	$3,526.00	$28,193.00	$153.00	$979.00
60 - 69.9	2,843	266	14.36	17.90	3.41	1.32	$119,030.00	$315,567.00	$7,165.00	$19,277.00
+/- SEM			0.42	1.40	0.20	0.16	$5,835.00	$37,472.00	$187.00	$931.00
70 - 79.9	1,645	298	15.82	13.90	3.59	1.13	$125,581.00	$206,612.00	$7,252.00	$15,950.00
+/- SEM			0.47	1.09	0.21	0.15	$5,391.00	$18,020.00	$203.00	$739.00
80 or greater	1,051	368	14.14	12.28	3.53	1.18	$108,748.00	$142,036.00	$6,992.00	$14,136.00
+/- SEM			0.49	0.92	0.17	0.18	$5,531.00	$11,228.00	$207.00	$1,535.00
Total	**51,335**	**2,087**	**10.11**	**16.35**	**2.22**	**0.94**	**$78,388.00**	**$240,062.00**	**$6,223.00**	**$17,859.00**
+/- SEM			**0.11**	**0.61**	**0.03**	**0.05**	**$1,027.00**	**$9,785.00**	**$45.00**	**$445.00**

3 Analysis
by Age Group

This year encompasses a decade of collected data. 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 (NBR). As we improve our collection of data, it is interesting to note the stability of incidence of burns in each ten year cohort. Although, some of these findings continue to be surprising, others in prior years are still expected. All, however, are 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 four pages of figures and 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) than would be expected based on national demographics. The same marked over-representation disappears in young adulthood. This year there has been a shift in the decades of Birth-0.9 years. The NBR shows a marked increase in the number of Hispanic and Native Americans and a slight decrease in Black children, while all other decades of age groups show essentially no change. One would wonder if this is due to increased participation in the NBR, or does this reflect a shift in the populated communities that are at 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 is consistently the predominant etiology in adolescent and into adulthood with a change in ranking of electrical burns over heat contact burns in the 20-29.9 age category. Also, there has been a 10% increase in fire/flame burns in the birth – 0.9 age category. There continues to be a large amount of unspecified burns throughout all age groups. Improvement in data collection may impact these numbers bringing a better appreciation of the total data set.

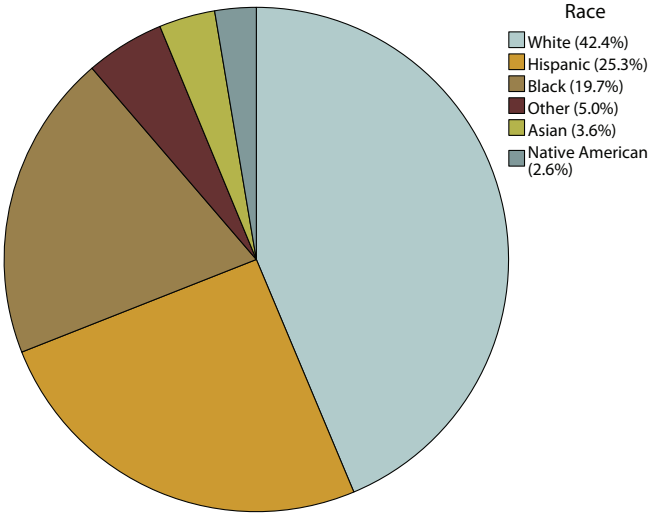
Inhalation injury is one of the most lethal characteristics of burn victims, and, somewhat surprisingly, increases in incidence with age. Even though children are exposed to smoke in structure fires and even with the increase in fire/flame injuries in the lowest age group, the preponderance of scald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

When examining most frequent complications, this year's NBR dataset is demonstrating tangible differences from prior years. Urinary tract infections, pneumonia and cellulitis are the top three complications in those patients under age 60. Those over age 60, show a shift in the top three with respiratory failure over stepping cellulitis in the age 60-69.9 age group and arrhythmias in the over 70 population. Pneumonia remains a very frequent complication in all age groups. Cellulitis continues to be a common thread in all age groups, while septicemia has sustained its downward trend. Even with the emphasis on tracking Hospital Acquired Infections (HAI) and more stringent protocols geared to prevention, Urinary tract infections and pneumonia continue to be our top three complications all age categories.

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. In fact, age of the burn patient seems to be more linearly correlated with mortality than total body surface area. Mortality this year has shown a slight decrease, along with overall hospital days. The decrease on hospital days is very slight, so that the percentage of hospital days to percent body surface area burned, remains at approximately one day/% BSA. Overall length of stay tends to increase by one day for each % TBSA burned, up to roughly 40-50% burns in the under 60 age groups, then becomes erratic with no pattern linked to % TBSA.

Finally, a significant amount of medical economic information resides within this Age Analysis section. Mean charges related to MS-DRGs and mean charges related to etiology are beginning to show a decrease consistent throughout all age groups from last years' data. Mean hospital days for flame, scald and contact injuries are also showing a noticeable decrease in every age category. With the nationwide push overall to decrease hospital stays, we may begin to see changes in these areas over the next few years.

Figure 23 RACE/ETHNICITY

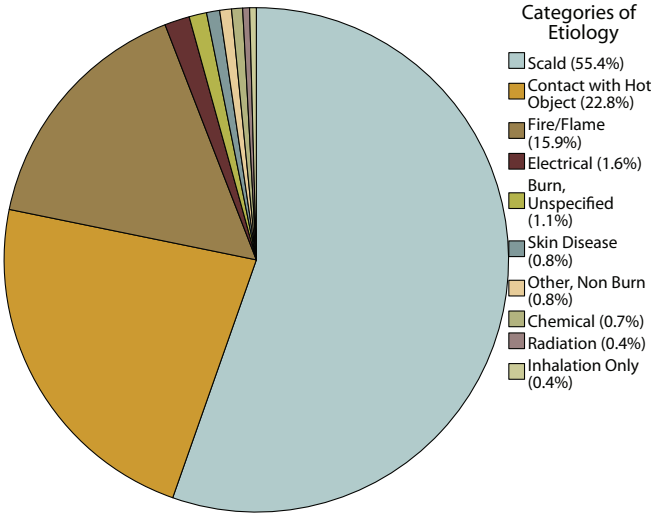


Total N=8,917 (Excluding 489 Unknown/Missing)

Table 20 RACE/ETHNICITY

Race	Cases
White	3,895
Hispanic	2,259
Black	1,756
Other	450
Asian	321
Native American	236
Unknown	489
TOTAL	9,406

Figure 24 ETIOLOGY



Total N=6,567 (Excluding 2,839 Unknown/Missing)

Table 21 ETIOLOGY

Etiology	Cases
Scald	3,637
Contact with Hot Object	1,499
Fire/Flame	1,044
Electrical	105
Burn, Unspecified	74
Skin Disease	55
Other, Non Burn	50
Chemical	46
Radiation	29
Inhalation Only	28
Unknown	2,839
TOTAL	9,406

Table 22

HOSPITAL DAYS: LIVED/DIED BY INHALATION INJURY

	Total		Lived		Died	
Inhalation Injury	**Cases**	**Mean +/- SEM**	**Cases**	**Mean +/- SEM**	**Cases**	**Mean +/- SEM**
No	7,832	8.16+0.32	7,665	7.92+0.32	167	19.43+2.85
Yes	471	26.61+1.64	372	30.64+1.90	99	11.45+2.66
Subtotal	**8,303**		**8,037**		**266**	
Missing	1,103	6.94+0.28	1,082	7.02+0.28	21	2.71+0.77
TOTAL	**9,406**		**9,119**		**287**	

Total N=9,406

Table 23

TOP TEN COMPLICATIONS

Top Ten Complications	Count	% of All Complications	% of Patients with Complication
Urinary Tract Infection	82	10.8	1.5
Cellulitis	77	10.1	1.4
Pneumonia	55	7.2	0.0
Respiratory Failure	39	5.1	0.7
Wound Infection	37	4.9	0.7
Septicemia	26	3.4	0.5
Arrythmia	23	3.0	0.4
Bacteremia	20	2.6	0.4
ARDS	18	2.4	0.3
Other blood/systemic infection	18	2.4	0.3
Total Complications	**762**		

Total N=5,621 (Excluding 3,785 cases from non TRACS centers)

Table 24

TOP TEN PROCEDURES

Top Ten Procedures Codes	Count	% of All Procedures
86.22 Excisional debridement of wound, infection, or burn	2,969	16.8
86.69 Other skin graft to other sites	2,196	12.4
86.28 Nonexcisional debridement of wound, infection or burn	1,413	8.0
86.66 Homograft to skin	1,334	7.5
93.57 Application of other wound dressing	1,237	7.0
38.93 Venous catheterization, not elsewhere classified	994	5.6
38.91 Arterial catheterization	501	2.8
86.67 Dermal regenerative graft	391	2.2
86.62 Other skin graft to hand	314	1.8
86.65 Heterograft to skin	302	1.7

Total N=9,406

Table 25

LIVED/DIED BY BURN GROUP SIZE (% TBSA)

	Lived	Died	
%TBSA	Cases	Cases	Mortality Rate
0.1 - 9.9	5,543	15	0.3
10 - 19.9	1,430	26	1.8
20 - 29.9	405	30	6.9
30 - 39.9	203	21	9.4
40 - 49.9	73	24	24.7
50 - 59.9	52	21	28.8
60 - 69.9	27	22	44.9
70 - 79.9	21	21	50.0
80 - 89.9	8	19	70.4
≥ 90	3	33	91.7
Subtotal	**7,765**	**232**	**2.9**
Missing or 0%	1,354	55	3.9
TOTAL	9,119	287	**3.1**

Total N=9,406

Table 26

HOSPITAL DAYS BY BURN GROUP SIZE (% TBSA)

	Cases	Mean +/- SEM
%TBSA		
0.1 - 9.9	5,558	4.8+0.1
10 - 19.9	1,456	11.1+0.3
20 - 29.9	435	22.3+1.0
30 - 39.9	224	34.0+1.7
40 - 49.9	97	34.0+3.4
50 - 59.9	73	42.2+4.2
60 - 69.9	49	32.6+5.0
70 - 79.9	42	60.8+11.8
80 - 89.9	27	20.6+5.7
≥ 90	36	21.8+8.4
Subtotal	**7,997**	**9.0+0.2**
Missing or 0%	1,409	8.3+1.4
TOTAL	**9,406**	**8.9+0.2**

Total N=9,406

Table 27

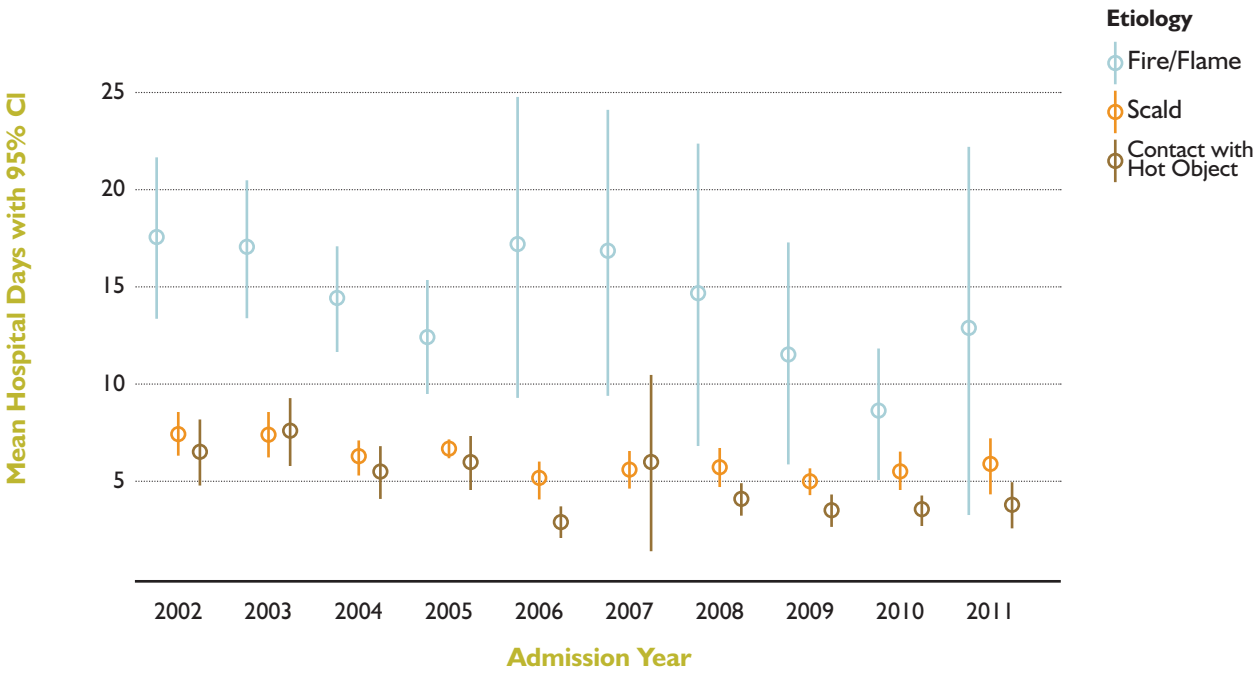
MEAN CHARGES FOR TOP FIVE MS-DRGs

MS-DRG Code	Cases	Cases with Valid Charges	Mean +/- SEM
935 Non-extensive burns	3,923	2,124	95554+/-22207
929 Full thickness burn w skin graft or inhal inj w/o CC/MCC	472	237	126826+/-11453
928 Full thickness burn w skin graft or inhal inj w CC/MCC	308	215	29690+/-2095
934 Full thickness burn w/o skin graft or inhal inj	300	202	296121+/-34440
927 Extensive burns or full thickness burns w MV 96+ hrs w skin graft	122	73	75317+/-6465

Total N=5,125

Figure 25

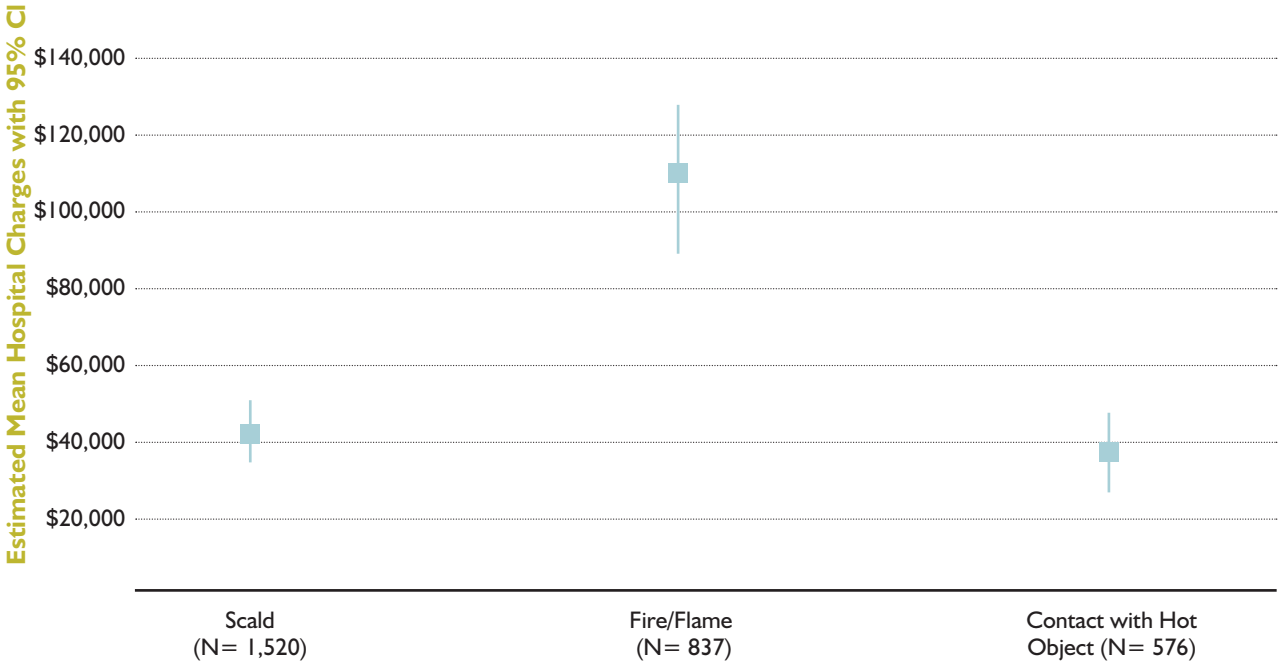
MEAN HOSPITAL DAYS FOR FIRE/FLAME, CONTACT WITH HOT OBJECT, AND SCALD BY ADMISSION YEAR



Total N=9,406

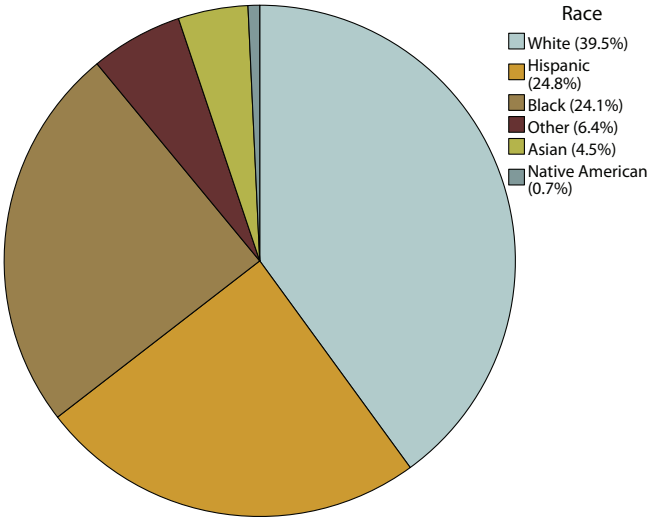
Figure 26

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



Total N=2,933

Figure 27 RACE/ETHNICITY

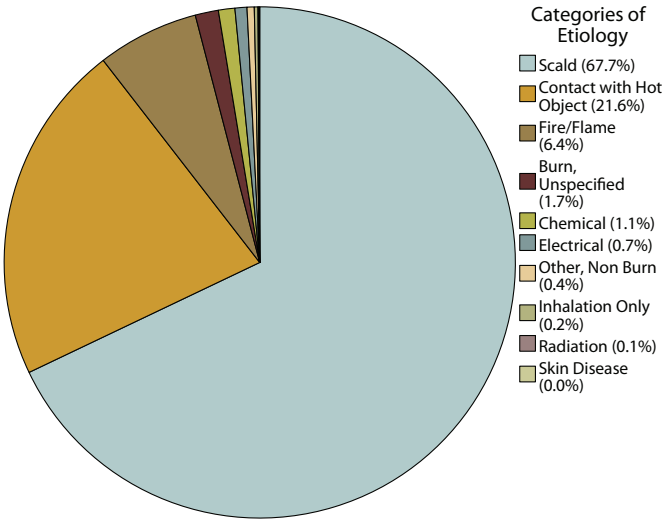


Total N=13,399 (Excluding 697 Unknown/Missing)

RACE/ETHNICITY Table 28

Race	Cases
White	5,290
Black	3,326
Hispanic	3,226
Other	861
Asian	602
Native American	94
Unknown	697
TOTAL	14,096

Figure 28 ETIOLOGY



Total N=13,003 (Excluding 1,093 Unknown/Missing)

ETIOLOGY Table 29

Etiology	Cases
Scald	8,798
Contact with Hot Object	2,815
Fire/Flame	833
Burn, Unspecified	227
Chemical	141
Electrical	94
Other, Non Burn	56
Inhalation Only	28
Radiation	9
Skin Disease	2
Unknown	1,093
TOTAL	14,096

Table 30

HOSPITAL DAYS: LIVED/DIED BY INHALATION INJURY

	Total		Lived		Died	
Inhalation Injury	**Cases**	**Mean +/- SEM**	**Cases**	**Mean +/- SEM**	**Cases**	**Mean +/- SEM**
No	12,997	5.0+/-0.0	12,977	5.0+/-0.0	20	13.3+/-4.3
Yes	99	26.3+/-3.3	86	28.4+/-3.7	13	12.7+/-5.2
Subtotal	**13,096**		**13,063**		**33**	
Missing	1,000	8.4+/-3.7	995	8.5+/-3.7	5	1.8+/-0.5
TOTAL	**14,096**		**14,058**		**38**	

Total N=14,096

Table 31

TOP TEN COMPLICATIONS

Top Ten Complications	Count	% of All Complications	% of Patients with Complication
Cellulitis	200	14.3	1.5
Urinary Tract Infection	133	9.5	0.0
Pneumonia	113	8.1	0.8
Wound Infection	76	5.4	0.6
Respiratory Failure	61	4.4	0.5
Septicemia	53	3.8	0.4
Surgical site infection, deep	53	3.8	0.4
Other blood/systemic infection	48	3.4	0.4
Fungal Sepsis	37	2.6	0.3
Bacteremia	33	2.4	0.2
Total Complications	**1,399**		

Total N=13,555 (Excluding 541 cases from non TRACS centers)

Table 32

TOP TEN PROCEDURES

Top Ten Procedures Codes	Count	% of All Procedures
86.22 Excisional debridement of wound, infection, or burn	4,460	17.7
86.28 Nonexcisional debridement of wound, infection or burn	3,324	13.2
93.57 Application of other wound dressing	3,189	12.6
86.69 Other skin graft to other sites	2,865	11.4
86.66 Homograft to skin	1,516	6.0
86.67 Dermal regenerative graft	945	3.7
86.65 Heterograft to skin	842	3.3
38.93 Venous catheterization, not elsewhere classified	839	3.3
86.62 Other skin graft to hand	497	2.0
99.04 Transfusion of packed cells	419	1.7

Total N=14,096

Table 33

LIVED/DIED BY BURN GROUP SIZE (% TBSA)

	Lived	Died	
%TBSA	**Cases**	**Cases**	**Mortality Rate**
0.1 - 9.9	10,136	0	0.0
10 - 19.9	1,991	7	0.4
20 - 29.9	336	2	0.6
30 - 39.9	109	3	2.7
40 - 49.9	43	4	8.5
50 - 59.9	15	3	16.7
60 - 69.9	15	6	28.6
70 - 79.9	8	2	20.0
80 - 89.9	3	1	25.0
≥ 90	1	3	75.0
Subtotal	**12,657**	**31**	**0.2**
Missing or 0%	1,401	7	0.5
TOTAL	14,058	38	**0.3**

Total N=14,096

Table 34

HOSPITAL DAYS BY BURN GROUP SIZE (% TBSA)

%TBSA	Cases	Mean +/- SEM
0.1 - 9.9	10,136	4.0+/-0.3
10 - 19.9	1,998	8.1+/-0.1
20 - 29.9	338	15.7+/-0.6
30 - 39.9	112	27.5+/-2.0
40 - 49.9	47	31.8+/-3.1
50 - 59.9	18	51.7+/-9.4
60 - 69.9	21	52.3+/-12.7
70 - 79.9	10	46.4+/-12.1
80 - 89.9	4	69.5+/-17.6
≥ 90	4	48.2+/-31.6
Subtotal	**12,688**	**5.5+/-0.3**
Missing or 0%	1,408	4.2+/-0.2
TOTAL	**14,096**	**5.4+/-0.2**

Total N=14,096

Table 35

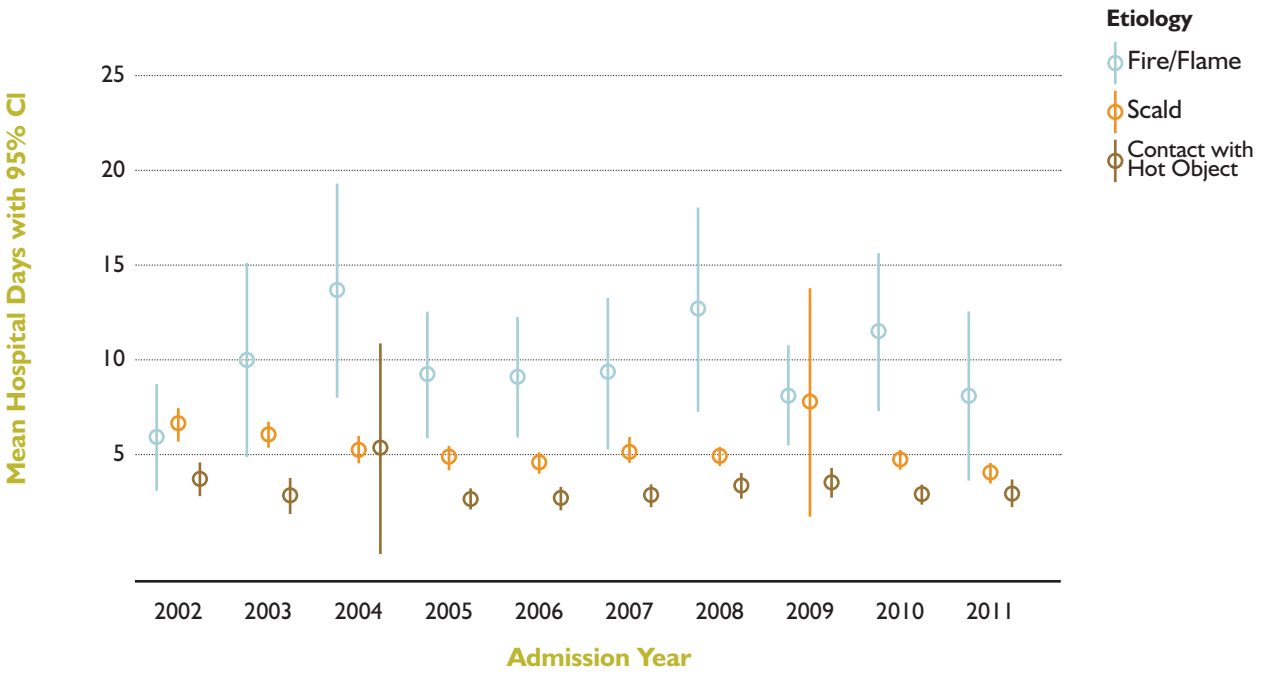
MEAN CHARGES FOR TOP FIVE MS-DRGs

MS-DRG Code	Cases	Cases with Valid Charges	Mean +/- SEM
935 Non-extensive burns	7,432	2,672	$19869+/-734
929 Full thickness burn w skin graft or inhal inj w/o CC/MCC	906	249	$73855+/-4375
934 Full thickness burn w/o skin graft or inhal inj	439	195	$27899+/-2864
928 Full thickness burn w skin graft or inhal inj w CC/MCC	341	143	$133073+/-10550
507 Major shoulder or elbow joint procedures w CC/MCC	243	211	$69691+/-3794

Total N=9,361

Figure 29

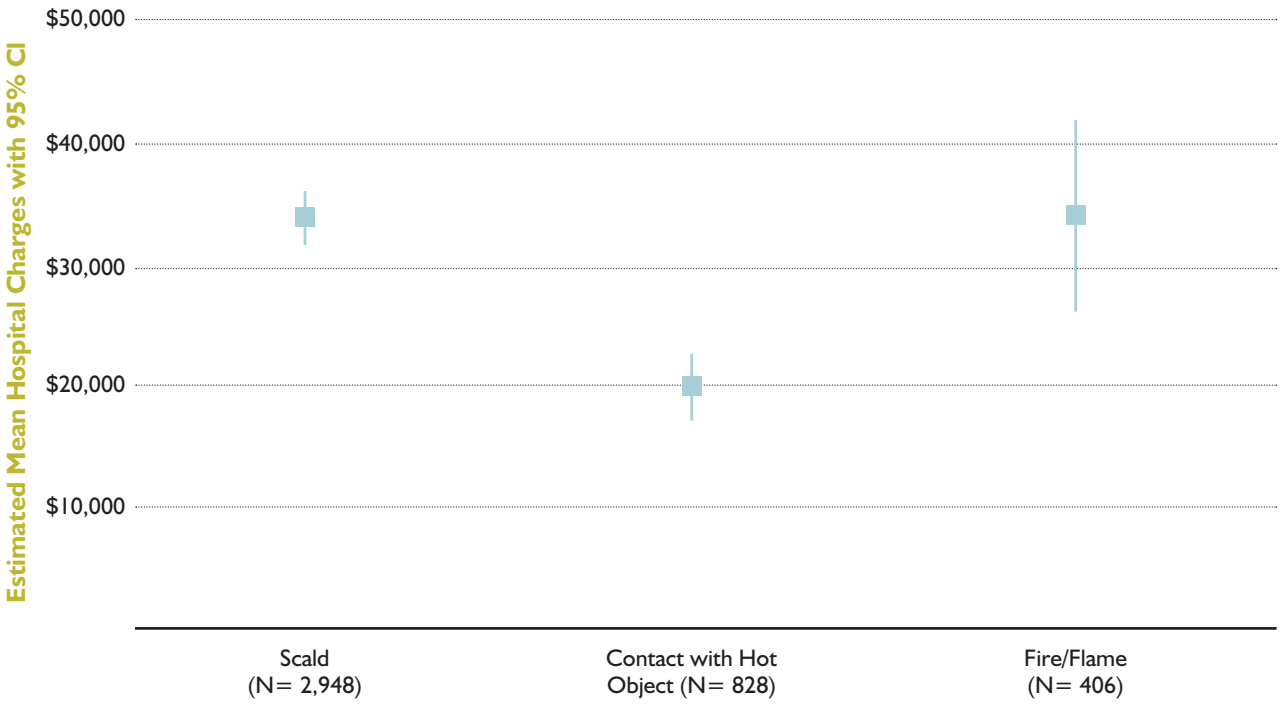
MEAN HOSPITAL DAYS FOR FIRE/FLAME, CONTACT WITH HOT OBJECT, AND SCALD BY ADMISSION YEAR



Total N=14,096

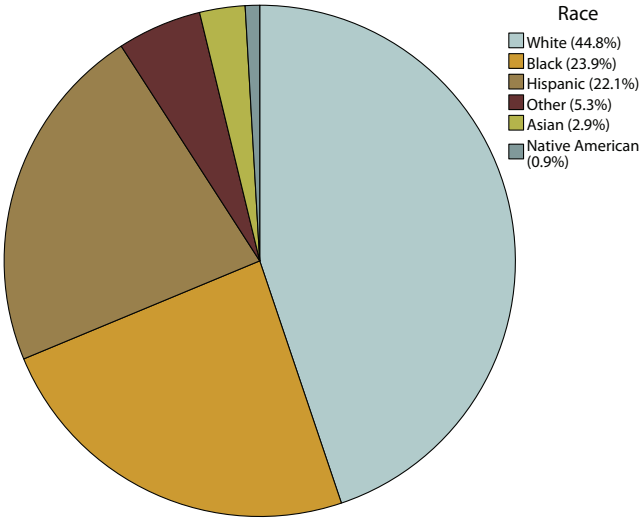
Figure 30

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



Total N=4,182

Figure 31 RACE/ETHNICITY

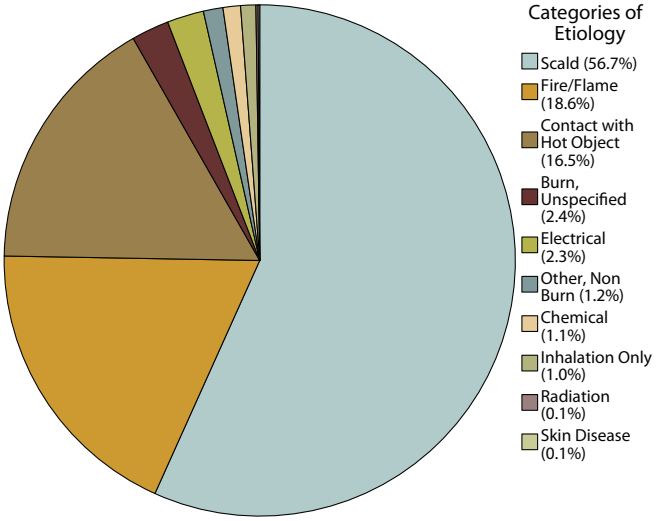


Total N=11,163 (Excluding 508 Unknown/Missing)

RACE/ETHNICITY Table 36

Race	Cases
White	5,004
Black	2,669
Hispanic	2,472
Other	595
Asian	321
Native American	102
Unknown	508
TOTAL	11,671

Figure 32 ETIOLOGY



Total N=10,505 (Excluding 1,166 Unknown/Missing)

ETIOLOGY Table 37

Etiology	Cases
Scald	5,959
Fire/Flame	1,949
Contact with Hot Object	1,731
Burn, Unspecified	250
Electrical	244
Other, Non Burn	130
Chemical	116
Inhalation Only	101
Radiation	14
Skin Disease	11
Unknown	1,166
TOTAL	11,671

Table 38

HOSPITAL DAYS: LIVED/DIED BY INHALATION INJURY

	Total		Lived		Died	
Inhalation Injury	**Cases**	**Mean +/- SEM**	**Cases**	**Mean +/- SEM**	**Cases**	**Mean +/- SEM**
No	10,528	6.3+/-0.1	10,491	6.3+/-0.1	37	9.0+/-2.2
Yes	328	27.1+/-2.6	264	31.0+/-3.1	64	11.6+/-2.5
Subtotal	**10,856**		**10,755**		**101**	
Missing	815	6.9+/-0.6	800	6.7+/-0.6	15	17.0+/-12.6
TOTAL	**11,671**		**11,555**		**116**	

Total N=11,671

Table 39

TOP TEN COMPLICATIONS

Top Ten Complications	Count	% of All Complications	% of Patients with Complication
Urinary Tract Infection	180	11.7	1.6
Cellulitis	163	10.6	1.5
Pneumonia	131	8.5	1.2
Wound Infection	87	5.7	0.8
Septicemia	79	5.1	0.7
Respiratory Failure	68	4.4	0.6
Other blood/systemic infection	48	3.1	0.4
ARDS	42	2.7	0.4
Catheter-related bloodstream infection	39	2.5	0.3
Bacteremia	35	2.3	0.3
Total Complications	**1,537**		

Total N=11,169 (Excluding 502 cases from non TRACS centers)

Table 40

TOP TEN PROCEDURES

Top Ten Procedures Codes	Count	% of All Procedures
86.22 Excisional debridement of wound, infection, or burn	5,296	17.3
86.69 Other skin graft to other sites	3,910	12.8
86.28 Nonexcisional debridement of wound, infection or burn	2,993	9.8
93.57 Application of other wound dressing	2,932	9.6
86.66 Homograft to skin	2,237	7.3
38.93 Venous catheterization, not elsewhere classified	1,244	4.1
86.67 Dermal regenerative graft	1,030	3.4
86.65 Heterograft to skin	889	2.9
99.04 Transfusion of packed cells	798	2.6
86.62 Other skin graft to hand	533	1.7

Total N=11,671

Table 41

LIVED/DIED BY BURN GROUP SIZE (% TBSA)

	Lived	Died	
%TBSA	**Cases**	**Cases**	**Mortality Rate**
0.1 - 9.9	7,678	9	0.1
10 - 19.9	1,572	3	0.2
20 - 29.9	376	3	0.8
30 - 39.9	180	10	5.3
40 - 49.9	93	8	7.9
50 - 59.9	53	13	19.7
60 - 69.9	39	4	9.3
70 - 79.9	21	7	25.0
80 - 89.9	12	18	60.0
≥ 90	12	10	45.5
Subtotal	**10,036**	**85**	**0.8**
Missing or 0%	1,519	31	2.0
TOTAL	11,555	116	**0.0**

Total N=11,671

Table 42

HOSPITAL DAYS BY BURN GROUP SIZE (% TBSA)

%TBSA	Cases	Mean +/- SEM
0.1 - 9.9	7,687	4.0+/-0.0
10 - 19.9	1,575	9.6+/-0.2
20 - 29.9	379	19.2+/-0.8
30 - 39.9	190	29.9+/-1.7
40 - 49.9	101	38.4+/-3.3
50 - 59.9	66	38.7+/-3.7
60 - 69.9	43	67.6+/-6.6
70 - 79.9	28	68.7+/-11.7
80 - 89.9	30	48.0+/-9.5
≥ 90	22	68.8+/-27.3
Subtotal	**10,121**	**7.2+/-0.1**
Missing or 0%	1,550	4.9+/-0.2
TOTAL	**11,671**	**6.9+/-0.1**

Total N=11,671

Table 43

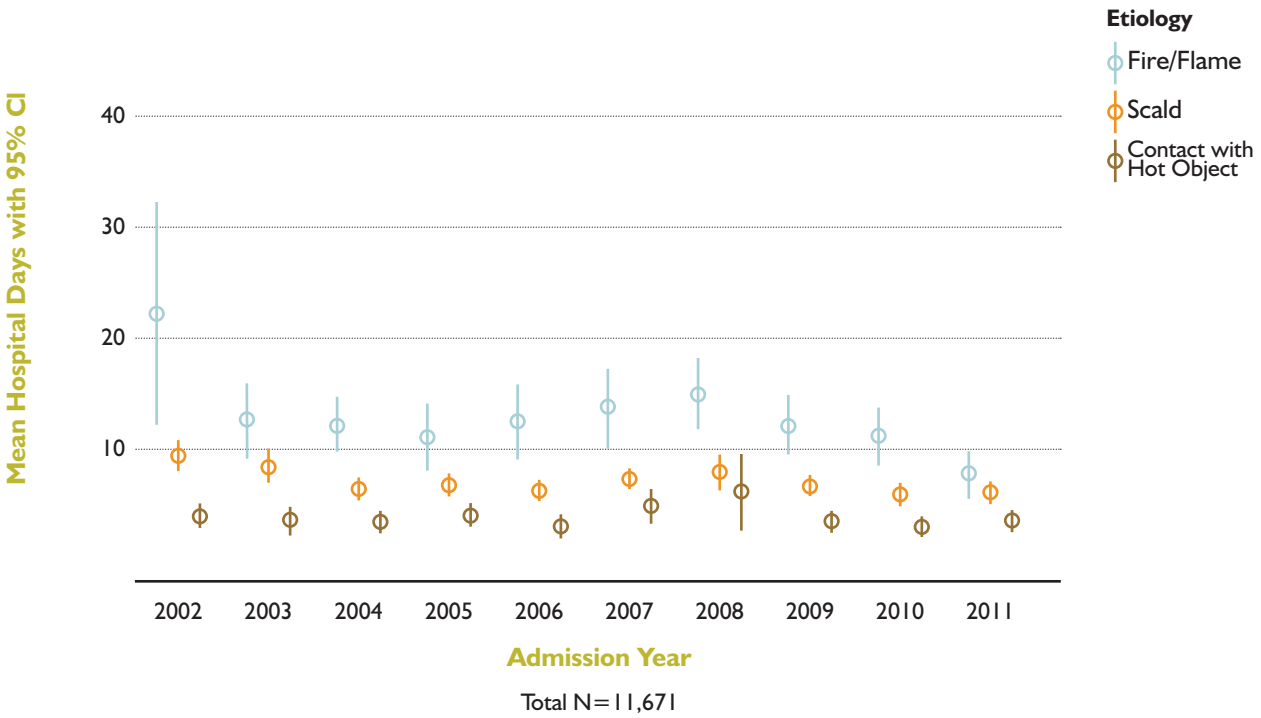
MEAN CHARGES FOR TOP FIVE MS-DRGs

MS-DRG Code	Cases	Cases with Valid Charges	Mean +/- SEM
935 Non-extensive burns	5,285	2,013	$25159+/-4642
929 Full thickness burn w skin graft or inhal inj w/o CC/MCC	871	238	$85115+/-7374
934 Full thickness burn w/o skin graft or inhal inj	405	180	$34324+/-3885
928 Full thickness burn w skin graft or inhal inj w CC/MCC	359	169	$144962+/-16608
927 Extensive burns or full thickness burns w MV 96+ hrs w skin graft	343	79	$293532+/-39230

Total N=7,263

Figure 33

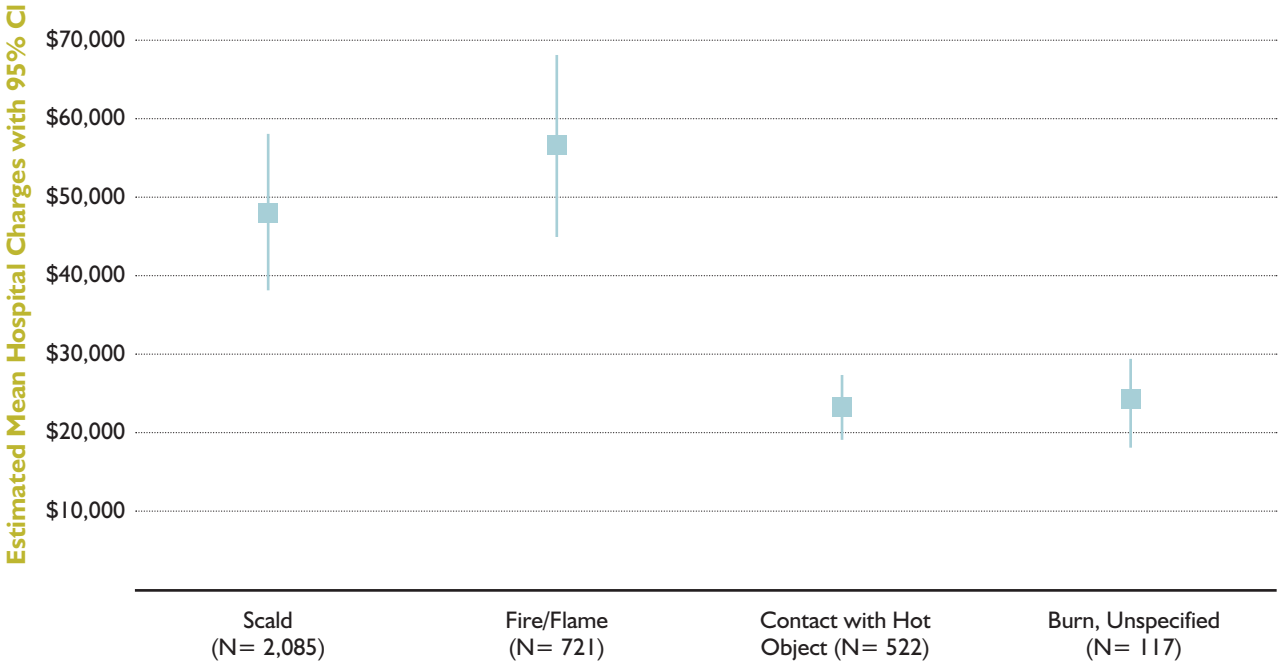
MEAN HOSPITAL DAYS FOR FIRE/FLAME, CONTACT WITH HOT OBJECT, AND SCALD BY ADMISSION YEAR



Total N=11,671

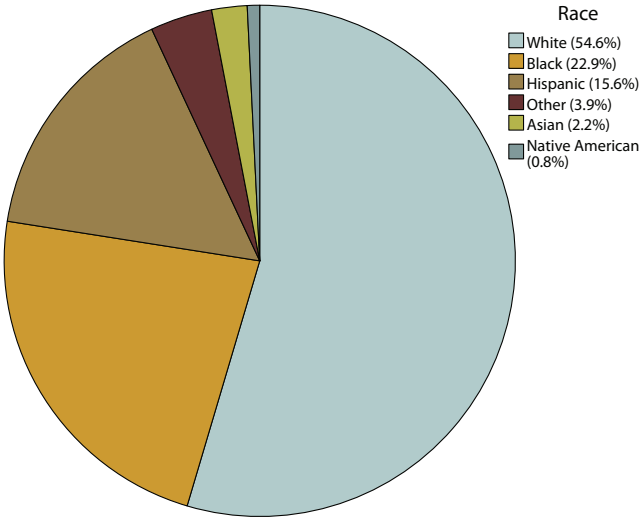
Figure 34

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



Total N=3,445

Figure 35 RACE/ETHNICITY

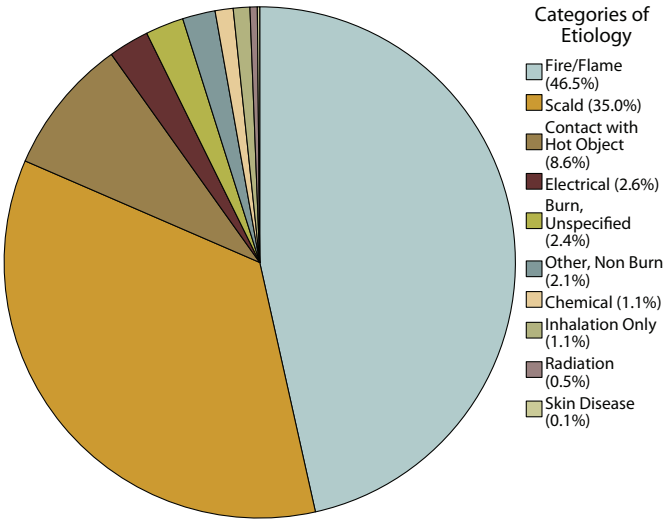


Total N=16,352 (Excluding 718 Unknown/Missing)

RACE/ETHNICITY Table 44

Race	Cases
White	8,926
Black	3,744
Hispanic	2,547
Other	641
Asian	366
Native American	128
Unknown	718
TOTAL	17,070

Figure 36 ETIOLOGY



Total N=14,761 (Excluding 2,309 Unknown/Missing)

ETIOLOGY Table 45

Etiology	Cases
Fire/Flame	6,864
Scald	5,166
Contact with Hot Object	1,276
Electrical	379
Burn, Unspecified	357
Other, Non Burn	306
Chemical	168
Inhalation Only	155
Radiation	68
Skin Disease	22
Unknown	2,309
TOTAL	17,070

Table 46

HOSPITAL DAYS: LIVED/DIED BY INHALATION INJURY

	Total		Lived		Died	
Inhalation Injury	**Cases**	**Mean +/- SEM**	**Cases**	**Mean +/- SEM**	**Cases**	**Mean +/- SEM**
No	15,140	6.8+/-0.1	15,084	6.8+/-0.1	56	8.3+/-1.7
Yes	697	28.2+/-1.4	620	29.8+/-1.5	77	15.6+/-4.1
Subtotal	**15,837**		**15,704**		**133**	
Missing	1,233	7.5+/-0.5	1,217	7.4+/-0.5	16	15.0+/-10.3
TOTAL	**17,070**		**16,921**		**149**	

Total N=17,070

Table 47

TOP TEN COMPLICATIONS

Top Ten Complications	Count	% of All Complications	% of Patients with Complication
Urinary Tract Infection	297	10.2	1.8
Pneumonia	292	10.0	1.8
Cellulitis	291	10.0	1.8
Wound Infection	212	7.3	1.3
Septicemia	172	5.9	1.1
Catheter-related bloodstream infection	119	4.1	0.7
Respiratory Failure	116	3.0	0.7
Other blood/systemic infection	71	2.4	0.4
Bacteremia	70	2.4	0.4
ARDS	64	2.2	0.4
Total Complications	**2,910**		

Total N=16,304 (Excluding 766 cases from non TRACS centers)

Table 48

TOP TEN PROCEDURES

Top Ten Procedures Codes	Count	% of All Procedures
86.22 Excisional debridement of wound, infection, or burn	9,757	17.8
86.69 Other skin graft to other sites	7,636	13.9
86.28 Nonexcisional debridement of wound, infection or burn	4,355	7.9
93.57 Application of other wound dressing	4,018	7.3
86.66 Homograft to skin	3,704	6.8
38.93 Venous catheterization, not elsewhere classified	2,385	4.3
99.04 Transfusion of packed cells	2,057	3.7
86.67 Dermal regenerative graft	1,715	3.1
86.65 Heterograft to skin	1,418	2.6
86.62 Other skin graft to hand	936	1.7

Total N=17,070

Table 49

LIVED/DIED BY BURN GROUP SIZE (% TBSA)

	Lived	Died	
%TBSA	**Cases**	**Cases**	**Mortality Rate**
0.1 - 9.9	10,516	8	0.1
10 - 19.9	2,128	6	0.3
20 - 29.9	633	7	1.1
30 - 39.9	294	7	2.3
40 - 49.9	178	8	4.3
50 - 59.9	111	6	5.1
60 - 69.9	76	10	11.6
70 - 79.9	50	8	13.8
80 - 89.9	25	24	48.0
≥ 90	14	21	60.0
Subtotal	**14,025**	**105**	**0.7**
Missing or 0%	2,896	44	1.5
TOTAL	16,921	149	**0.9**

Total N=17,070

Table 50

HOSPITAL DAYS BY BURN GROUP SIZE (% TBSA)

%TBSA	Cases	Mean +/- SEM
0.1 - 9.9	10,524	4.0+/-0.0
10 - 19.9	2,134	10.4+/-0.2
20 - 29.9	640	20.1+/-0.6
30 - 39.9	301	36.6+/-1.5
40 - 49.9	186	47.6+/-2.4
50 - 59.9	117	54.7+/-3.9
60 - 69.9	86	65.1+/-5.0
70 - 79.9	58	61.6+/-7.2
80 - 89.9	49	57.0+/-6.8
≥ 90	35	40.7+/-11.8
Subtotal	**14,130**	**8.3+/-0.1**
Missing or 0%	2,940	5.2+/-0.2
TOTAL	**17,070**	**7.7+/-0.1**

Total N=17,070

Table 51

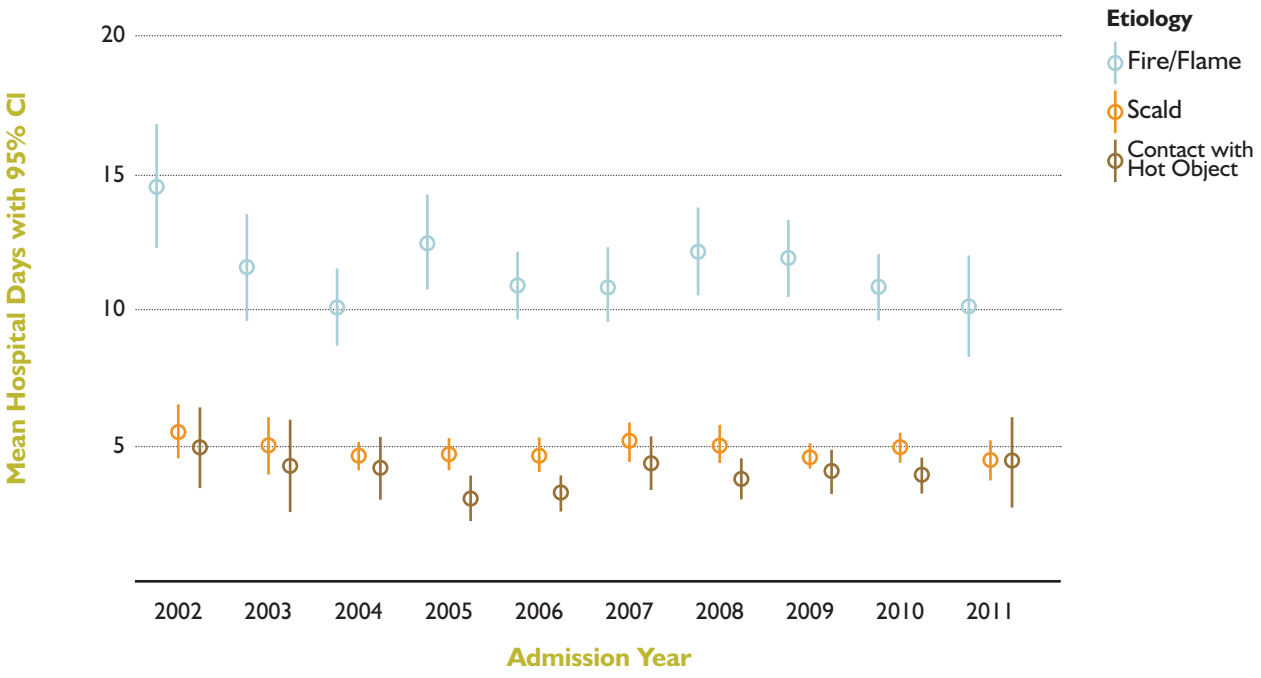
MEAN CHARGES FOR TOP FIVE MS-DRGs

MS-DRG Code	Cases	Cases with Valid Charges	Mean +/- SEM
935 Non-extensive burns	6,374	2,296	$23765+/-2429
929 Full thickness burn w skin graft or inhal inj w/o CC/MCC	1,784	542	$69012+/-2980
928 Full thickness burn w skin graft or inhal inj w CC/MCC	651	266	$161895+/-17796
927 Extensive burns or full thickness burns w MV 96+ hrs w skin graft	644	131	$380239+/-44051
934 Full thickness burn w/o skin graft or inhal inj	475	218	$30409+/-5597

Total N=9,928

Figure 37

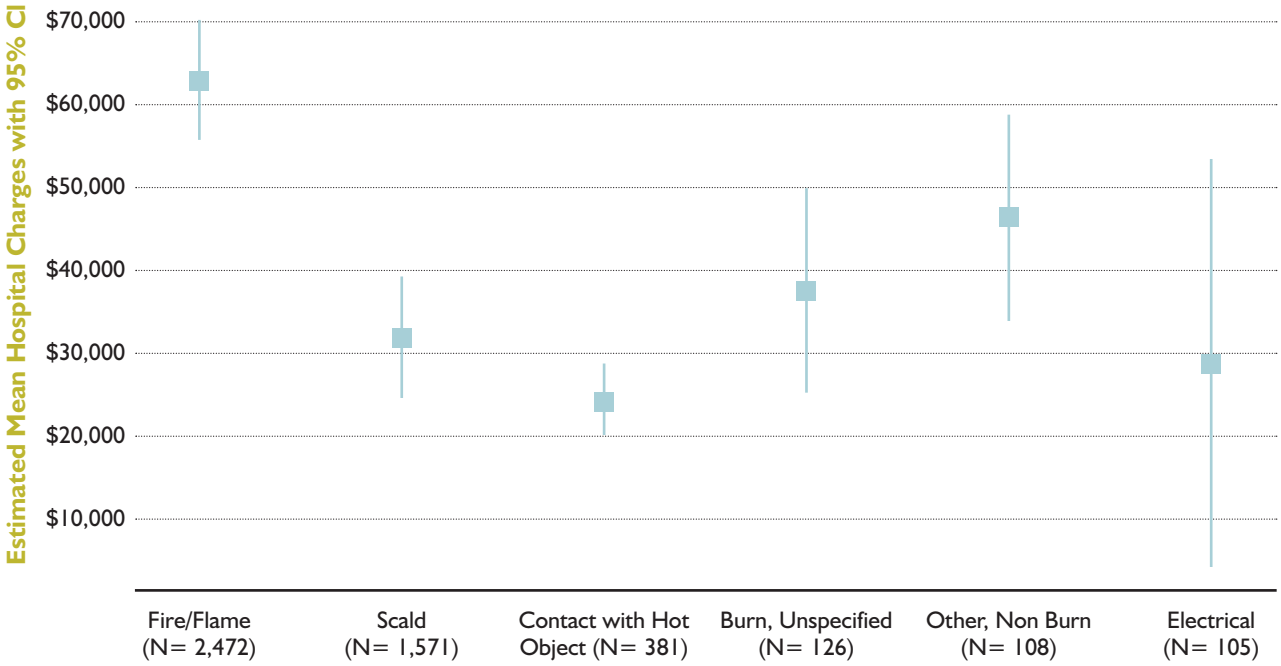
MEAN HOSPITAL DAYS FOR FIRE/FLAME, CONTACT WITH HOT OBJECT, AND SCALD BY ADMISSION YEAR



Total N=17,070

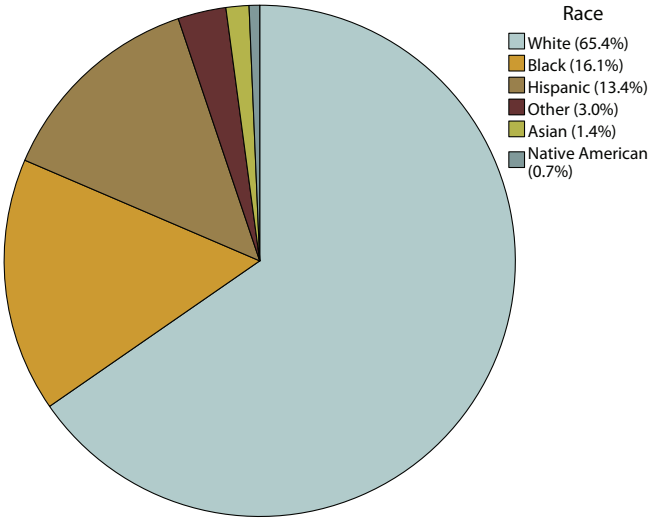
Figure 38

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



Total N=4,554

Figure 39 RACE/ETHNICITY

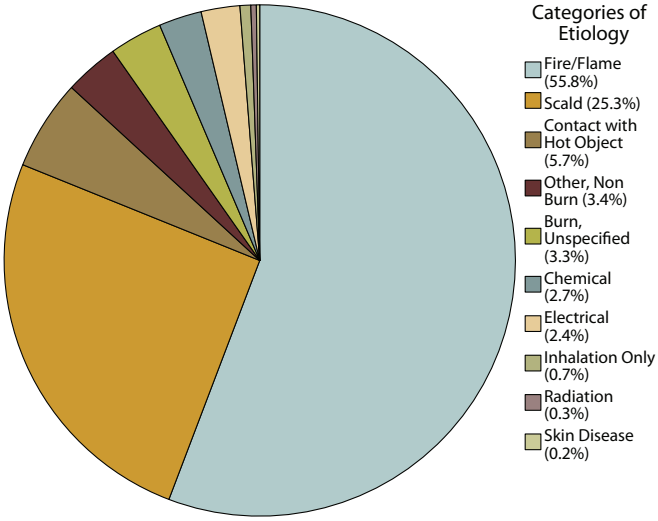


Total N=9,253 (Excluding 437 Unknown/Missing)

RACE/ETHNICITY Table 52

Race	Cases
White	6,048
Black	1,488
Hispanic	1,239
Other	282
Asian	134
Native American	62
Unknown	437
TOTAL	9,690

Figure 40 ETIOLOGY



Total N=7,895 (Excluding 1,795 Unknown/Missing)

ETIOLOGY Table 53

Etiology	Cases
Fire/Flame	4,404
Scald	2,000
Contact with Hot Object	451
Other, Non Burn	271
Burn, Unspecified	264
Chemical	214
Electrical	193
Inhalation Only	54
Radiation	27
Skin Disease	17
Unknown	1,795
TOTAL	9,690

Table 54

HOSPITAL DAYS: LIVED/DIED BY INHALATION INJURY

	Total		Lived		Died	
Inhalation Injury	**Cases**	**Mean +/- SEM**	**Cases**	**Mean +/- SEM**	**Cases**	**Mean +/- SEM**
No	8,417	6.6+/-0.1	8,330	6.6+/-0.1	87	9.7+/-3.0
Yes	432	20.9+/-1.5	382	22.8+/-1.7	50	6.6+/-1.3
Subtotal	**8,849**		**8,712**		**137**	
Missing	841	7.7+/-0.6	828	7.7+/-0.6	13	5.2+/-1.9
TOTAL	**9,690**		**9,540**		**150**	

Total N=9,690

Table 55

TOP TEN COMPLICATIONS

Top Ten Complications	Count	% of All Complications	% of Patients with Complication
Pneumonia	232	10.9	2.6
Cellulitis	198	9.3	2.2
Urinary Tract Infection	153	7.2	1.7
Wound Infection	142	6.7	1.6
Respiratory Failure	110	5.2	1.2
Septicemia	107	5.0	1.2
Other Hematologic	50	2.4	0.6
Other blood/systemic infection	48	2.3	0.5
Catheter-related bloodstream infection	46	2.2	0.5
Arrythmia	43	2.0	0.5
Total Complications	**2,123**		

Total N=9,089 (Excluding 601 cases from non TRACS centers)

Table 56

TOP TEN PROCEDURES

Top Ten Procedures Codes	Count	% of All Procedures
86.22 Excisional debridement of wound, infection, or burn	4,771	16.5
86.69 Other skin graft to other sites	3,318	11.5
86.28 Nonexcisional debridement of wound, infection or burn	2,079	7.2
86.66 Homograft to skin	1,572	5.4
93.57 Application of other wound dressing	1,529	5.3
38.93 Venous catheterization, not elsewhere classified	1,053	3.6
86.65 Heterograft to skin	906	3.1
99.04 Transfusion of packed cells	783	2.7
86.67 Dermal regenerative graft	771	2.7
86.62 Other skin graft to hand	614	2.1

Total N=9,690

Table 57

LIVED/DIED BY BURN GROUP SIZE (% TBSA)

	Lived	Died	
%TBSA	**Cases**	**Cases**	**Mortality Rate**
0.1 - 9.9	5,397	7	0.1
10 - 19.9	1,185	5	0.4
20 - 29.9	366	4	1.1
30 - 39.9	147	5	3.3
40 - 49.9	109	6	5.2
50 - 59.9	58	6	9.4
60 - 69.9	36	6	14.3
70 - 79.9	22	5	18.5
80 - 89.9	10	14	58.3
≥ 90	11	22	66.7
Subtotal	**7,341**	**80**	**1.1**
Missing or 0%	2,199	70	3.1
TOTAL	9,540	150	**1.5**

Total N=9,690

Table 58

HOSPITAL DAYS BY BURN GROUP SIZE (% TBSA)

%TBSA	Cases	Mean +/- SEM
0.1 - 9.9	5,404	4.1+/-0.0
10 - 19.9	1,190	9.0+/-0.2
20 - 29.9	370	19.6+/-1.0
30 - 39.9	152	28.7+/-1.8
40 - 49.9	115	41.5+/-2.9
50 - 59.9	64	55.3+/-6.4
60 - 69.9	42	72.5+/-9.6
70 - 79.9	27	58.4+/-10.0
80 - 89.9	24	30.3+/-9.0
≥ 90	33	37.5+/-11.8
Subtotal	**7,421**	**8.0+/-0.1**
Missing or 0%	2,269	5.1+/-0.2
TOTAL	**9,690**	**7.3+/-0.1**

Total N=9,690

Table 59

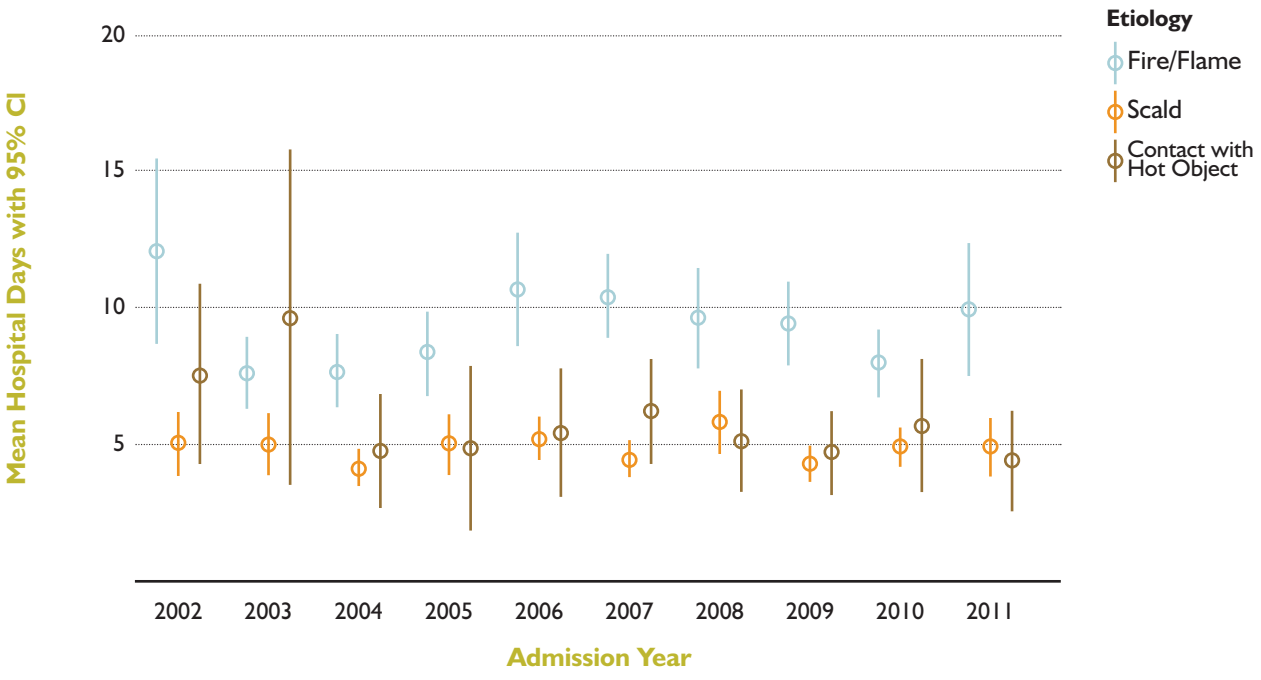
MEAN CHARGES FOR TOP FIVE MS-DRGs

MS-DRG Code	Cases	Cases with Valid Charges	Mean +/- SEM
935 Non-extensive burns	3,208	1,407	$22408+/-3208
929 Full thickness burn w skin graft or inhal inj w/o CC/MCC	767	284	$83127+/-7418
928 Full thickness burn w skin graft or inhal inj w CC/MCC	406	200	$135112+/-13490
934 Full thickness burn w/o skin graft or inhal inj	293	168	$32303+/-7699
927 Extensive burns or full thickness burns w MV 96+ hrs w skin graft	237	87	$399648+/-54338

Total N=4,911

Figure 41

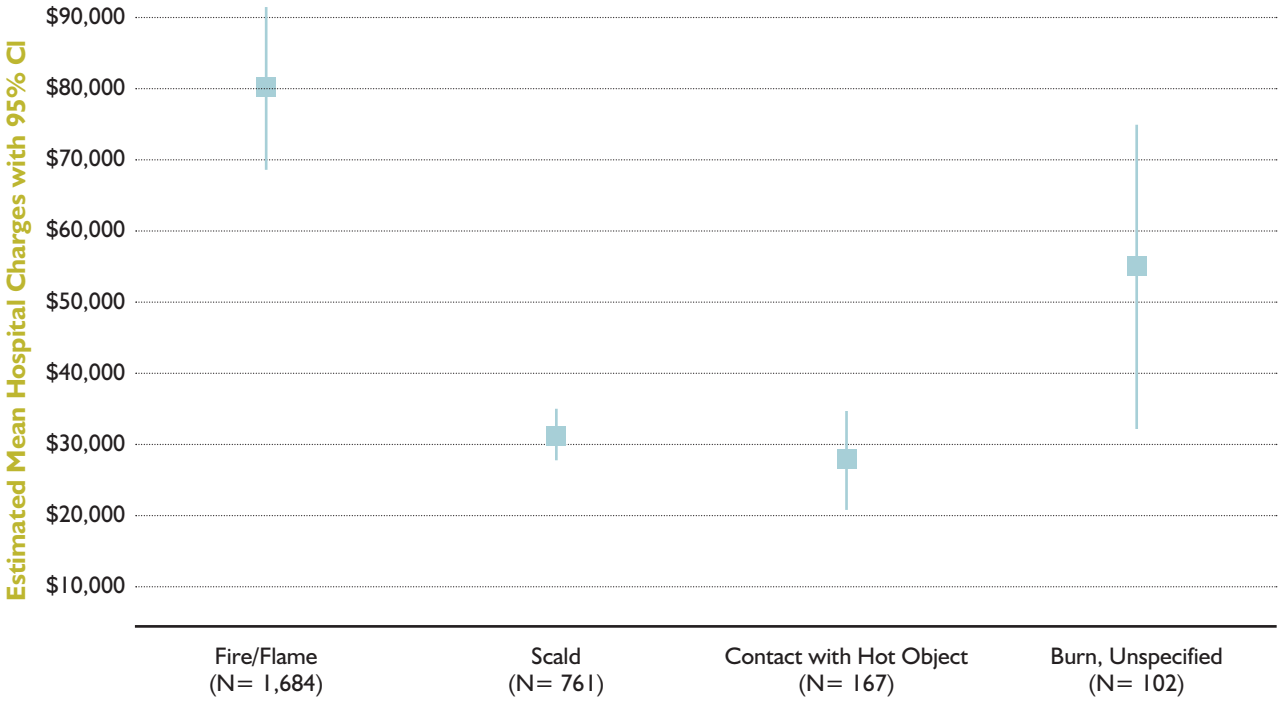
MEAN HOSPITAL DAYS FOR FIRE/FLAME, CONTACT WITH HOT OBJECT, AND SCALD BY ADMISSION YEAR



Total N=9,690

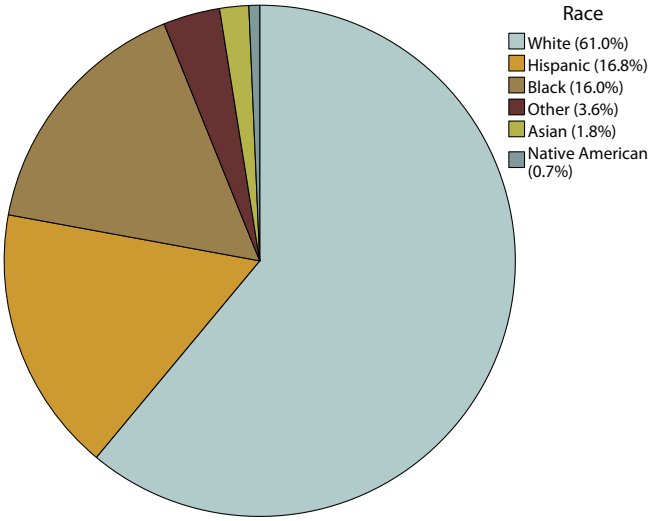
Figure 42

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



Total N=2,714

Figure 43 RACE/ETHNICITY

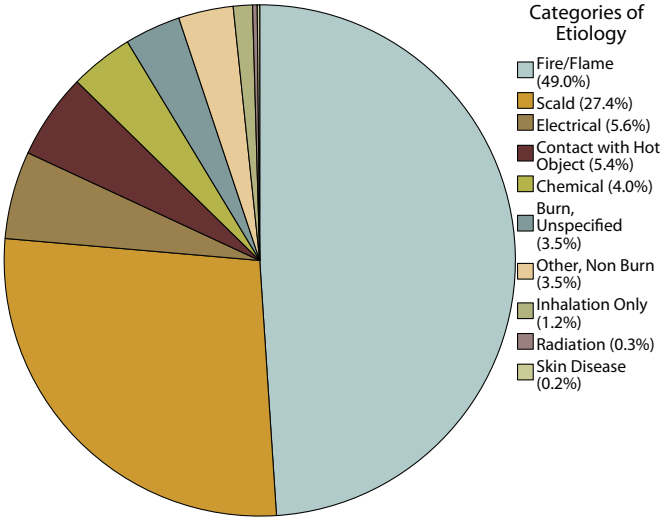


Total N=25,766 (Excluding 1,318 Unknown/Missing)

RACE/ETHNICITY Table 60

Race	Cases
White	15,728
Hispanic	4,341
Black	4,124
Other	924
Asian	473
Native American	176
Unknown	1,318
TOTAL	27,084

Figure 44 ETIOLOGY



Total N=22,341 (Excluding 4,743 Unknown/Missing)

ETIOLOGY Table 61

Etiology	Cases
Fire/Flame	10,937
Scald	6,125
Electrical	1,240
Contact with Hot Object	1,208
Chemical	897
Burn, Unspecified	788
Other, Non Burn	775
Inhalation Only	271
Radiation	65
Skin Disease	35
Unknown	4,743
TOTAL	27,084

Table 62

HOSPITAL DAYS: LIVED/DIED BY INHALATION INJURY

	Total		Lived		Died	
Inhalation Injury	**Cases**	**Mean +/- SEM**	**Cases**	**Mean +/- SEM**	**Cases**	**Mean +/- SEM**
No	23,124	7.1+/-0.0	22,865	7.0+/-0.0	259	13.8+/-2.4
Yes	1,620	24.1+/-0.9	1,398	24.5+/-0.9	222	21.7+/-3.2
Subtotal	**24,744**		**24,263**		**481**	
Missing	2,340	7.8+/-0.3	2,295	7.6+/-0.3	45	17.4+/-8.6
TOTAL	**27,084**		**26,558**		**526**	

Total N=27,084

Table 63

TOP TEN COMPLICATIONS

Top Ten Complications	Count	% of All Complications	% of Patients with Complication
Cellulitis	801	11.0	3.2
Pneumonia	773	10.6	3.1
Urinary Tract Infection	460	6.3	1.8
Respiratory Failure	447	6.1	1.8
Wound Infection	416	5.7	1.6
Septicemia	411	5.6	1.6
Renal Failure	185	2.5	0.7
Other blood/systemic infection	169	2.3	0.7
Catheter-related bloodstream infection	158	2.2	0.6
ARDS	152	2.1	0.6
Total Complications	**7,280**		

Total N=25,237 (Excluding 1,847 cases from non TRACS centers)

Table 64

TOP TEN PROCEDURES

Top Ten Procedures Codes	Count	% of All Procedures
86.22 Excisional debridement of wound, infection, or burn	14,498	17.9
86.69 Other skin graft to other sites	9,008	11.1
86.28 Nonexcisional debridement of wound, infection or burn	5,433	6.7
86.66 Homograft to skin	4,302	5.3
93.57 Application of other wound dressing	3,891	4.8
86.65 Heterograft to skin	2,932	3.6
38.93 Venous catheterization, not elsewhere classified	2,817	3.5
86.67 Dermal regenerative graft	1,970	2.4
86.62 Other skin graft to hand	1,835	2.3
86.6 Free skin graft	1,457	1.8

Total N=27,084

Table 65

LIVED/DIED BY BURN GROUP SIZE (% TBSA)

	Lived	Died	
%TBSA	**Cases**	**Cases**	**Mortality Rate**
0.1 - 9.9	14,831	23	0.2
10 - 19.9	3,349	19	0.6
20 - 29.9	1,085	18	1.6
30 - 39.9	472	31	6.2
40 - 49.9	218	31	12.4
50 - 59.9	124	30	19.5
60 - 69.9	95	32	25.2
70 - 79.9	39	30	43.5
80 - 89.9	32	48	60.0
≥ 90	20	67	77.0
Subtotal	**20,265**	**329**	**1.6**
Missing or 0%	6,293	197	3.0
TOTAL	26,558	526	**1.9**

Total N=27,084

Table 66

HOSPITAL DAYS BY BURN GROUP SIZE (% TBSA)

%TBSA	Cases	Mean +/- SEM
0.1 - 9.9	14,854	4.7+/-0.0
10 - 19.9	3,368	10.6+/-0.1
20 - 29.9	1,103	18.2+/-0.4
30 - 39.9	503	32.0+/-1.3
40 - 49.9	249	48.6+/-3.2
50 - 59.9	154	62.2+/-4.3
60 - 69.9	127	58.6+/-4.4
70 - 79.9	69	70.9+/-7.8
80 - 89.9	80	61.2+/-9.6
≥ 90	87	31.9+/-7.6
Subtotal	**20,594**	**8.9+/-0.1**
Missing or 0%	6,490	5.7+/-0.1
TOTAL	**27,084**	**8.2+/-0.1**

Total N=27,084

Table 67

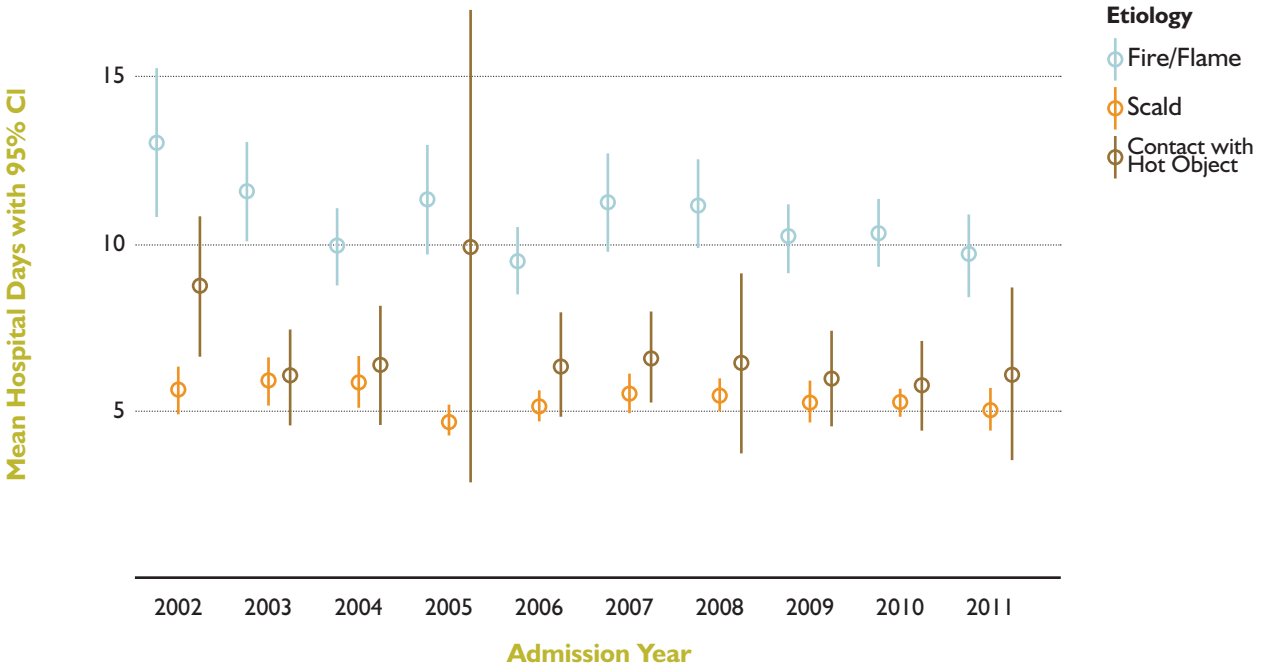
MEAN CHARGES FOR TOP FIVE MS-DRGs

MS-DRG Code	Cases	Cases with Valid Charges	Mean +/- SEM
935 Non-extensive burns	8,658	4,093	$20472+/-597
929 Full thickness burn w skin graft or inhal inj w/o CC/MCC	2,266	880	$96581+/-7133
928 Full thickness burn w skin graft or inhal inj w CC/MCC	1,281	647	$170841+/-11045
934 Full thickness burn w/o skin graft or inhal inj	865	507	$29528+/-2575
927 Extensive burns or full thickness burns w MV 96+ hrs w skin graft	708	321	$433738+/-37243

Total N=13,778

Figure 45

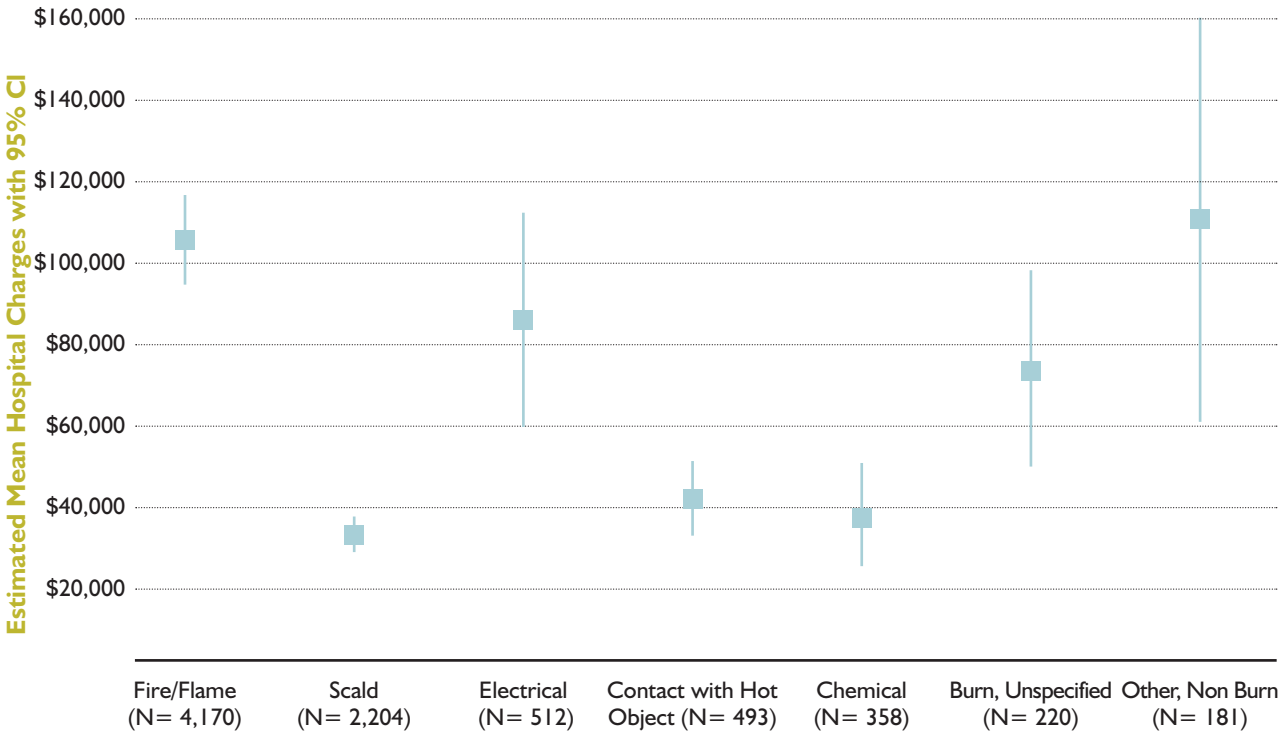
MEAN HOSPITAL DAYS FOR FIRE/FLAME, CONTACT WITH HOT OBJECT, AND SCALD BY ADMISSION YEAR



Total N=27,084

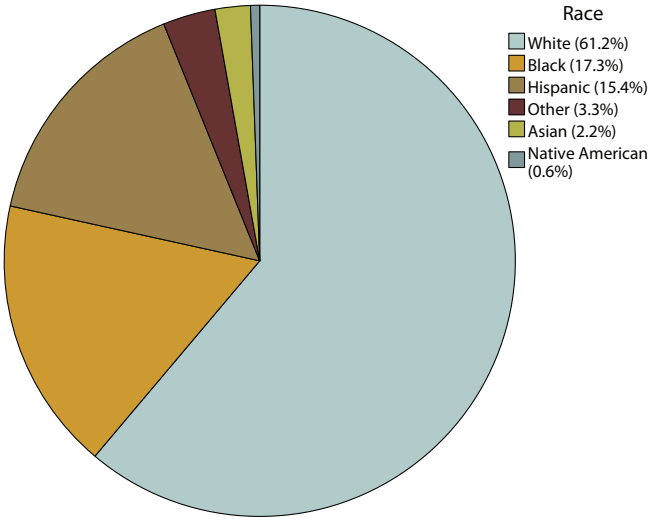
Figure 46

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



Total N=8,774

Figure 47 RACE/ETHNICITY

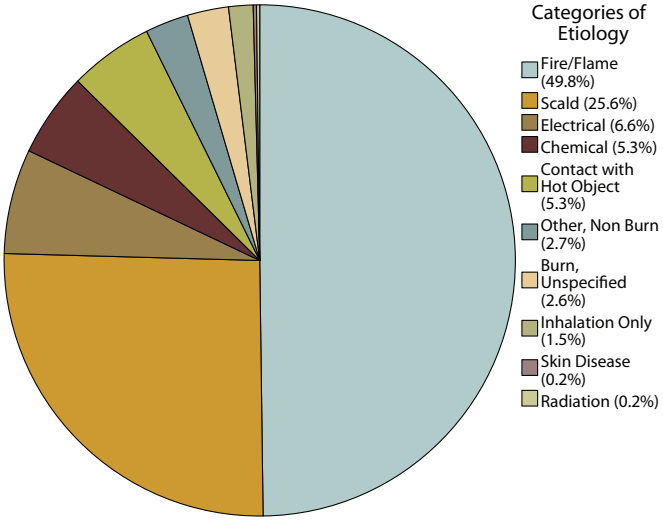


Total N=22,531 (Excluding 1,125 Unknown/Missing)

RACE/ETHNICITY Table 68

Race	Cases
White	13,779
Black	3,897
Hispanic	3,475
Other	747
Asian	502
Native American	131
Unknown	1,125
TOTAL	23,656

Figure 48 ETIOLOGY



Total N=19,685 (Excluding 3,971 Unknown/Missing)

ETIOLOGY Table 69

Etiology	Cases
Fire/Flame	9,801
Scald	5,048
Electrical	1,304
Chemical	1,049
Contact with Hot Object	1,046
Other, Non Burn	540
Burn, Unspecified	512
Inhalation Only	304
Skin Disease	41
Radiation	40
Unknown	3,971
TOTAL	23,656

Table 70

HOSPITAL DAYS: LIVED/DIED BY INHALATION INJURY

	Total		Lived		Died	
Inhalation Injury	**Cases**	**Mean +/- SEM**	**Cases**	**Mean +/- SEM**	**Cases**	**Mean +/- SEM**
No	19,942	7.6+/-0.1	19,677	7.5+/-0.1	265	14.6+/-2.2
Yes	1,665	21.1+/-0.7	1,425	22.6+/-0.8	240	12.5+/-1.3
Subtotal	**21,607**		**21,102**		**505**	
Missing	2,049	8.5+/-0.4	1,992	8.2+/-0.3	57	19.1+/-5.6
TOTAL	**23,656**		**23,094**		**562**	

Total N=23,656

Table 71

TOP TEN COMPLICATIONS

Top Ten Complications	Count	% of All Complications	% of Patients with Complication
Pneumonia	842	11.6	3.8
Cellulitis	777	10.7	3.5
Urinary Tract Infection	485	6.7	2.2
Respiratory Failure	436	5.0	1.0
Wound Infection	421	5.8	1.9
Septicemia	394	5.4	1.8
Other blood/systemic infection	191	2.6	0.9
Renal Failure	188	2.6	0.8
Bacteremia	175	2.4	0.8
Other Hematologic	171	2.4	0.8
Total Complications	**7,274**		

Total N=22,334 (Excluding 1,322 cases from non TRACS centers)

Table 72

TOP TEN PROCEDURES

Codes	Count	% of All Procedures
86.22 Excisional debridement of wound, infection, or burn	13,181	18.3
86.69 Other skin graft to other sites	8,289	11.5
86.28 Nonexcisional debridement of wound, infection or burn	4,855	6.7
86.66 Homograft to skin	3,980	5.5
93.57 Application of other wound dressing	3,128	4.3
38.93 Venous catheterization, not elsewhere classified	2,642	3.7
86.65 Heterograft to skin	2,552	3.5
86.62 Other skin graft to hand	1,685	2.3
86.67 Dermal regenerative graft	1,677	2.3
86.6 Free skin graft	1,330	1.8

Total N=23,656

Table 73

LIVED/DIED BY BURN GROUP SIZE (% TBSA)

	Lived	Died	
%TBSA	**Cases**	**Cases**	**Mortality Rate**
0.1 - 9.9	12,594	35	0.3
10 - 19.9	3,030	27	0.9
20 - 29.9	964	29	2.9
30 - 39.9	447	32	6.7
40 - 49.9	235	29	10.0
50 - 59.9	118	40	25.3
60 - 69.9	77	41	34.7
70 - 79.9	44	46	51.1
80 - 89.9	23	51	68.9
≥ 90	5	82	94.3
Subtotal	**17,537**	**412**	**2.3**
Missing or 0%	5,557	150	2.6
TOTAL	23,094	562	**2.4**

Total N=23,656

Table 74

HOSPITAL DAYS BY BURN GROUP SIZE (% TBSA)

%TBSA	Cases	Mean +/- SEM
0.1 - 9.9	12,629	5.2+/-0.1
10 - 19.9	3,057	11.0+/-0.2
20 - 29.9	993	20.3+/-0.5
30 - 39.9	479	34.5+/-1.8
40 - 49.9	264	45.9+/-2.1
50 - 59.9	158	54.5+/-3.8
60 - 69.9	118	60.8+/-5.7
70 - 79.9	90	48.8+/-6.1
80 - 89.9	74	29.2+/-6.1
≥ 90	87	7.6+/-2.2
Subtotal	**17,949**	**9.5+/-0.1**
Missing or 0%	5,707	5.8+/-0.1
TOTAL	**23,656**	**8.6+/-0.1**

Total N=23,656

Table 75

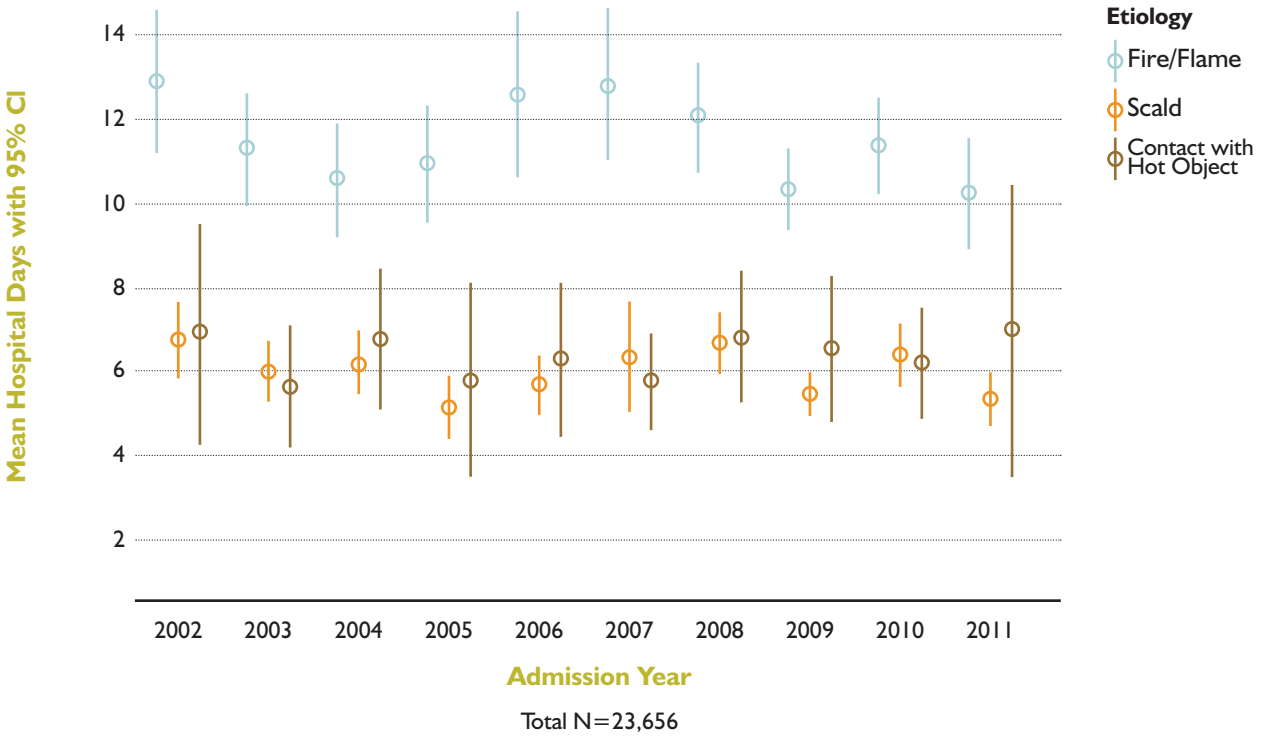
MEAN CHARGES FOR TOP FIVE MS-DRGs

MS-DRG Code	Cases	Cases with Valid Charges	Mean +/- SEM
935 Non-extensive burns	7,419	3,424	$22927+/-843
929 Full thickness burn w skin graft or inhal inj w/o CC/MCC	1,972	739	$92842+/-4848
928 Full thickness burn w skin graft or inhal inj w CC/MCC	1,354	687	$143799+/-8279
934 Full thickness burn w/o skin graft or inhal inj	753	422	$31923+/-3050
927 Extensive burns or full thickness burns w MV 96+ hrs w skin graft	685	312	$435656+/-34664

Total N=12,183

Figure 49

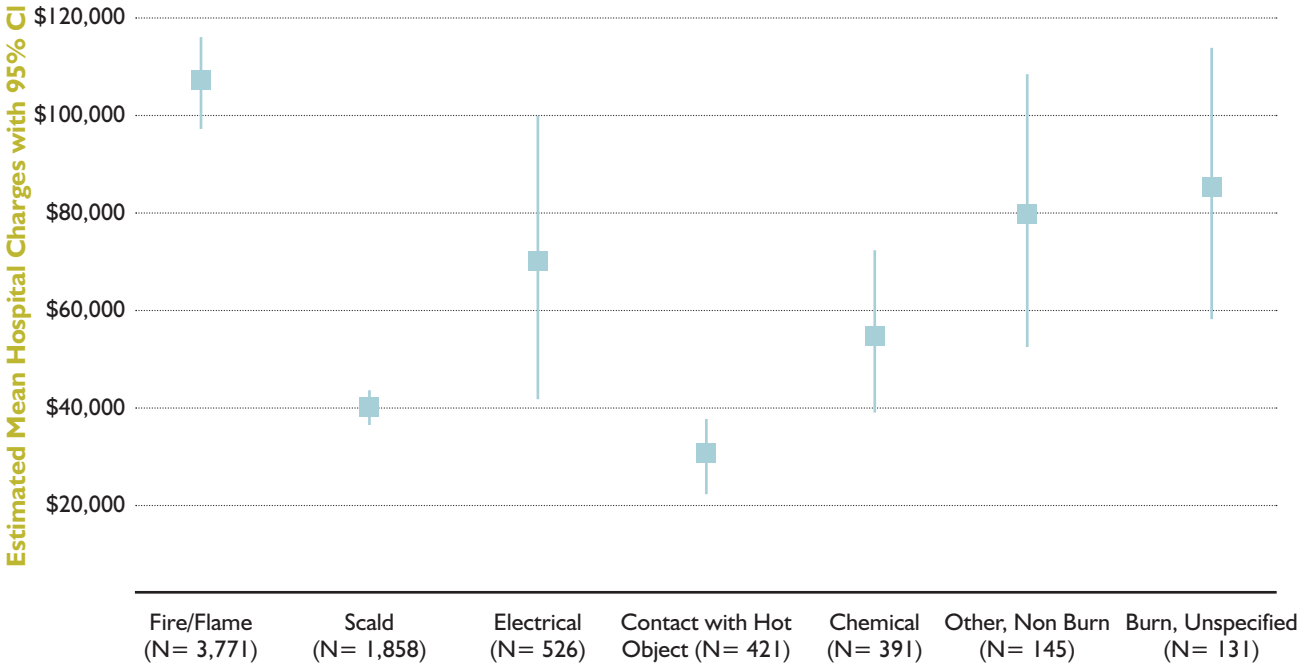
MEAN HOSPITAL DAYS FOR FIRE/FLAME, CONTACT WITH HOT OBJECT, AND SCALD BY ADMISSION YEAR



Total N=23,656

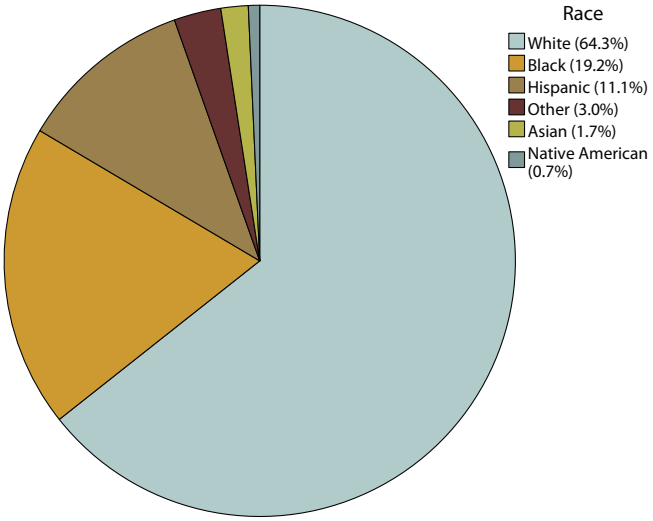
Figure 50

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



Total N=7,569

Figure 51 RACE/ETHNICITY

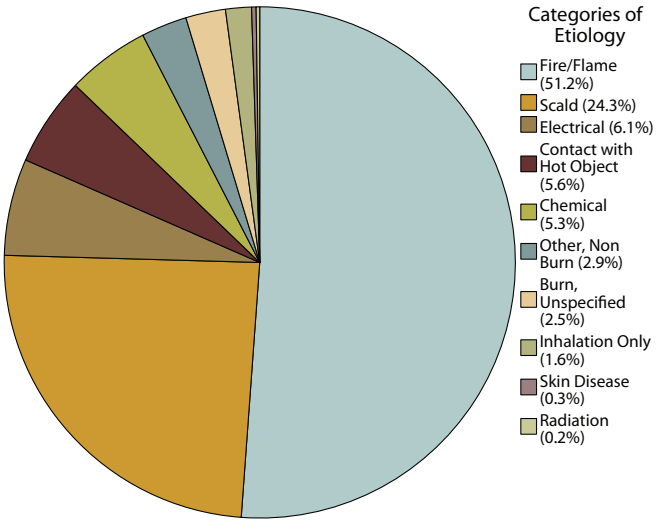


Total N=24,920 (Excluding 1,220 Unknown/Missing)

RACE/ETHNICITY Table 76

Race	Cases
White	16,036
Black	4,775
Hispanic	2,760
Other	740
Asian	431
Native American	178
Unknown	1,220
TOTAL	26,140

Figure 52 ETIOLOGY



Total N=21,817 (Excluding 4,323 Unknown/Missing)

ETIOLOGY Table 77

Etiology	Cases
Fire/Flame	11,161
Scald	5,299
Electrical	1,335
Contact with Hot Object	1,225
Chemical	1,147
Other, Non Burn	632
Burn, Unspecified	549
Inhalation Only	358
Skin Disease	61
Radiation	50
Unknown	4,323
TOTAL	26,140

Table 78

HOSPITAL DAYS: LIVED/DIED BY INHALATION INJURY

	Total		Lived		Died	
Inhalation Injury	**Cases**	**Mean +/- SEM**	**Cases**	**Mean +/- SEM**	**Cases**	**Mean +/- SEM**
No	21,642	8.8+/-0.1	21,240	8.6+/-0.1	402	18.7+/-1.5
Yes	2,166	21.2+/-0.6	1,774	22.3+/-0.7	392	16.5+/-1.5
Subtotal	**23,808**		**23,014**		**794**	
Missing	2,332	10.1+/-0.4	2,248	9.9+/-0.4	84	15.1+/-2.6
TOTAL	**26,140**		**25,262**		**878**	

Total N=26,140

Table 79

TOP TEN COMPLICATIONS

Top Ten Complications	Count	% of All Complications	% of Patients with Complication
Pneumonia	1051	10.8	4.3
Cellulitis	974	9.0	3.9
Urinary Tract Infection	646	6.6	2.6
Respiratory Failure	641	6.6	2.6
Septicemia	524	5.4	2.1
Wound Infection	513	5.2	2.1
Renal Failure	352	3.6	1.4
Arrythmia	223	2.3	0.9
Other blood/systemic infection	213	2.2	0.9
Bacteremia	209	2.1	0.8
Total Complications	**9,773**		

Total N=24,720 (Excluding 1,420 cases from non TRACS centers)

Table 80

TOP TEN PROCEDURES

Top Ten Procedures Codes	Count	% of All Procedures
86.22 Excisional debridement of wound, infection, or burn	15,779	17.9
86.69 Other skin graft to other sites	10,390	11.8
86.28 Nonexcisional debridement of wound, infection or burn	5,246	6.0
86.66 Homograft to skin	4,703	5.3
93.57 Application of other wound dressing	3,623	4.1
38.93 Venous catheterization, not elsewhere classified	3,570	4.1
86.65 Heterograft to skin	2,823	3.2
86.62 Other skin graft to hand	2,031	2.3
86.67 Dermal regenerative graft	1,851	2.1
33.22 Fiber-optic bronchoscopy	1,699	1.9

Total N=26,140

Table 81

LIVED/DIED BY BURN GROUP SIZE (% TBSA)

	Lived	Died	
%TBSA	**Cases**	**Cases**	**Mortality Rate**
0.1 - 9.9	13,983	50	0.4
10 - 19.9	3,363	51	1.5
20 - 29.9	1,122	57	4.8
30 - 39.9	531	65	10.9
40 - 49.9	247	74	23.1
50 - 59.9	116	85	42.3
60 - 69.9	88	53	37.6
70 - 79.9	26	44	62.9
80 - 89.9	22	65	74.7
≥ 90	10	101	90.0
Subtotal	**19,508**	**645**	**3.2**
Missing or 0%	5,754	233	3.9
TOTAL	25,262	878	**3.4**

Total N=26,140

Table 82

HOSPITAL DAYS BY BURN GROUP SIZE (% TBSA)

%TBSA	Cases	Mean +/- SEM
0.1 - 9.9	14,033	6.1+/-0.0
10 - 19.9	3,414	13.4+/-0.2
20 - 29.9	1,179	23.0+/-0.6
30 - 39.9	596	33.7+/-1.1
40 - 49.9	321	45.5+/-2.0
50 - 59.9	201	48.1+/-3.0
60 - 69.9	141	59.1+/-4.9
70 - 79.9	70	52.3+/-8.7
80 - 89.9	87	29.6+/-5.8
≥ 90	111	5.2+/-1.0
Subtotal	**20,153**	**10.8+/-0.1**
Missing or 0%	5,987	7.1+/-0.2
TOTAL	**26,140**	**10.0+/-0.1**

Total N=26,140

Table 83

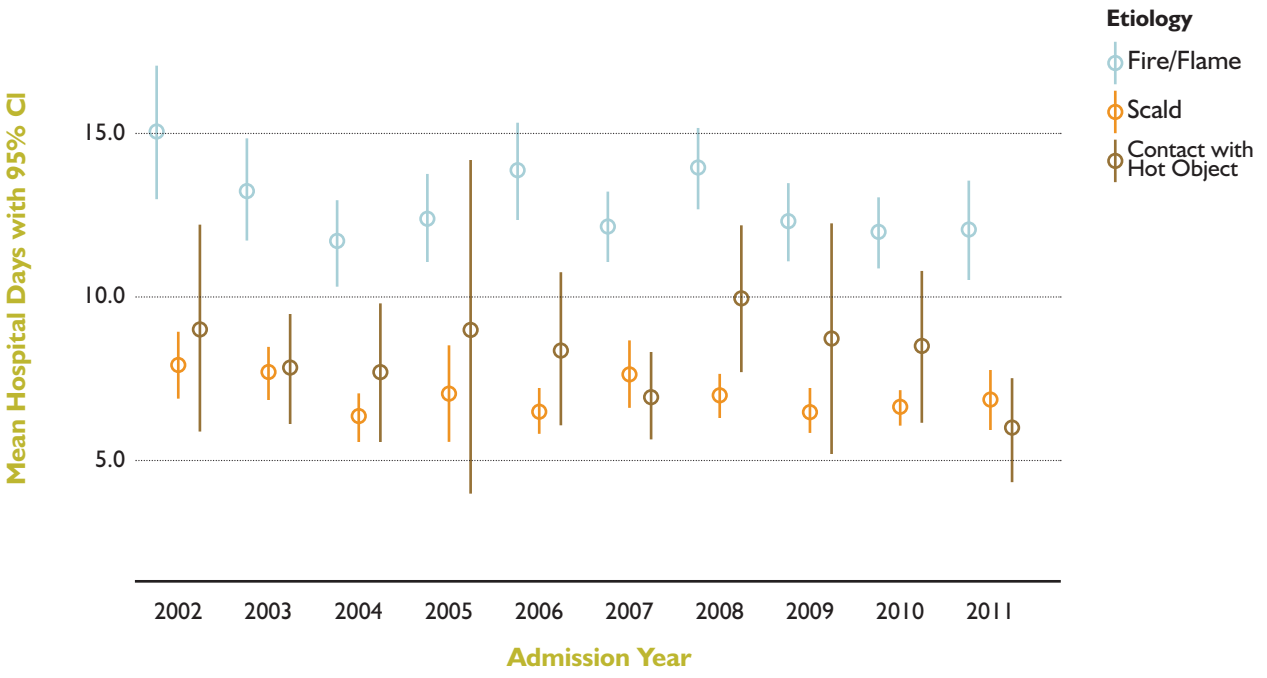
MEAN CHARGES FOR TOP FIVE MS-DRGs

MS-DRG Code	Cases	Cases with Valid Charges	Mean +/- SEM
935 Non-extensive burns	7,687	3,522	$27880+/-1031
929 Full thickness burn w skin graft or inhal inj w/o CC/MCC	2,161	794	$98589+/-8234
928 Full thickness burn w skin graft or inhal inj w CC/MCC	1,883	960	$168154+/-8792
927 Extensive burns or full thickness burns w MV 96+ hrs w skin graft	793	356	$455179+/-29770
934 Full thickness burn w/o skin graft or inhal inj	771	451	$31635+/-2238

Total N=13,295

Figure 53

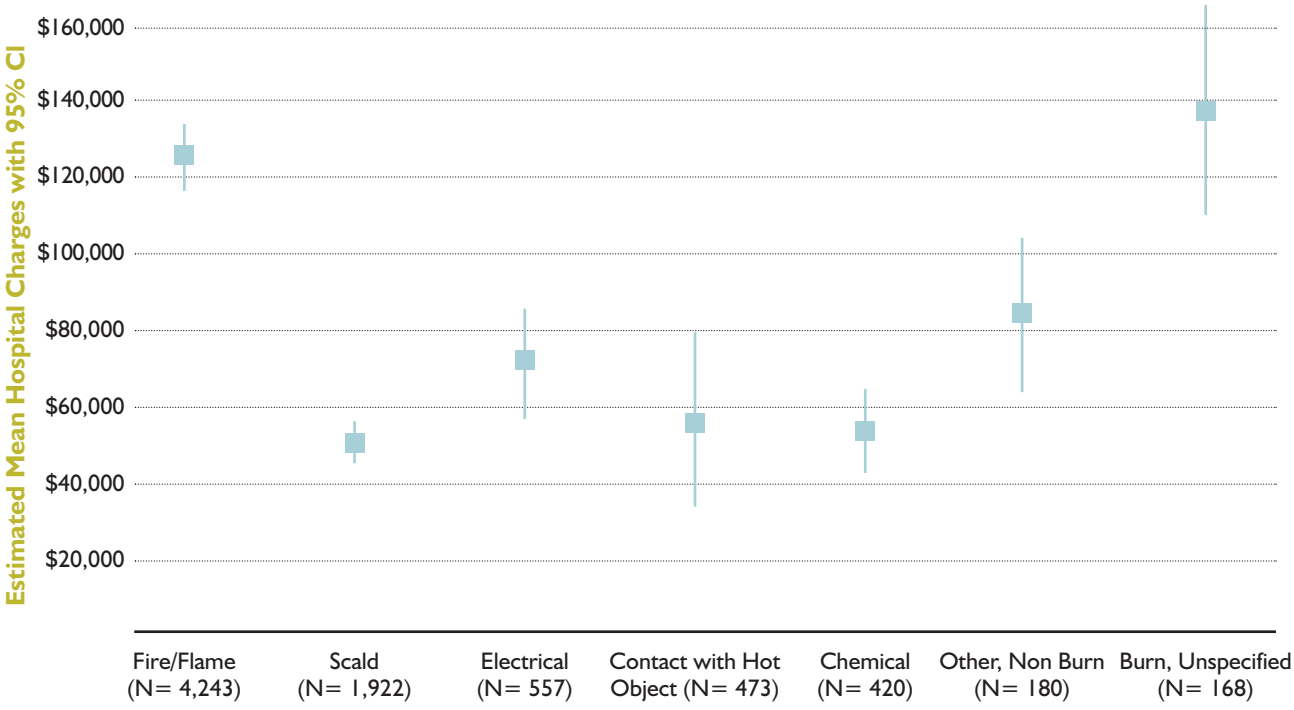
MEAN HOSPITAL DAYS FOR FIRE/FLAME, CONTACT WITH HOT OBJECT, AND SCALD BY ADMISSION YEAR



Total N=26,140

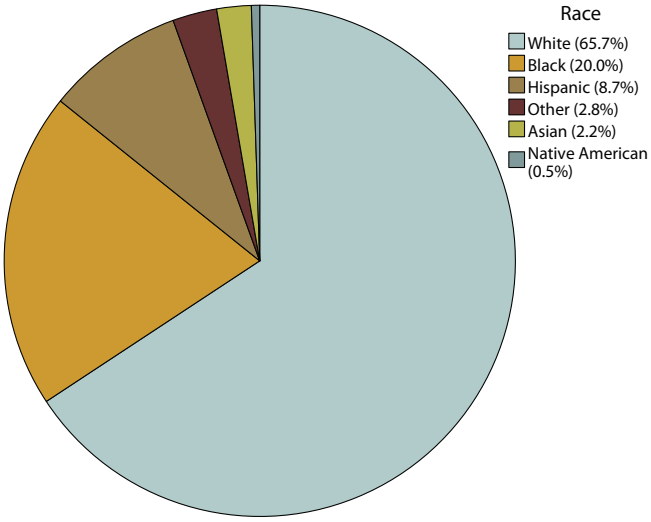
Figure 54

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



Total N=8,464

Figure 55 RACE/ETHNICITY

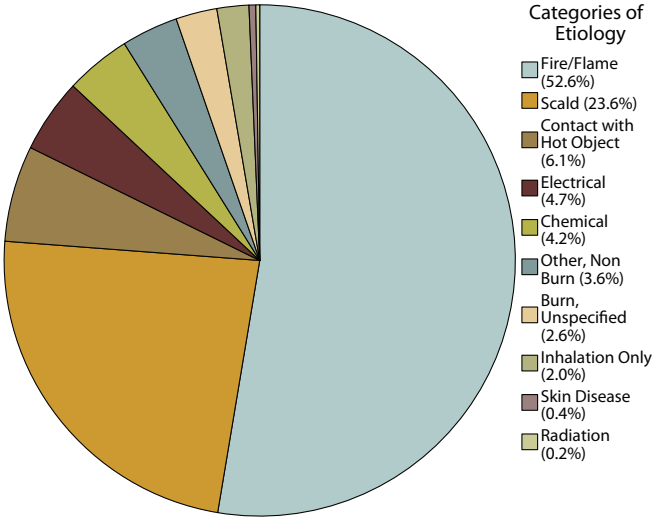


Total N=18,731 (Excluding 856 Unknown/Missing)

RACE/ETHNICITY Table 84

Race	Cases
White	12,312
Black	3,751
Hispanic	1,637
Other	524
Asian	409
Native American	98
Unknown	856
TOTAL	19,587

Figure 56 ETIOLOGY



Total N=16,458 (Excluding 3,129 Unknown/Missing)

ETIOLOGY Table 85

Etiology	Cases
Fire/Flame	8,663
Scald	3,879
Contact with Hot Object	1,000
Electrical	770
Chemical	684
Other, Non Burn	589
Burn, Unspecified	430
Inhalation Only	332
Skin Disease	71
Radiation	40
Unknown	3,129
TOTAL	19,587

Table 86

HOSPITAL DAYS: LIVED/DIED BY INHALATION INJURY

	Total		Lived		Died	
Inhalation Injury	**Cases**	**Mean +/- SEM**	**Cases**	**Mean +/- SEM**	**Cases**	**Mean +/- SEM**
No	15,763	9.9+/-0.1	15,243	9.5+/-0.1	520	20.6+/-1.4
Yes	2,092	22.2+/-0.6	1,649	23.3+/-0.7	443	18.4+/-1.6
Subtotal	**17,855**		**16,892**		**963**	
Missing	1,732	11.8+/-0.5	1,652	11.7+/-0.5	80	12.3+/-2.3
TOTAL	**19,587**		**18,544**		**1,043**	

Total N=19,587

Table 87

TOP TEN COMPLICATIONS

Top Ten Complications	Count	% of All Complications	% of Patients with Complication
Pneumonia	974	10.9	5.2
Cellulitis	724	8.1	3.9
Urinary Tract Infection	630	7.1	3.4
Respiratory Failure	583	6.5	3.1
Wound Infection	493	5.5	2.7
Septicemia	422	4.7	2.3
Renal Failure	354	3.0	1.9
Arrythmia	235	2.6	1.3
Other Hematologic	192	2.2	1.0
Other blood/systemic infection	177	1.0	0.0
Total Complications	**8,910**		

Total N=18,554 (Excluding 1,033 cases from non TRACS centers)

Table 88

TOP TEN PROCEDURES

Top Ten Procedures Codes	Count	% of All Procedures
86.22 Excisional debridement of wound, infection, or burn	12,204	17.6
86.69 Other skin graft to other sites	8,037	11.6
86.28 Nonexcisional debridement of wound, infection or burn	3,718	5.4
86.66 Homograft to skin	3,681	5.3
38.93 Venous catheterization, not elsewhere classified	3,095	4.5
93.57 Application of other wound dressing	2,707	3.9
86.65 Heterograft to skin	1,944	2.8
86.62 Other skin graft to hand	1,434	2.1
38.91 Arterial catheterization	1,433	2.1
96.04 Insertion of endotracheal tube	1,225	1.8

Total N=19,587

Table 89

LIVED/DIED BY BURN GROUP SIZE (% TBSA)

	Lived	Died	
%TBSA	**Cases**	**Cases**	**Mortality Rate**
0.1 - 9.9	10,381	82	0.8
10 - 19.9	2,506	96	3.7
20 - 29.9	829	93	10.1
30 - 39.9	309	83	21.2
40 - 49.9	146	96	39.7
50 - 59.9	70	79	53.0
60 - 69.9	37	78	67.8
70 - 79.9	14	62	81.6
80 - 89.9	9	65	87.8
≥ 90	10	86	89.6
Subtotal	**14,311**	**820**	**5.4**
Missing or 0%	4,233	223	5.0
TOTAL	18,544	1,043	**5.3**

Total N=19,587

Table 90

HOSPITAL DAYS BY BURN GROUP SIZE (% TBSA)

%TBSA	Cases	Mean +/- SEM
0.1 - 9.9	10,463	7.4+/-0.1
10 - 19.9	2,602	15.9+/-0.3
20 - 29.9	922	27.1+/-0.8
30 - 39.9	392	40.0+/-1.9
40 - 49.9	242	44.0+/-2.5
50 - 59.9	149	46.2+/-3.9
60 - 69.9	115	36.9+/-4.6
70 - 79.9	76	25.7+/-5.0
80 - 89.9	74	14.3+/-4.0
≥ 90	96	4.0+/-0.8
Subtotal	**15,131**	**12.2+/-0.1**
Missing or 0%	4,456	8.5+/-0.2
TOTAL	**19,587**	**11.4+/-0.1**

Total N=19,587

Table 91

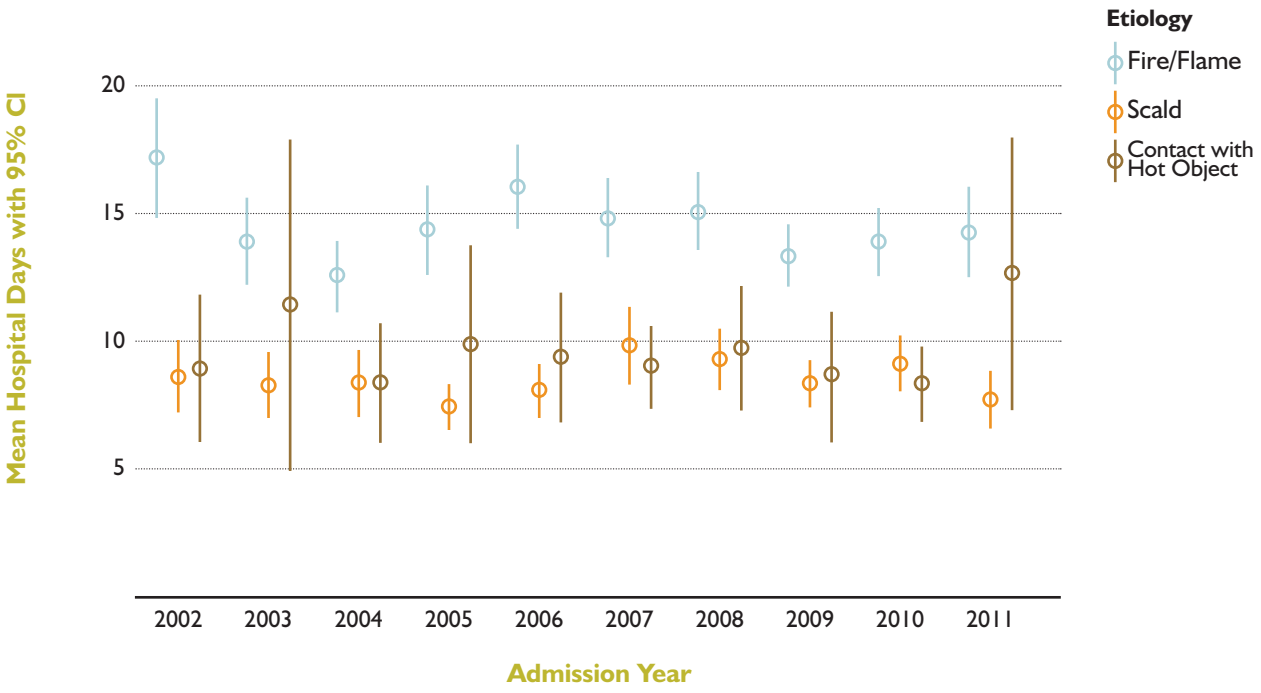
MEAN CHARGES FOR TOP FIVE MS-DRGs

MS-DRG Code	Cases	Cases with Valid Charges	Mean +/- SEM
935 Non-extensive burns	5,261	2,475	$34164+/-1777
929 Full thickness burn w skin graft or inhal inj w/o CC/MCC	1,746	642	$114494+/-6137
928 Full thickness burn w skin graft or inhal inj w CC/MCC	1,688	805	$190260+/-8928
927 Extensive burns or full thickness burns w MV 96+ hrs w skin graft	654	293	$465458+/-39828
934 Full thickness burn w/o skin graft or inhal inj	644	362	$40519+/-4836

Total N=9,993

Figure 57

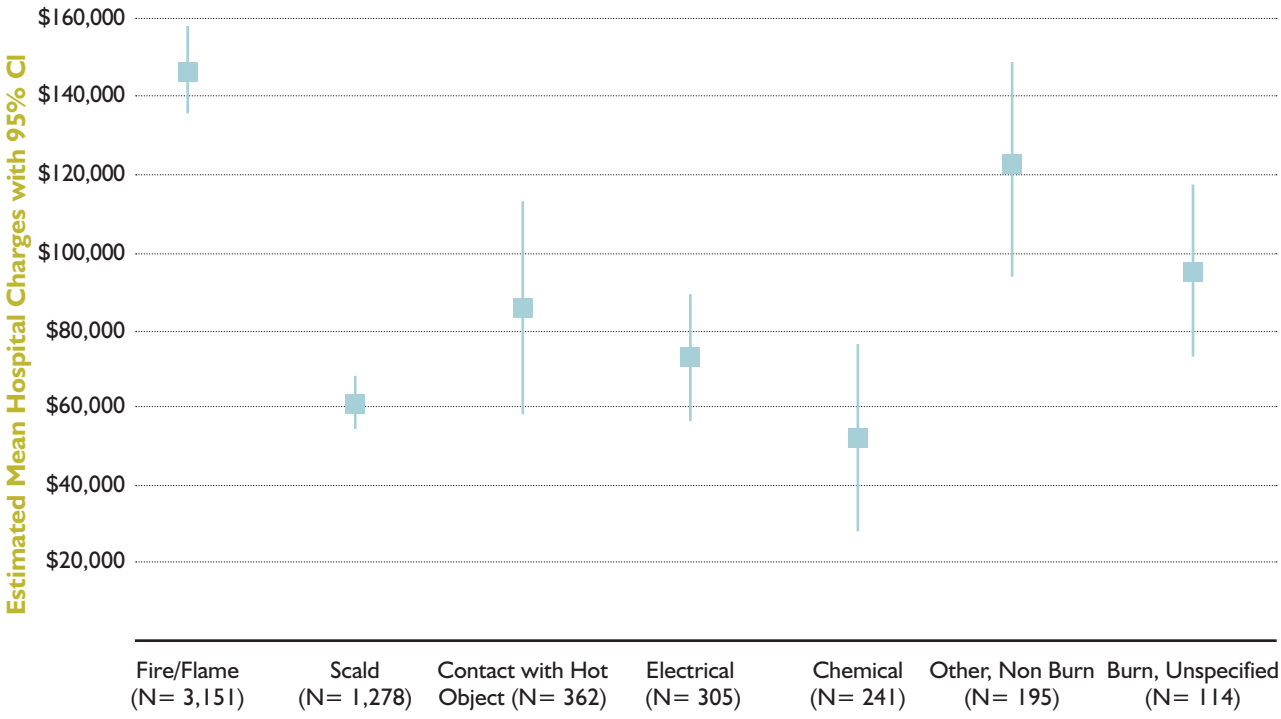
MEAN HOSPITAL DAYS FOR FIRE/FLAME, CONTACT WITH HOT OBJECT, AND SCALD BY ADMISSION YEAR



Total N=19,587

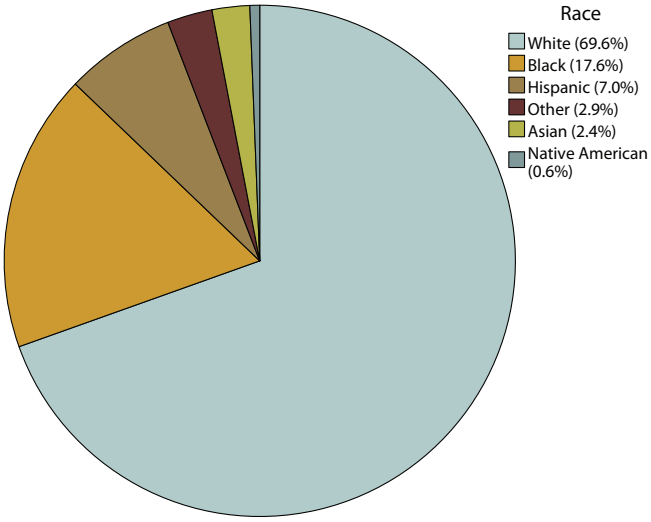
Figure 58

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



Total N=6,328

Figure 59 RACE/ETHNICITY

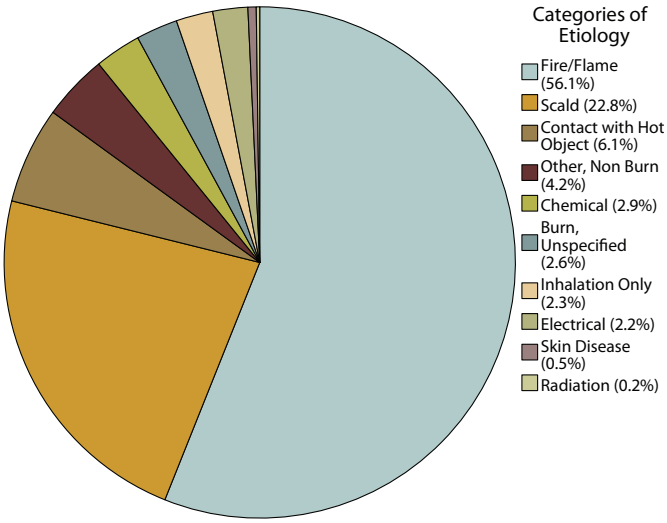


Total N=10,309 (Excluding 461 Unknown/Missing)

RACE/ETHNICITY Table 92

Race	Cases
White	7,170
Black	1,816
Hispanic	720
Other	294
Asian	245
Native American	64
Unknown	461
TOTAL	10,770

Figure 60 ETIOLOGY



Total N=9,005 (Excluding 1,765 Unknown/Missing)

ETIOLOGY Table 93

Etiology	Cases
Fire/Flame	5,048
Scald	2,055
Contact with Hot Object	551
Other, Non Burn	374
Chemical	264
Burn, Unspecified	237
Inhalation Only	210
Electrical	199
Skin Disease	47
Radiation	20
Unknown	1,765
TOTAL	10,770

Table 94

HOSPITAL DAYS: LIVED/DIED BY INHALATION INJURY

	Total		Lived		Died	
Inhalation Injury	**Cases**	**Mean +/- SEM**	**Cases**	**Mean +/- SEM**	**Cases**	**Mean +/- SEM**
No	8,594	11.5+/-0.2	8,134	11.1+/-0.2	460	19.3+/-1.2
Yes	1,249	19.6+/-0.7	905	21.2+/-0.8	344	15.4+/-1.2
Subtotal	**9,843**		**9,039**		**804**	
Missing	927	11.9+/-0.6	862	12.0+/-0.6	65	11.3+/-2.0
TOTAL	**10,770**		**9,901**		**869**	

Total N=10,770

Table 95

TOP TEN COMPLICATIONS

Top Ten Complications	Count	% of All Complications	% of Patients with Complication
Pneumonia	641	10.4	6.3
Urinary Tract Infection	518	8.4	5.1
Respiratory Failure	448	7.3	4.4
Cellulitis	381	6.2	3.7
Renal Failure	295	4.8	2.9
Septicemia	293	4.7	2.9
Arrythmia	272	4.4	2.7
Wound Infection	262	4.2	2.6
Pleural Effusion	140	2.3	1.4
Bacteremia	135	2.2	1.3
Total Complications	**6,171**		

Total N=10,201 (Excluding 569 cases from non TRACS centers)

Table 96

TOP TEN PROCEDURES

Top Ten Procedures Codes	Count	% of All Procedures
86.22 Excisional debridement of wound, infection, or burn	6,803	16.7
86.69 Other skin graft to other sites	4,717	11.6
38.93 Venous catheterization, not elsewhere classified	2,062	5.1
86.66 Homograft to skin	2,042	5.0
86.28 Nonexcisional debridement of wound, infection or burn	1,937	4.8
93.57 Application of other wound dressing	1,437	3.5
86.65 Heterograft to skin	1,091	2.7
38.91 Arterial catheterization	977	2.4
96.04 Insertion of endotracheal tube	786	1.9
33.22 - Fiber-optic bronchoscopy	784	1.9

Total N=10,770

Table 97

LIVED/DIED BY BURN GROUP SIZE (% TBSA)

	Lived	Died	
%TBSA	**Cases**	**Cases**	**Mortality Rate**
0.1 - 9.9	5,599	115	2.0
10 - 19.9	1,434	99	6.5
20 - 29.9	406	96	19.1
30 - 39.9	133	100	42.9
40 - 49.9	57	63	52.5
50 - 59.9	30	61	67.0
60 - 69.9	7	42	85.7
70 - 79.9	5	46	90.2
80 - 89.9	0	30	100.0
≥ 90	5	43	89.6
Subtotal	**7,676**	**695**	**8.3**
Missing or 0%	2,225	174	7.3
TOTAL	9,901	869	**8.1**

Total N=10,770

Table 98

HOSPITAL DAYS BY BURN GROUP SIZE (% TBSA)

%TBSA	Cases	Mean +/- SEM
0.1 - 9.9	5,714	8.6+/-0.1
10 - 19.9	1,533	18.4+/-0.4
20 - 29.9	502	31.7+/-1.2
30 - 39.9	233	40.3+/-2.3
40 - 49.9	120	35.6+/-3.7
50 - 59.9	91	31.9+/-4.6
60 - 69.9	49	19.7+/-3.6
70 - 79.9	51	13.0+/-3.4
80 - 89.9	30	2.3+/-0.5
≥ 90	48	7+/-3.0
Subtotal	**8,371**	**13.4+/-0.2**
Missing or 0%	2,399	9.4+/-0.3
TOTAL	**10,770**	**12.5+/-0.1**

Total N=10,770

Table 99

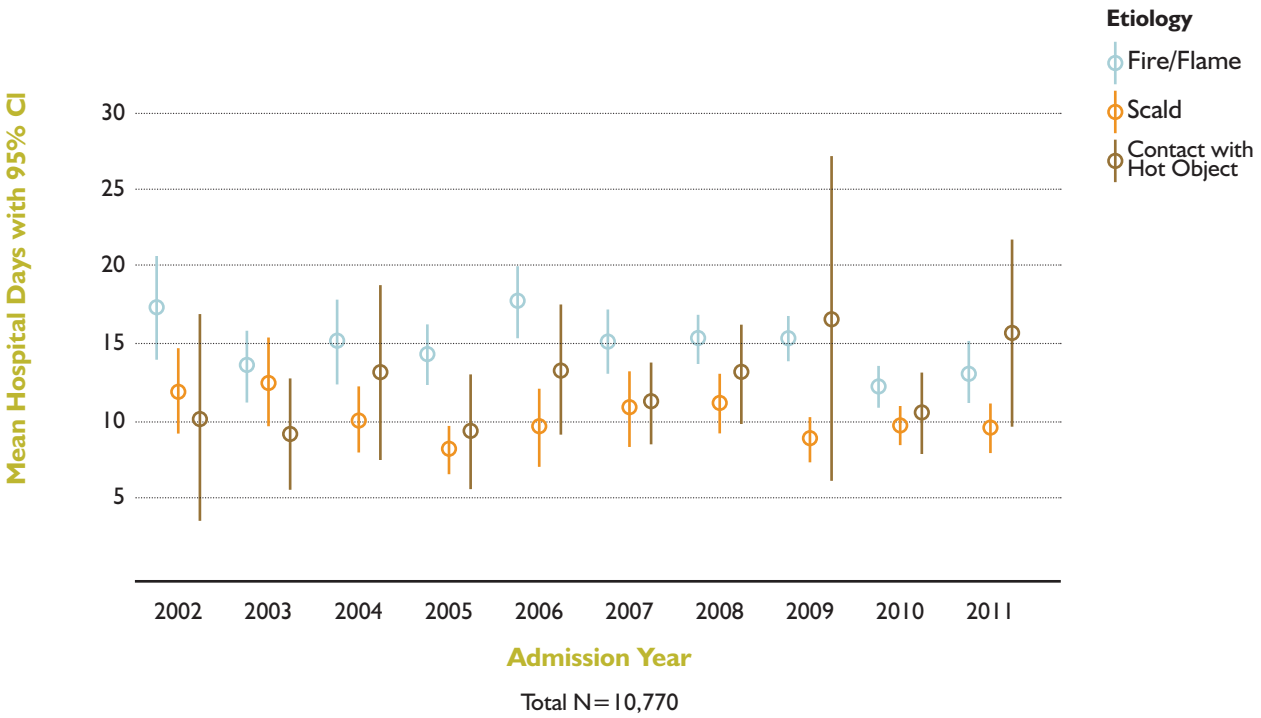
MEAN CHARGES FOR TOP FIVE MS-DRGs

MS-DRG Code	Cases	Cases with Valid Charges	Mean +/- SEM
935 Non-extensive burns	2,673	1,224	$40131+/-2724
928 Full thickness burn w skin graft or inhal inj w CC/MCC	1,135	498	$204573+/-18652
929 Full thickness burn w skin graft or inhal inj w/o CC/MCC	893	316	$138558+/-15983
927 Extensive burns or full thickness burns w MV 96+ hrs w skin graft	392	178	$357054+/-29621
934 Full thickness burn w/o skin graft or inhal inj	353	175	$61080+/-27862

Total N=5,446

Figure 61

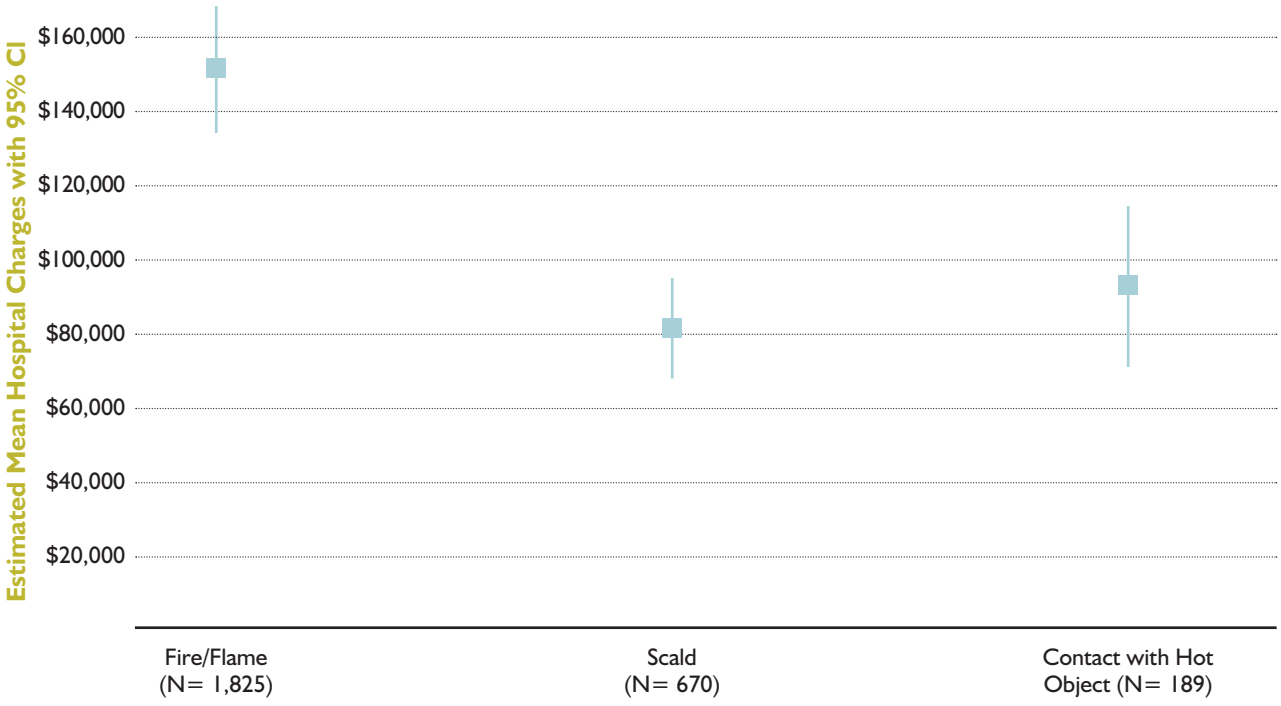
MEAN HOSPITAL DAYS FOR FIRE/FLAME, CONTACT WITH HOT OBJECT, AND SCALD BY ADMISSION YEAR



Total N=10,770

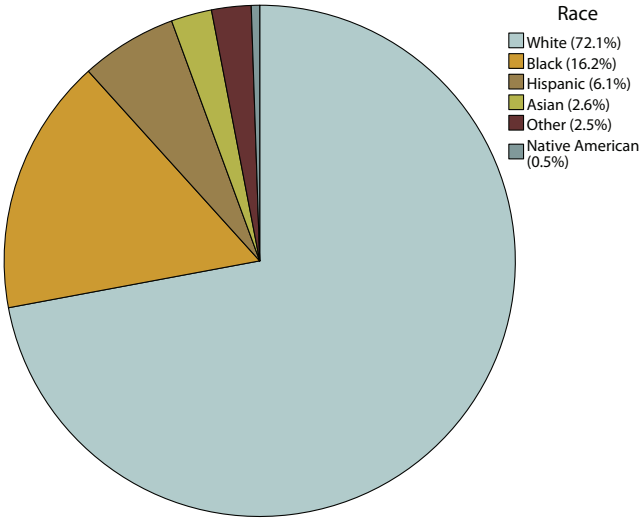
Figure 62

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



Total N=3,105

Figure 63 RACE/ETHNICITY

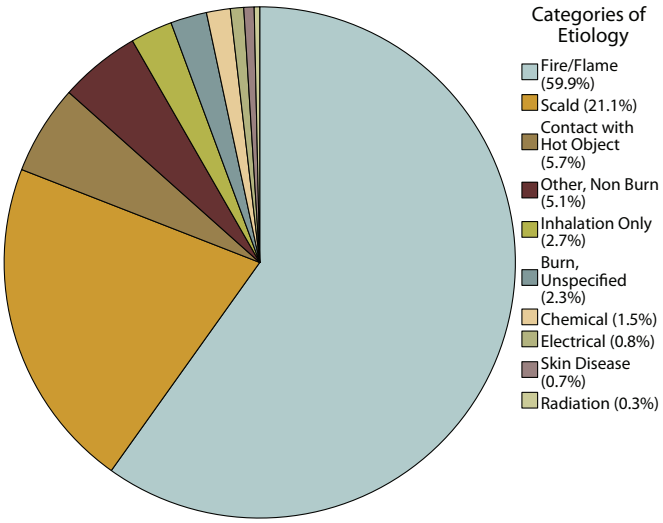


Total N=6,242 (Excluding 273 Unknown/Missing)

RACE/ETHNICITY Table 100

Race	Cases
White	4,498
Black	1,014
Hispanic	380
Asian	161
Other	156
Native American	33
Unknown	273
TOTAL	6,515

Figure 64 ETIOLOGY



Total N=5,494 (Excluding 1,021 Unknown/Missing)

ETIOLOGY Table 101

Etiology	Cases
Fire/Flame	3,289
Scald	1,157
Contact with Hot Object	311
Other, Non Burn	281
Inhalation Only	146
Burn, Unspecified	126
Chemical	83
Electrical	46
Skin Disease	36
Radiation	19
Unknown	1,021
TOTAL	6,515

Table 102

HOSPITAL DAYS: LIVED/DIED BY INHALATION INJURY

	Total		Lived		Died	
Inhalation Injury	**Cases**	**Mean +/- SEM**	**Cases**	**Mean +/- SEM**	**Cases**	**Mean +/- SEM**
No	5,031	13.7+/-0.3	4,496	13.1+/-0.3	535	18.5+/-1.1
Yes	888	16.4+/-0.7	561	19.0+/-0.9	327	11.9+/-1.1
Subtotal	**5,919**		**5,057**		**862**	
Missing	596	14.2+/-1.0	499	13.9+/-0.9	97	15.6+/-4.2
TOTAL	**6,515**		**5,556**		**959**	

Total N=6,515

Table 103

TOP TEN COMPLICATIONS

Top Ten Complications	Count	% of All Complications	% of Patients with Complication
Pneumonia	497	10.7	8.0
Urinary Tract Infection	465	10.0	7.5
Respiratory Failure	357	7.7	5.8
Arrythmia	262	5.6	4.2
Cellulitis	213	4.6	3.4
Renal Failure	206	4.4	3.3
Septicemia	205	4.4	3.3
Wound Infection	163	3.5	2.6
Pleural Effusion	116	2.5	1.9
Other Cardiovascular	112	2.4	1.8
Total Complications	**4,645**		

Total N=6,192 (Excluding 323 cases from non TRACS centers)

Table 104

TOP TEN PROCEDURES

Top Ten Procedures Codes	Count	% of All Procedures
86.22 Excisional debridement of wound, infection, or burn	4,193	16.5
86.69 Other skin graft to other sites	2,916	11.5
38.93 Venous catheterization, not elsewhere classified	1,378	5.4
86.66 Homograft to skin	1,345	5.3
86.28 Nonexcisional debridement of wound, infection or burn	1,081	4.3
93.57 Application of other wound dressing	772	3.0
38.91 Arterial catheterization	649	2.6
86.65 Heterograft to skin	560	2.2
33.22 - Fiber-optic bronchoscopy	543	2.1
96.04 Insertion of endotracheal tube	524	2.1

Total N=6,515

Table 105

LIVED/DIED BY BURN GROUP SIZE (% TBSA)

	Lived	Died	
%TBSA	**Cases**	**Cases**	**Mortality Rate**
0.1 - 9.9	3,136	132	4.0
10 - 19.9	760	138	15.4
20 - 29.9	231	119	34.0
30 - 39.9	75	109	59.2
40 - 49.9	25	73	74.5
50 - 59.9	10	54	84.4
60 - 69.9	6	44	88.0
70 - 79.9	2	26	92.9
80 - 89.9	2	18	90.0
≥ 90	3	29	90.6
Subtotal	**4,250**	**742**	**14.9**
Missing or 0%	1,306	217	14.2
TOTAL	5,556	959	**14.7**

Total N=6,515

Table 106

HOSPITAL DAYS BY BURN GROUP SIZE (% TBSA)

%TBSA	Cases	Mean +/- SEM
0.1 - 9.9	3,268	10.2+/-0.3
10 - 19.9	898	22.0+/-0.6
20 - 29.9	350	33.0+/-1.6
30 - 39.9	184	32.0+/-2.6
40 - 49.9	98	23.7+/-3.4
50 - 59.9	64	13.8+/-3.1
60 - 69.9	50	13.9+/-3.1
70 - 79.9	28	3.0+/-0.7
80 - 89.9	20	2.5+/-0.7
≥ 90	32	1.5+/-0.2
Subtotal	**4,992**	**14.9+/-0.3**
Missing or 0%	1,523	11.3+/-0.4
TOTAL	**6,515**	**14.1+/-0.2**

Total N=6,515

Table 107

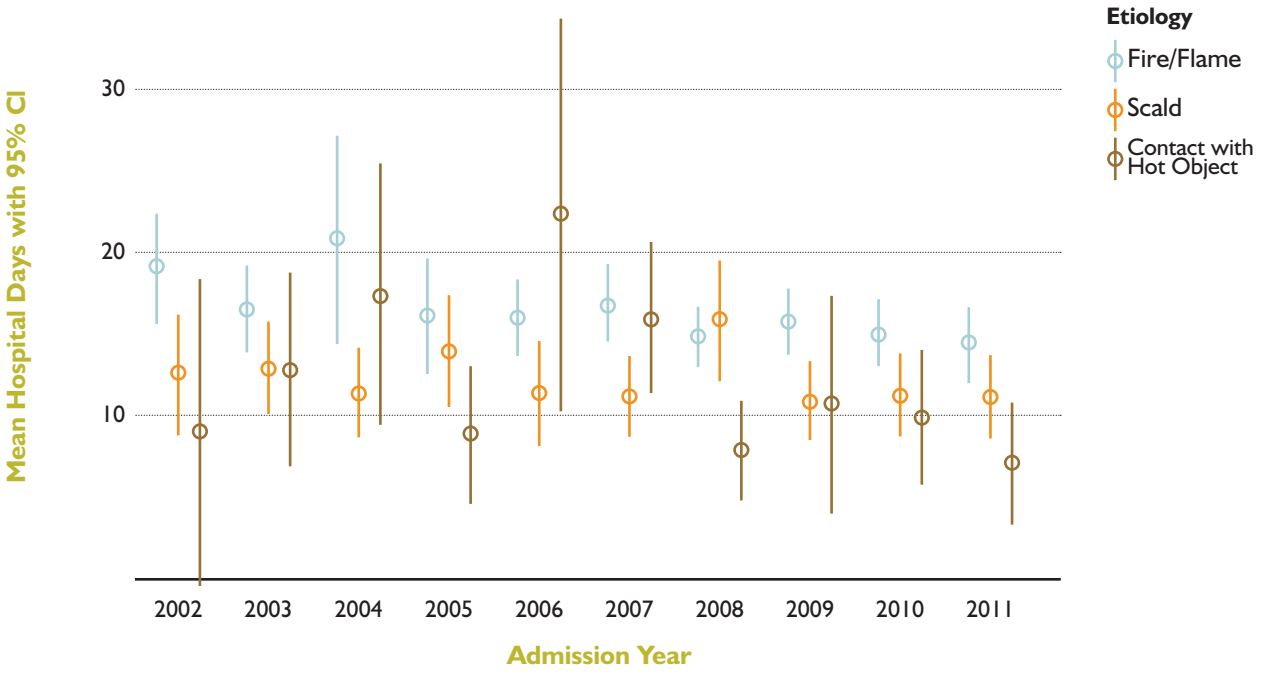
MEAN CHARGES FOR TOP FIVE MS-DRGs

MS-DRG Code	Cases	Cases with Valid Charges	Mean +/- SEM
935 Non-extensive burns	1,330	615	$49417+/-3656
928 Full thickness burn w skin graft or inhal inj w CC/MCC	749	368	$198583+/-12869
929 Full thickness burn w skin graft or inhal inj w/o CC/MCC	494	183	$133485+/-11058
934 Full thickness burn w/o skin graft or inhal inj	283	149	$48315+/-5057
927 Extensive burns or full thickness burns w MV 96+ hrs w skin graft	274	116	$470708+/-46999

Total N=3,130

Figure 65

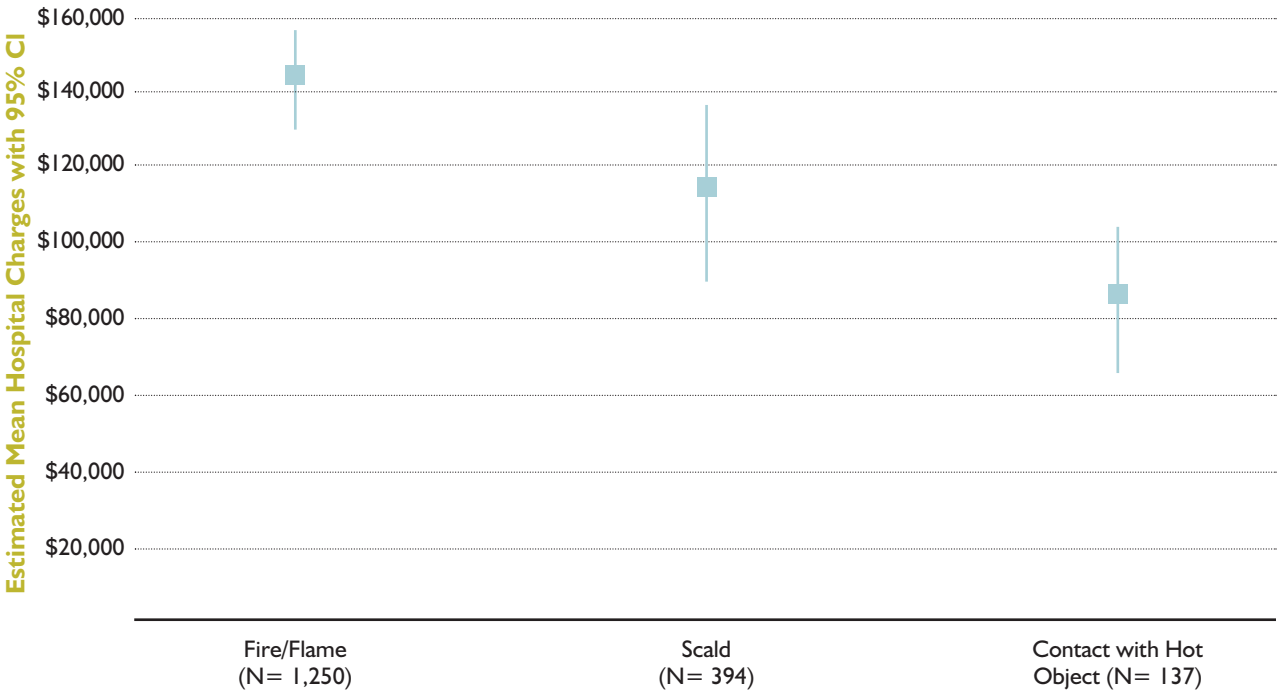
MEAN HOSPITAL DAYS FOR FIRE/FLAME, CONTACT WITH HOT OBJECT, AND SCALD BY ADMISSION YEAR



Total N=6,515

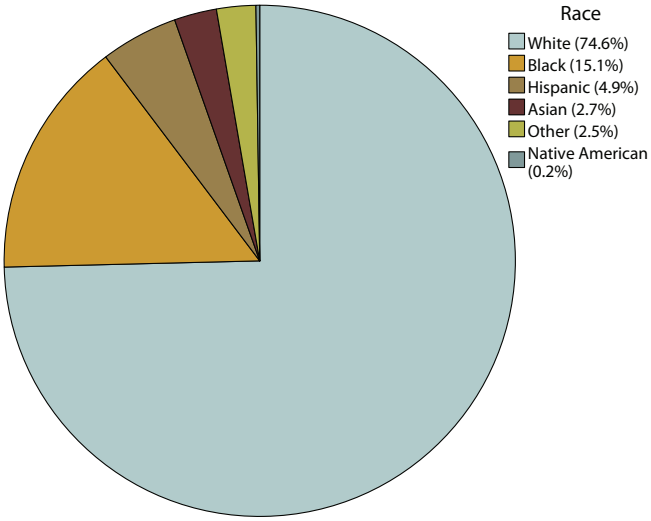
Figure 66

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



Total N=1,932

Figure 67 RACE/ETHNICITY

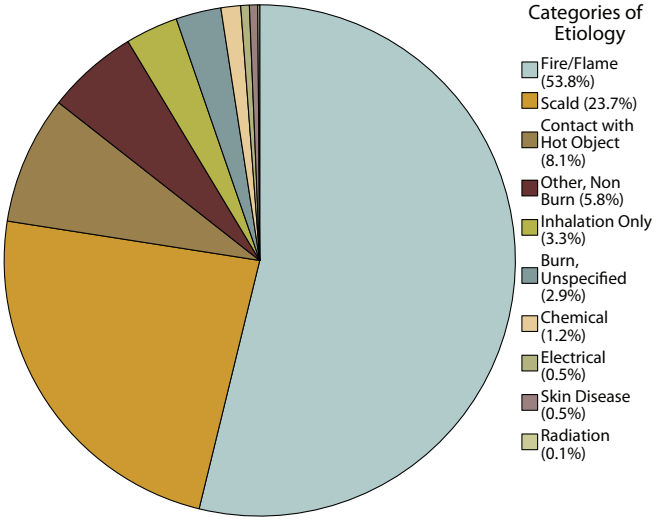


Total N=4,557 (Excluding 195 Unknown/Missing)

Table 108 RACE/ETHNICITY

Race	Cases
White	3,400
Black	688
Hispanic	223
Asian	122
Other	113
Native American	11
Unknown	195
TOTAL	4,752

Figure 68 ETIOLOGY



Total N=4,025 (Excluding 727 Unknown/Missing)

Table 109 ETIOLOGY

Etiology	Cases
Fire/Flame	2,166
Scald	952
Contact with Hot Object	327
Other, Non Burn	233
Inhalation Only	134
Burn, Unspecified	115
Chemical	50
Electrical	22
Skin Disease	21
Radiation	5
Unknown	727
TOTAL	4,752

Table 110

HOSPITAL DAYS: LIVED/DIED BY INHALATION INJURY

	Total		Lived		Died	
Inhalation Injury	**Cases**	**Mean +/- SEM**	**Cases**	**Mean +/- SEM**	**Cases**	**Mean +/- SEM**
No	3,650	14.0+/-0.5	2,977	13.9+/-0.5	673	14.5+/-0.7
Yes	653	12.0+/-0.6	287	17.3+/-1.2	366	7.8+/-0.6
Subtotal	**4,303**		**3,264**		**1,039**	
Missing	449	13.2+/-0.8	359	13.5+/-0.9	90	11.9+/-1.9
TOTAL	**4,752**		**3,623**		**1,129**	

Total N=4,752

Table 111

TOP TEN COMPLICATIONS

Top Ten Complications	Count	% of All Complications	% of Patients with Complication
Urinary Tract Infection	379	11.5	8.5
Pneumonia	311	9.5	6.0
Respiratory Failure	267	8.1	5.0
Arrythmia	176	5.4	3.9
Cellulitis	175	5.3	3.9
Septicemia	145	4.4	3.3
Renal Failure	144	4.4	3.2
Wound Infection	111	3.4	2.5
Other Cardiovascular	84	2.6	1.9
Bacteremia	75	2.3	1.7
Total Complications	**3,286**		

Total N=4,460 (Excluding 292 cases from non TRACS centers)

Table 112

TOP TEN PROCEDURES

Top Ten Procedures Codes	Count	% of All Procedures
86.22 Excisional debridement of wound, infection, or burn	2,834	16.3
86.69 Other skin graft to other sites	2,004	11.5
38.93 Venous catheterization, not elsewhere classified	950	5.5
86.66 Homograft to skin	817	4.7
86.28 Nonexcisional debridement of wound, infection or burn	708	4.1
93.57 Application of other wound dressing	554	3.2
87.44 - Routine chest x-ray, so described	417	2.4
99.04 Transfusion of packed cells	409	2.3
96.04 Insertion of endotracheal tube	395	2.3
38.91 Arterial catheterization	377	2.2

Total N=4,752

Table 113

LIVED/DIED BY BURN GROUP SIZE (% TBSA)

	Lived	Died	
%TBSA	**Cases**	**Cases**	**Mortality Rate**
0.1 - 9.9	2,071	154	6.9
10 - 19.9	521	210	28.7
20 - 29.9	101	179	63.9
30 - 39.9	31	105	77.2
40 - 49.9	9	73	89.0
50 - 59.9	2	58	96.7
60 - 69.9	6	39	86.7
70 - 79.9	2	29	93.5
80 - 89.9	1	34	97.1
≥ 90	0	27	100.0
Subtotal	**2,744**	**908**	**24.9**
Missing or 0%	879	221	20.1
TOTAL	3,623	1,129	**23.8**

Total N=4,752

Table 114

HOSPITAL DAYS BY BURN GROUP SIZE (% TBSA)

%TBSA	**Cases**	**Mean +/- SEM**
0.1 - 9.9	2,225	11.9+/-0.7
10 - 19.9	731	22.5+/-0.7
20 - 29.9	280	23.4+/-1.4
30 - 39.9	136	17.1+/-1.9
40 - 49.9	82	10.1+/-1.9
50 - 59.9	60	3.6+/-0.9
60 - 69.9	45	3.5+/-0.9
70 - 79.9	31	1.1+/-0.1
80 - 89.9	35	1.1+/-0.0
≥ 90	27	1.8+/-0.6
Subtotal	**3,652**	**14.6+/-0.5**
Missing or 0%	1,100	10.5+/-0.5
TOTAL	**4,752**	**13.6+/-0.4**

Total N=4,752

Table 115

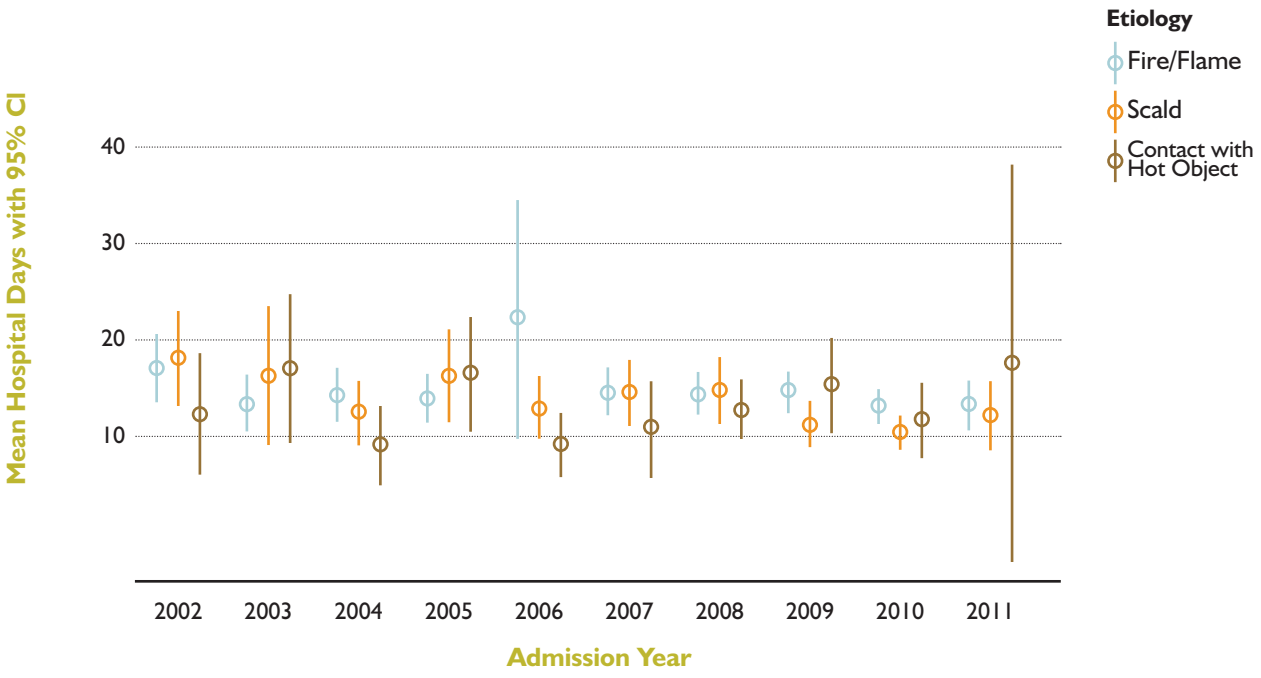
MEAN CHARGES FOR TOP FIVE MS-DRGs

MS-DRG Code	**Cases**	**Cases with Valid Charges**	**Mean +/- SEM**
935 Non-extensive burns	874	428	$49579+/-3845
928 Full thickness burn w skin graft or inhal inj w CC/MCC	596	266	$174204+/-12731
929 Full thickness burn w skin graft or inhal inj w/o CC/MCC	361	127	$98516+/-7469
934 Full thickness burn w/o skin graft or inhal inj	268	133	$53374+/-6020
933 Extensive burns or full thickness burns w MV 96+ hrs w/o skin graft	240	113	$42725+/-9089

Total N=2,339

Figure 69

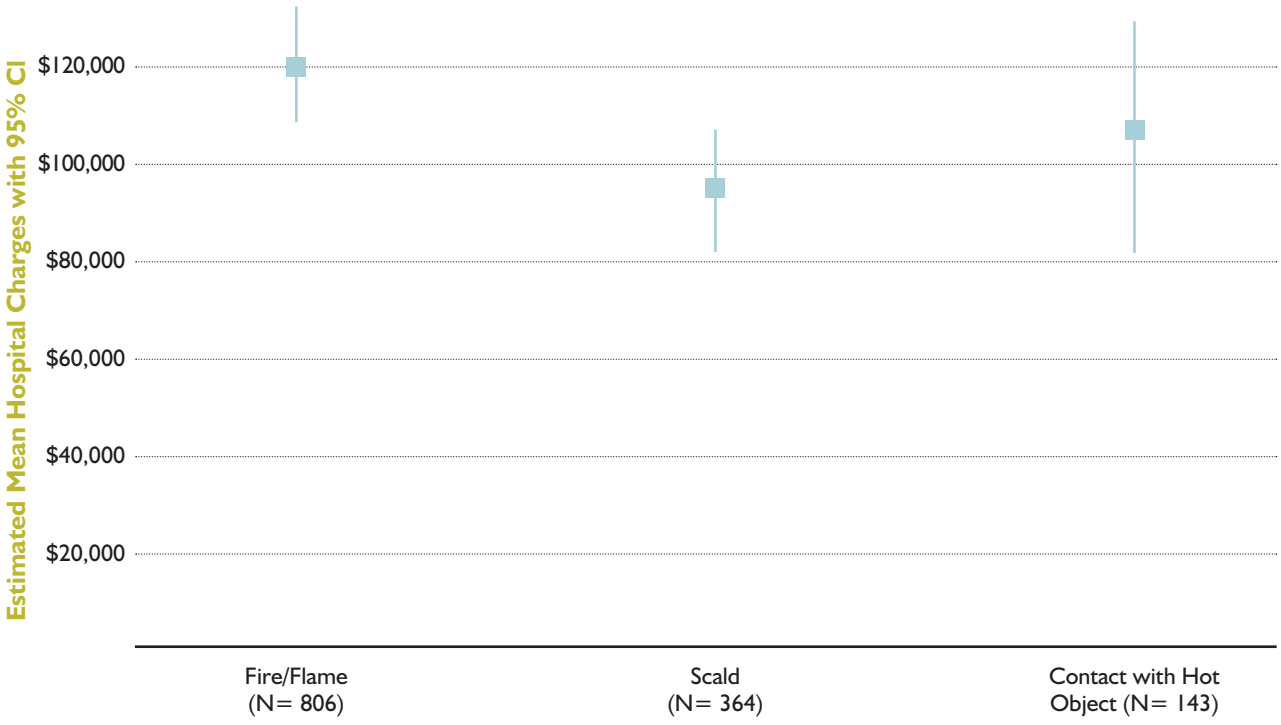
MEAN HOSPITAL DAYS FOR FIRE/FLAME, CONTACT WITH HOT OBJECT, AND SCALD BY ADMISSION YEAR



Total N=4,752

Figure 70

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



Total N=1,426

4

Analysis
by Etiology

The causative agent of a thermal injury has a significant impact on the morbidity and mortality of patients admitted to a burn center. As you will observe in this section of the 2012 National Burn Repository Report, different burns have different rates and categories of complications. Also, the cause of the burn wound has significant impact on hospital length of stay. The demographics of the patients suffering from burns from various etiologies is also different. With different etiologies, there are differences in the circumstances and environment in which they occur. There is also a difference in the gender of the burned patient. Understanding these patterns of varying burn etiologies is a key component in focusing burn prevention strategies.

The information in this section pertains only to burn admissions to burn centers. Valid conclusions regarding the demographics of outpatient burns and their etiologies cannot be drawn from this report. For example, the most common surgical procedure performed on all these patients is excision and skin grafting. This clearly suggests that these patients had a burn, regardless of etiology, severe enough to warrant admission to a burn center. Hopefully, this report will grow to include the outpatient burn population in the future.

Burn injuries from hot liquids, or scalds, are the second most common burn etiology reported by participating burn center over the past decade. Burns caused by scalds make up 36% of the injuries reported in this data set. Although the reported number (over 50,000) is less than the flame burns (over 67,000) a fair amount of these burns are managed as an outpatient. Therefore, the demographics of scald burns in this data set applies to burn center admissions and should not be construed as typical of all scald injuries.

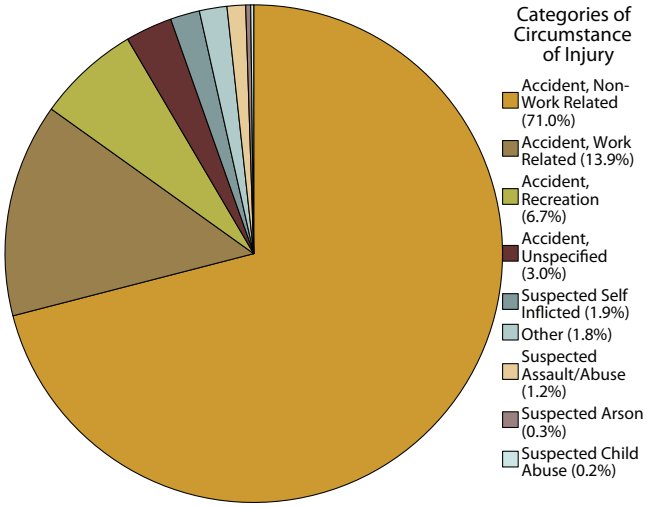
Contact burns from touching a hot object are extremely common, but only make up 10% of all the data in the registry for this decade of reporting burn centers. Again, this injury is typically managed as an outpatient, so keep that fact in mind when interpreting the demographics of this patient population.

Although one of the most devastating and debilitating injuries cared for in burn centers, electrical injuries only comprise 4.2% of all the reported etiologies in this year's review. Also, all types of electrical injuries are pooled into this analysis making broad interpretation of these findings difficult.

Flame burns continue to be one of the most severe etiologies of thermal injury. They are typically associated with the highest risk of death and complications compared to all other burn etiologies. The circumstances surrounding flame burns are most commonly non-work related accidents (64%), followed by work related injuries (12%). Recreational fire burns are the next most common circumstance occurring at 6% (Figure 71, Table 116). The percentage of burn patients with flame injuries admitted to burn centers in this ten year data set is 47%. Burns caused by fire most commonly occur in the home (61%). The next most common place of occurrence are at recreational events (6%) and from industrial accidents (6%). This is depicted in Figure 72 and Table 117.

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

Figure 71 CIRCUMSTANCE OF INJURY

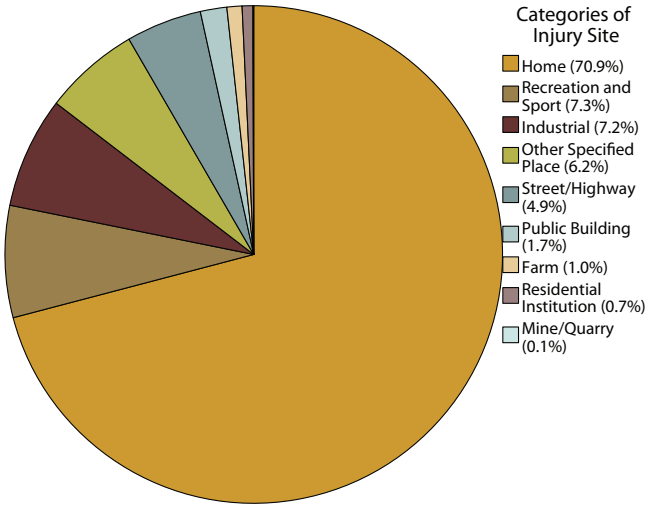


Total N=60,264 (Excluding 6,952 Unknown/Missing)

CIRCUMSTANCE OF INJURY Table 116

Circumstance of Injury	Cases
Accident, Non-Work Related	42,774
Accident, Work Related	8,373
Accident, Recreation	4,021
Accident, Unspecified	1,834
Suspected Self Inflicted	1,146
Other	1,077
Suspected Assault/Abuse	725
Suspected Arson	196
Suspected Child Abuse	118
Unknown	6,952
Total	**67,216**

Figure 72 PLACE OF OCCURRENCE - E849 CODE



Total N=58,200 (Excluding 9,016 Unknown/Missing)

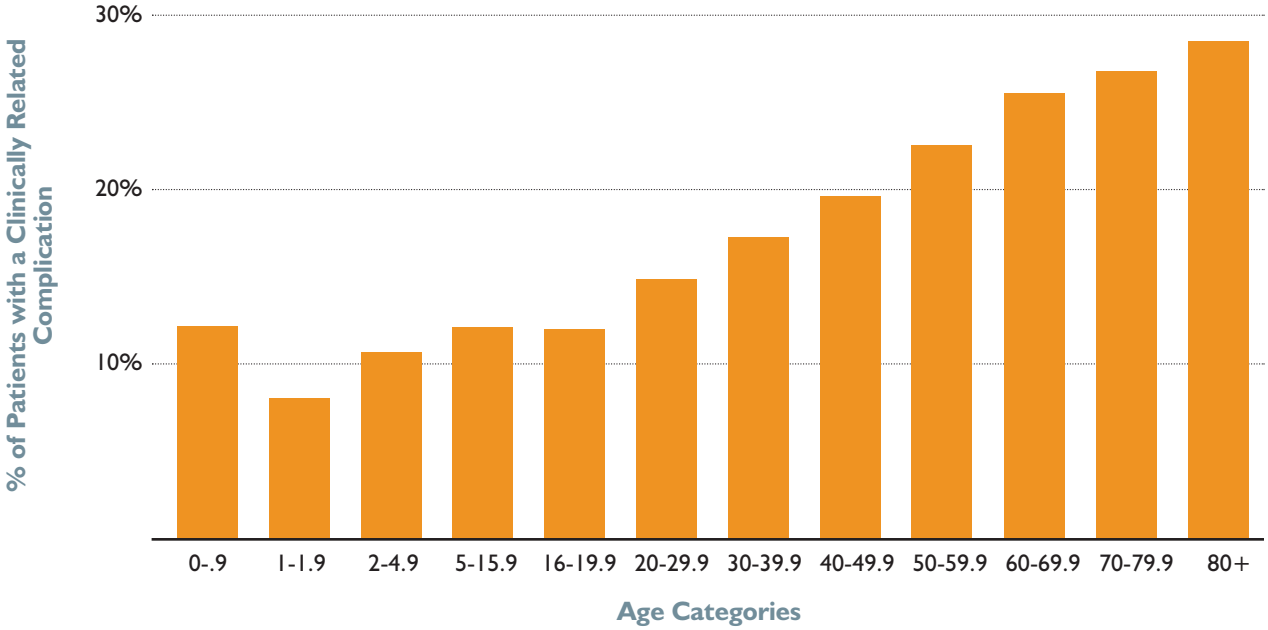
PLACE OF OCCURRENCE - E849 CODE Table 117

Place of Occurrence	Cases
Home	41,268
Recreation and Sport	4,228
Industrial	4,208
Other Specified Place	3,631
Street/Highway	2,859
Public Building	999
Farm	573
Residential Institution	399
Mine/Quarry	35
Unspecified	9,016
Total	**67,216**

Burns caused by flames typically are associated with a high rate of complications. The incidence of complications reported by participating burn centers over the past ten years is 18% (Table 118). As expected, as age increases, the rate of complications increase as well (Figure 73). Children and young adults under the age of 20 have a reported complication rate of 12%. Those above the age of 20 have a linearly increasing rate of complications (Figure 73). Patients older than 50 have an incidence of complications from 22 to 28% (Table 118).

Figure 73

PERCENT OF PATIENT WITH CLINICALLY RELEVANT COMPLICATIONS BY AGE GROUP



Total N=63,399 (Excluding 3,817 cases from non TRACS users or missing/unknown age)

Table 118

COMPLICATION RATE BY AGE GROUP

	No Complication	Complication	
Age Category	**Cases**	**Cases**	**Complication Rate**
0-.9	344	48	12.2
1-1.9	758	67	8.1
2-4.9	1,686	202	10.7
5-15.9	5,880	820	12.2
16-19.9	3,740	511	12.0
20-29.9	8,918	1,560	14.9
30-39.9	7,857	1,634	17.2
40-49.9	8,673	2,105	19.5
50-59.9	6,497	1,879	22.4
60-69.9	3,651	1,243	25.4
70-79.9	2,344	854	26.7
80 and Over	1,497	594	28.4
Subtotal	**51,845**	**11,517**	**18.2**
Missing	897	159	15.1
Total	**52,742**	**11,676**	**18.1**

Total N=64,418 (Excluding 2,798 cases from non TRACS users)

The most commonly reported complication reported in patients with flame burns are infectious. The most common infection is pneumonia occurring at an incidence of 6% of all patients and represents 14% of all complications (Table 119). The next most common complications are urinary tract infections (3.9%) and cellulitis (3.6%). Catheter-related blood stream infections were reported in only 1.3% of the data set. Despite the infectious complications, septicemia was only reported in 3.3% of the population.

The most commonly performed procedures on patients with flame burns are excision (18%) and grafting (12%). The use of homograft is reported in approximately 6% of the procedures. Heterografts make up 3.2% of procedures and dermal regenerative templates make up 2.3% of reported procedures. Skin grafts to the hand compose only 2% of the population (Table 120).

Table 119 TOP TEN COMPLICATIONS

Top Ten Complications	Count	% of All Complications	% of Patients with Complication
Pneumonia	3,957	13.9	6.1
Urinary Tract Infection	2,508	8.8	3.9
Cellulitis	2,397	8.4	3.7
Respiratory Failure	2,347	8.2	3.6
Septicemia	2,095	7.4	3.3
Wound Infection	1,922	6.7	2.0
Renal Failure	1,211	4.3	1.9
Arrythmia	980	3.4	1.5
Catheter-related bloodstream infection	878	3.1	1.4
Other blood/systemic infection	819	2.9	1.3
Total Complications	**28,478**		

Total N=64,418 (Excluding 2,798 cases from non TRACS users)

Table 120 TOP TEN PROCEDURES

Top Ten Procedures Codes	Count	% of All Procedures
86.22 Excisional debridement of wound, infection, or burn	52,022	17.8
86.69 Other skin graft to other sites	35,792	12.2
86.66 Homograft to skin	17,888	6.1
86.28 Nonexcisional debridement of wound, infection or burn	17,594	6.0
38.93 Venous catheterization, not elsewhere classified	14,165	4.8
93.57 Application of other wound dressing	12,982	4.4
86.65 Heterograft to skin	9,377	3.2
86.67 Dermal regenerative graft	6,805	2.3
38.91 Arterial catheterization	6,762	2.3
86.62 Other skin graft to hand	6,498	2.2

Total N=67,216

Smoke inhalation continues to have a significant impact on the morbidity and mortality of flame burns. Inhalation injury is present in 17% of patients with flame burns. The presence of smoke inhalation is associated with an overall mortality rate of 24% over the past decade, while the mortality is 3% in those patients without smoke inhalation. Patients with smoke inhalation injury had a 2.5 times higher length of stay compared to those without smoke inhalation injury (24 days vs. 10 days). When stratified by survivors, those with smoke inhalation have an average length of stay of 27 days, while those without it have an average hospital stay of 10 days. Non-survivors with smoke inhalation injury have a length of stay of two weeks before succumbing to the injury. Non-survivors of flame burns without inhalation injury have a length of stay of 3 weeks before succumbing to their injury (Table 121).

As expected, the length of hospital stay increases with % total body surface area (%TBSA) burned. The adage of length of stay being approximated by %TBSA only holds true in the current data set for all survivors with a %TBSA up to 40%. Survivors with %TBSA burn sizes between 50 and 90% had a length of stay of 1.2 days per %TBSA burned. Patients with flame burns > 90% TBSA had a length of stay of 1.5 days per %TBSA burned. In non-survivors, the length of stay is approximately 2 weeks for %TBSA flame burns between 10 and 70%. Non-survivors with flame burns <10% had a length of stay of two weeks. Those dying with burns > 70% TBSA had an average length of stay of less than two weeks (Table 122).

Table 121

HOSPITAL DAYS: LIVED/DIED BY INHALATION INJURY

	Total		Lived		Dead	
Inhalation Injury	**Cases**	**Mean +/- SEM**	**Cases**	**Mean +/- SEM**	**Cases**	**Mean +/- SEM**
No	52,220	10.4+/-0.0	50,552	10.1+/-0.0	1,668	20.7+/-0.8
Yes	9,066	24.0+/-0.3	6,885	26.9+/-0.4	2,181	14.8+/-0.6
Subtotal	**61,286**		**57,437**		**3,849**	
Missing	5,930	13.2+/-0.3	5,519	13.2+/-0.3	411	13.8+/-1.4
TOTAL	**67,216**		**62,956**		**4,260**	

Total N=67,216

Table 122

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

	Total		Lived		Died	
% TBSA	Cases	Mean +/- SEM	Cases	Mean +/- SEM	Cases	Mean +/- SEM
0.1 - 9.9	35,907	6.1+/-0.0	35,568	6.0+/-0.0	339	15.1+/-1.2
10 - 19.9	12,402	14.2+/-0.1	11,929	13.9+/-0.1	473	21.6+/-1.2
20 - 29.9	4,660	24.8+/-0.3	4,179	25.4+/-0.3	481	20.1+/-1.1
30 - 39.9	2,378	35.8+/-0.6	1,927	39.2+/-0.7	451	21.2+/-1.3
40 - 49.9	1,437	44.5+/-1.0	1,042	52.8+/-1.1	395	22.7+/-2.1
50 - 59.9	897	48.4+/-1.5	536	67.7+/-1.7	361	19.8+/-2.1
60 - 69.9	665	52.6+/-2.1	351	81.3+/-2.7	314	20.7+/-2.2
70 - 79.9	424	43.1+/-2.8	161	91.9+/-4.6	263	13.0+/-1.8
80 - 89.9	412	31.2+/-2.7	92	103.0+/-7.4	320	10.6+/-1.3
> 90	457	16.6+/-2.4	34	147.3+/-20.3	423	6.4+/-1.1
Subtotal	**59,639**	**13.0+/-0.0**	**55,819**	**12.7+/-0.0**	**3,820**	**17.5+/-0.5**
Missing or 0%	7,577	8.2+/-0.2	7,137	7.9+/-0.2	440	12.7+/-1.4
TOTAL	**67,216**		**62,956**		**4,260**	

Total N=67,216

In Table 123, the mortality of flame burn patients are stratified by age greater and less than 60 years and by the presence of smoke inhalation. In patients with burns under 20 %TBSA, the presence of smoke inhalation has a four fold increase in mortality (Age < 60: 0.3% without smoke inhalation, 4.6% with smoke inhalation ; Age > 60: 5% without smoke inhalation, 20% with smoke inhalation). Also, age plays a significant factor with those over the age of 60 with a five-fold increase in mortality with and without smoke inhalation.

In patients with burn sizes between 20 and 40 %TBSA, smoke inhalation in the age < 60 years has a five fold increase in mortality (3 vs. 15%). In patients over the age of 60, flame burns are more lethal with an average mortality of 38%. If accompanied by smoke inhalation, the mortality in this age group is nearly double (59%).

Patients with flame burns covering 40 to 60 %TBSA have an even higher mortality. In those under the age of 60, the presence of smoke inhalation doubles the mortality (15 vs. 32%). In those over the age of 60, the prognosis is grave with mortality rates of 73% without smoke inhalation and 83% with smoke inhalation.

The presence of smoke inhalation injury has less effect on survival for large flame burns (> 60 %TBSA). In those under the age of 60, the mortality rate with and without smoke inhalation is 66% and 51%, respectively. Patients with flame burns > 60% in the age > 60 category are uniformly fatal despite the presence of inhalation injury (98% with smoke inhalation; 96% without smoke inhalation).

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	33,766	108	0.3
0.1-19.9	0-59.9	Yes	2,765	132	4.6
0.1-19.9	60 and Over	No	5,414	283	4.0
0.1-19.9	60 and Over	Yes	813	204	20.1
20-39.9	0-59.9	No	3,796	119	3.0
20-39.9	0-59.9	Yes	1,117	203	15.4
20-39.9	60 and Over	No	481	294	37.9
20-39.9	60 and Over	Yes	153	223	59.3
40-59.9	0-59.9	No	815	143	14.9
40-59.9	0-59.9	Yes	521	245	31.0
40-59.9	60 and Over	No	52	141	73.1
40-59.9	60 and Over	Yes	31	155	83.3
60 and Over	0-59.9	No	291	306	51.3
60 and Over	0-59.9	Yes	289	569	66.3
60 and Over	60 and Over	No	5	120	96.0
60 and Over	60 and Over	Yes	3	187	98.4
		TOTAL	**50,312**	**3,432**	**6.4**

Total N=53,744 (Excluding 13,472 Unknown/Missing)

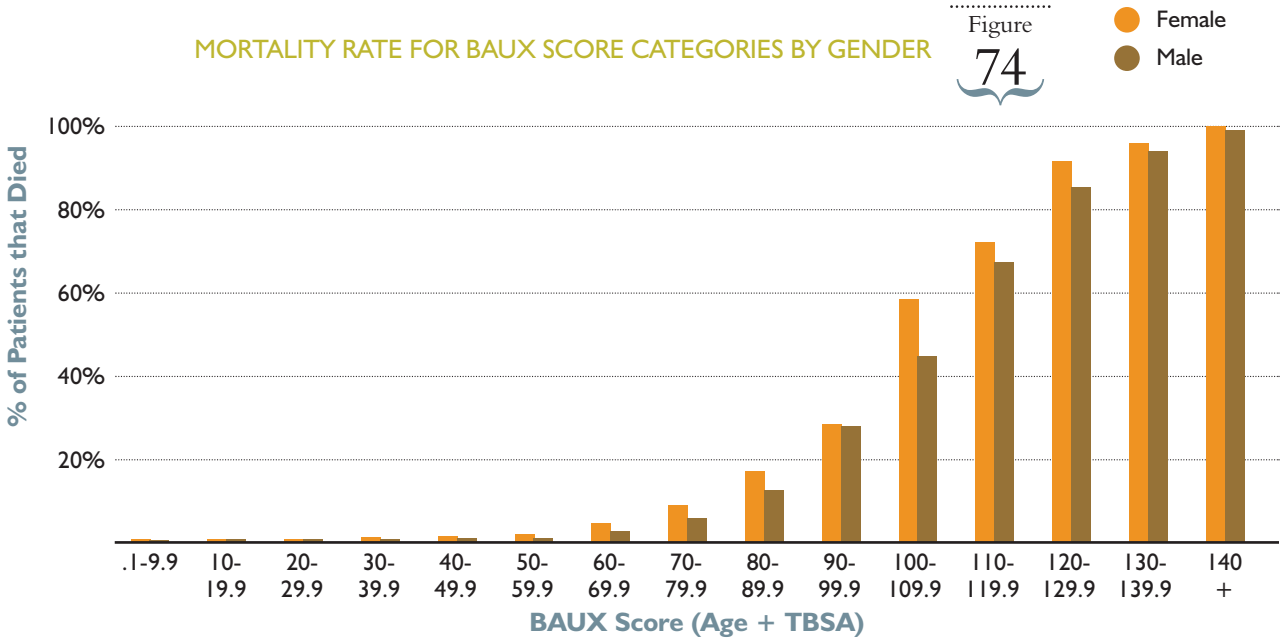
The BAUX score (Age + %TBSA burned) has been a standard to estimate the mortality of burn patients for decades. Figure 74 demonstrates that increasing BAUX score is associated with a higher mortality. The effect of gender is also depicted in this chart. Although there is no statistical analysis, in nearly every BAUX category, there is a higher mortality in women compared to men. Analyzing Table 124, there is a nearly two fold higher mortality for women with flame burns (9.4%) compared to men (5.4%). This difference is statistically significant (Chi-squared, $p < 0.0001$).

Traditionally, a BAUX score > 100 was associated with a mortality of > 50%. This holds true in this table, however, a BAUX score of 100 to 110 in women has a mortality rate of 58% vs. a mortality rate of 46% in men. This difference is also statistically different (Chi-squared, $p < 0.001$). The effect of gender on the mortality of flame burns would be an interesting research query.

Although it appears that men have a survival advantage, burn center admission for flame burns occur in men 77% of the time and women 23% of the time.

MORTALITY RATE FOR BAUX SCORE CATEGORIES BY GENDER

Figure 74



Total N=63,030 (Excluding 4,186 Unknown/Missing)

NUMBER OF CASES IN BAUX SCORE CATEGORIES BY GENDER

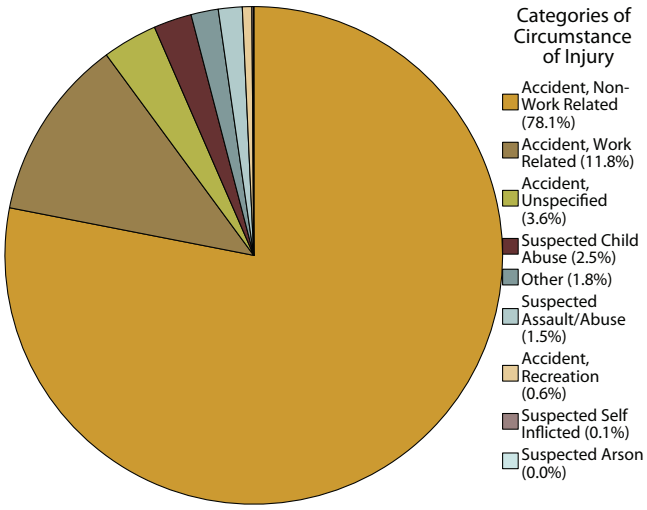
Table 124

	Female		Male	
BAUX Score (Age + TBSA)	**Lived**	**Died**	**Lived**	**Died**
0-9.9	1,009	8	1,830	17
10-19.9	1,025	7	3,920	15
20-29.9	1,429	14	7,006	23
30-39.9	1,557	26	6,852	34
40-49.9	1,850	35	7,155	66
50-59.9	2,101	53	6,904	91
60-69.9	1,618	84	5,124	160
70-79.9	1,204	122	3,353	211
80-89.9	880	187	2,017	288
90-99.9	459	182	915	358
100-109.9	147	205	386	311
110-119.9	54	136	154	316
120-129.9	11	116	43	246
130-139.9	4	82	13	206
140 and Over	0	131	3	277
Total	**13,348**	**1,388**	**45,675**	**2,619**

Total N=63,030 (Excluding 4,186 Unknown/Missing)

In Figure 75 and Table 125, the majority of scald burns occur as non-work related accidents (71%). The next most common etiology is work related accidents (11%). The location of these injuries, as expected, occurs at home (75%) and the workplace (6%). Approximately 2.2 % of scald admissions are suspect for child abuse and 1.4% is the result of an assault (Figure 76, Table 126).

Figure 75 CIRCUMSTANCE OF INJURY

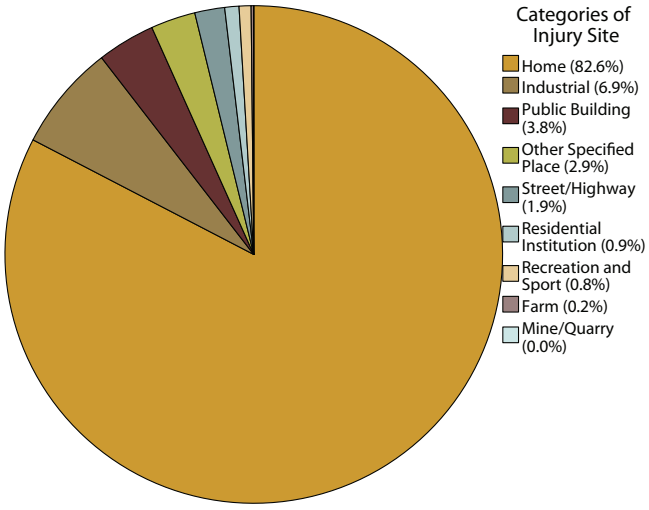


Total N=45,885 (Excluding 4,789 Unknown/Missing)

CIRCUMSTANCE OF INJURY Table 125

Circumstance of Injury	Cases
Accident, Non-Work Related	35,820
Accident, Work Related	5,437
Accident, Unspecified	1,630
Suspected Child Abuse	1,137
Other	813
Suspected Assault/Abuse	711
Accident, Recreation	282
Suspected Self Inflicted	52
Suspected Arson	3
Unknown	4,789
Total	**50,674**

Figure 76 PLACE OF OCCURRENCE - E849 CODE



Total N=45,710 (Excluding 4,964 Unknown/Missing)

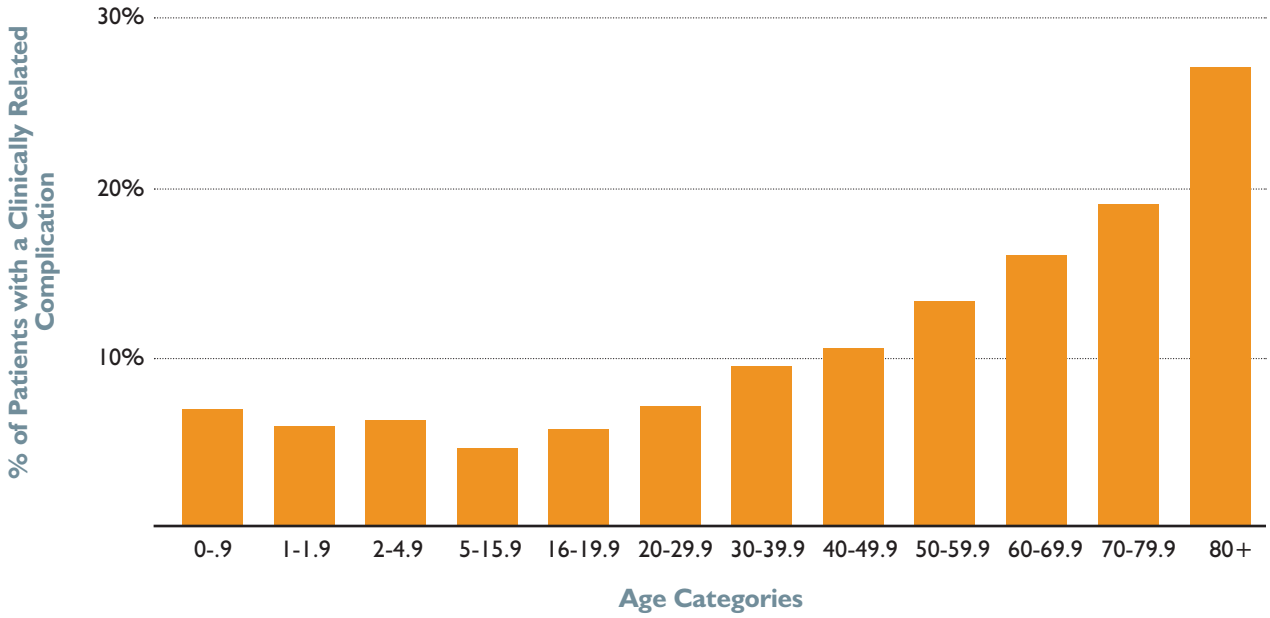
PLACE OF OCCURRENCE - E849 CODE Table 126

Place of Occurrence	Cases
Home	37,767
Industrial	3,154
Public Building	1,719
Other Specified Place	1,327
Street/Highway	890
Residential Institution	422
Recreation and Sport	354
Farm	73
Mine/Quarry	4
Unspecified	4,964
Total	**50,674**

The overall complication rate of admitted scald burns (8.7%) is less than half of patients admitted with flame burns (18.2%, Table 127 & 118). As with flame burns, the incidence of complications increases with age of the patient burned (Figure 77). For patients admitted with scald burns under 30 %TBSA, the complication rate is approximately 6 to 7%. In patients with scald burns between 30 and 80 %TBSA, the incidence of complications is between 10 and 20%. Patients with scalds over 80 %TBSA have a complication rate of 27% (Table 127). The complication rate of scald burns with greater than 80 %TBSA involvement mirrors that of flame burns (Table 118).

Figure 77

PERCENT OF PATIENT WITH CLINICALLY RELEVANT COMPLICATIONS BY AGE GROUP



Total N=48,324 (Excluding 2,350 cases from non TRACS users or missing/unknown age)

Table 127

COMPLICATION RATE BY AGE GROUP

	No Complication	Complication	
Age Category	**Cases**	**Cases**	**Complication Rate**
0-.9	2,856	217	7.1
1-1.9	8,072	528	6.1
2-4.9	5,428	371	6.4
5-15.9	4,764	234	4.7
16-19.9	1,818	116	5.0
20-29.9	5,510	431	7.3
30-39.9	4,439	476	9.7
40-49.9	4,627	551	10.6
50-59.9	3,276	509	13.4
60-69.9	1,691	324	16.1
70-79.9	918	216	19.0
80 and Over	684	255	27.2
Subtotal	**44,083**	**4,228**	**8.8**
Missing	544	46	7.8
Total	**44,627**	**4,274**	**8.7**

Total N=48,901 (Excluding 1,773 cases from non TRACS users)

The top complications of scald burn admissions are also infections. The most common infection is cellulitis occurring at a reported incidence of 3% and making up 18% of all scald complications. The next most common infection is urinary tract infections occurring at a rate of 1.8%. Septicemia is a rare complication, occurring at a rate of 0.5%.

The most common surgical procedure performed on patients with scald injuries is still excision and skin grafting reported in 20% and 14% of cases, respectively. This number is similar to the incidence of grafting in flame burns (18%, 13%, Table 120). This is not surprising, since these are scalds requiring admission to a burn center. Non-excisional debridement of burn injuries and application of dressings is the third most common procedure performed on these patients, reported approximately 10% of the time. The use of homograft in scald burns is reported at a rate of 6% (Table 129), which is similar to the utilization in flame burn patients (6.1%, Table 120). The use of heterografts is reported in 4.1% of procedures and dermal regenerative templates are reported in 3.4% of procedures on scald burn patients. This is higher than that of flame burn patients (3.2% heterografts; 2.3% dermal templates, Table 120). Also, the use of skin grafts to the hand also is reported at a rate of approximately 2%, which is similar to flame burn patients with a procedural rate of 2.2% (Table 120).

Table 128 TOP TEN COMPLICATIONS

Top Ten Complications	Count	% of All Complications	% of Patients with Complication
Cellulitis	1514	18.5	3.1
Urinary Tract Infection	883	10.8	1.8
Wound Infection	570	6.0	1.2
Pneumonia	541	6.6	1.1
Respiratory Failure	316	3.9	0.6
Septicemia	258	3.1	0.5
Other blood/systemic infection	221	2.7	0.5
Renal Failure	215	2.6	0.4
Arrythmia	203	2.5	0.4
Surgical site infection, deep	160	1.0	0.3
Total Complications	**8,200**		

Total N=48,901 (Excluding 1,773 cases from non TRACS users)

Table 129 TOP TEN PROCEDURES

Top Ten Procedures Codes	Count	% of All Procedures
86.22 Excisional debridement of wound, infection, or burn	22,072	20.6
86.69 Other skin graft to other sites	14,700	13.7
86.28 Nonexcisional debridement of wound, infection or burn	12,609	11.7
93.57 Application of other wound dressing	10,314	9.6
86.66 Homograft to skin	6,322	5.9
86.65 Heterograft to skin	4,370	4.1
86.67 Dermal regenerative graft	3,632	3.4
38.93 Venous catheterization, not elsewhere classified	3,467	3.2
86.62 Other skin graft to hand	2,251	2.1
86.6 Free skin graft	1,805	1.7

Total N=50,674

The overall mortality of scald burn patients admitted to participating burn centers is 0.7%. This is significantly less with flame burns with (24%) and without (3%) smoke inhalation injury (Table 130 & 121). As with flame burns, as burns size increases the hospital length of stay also increases. In patients that are survivors, the "rule of thumb" of hospital stay equal to the %TBSA burned does not apply for burn sizes > 10 %TBSA. For patients with scalds covering between 10 to 30 %TBSA, the length of stay is 0.6 days per %TBSA. For patients with scalds between 30 and 70 %TBSA, the length of stay is approximately 0.8 to 0.9 days per %TBSA. There are too few patients with burn sizes greater than 70 %TBSA to draw any conclusions.

Non-survivors of scald injuries involving < 10 %TBSA have a length of stay of one month. The non-survivors of scald injuries between 10 and 30 %TBSA survive approximately 3 weeks prior to succumbing to their injury. The length of stay for non-survivors of scald burns under from 30 to 60% TBSA is approximately two weeks. Interestingly, the length of hospital stay for non-survivors of scald burns from 30 to 60 %TBSA is shorter than than the same size burn in patients with flame burns. This difference is a curious finding that begs for further analysis.

Table 130

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

	Total		Lived		Dead	
% TBSA	**Cases**	**Mean +/- SEM**	**Cases**	**Mean +/- SEM**	**Cases**	**Mean +/- SEM**
0.1 - 9.9	36,519	5.1+/-0.1	36,447	5.0+/-0.1	72	32.0+/-5.1
10 - 19.9	7,424	9.8+/-0.1	7,334	9.6+/-0.1	90	22.1+/-2.3
20 - 29.9	1,575	17.0+/-0.3	1,517	16.8+/-0.3	58	20.7+/-2.9
30 - 39.9	486	27.2+/-1.0	440	28.7+/-1.0	46	13.3+/-2.7
40 - 49.9	176	34.1+/-2.2	147	37.8+/-2.4	29	15.8+/-3.4
50 - 59.9	72	41.1+/-3.8	56	48.3+/-4.3	16	16.0+/-4.6
60 - 69.9	40	50.2+/-8.3	33	59.2+/-9.3	7	7.5+/-3.7
70 - 79.9	17	51.1+/-17.8	9	89.4+/-28.3	8	8.0+/-2.8
80 - 89.9	15	28.0+/-12.3	5	29.6+/-9.4	10	27.2+/-18.3
≥ 90	17	15.0+/-6.7	5	44.6+/-17.3	12	2.6+/-0.8
Subtotal	**46,341**	**6.7+/-0.0**	**45,993**	**6.6+/-0.0**	**348**	**20.8+/-1.5**
Missing or 0%	4,333	4.7+/-0.1	4,311	4.6+/-0.1	22	18.2+/-4.2
TOTAL	**50,674**		**50,304**		**370**	

Total N=50,674

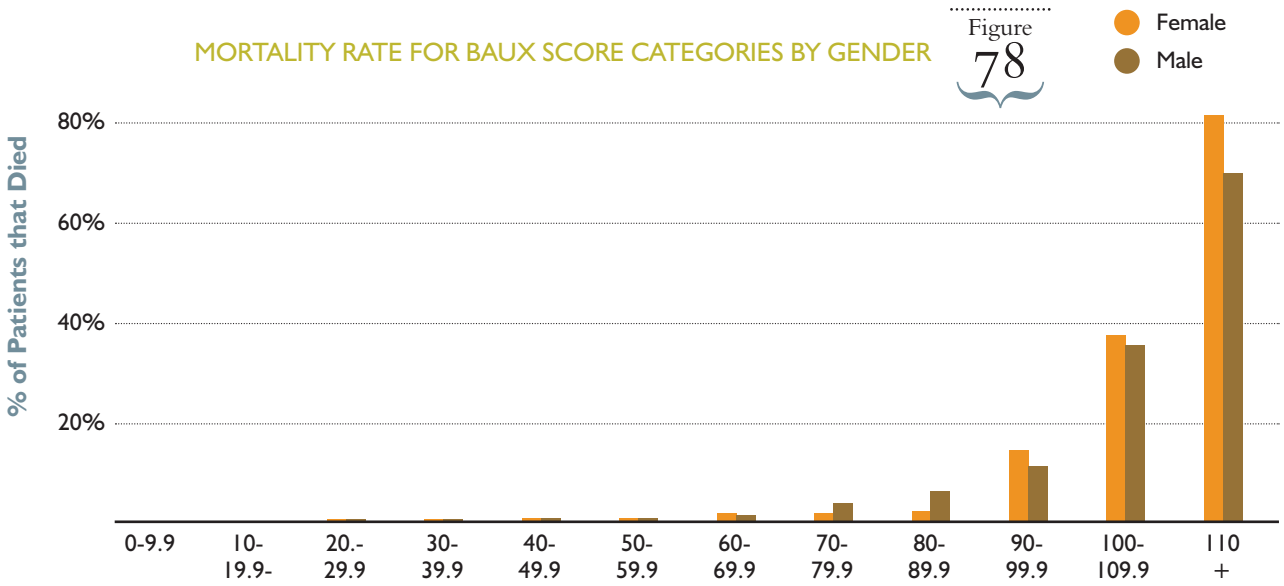
In Figure 78, as with flame burns admissions, a higher BAUX score is associated with a higher mortality. Again, there appears to be a higher mortality in women with BAUX scores > 100 that were admitted with scalds.

Scald injuries are much less lethal than flame burns. The overall mortality is 0.73%. When stratified by gender, again, there is a survival advantage of men over women. The mortality for woman admitted with scald burns is 0.85% whereas the observed mortality in men admitted with scalds is 0.64%. This difference is statistically significant (Chi-squared, p=0.008). In scald injuries, a BAUX score of 100 to 110 is associated with a mortality rate of approximately 36% in both men and women (35.1% men vs. 36.8% women). This difference is not statistically significant.

Interestingly, the gender ratio of scald burn admissions is different than flame burn admissions. The percentage of men admitted with scald burns is 58%, while the percentage of women is 42%. This ratio is nearly one to one, where as it is approximately three to one (male to female) for flame burns.

MORTALITY RATE FOR BAUX SCORE CATEGORIES BY GENDER

Figure 78



Total N=48,347 (Excluding 2,327 Unknown/Missing)

NUMBER OF CASES IN BAUX SCORE CATEGORIES BY GENDER

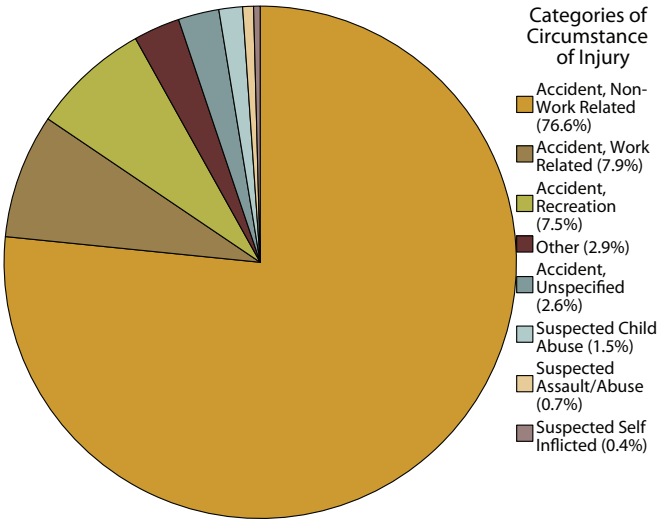
Table 131

	Female		Male	
BAUX Score (Age + TBSA)	**Lived**	**Died**	**Lived**	**Died**
0-9.9	5,612	1	7,517	2
10-19.9	3,767	3	4,488	4
20-29.9	2,411	1	3,717	3
30-39.9	2,067	5	3,197	4
40-49.9	1,978	9	3,105	10
50-59.9	1,726	4	2,586	11
60-69.9	1,162	13	1,544	15
70-79.9	769	13	832	27
80-89.9	527	9	424	26
90-99.9	275	43	169	20
100-109.9	60	35	37	20
110- and Over	9	38	16	36
Total	**20,363**	**174**	**27,632**	**178**

Total N=48,347 (Excluding 2,327 Unknown/Missing)

Contact burns from touching a hot object are extremely common, but only make up 10% of all the data in the registry for this decade of reporting burn centers. Again, this injury is typically managed as an outpatient, so the reader is reminded to keep that fact in mind when interpreting the demographics of this patient population. These types of burns, as with flame and scald burns, are frequently non-work related accidents (69%). The next most common circumstances of contact burns are work related accidents and accidents involving recreational activities, each approximately 7% (Figure 79, Table 132). The majority of these injuries occur at home (65%, Figure 80, Table 133) with the second most common frequency associated with sports and recreation (7%). Contact burns can be commonly associated with motor vehicle and motor cycle accidents (5.6%) or occur in the workplace (5.0%).

Figure 79 CIRCUMSTANCE OF INJURY

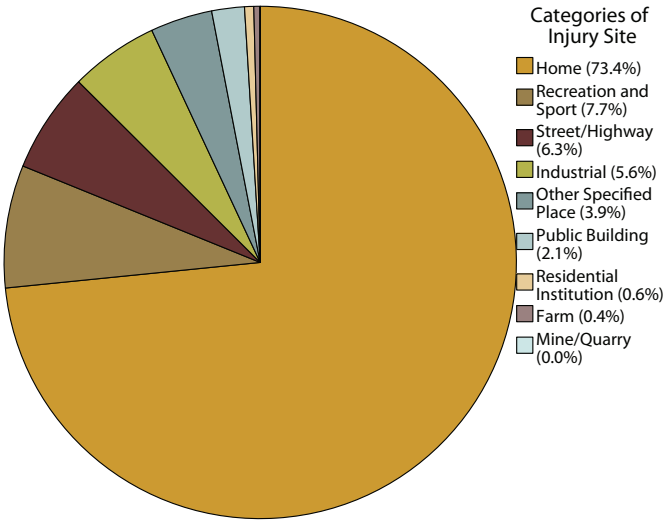


Total N=12,281 (Excluding 1,275 Unknown/Missing)

CIRCUMSTANCE OF INJURY Table 132

Circumstance of Injury	Cases
Accident, Non-Work Related	9,407
Accident, Work Related	965
Accident, Recreation	915
Other	360
Accident, Unspecified	316
Suspected Child Abuse	183
Suspected Assault/Abuse	84
Suspected Self Inflicted	51
Unknown	1,275
Total	**13,556**

Figure 80 PLACE OF OCCURRENCE - E849 CODE



Total N=12,041 (Excluding 1,515 Unknown/Missing)

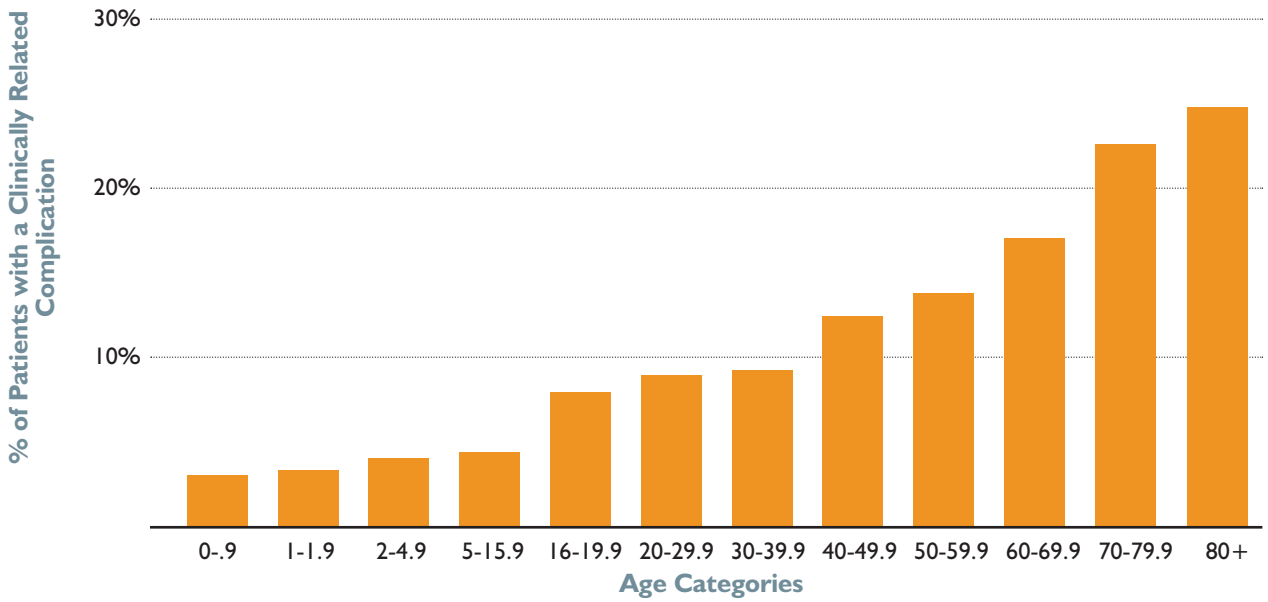
PLACE OF OCCURRENCE - E849 CODE Table 133

Place of Occurrence	Cases
Home	8,839
Recreation and Sport	932
Street/Highway	760
Industrial	673
Other Specified Place	471
Public Building	248
Residential Institution	70
Farm	47
Mine/Quarry	1
Unspecified	1,515
Total	**13,556**

As with both flame and scald injuries, the risk of complications increase as the patient gets older. The overall incidence of complications in contact burn admissions is 7.8%. This is similar to the rate observed in scald burns (8.8%, Table 127). The incidence of complications is 3 to 4% in patients under the age of 16. From age 16 to 40, the incidence of complications increases to 8 to 9%. The complication rate continues to increase exponentially from a rate of 12.5% for contact burns in the 40 to 49 year old group up to a rate of 25% in patients over 80 years of age (Table 134). This progression is very similar to that observed in patients with scald burns (Table 127).

Figure 81

PERCENT OF PATIENT WITH CLINICALLY RELEVANT COMPLICATIONS BY AGE GROUP



Total N=12,730 (Excluding 826 cases from non TRACS users or missing/unknown age)

Table 134

COMPLICATION RATE BY AGE GROUP

	No Complication	Complication	
Age Category	**Cases**	**Cases**	**Complication Rate**
0-.9	1,198	38	3.1
1-1.9	2,639	91	3.3
2-4.9	1,621	68	4.0
5-15.9	1,170	54	4.4
16-19.9	398	34	7.9
20-29.9	1,052	104	8.0
30-39.9	904	93	9.3
40-49.9	1,029	147	12.5
50-59.9	822	132	13.8
60-69.9	431	89	17.1
70-79.9	233	68	22.6
80 and Over	234	77	24.8
Subtotal	**11,731**	**995**	**7.8**
Missing	102	11	9.7
Total	**11,833**	**1,006**	**7.8**

Total N=12,839 (Excluding 717 cases from non TRACS users)

The complications reported with contact burns are very similar to those of scald burns. The most frequent complication is cellulitis with a reported incidence of 2.8% of admitted contact burns and represents 27% of all complications. The next most common infection is a urinary tract infection with a reported incidence of 1.3% of contact burn patients. As with scalds, sepsis is a rare complication occurring 0.4% of the time.

The most commonly reported procedure for contact burns, as with both flame burns and scalds, is excision and grafting (21%, 13% respectively). Again, as in the previous two sections, homograft has a reported use of 6%, heterograft use of 2.3% and dermal templates have a procedural incidence of 3.1%. Skin grafts to the hand are, expectedly, more common occurring at a rate of 3.8%. Of note, full thickness skin grafts make up approximately one-third of hand grafts reported.

Table 135 TOP TEN COMPLICATIONS

Top Ten Complications	Count	% of All Complications	% of Patients with Complication
Cellulitis	355	27.4	2.8
Urinary Tract Infection	170	13.1	1.3
Wound Infection	143	11.1	1.1
Pneumonia	119	9.2	0.9
Respiratory Failure	80	6.2	0.6
Renal Failure	55	4.3	0.4
Septicemia	54	4.2	0.4
Arrythmia	50	3.9	0.4
Other blood/systemic infection	49	3.8	0.4
Surgical site infection, deep	49	3.8	0.4
Total Complications	**1,294**		

Total N=12,839 (Excluding 717 cases from non TRACS users)

Table 136 TOP TEN PROCEDURES

Top Ten Procedures Codes	Count	% of All Procedures
86.22 Excisional debridement of wound, infection, or burn	6,495	21.2
86.69 Other skin graft to other sites	4,093	13.4
93.57 Application of other wound dressing	2,865	9.4
86.28 Nonexcisional debridement of wound, infection or burn	2,794	9.1
86.66 Homograft to skin	1,828	5.0
86.67 Dermal regenerative graft	961	3.1
38.93 Venous catheterization, not elsewhere classified	779	2.5
86.65 Heterograft to skin	710	2.3
86.62 Other skin graft to hand	707	2.3
86.61 Full-thickness skin graft to hand	467	1.5

Total N=13,556

Although there are many similarities in the demographics of scald and contact burns, contact burns are significantly smaller in size. The most frequent size reported is < 10%, compromising 96% of all contact burns. This is also the most common size category of scald burns, but only 78% of the reported scald burns fall into the 0 to 10 %TBSA category. As with scalds, the mortality rate of contact burns is extremely small, reported at 0.5%.

The estimated length of stay of contact burn survivors based on burn size approximates one day for each %TBSA burned for burn sizes up to 40%. There are too few numbers to draw meaningful conclusions for contact burns grater than 40 %TBSA. Non-survivors with contact burns measuring < 10% spend approximately three weeks in the hospital. This is one week shorter than the scald burn non-survivors and one week longer than the flame injury non-survivors. This difference in length of stay for non survivors of flame, scald and contact burns with burn sizes less than 10 %TBSA is an interesting observation and deserves further investigation. Non-survivors of contact burns with a 10 to 40 %TBSA involvement survive an average of one to two weeks. This is less than either flame or scald burn non-survivors.

Table 137

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

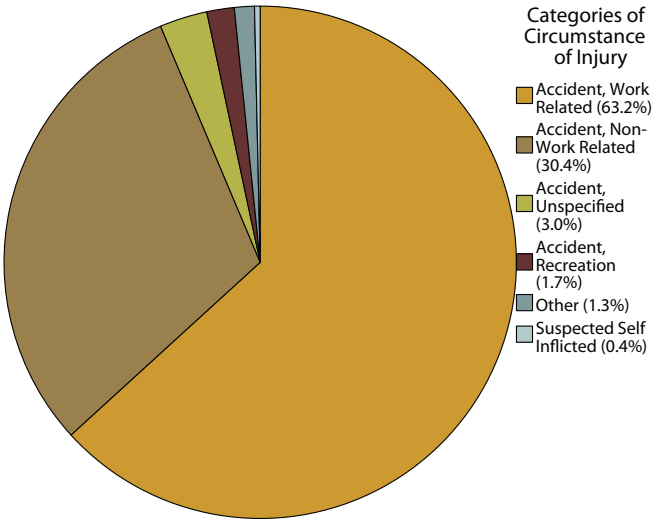
	Total		Lived		Dead	
% TBSA	**Cases**	**Mean +/- SEM**	**Cases**	**Mean +/- SEM**	**Cases**	**Mean +/- SEM**
0.1 - 9.9	11,688	5.5+/-0.1	11,625	5.4+/-0.1	63	23.1+/-3.8
10 - 19.9	457	17.1+/-0.7	434	17.3+/-0.8	23	13.7+/-4.1
20 - 29.9	59	22.9+/-3.0	50	25.5+/-3.3	9	8.7+/-4.5
30 - 39.9	19	28.9+/-5.4	14	34.3+/-6.2	5	13.8+/-8.4
40 - 49.9	2	35.5+/-15.5	2	35.5+/-15.5	0	.
50 - 59.9	2	79.0+/-3.0	1	76	1	82
60 - 69.9	0	.	0	.	0	.
70 - 79.9	3	67.0+/-4.0	3	67.0+/-4.0	0	.
80 - 89.9	0	.	0	.	0	.
≥ 90	0	.	0	.	0	.
Subtotal	**12,230**	**6.1+/-0.1**	**12,129**	**6.0+/-0.1**	**101**	**19.8+/-2.7**
Missing or 0%	1,326	5.1+/-0.2	1,319	5.0+/-0.2	7	12.1+/-4.4
TOTAL	**13,556**		**13,448**		**108**	

Total N=13,556

The low voltage contact burn will obviously behave much more differently than an electrical flash or electrical conduction burn. These injuries, unlike flame burns, scalds and contact burns, occur as accidents in the work place 56% of the time with only 27% of these accidents occurring at home (Figure 82, Table 138). The majority of these burns occur in industry (35%) with the second most common place of occurrence being the home (23%) depicted in Figure 83 and Table 139.

Figure 82

CIRCUMSTANCE OF INJURY



Total N=5,319 (Excluding 680 Unknown/Missing)

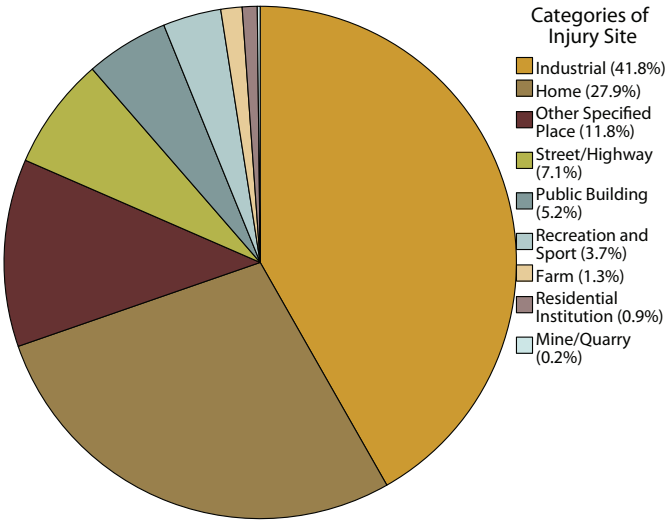
Table 138

CIRCUMSTANCE OF INJURY

Circumstance of Injury	Cases
Accident, Work Related	3,363
Accident, Non-Work Related	1,618
Accident, Unspecified	160
Accident, Recreation	92
Other	67
Suspected Self Inflicted	19
Suspected Child Abuse	0
Unknown	680
Total	**5,999**

Figure 83

PLACE OF OCCURRENCE - E849 CODE



Total N=4,982 (Excluding 1,017 Unknown/Missing)

Table 139

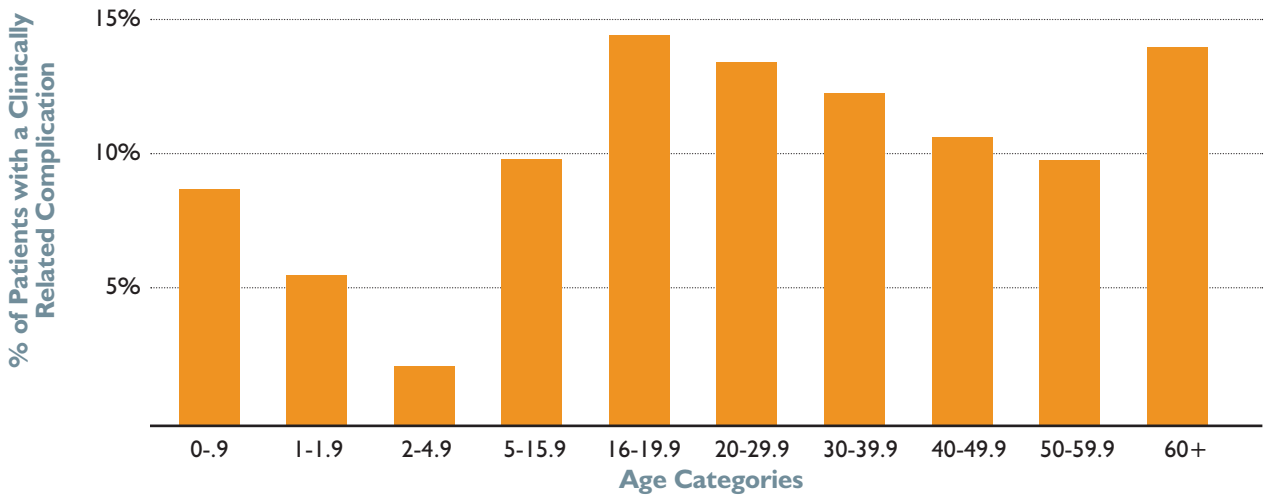
PLACE OF OCCURRENCE - E849 CODE

Place of Occurrence	Cases
Industrial	2,081
Home	1,391
Other Specified Place	590
Street/Highway	353
Public Building	261
Recreation and Sport	183
Farm	67
Residential Institution	47
Mine/Quarry	9
Unspecified	1,017
Total	**5,999**

Unlike the other three previously reviewed burn etiologies, flames, scalds and contact burns (Figures 73, 77 & 81), there is no correlation between age and risk of complication (Figure 84). The overall complication rate (11.2%) is higher in electrical burns than either scalds (8.8%, Table 127) and contact burns (7.8, Table 134), but less than flame burns (18.2%, Table 118). The complication rate in patients over the age of 60 is approximately 14%. The lowest rates of complications are in the 0 to 1 year olds (8.7%), 1 to 2 year olds (5.5%) and 2 to 5 year olds (2.1%). It is possible that the complications are lower in these children since they most likely represent electrical contact burns and not electrical conduction burns. The electrical burn admissions in the 16 to 60 year olds are more likely to have electrical conduction injuries since this age compromises the demographic of the work force. Still, there is likely a great deal of variability because electrical shocks, electrical contacts and electrical conduction injuries are pooled in this section.

Figure 84

PERCENT OF PATIENT WITH CLINICALLY RELEVANT COMPLICATIONS BY AGE GROUP



Total N=5,644 (Excluding 355 cases from non TRACS users or missing/unknown age)

Table 140

COMPLICATION RATE BY AGE GROUP

	No Complication	Complication	
Age Category	**Cases**	**Cases**	**Complication Rate**
0-.9	21	2	8.7
1-1.9	86	5	5.5
2-4.9	231	5	2.1
5-15.9	332	36	9.8
16-19.9	160	27	14.4
20-29.9	1,030	159	13.4
30-39.9	1,105	155	12.3
40-49.9	1,155	138	10.7
50-59.9	671	73	9.8
60 and Over	217	35	13.9
Subtotal	**5,008**	**635**	**11.3**
Missing	63	5	7.4
Total	**5,071**	**640**	**11.2**

Total N=5,711 (Excluding 288 cases from non TRACS users)

The most common complication reported in patients with electrical injuries is pneumonia (2.6%). This is followed by a wound infection (2.1%)and cellulitis (1.9%). Septicemia is less common in this burn etiology subset (1.7%) than in flame burns (3.3%, Table 119), but more common than scald burns (0.5%, Table 128) and contact burns (0.4%, Table 135). Renal failure remains a low complication in electrical burns (1%) but again, this may be due to the fact that the types of electrical injuries are combined in this analysis.

As with all previous burn etiologies, excision and skin grafting remain the most commonly performed surgical procedure with admitted electrical burns encompassing 17% of all procedures. The use of homograft is also similar and reported in 6% of procedures. The reported procedural incidence of heterografts is 2.3% and dermal templates is 2.0%. Skin grafts to the hand represent 2.1% of procedures.

Table 141 TOP TEN COMPLICATIONS

Top Ten Complications	Count	% of All Complications	% of Patients with Complication
Pneumonia	147	11.1	2.6
Wound Infection	116	8.8	2.1
Cellulitis	110	8.3	1.9
Septicemia	97	7.3	1.7
Respiratory Failure	82	6.2	1.5
Arrythmia	62	4.7	1.1
Urinary Tract Infection	58	4.4	1.0
Renal Failure	56	4.2	0.0
ARDS	41	3.1	0.7
Other musculoskeletal	38	2.9	0.7
Total Complications	**1,324**		

Total N=5,711 (Excluding 288 cases from non TRACS users)

Table 142 TOP TEN PROCEDURES

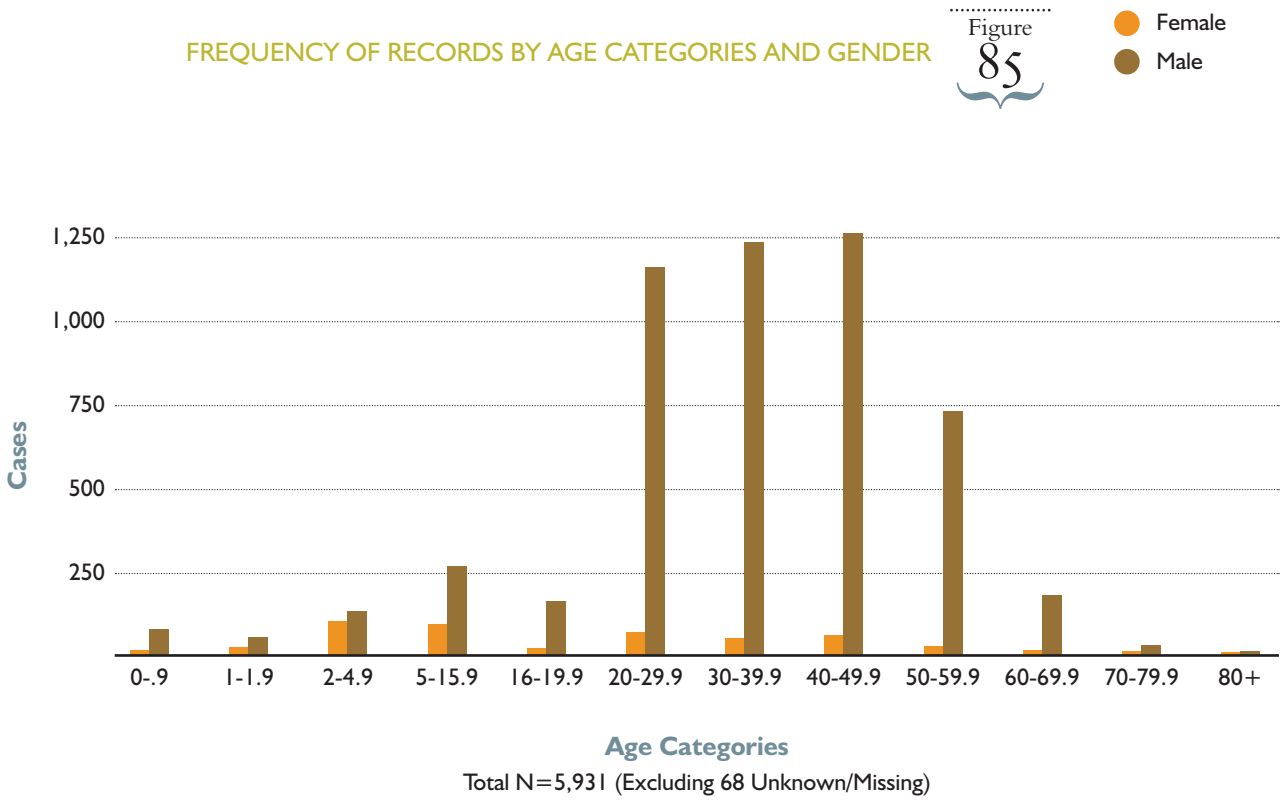
Top Ten Procedures Codes	Count	% of All Procedures
86.22 Excisional debridement of wound, infection, or burn	3,532	17.0
86.69 Other skin graft to other sites	2,047	9.9
86.66 Homograft to skin	1,246	6.0
86.28 Nonexcisional debridement of wound, infection or burn	1,198	5.8
93.57 Application of other wound dressing	913	4.4
38.93 Venous catheterization, not elsewhere classified	770	3.7
86.65 Heterograft to skin	482	2.3
86.62 Other skin graft to hand	435	2.1
86.67 Dermal regenerative graft	412	1.0
99.04 - Transfusion of packed cells	377	1.8

Total N=5,999

Figure 85 is a graphical representation of the distribution of gender for each age category from electrical injuries in this data set. It's clear that this injury is seen nearly exclusively in men in all age groups. The most common age represented is from the ages 20 and 60. Again, this represents the work force demographic that will likely sustain and electrical injury.

FREQUENCY OF RECORDS BY AGE CATEGORIES AND GENDER

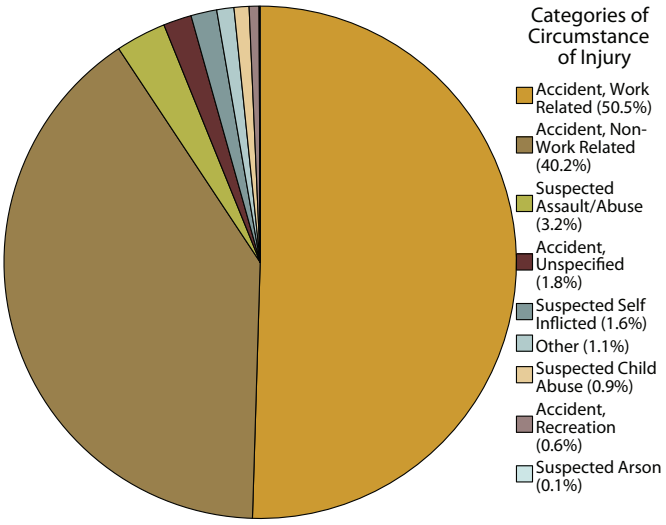
Figure 85



Total N=5,931 (Excluding 68 Unknown/Missing)

The chemical burn etiology section debuted in last years National Burn Repository Annual Report. The demographics of these patients mirror those of electrical burns. This category also consists of pooled data of varying types of chemical agents. The caustic injuries of acids are combined with the liquefaction destruction of alkali burns as well as other different types of chemical irritants. Again, the reader is reminded of this fact when reviewing this data. This important injury represents 3.5% of the data set. Like electrical injuries, chemical burns most commonly as a work related accident in 44% and non-work related accident in 35% of the data population (Figure 86, Table 143). Chemical burns occur more commonly in industry (34%) with the second most common place of occurrence being the home (3.2%) depicted in Figure 87 and Table 144.

Figure 86 CIRCUMSTANCE OF INJURY

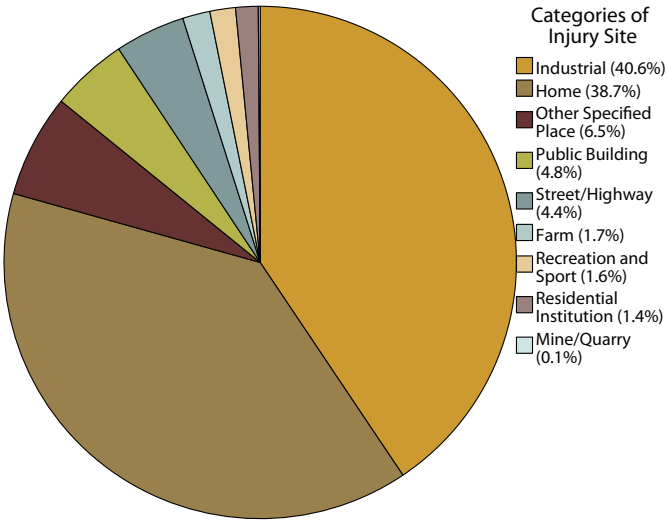


Total N=4,338 (Excluding 638 Unknown/Missing)

Table 143 CIRCUMSTANCE OF INJURY

Circumstance of Injury	Cases
Accident, Work Related	2,190
Accident, Non-Work Related	1,744
Suspected Assault/Abuse	138
Accident, Unspecified	77
Suspected Self Inflicted	71
Other	47
Suspected Child Abuse	41
Accident, Recreation	27
Suspected Arson	3
Unknown	638
Total	**4,976**

Figure 87 PLACE OF OCCURRENCE - E849 CODE



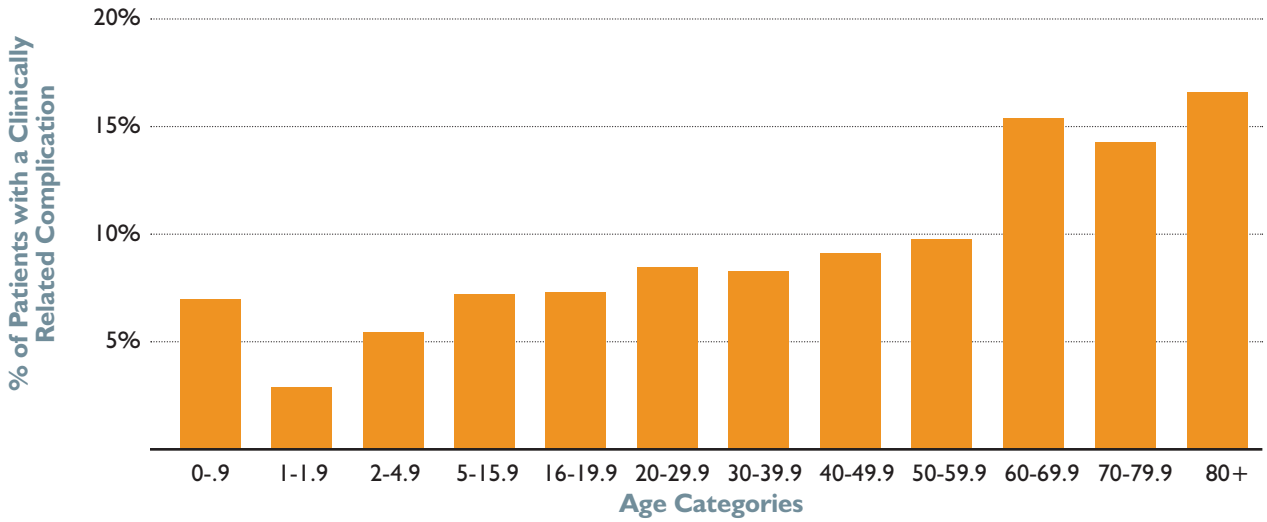
Total N=4,153 (Excluding 823 Unknown/Missing)

Table 144 PLACE OF OCCURRENCE - E849 CODE

Place of Occurrence	Cases
Industrial	1,686
Home	1,609
Other Specified Place	270
Public Building	201
Street/Highway	184
Farm	72
Recreation and Sport	67
Residential Institution	59
Mine/Quarry	5
Unspecified	823
Total	**4,976**

As depicted in Figure 88, there is a predictable increase in the rate of reported complications in chemical burns with increasing age. The complication rate in patients under the age of 20 is approximately 5 to 7%; between the age of 20 and 60, the complication rate varies from 8 to 10%. Above the age of 60, the complication rate reported is 14 to 16%. Even though the chemical burn category pools different types of chemical injuries, the population must be more homogeneous than the electrical burn category. Perhaps because the anatomic distribution, burn depth and medical care required for different chemical injuries is relatively consistent.

Figure 88 PERCENT OF PATIENT WITH CLINICALLY RELEVANT COMPLICATIONS BY AGE GROUP



Total N=4,681 (Excluding 295 cases from non TRACS users or missing/unknown age)

Table 145 COMPLICATION RATE BY AGE GROUP

	No Complication	Complication	
Age Category	**Cases**	**Cases**	**Complication Rate**
0-.9	40	3	6.0
1-1.9	135	4	2.9
2-4.9	104	6	5.5
5-15.9	154	12	7.2
16-19.9	190	15	7.3
20-29.9	788	73	8.5
30-39.9	927	84	8.3
40-49.9	1,004	101	9.1
50-59.9	590	64	9.8
60-69.9	221	40	15.3
70-79.9	66	11	14.3
80 and over	40	8	16.7
Subtotal	**4,259**	**421**	**9.0**
Missing	112	5	4.3
Total	**4,371**	**426**	**8.9**

Total N=4,797 (Excluding 179 cases from non TRACS users)

The most common complication reported in patients with chemical burns is cellulitis at a rate of approximately 3%. This rate of cellulitis is similar to those injuries seen with scalds (3.1%, Table 128). Pneumonia and wound infection are the next two most common infectious complications with a rate of 1.4% and 1.2% respectively. Sepsis is rare with this injury etiology being reported at only 0.9%.

As with all the other burn etiologies, the most common reported procedure is excision and skin grafting (19%, 13.2%, Table 147). The use of homograft is slightly less than all the other previous etiologies at a procedural rate of 5.3%. The use of both dermal templates and heterograft is used at a similar rate in chemical burns as well (3.0% heterograft, 2.5% dermal templates). Interestingly, skin grafts to the hand were not reported in the top ten procedure list as in the previous categories. Of note, fiber-optic bronchoscopy is reported in the top ten procedures. This was not in the top 10 procedures in the flame burn category despite the high incidence of smoke inhalation injury of 17% (Table 120). Perhaps the use of flexible bronchoscopy for smoke inhalation may be decreasing. This is also an area that is worthy of further investigation.

Table 146 TOP TEN COMPLICATIONS

Top Ten Complications	Count	% of All Complications	% of Patients with Complication
Cellulitis	137	22.9	2.9
Pneumonia	69	11.5	1.4
Wound Infection	59	9.9	1.2
Respiratory Failure	50	8.4	1.0
Urinary Tract Infection	49	8.2	1.0
Septicemia	44	7.4	0.9
Renal Failure	25	4.2	0.5
Other blood/systemic infection	24	4.0	0.5
Arrythmia	23	3.8	0.5
ARDS	18	3.0	0.4
Total Complications	**598**		

Total N=4,797 (Excluding 179 cases from non TRACS users)

Table 147 TOP TEN PROCEDURES

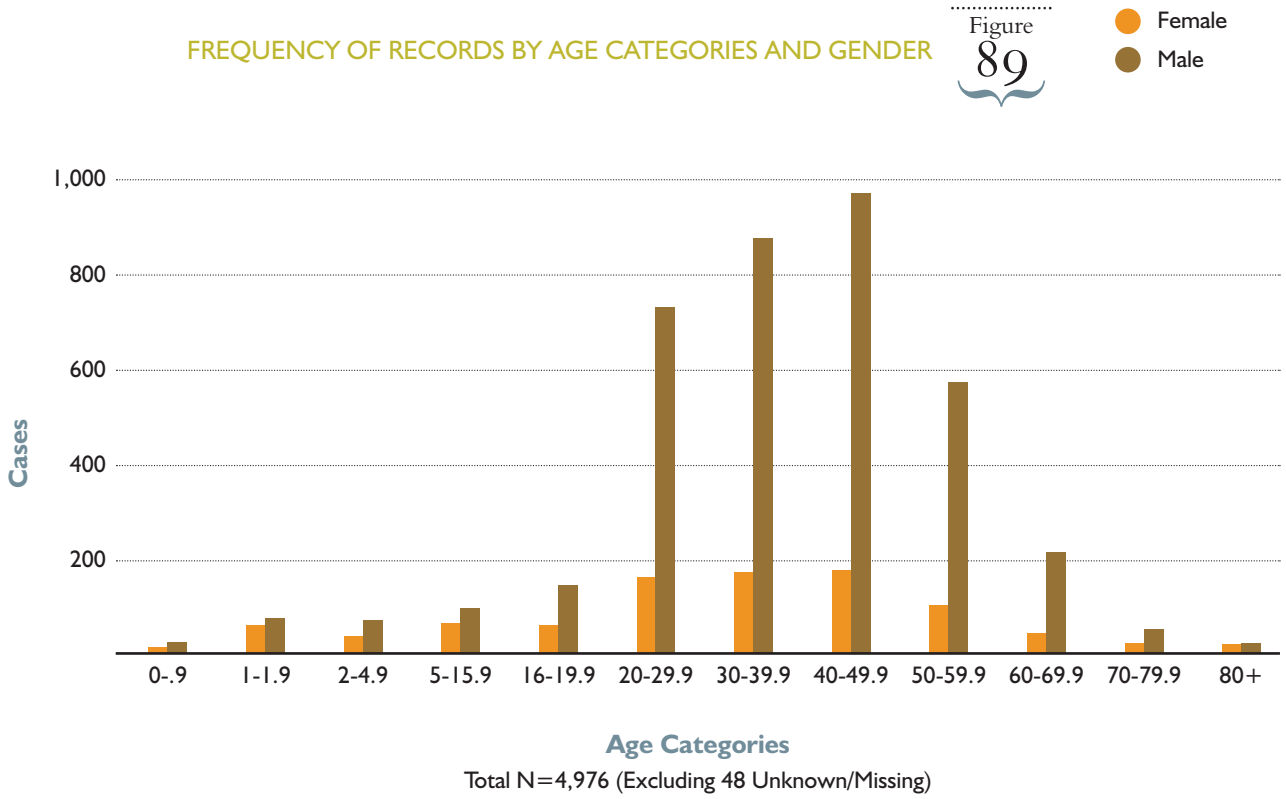
Top Ten Procedures Codes	Count	% of All Procedures
86.22 Excisional debridement of wound, infection, or burn	2,171	18.0
86.69 Other skin graft to other sites	1,512	13.2
86.28 Nonexcisional debridement of wound, infection or burn	943	8.2
93.57 Application of other wound dressing	848	7.4
86.66 Homograft to skin	601	5.3
38.93 Venous catheterization, not elsewhere classified	395	3.5
86.65 Heterograft to skin	347	3.0
86.67 Dermal regenerative graft	291	2.5
38.91 Arterial catheterization	202	1.8
33.22 - Fiber-optic bronchoscopy	192	1.7

Total N=4,976

In this gender stratified histogram, depicted in Figure 89, chemical burns occur predominantly in men. The peak frequency is between the ages of 20 and 60. This also parallels what is observed in patients with electrical burns. It is also the age demographic of the work force population. In children under the age of 16 and adults greater than 70, the male to female ratio of chemical injuries is approximately 1:1.

FREQUENCY OF RECORDS BY AGE CATEGORIES AND GENDER

Figure 89



Total N=4,976 (Excluding 48 Unknown/Missing)

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5

Hospital Comparisons

The analyses on the next three 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 categories based on the annual volume of submitted cases in 2008-2011. Low volume centers reported an average of less than 100 initial admissions per year (n=16); 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=24). Eighty-eight hospitals are represented, an increase of eleven from last year's report. All data is 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 has 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 points out 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, reliable and useful information in the future.

Figure 90 compares the raw mortality rates for fire/flame cases admitted from 2008-2011. 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 provides 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 significant variability between hospitals and suggests an overall lower mortality in hospitals with higher volume of admissions.

Figure 90

2008-2011 FIRE/FLAME INJURIES -- MORTALITY RATE

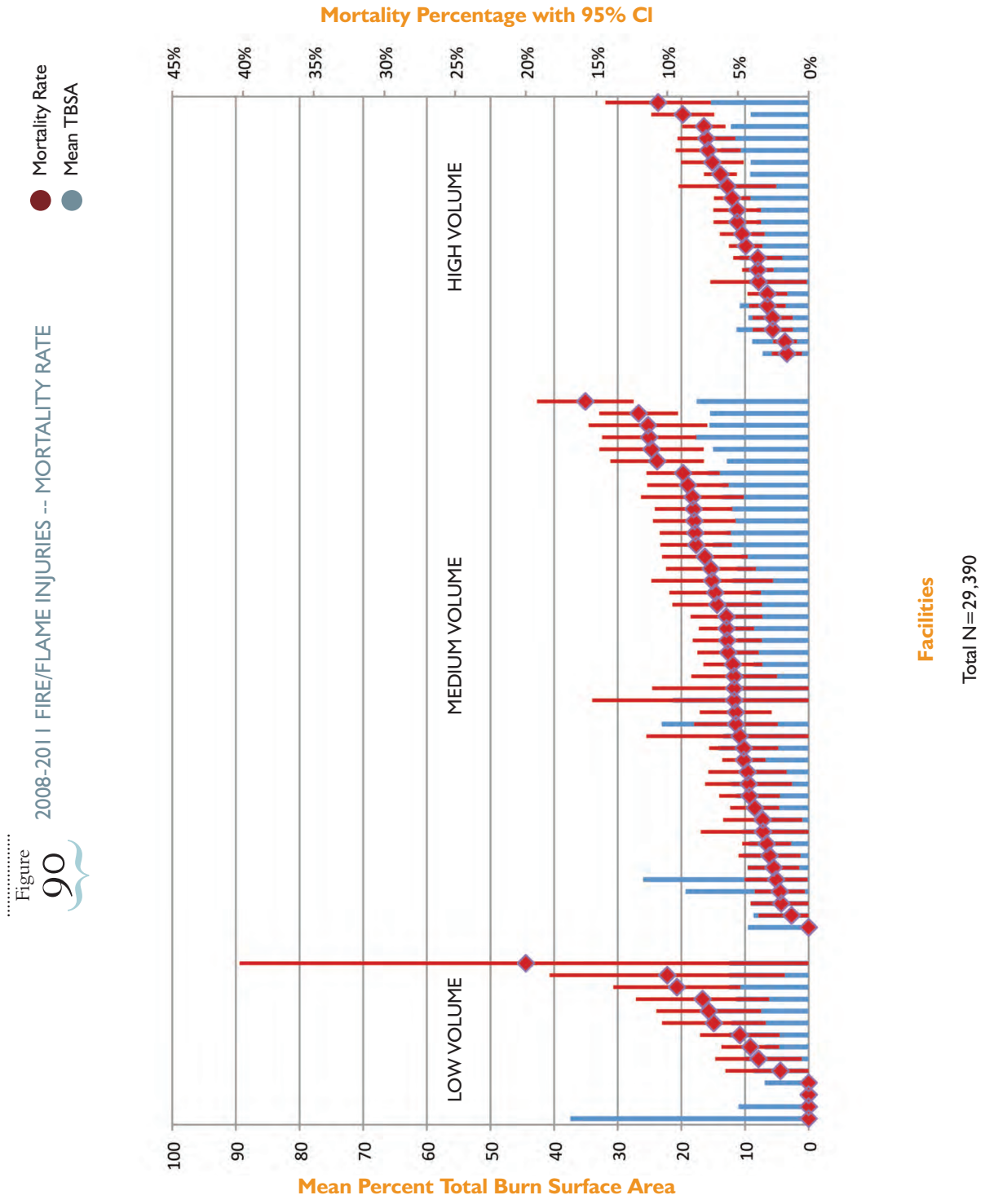


Figure 91 depicts hospital charges for fire/flame cases admitted from 2008-2011. Some centers do not report charge information. The left y-axis depicts the mean percentage TBSA scale. The right y-axis depicts the scale of charges per case. Red dots represent the mean charges per case. The blue bars represent the mean TBSA of patients admitted to each burn center. The red lines depict the 95% confidence interval for mean charges. This analysis does not adjust for outliers, but may significantly affect the calculated mean for any given center. Charges are not adjusted for mean burn size, but the data suggests that differences in charges are largely independent of burn size.

Figure 91 2008-2011 FIRE/FLAME INJURIES -- MEAN CHARGES

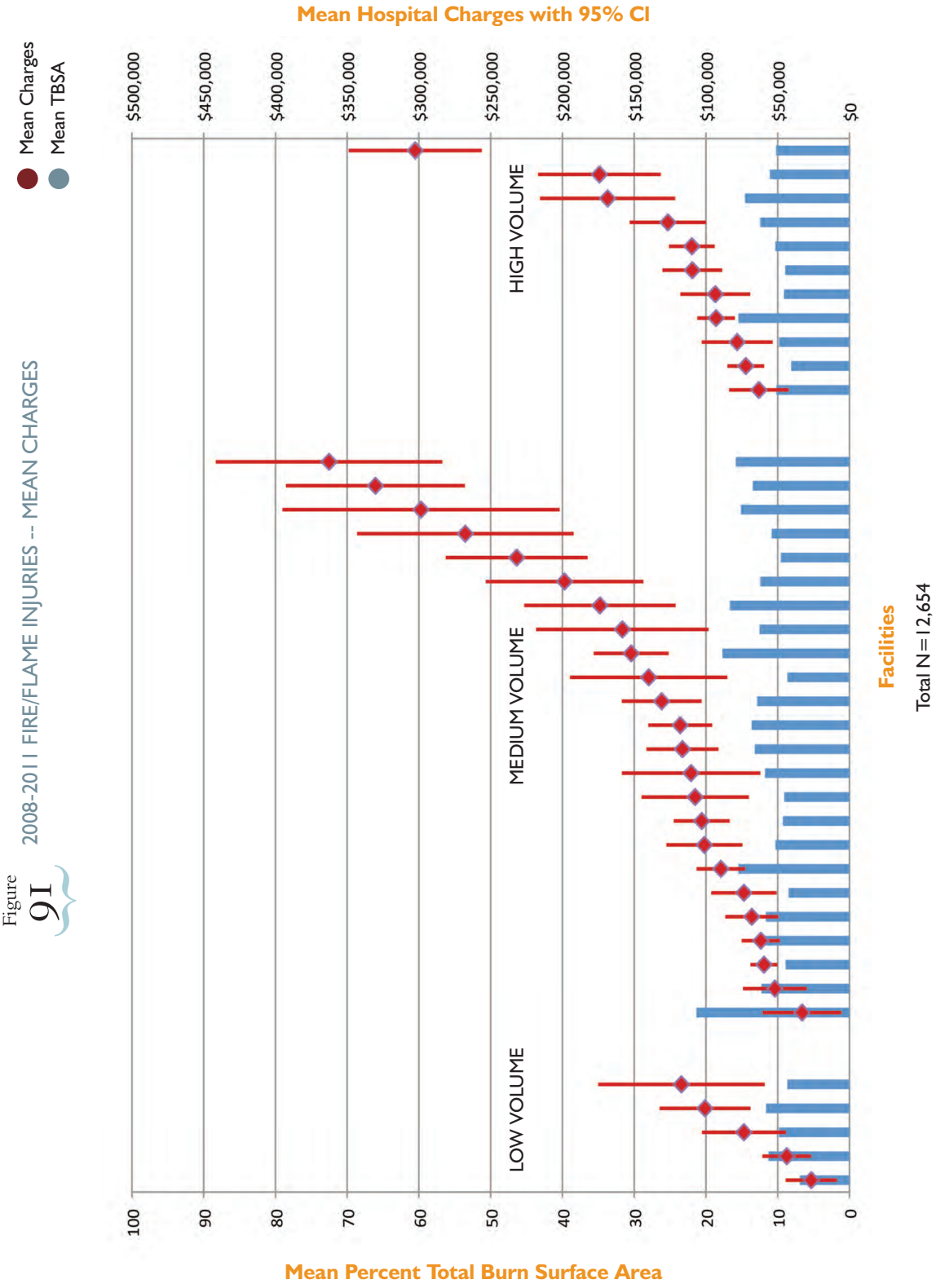


Figure 92 depicts mean length of stay (LOS) for fire/flame cases admitted between 2008-2011. The left y-axis depicts mean TBSA. The right y-axis depicts LOS. Blue bars represent the mean TBSA of admitted patients at each burn center. Red dots represent mean LOS for each facility. Red bars represent the 95% confidence interval for each mean LOS.

LOS varies significantly amongst burn centers, particularly in the low and medium volume centers. Outliers may have significant impact on mean LOS and that effect may be more pronounced in centers with lower reported admission volumes. This analysis does not adjust for outliers.

Figure 92

2008-2011 FIRE/FLAME INJURIES -- MEAN LENGTH OF STAY

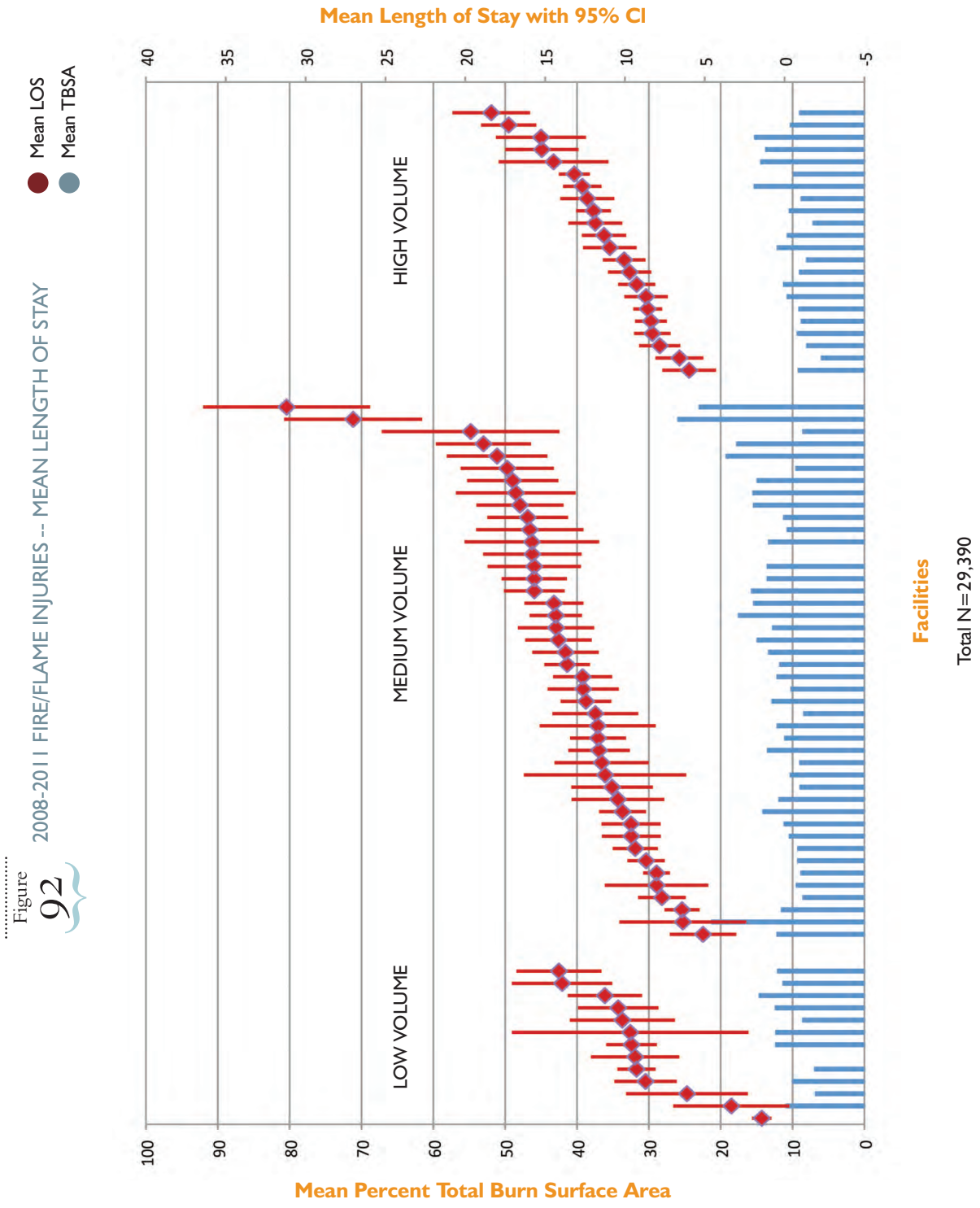
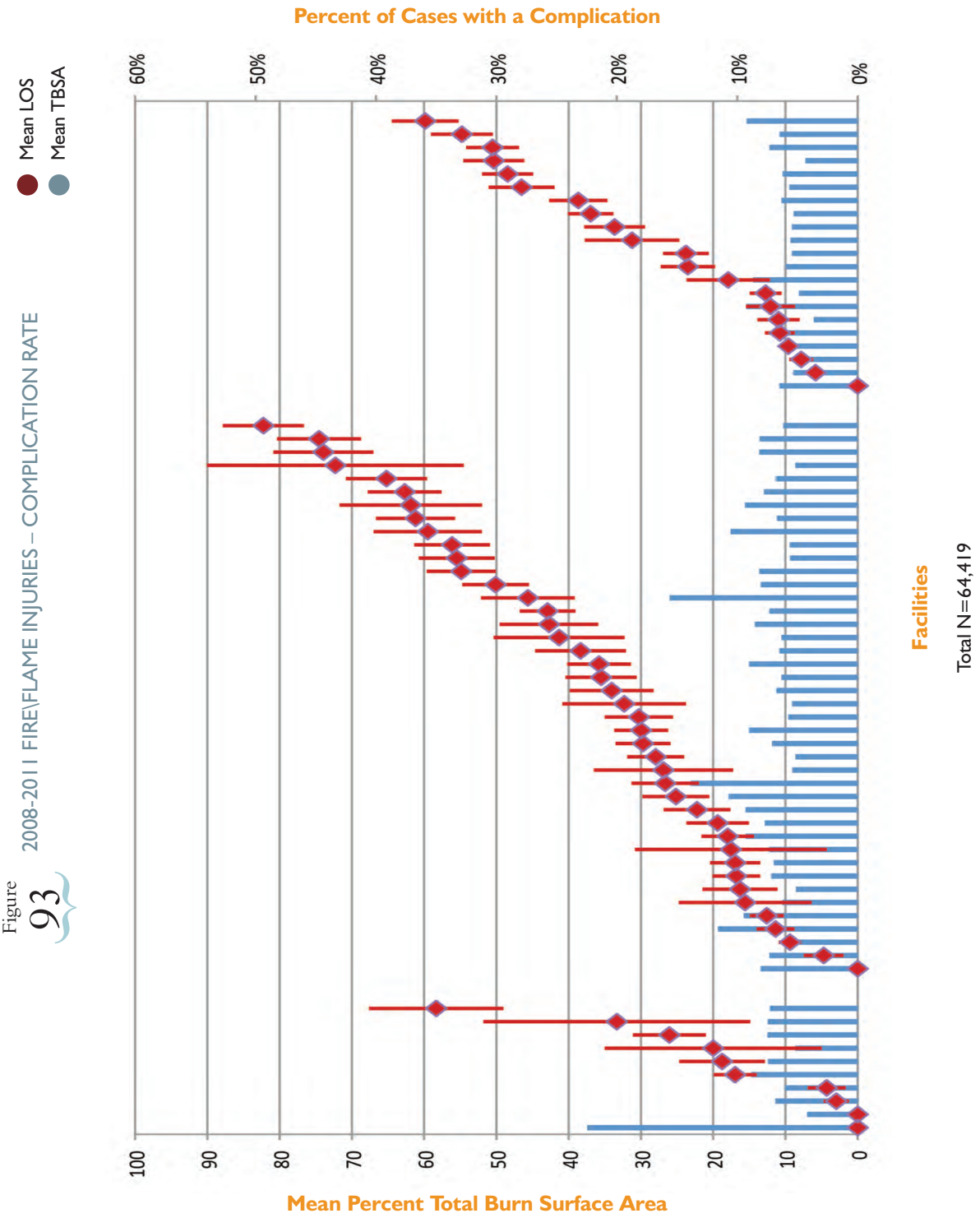


Figure 93 depicts complication rates for fire/flame cases submitted between 2008-2011. The left y-axis depicts mean TBSA. The right y-axis depicts the complication rate. Blue bars represent the mean TBSA of admitted patients at each burn center. Red dots represent the complication rate for each center. Red bars represent the 95% confidence interval for complication rates. Unaudited reporting of complications may be amongst the least accurate of all reported data. Standard definitions and rigorous application of definitions are required to produce comparable data. 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.

Figure 93 2008-2011 FIRE\FLAME INJURIES – COMPLICATION RATE



Analysis
of Canadian and International Records

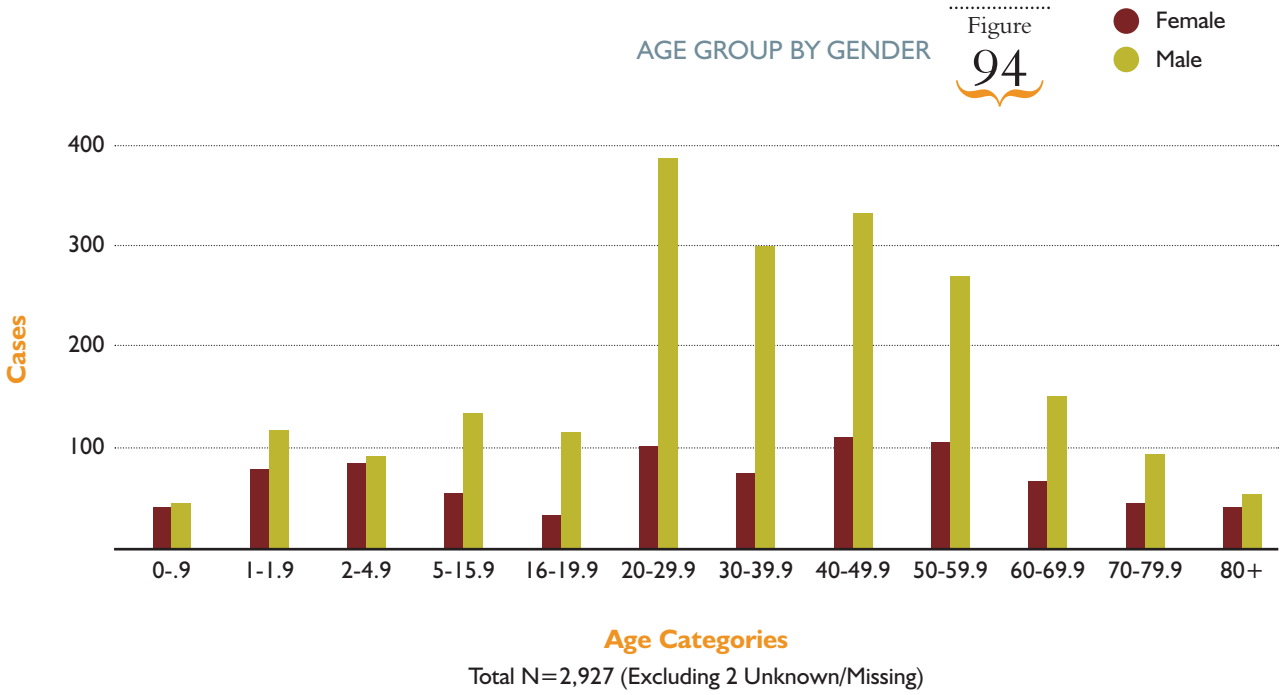
6

This year's NBR report includes 2929 International records, 1000 more than reported in 2011. This number of records is compared to 56,000 records from the United States. Overall comparison of the international data to that reported in the U.S. reveals close similarities. Four Canadian centers and two Swedish centers have submitted data to the NBR. The ABA has members throughout the world and the NBR encourages all participating burn centers to submit their data to the registry.

Figure 94 and Table 148 show the number of cases by age group and gender. The male/female distribution is fairly even in those younger than 5 years of age, and males dominate all age groups from 5 to 80 years old. The 20 to 29 year category is the largest and accounts for 16.7% of all burns. There are 97 patients over the age of 80 years and 85 patients younger than the age of one. Twenty eight percent of all records are women and 72% men.

Figure 94

AGE GROUP BY GENDER



Total N=2,927 (Excluding 2 Unknown/Missing)

Table 148

AGE GROUP BY GENDER

	Gender					
	Total		Female		Male	
Age Categories	Count	Column N %	Count	Column N %	Count	Column N %
0-.9	85	2.9	40	4.8	45	2.1
1-1.9	196	6.7	79	9.5	117	5.6
2-4.9	178	6.1	85	10.2	93	4.4
5-15.9	188	6.4	54	6.5	134	6.4
16-19.9	147	5.0	33	4.0	114	5.4
20-29.9	488	16.7	102	12.2	386	18.4
30-39.9	375	12.8	74	8.9	301	14.4
40-49.9	443	15.1	111	13.3	332	15.8
50-59.9	375	12.8	105	12.6	270	12.9
60-69.9	218	7.4	66	7.9	152	7.3
70-79.9	137	4.7	44	5.3	93	4.4
80 and over	97	3.3	41	4.9	56	2.7
Subtotal	**2,927**	**99.9**	**834**	**100.0**	**2,093**	**99.9**
Missing	2	0.1	0	0.0	2	0.1
Total	**2,929**	**100.0**	**834**	**100.0**	**2,095**	**100.0**

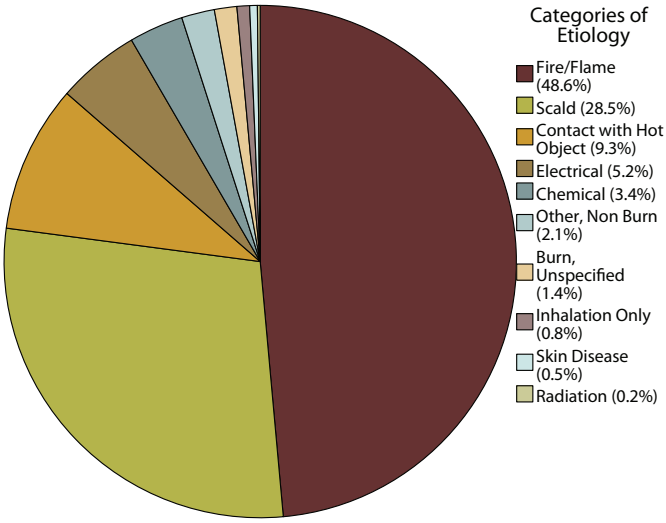
Total N=2,929

Analysis
of Canadian and International Records

Burn etiology is similar between the U.S. and other countries as shown in Figure 95 and Table 149. Fire/flame is the cause of nearly half of all burns, and scalds account for an additional 28%. There is an increase in the number of records reporting contact with hot object, as compared to the last report. The contact burn group is now more common than electrical injury among international records.

Mortality is detailed in Tables 150 and 151. Overall mortality has increased from 3.4% to 3.9% and is obviously related to TBSA burned. There were 12 survivors out of 53 patients with burns greater than 70% TBSA for a 38% survival rate in the groups with the largest burns. Mortality rate spiked in 2008 and 2009, but declined dramatically in 2010 and 2011.

Figure 95 ETIOLOGY



Total N=2,889 (Excluding 40 Unknown/Missing)

Table 149 ETIOLOGY

Etiology	Cases
Fire/Flame	1403
Scald	824
Contact with Hot Object	269
Electrical	151
Chemical	99
Other, Non Burn	60
Burn, Unspecified	41
Inhalation Only	23
Skin Disease	14
Radiation	5
Unknown	40
Total	**1,742**

Table 150 LIVED/DIED BY BURN GROUP SIZE (%TBSA)

	Lived	Died	
%TBSA	**Cases**	**Cases**	**Mortality Rate**
0.1 - 9.9	1,836	10	0.5
10 - 19.9	432	15	3.4
20 - 29.9	154	14	8.3
30 - 39.9	82	11	11.8
40 - 49.9	44	13	22.8
50 - 59.9	30	7	18.9
60 - 69.9	22	9	29.0
70 - 79.9	8	10	55.6
80 - 89.9	2	10	83.3
≥ 90	2	11	84.6
Subtotal	**2,612**	**110**	**4.0**
Missing or 0%	202	5	2.4
TOTAL	**2,814**	**115**	**3.9**

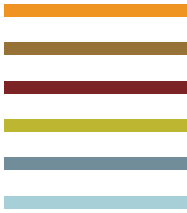
Total N=2,929

Table 151 LIVED/DIED BY ADMISSION YEAR

	Lived	Died	
Admission Year	**Cases**	**Cases**	**Mortality Rate**
2002	140	8	5.4
2003	124	6	4.6
2004	124	4	3.1
2005	185	6	3.1
2006	317	19	5.7
2007	218	11	4.8
2008	161	11	6.4
2009	127	12	8.6
2010	845	24	2.8
2011	573	14	2.4
Total	**2,814**	**115**	**3.9**

Total N=2,929

Appendix



Appendix A | Minimum Data Set and Data Quality

Improving the data quality in the NBR has been a focal point for the past few years. The launch of TRACS 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
- 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 because gender and reporting hospital number are required fields for a case to be included in this analysis. The remaining variables were excluded from analysis because they are not uniformly reported by non-TRACS centers.

Appendix A

Table 152 provides the count of cases with valid and missing data for a select number of variables from the Minimum Data Standard. The values for total burn size and total deep burn are potentially skewed in that previous version of the Burn TRACS software used 0 as a default value, thus it was not known if the true TBSA was 0 or unknown. Improving the quality of the data in the NBR should remain a focus of Burn Centers.

DATA COMPLETENESS BY VARIABLE Table 152

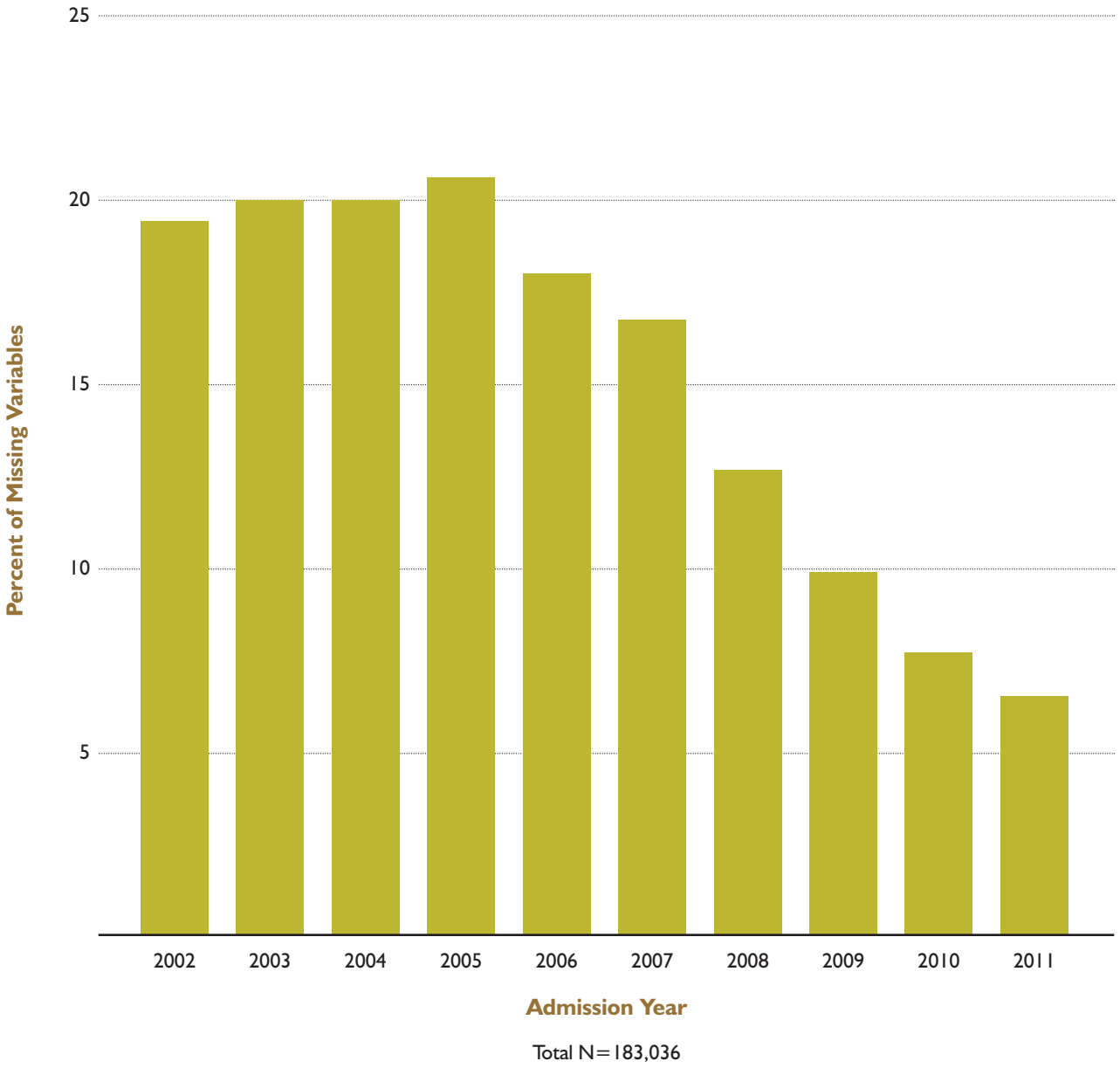
	Valid	Missing	Pct. Missing	Last Report Pct. Missing
State in which injury occurred	93,862	89,174	48.7	56.8
Cause of Death	3,905	2,917	42.8	43.6
Total deep burn (include 0 as missing)	107,023	76,013	41.5	42.3
DRG Code	123,770	59,266	32.4	36.1
Description of event	126,316	56,720	30.0	36.6
Interhospital transfer to hospital	136,749	46,287	25.3	28.6
Total ICU days	147,867	35,169	19.2	20.7
Circustances of Injury	150,327	32,709	17.9	19.3
Total burn size (include 0 as missing)	156,913	26,123	14.3	14.8
Site at which injury occurred (E 849 code)	157,674	25,362	13.9	14.7
Primary payor source	162,672	20,364	11.1	17.1
Inahaltion Injury	167,501	15,535	8.5	8.2
Year of Injury	174,939	8,097	4.4	5.0
Year of discharge or death	175,076	7,960	4.3	4.9
Etiology of injury code (E-code)	179,098	3,938	2.2	2.8
Discharge status (alive or dead)	179,766	3,270	1.8	2.5
Patient age	180,504	2,532	1.4	1.5
Total Hospital Days	181,833	1,203	0.7	0.6
Year of arrival at reporting hospital	183,036	0	0.0	0.0

Appendix A

Figure 96 shows the mean percent of missing variables from the Minimum Data Standard per case by admission year. Improving record completeness remains a key performance improvement area.

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

Figure 96

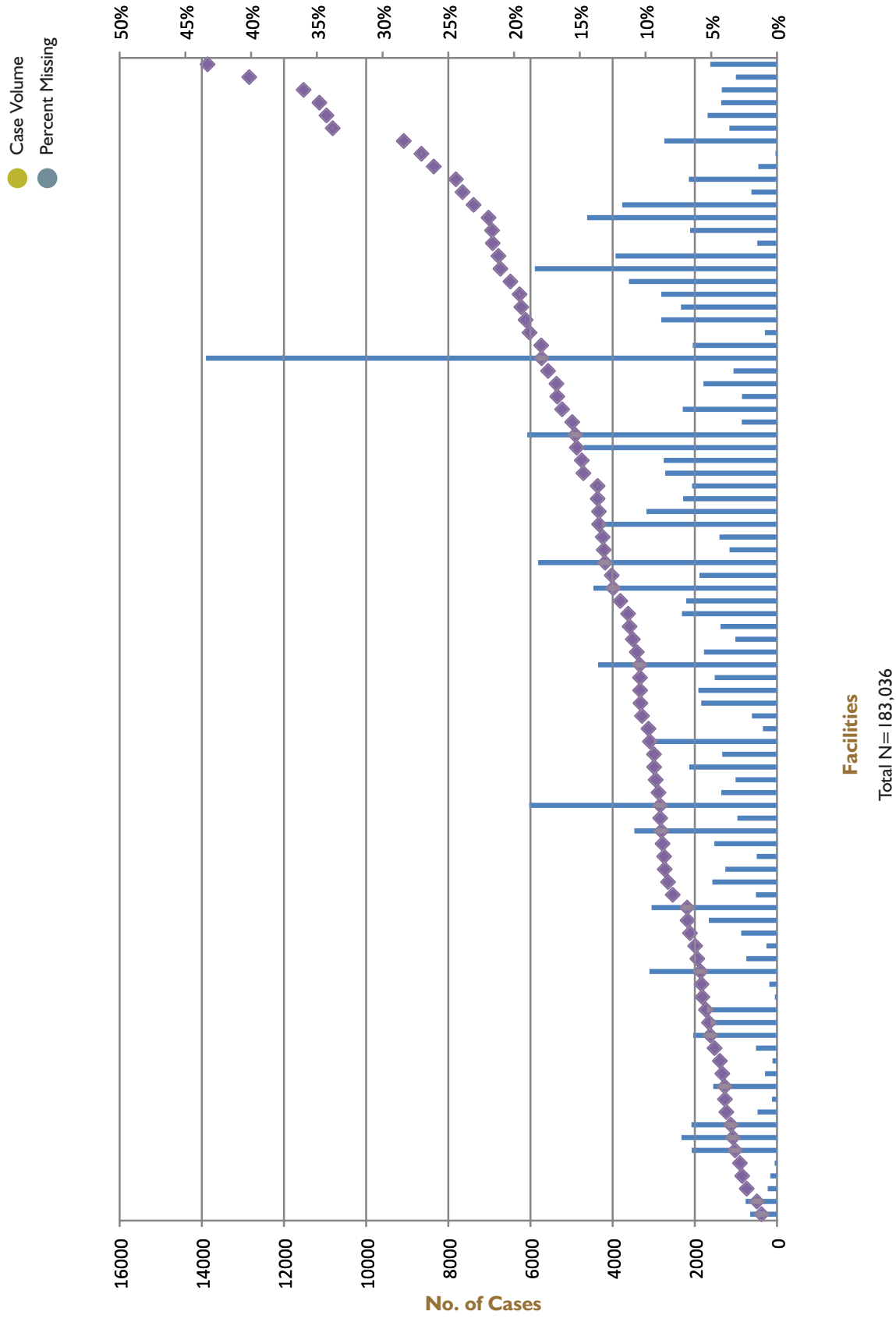


Appendix A

Figure 97 provides the mean percent (blue box) of missing variables from the Minimum Data Standard per case by Burn Center. The light green bars represent the volume of cases included in this Annual Report from burn centers. It does not appear that case volume is related to data quality and there is considerable variation in the data quality across Burn Centers.

Figure 97

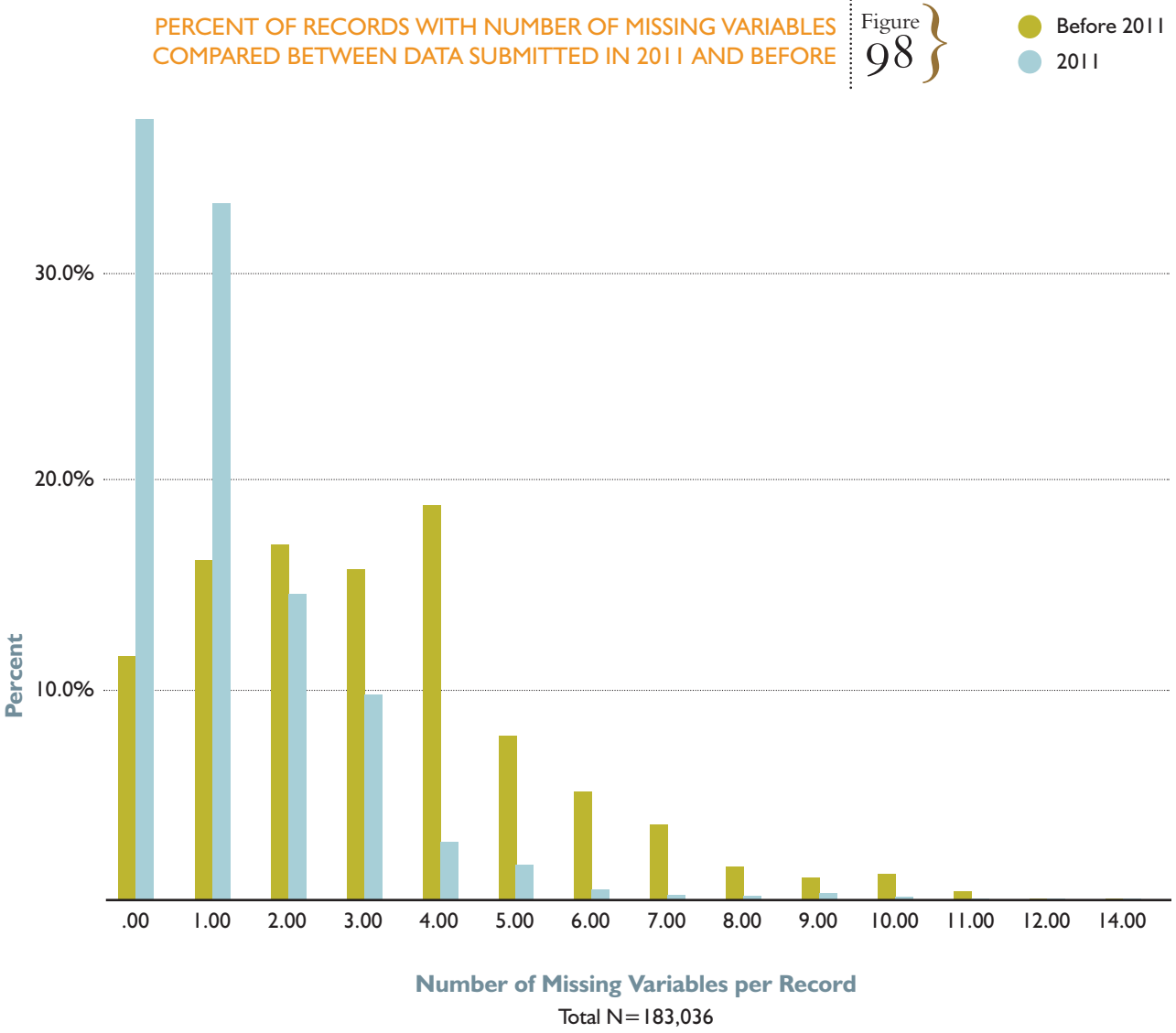
DATA QUALITY EXPRESSED AS MEAN PERCENT OF MISSING VARIABLES OF THE MINIMUM DATA STANDARD PER RECORD BY FACILITY



Appendix A

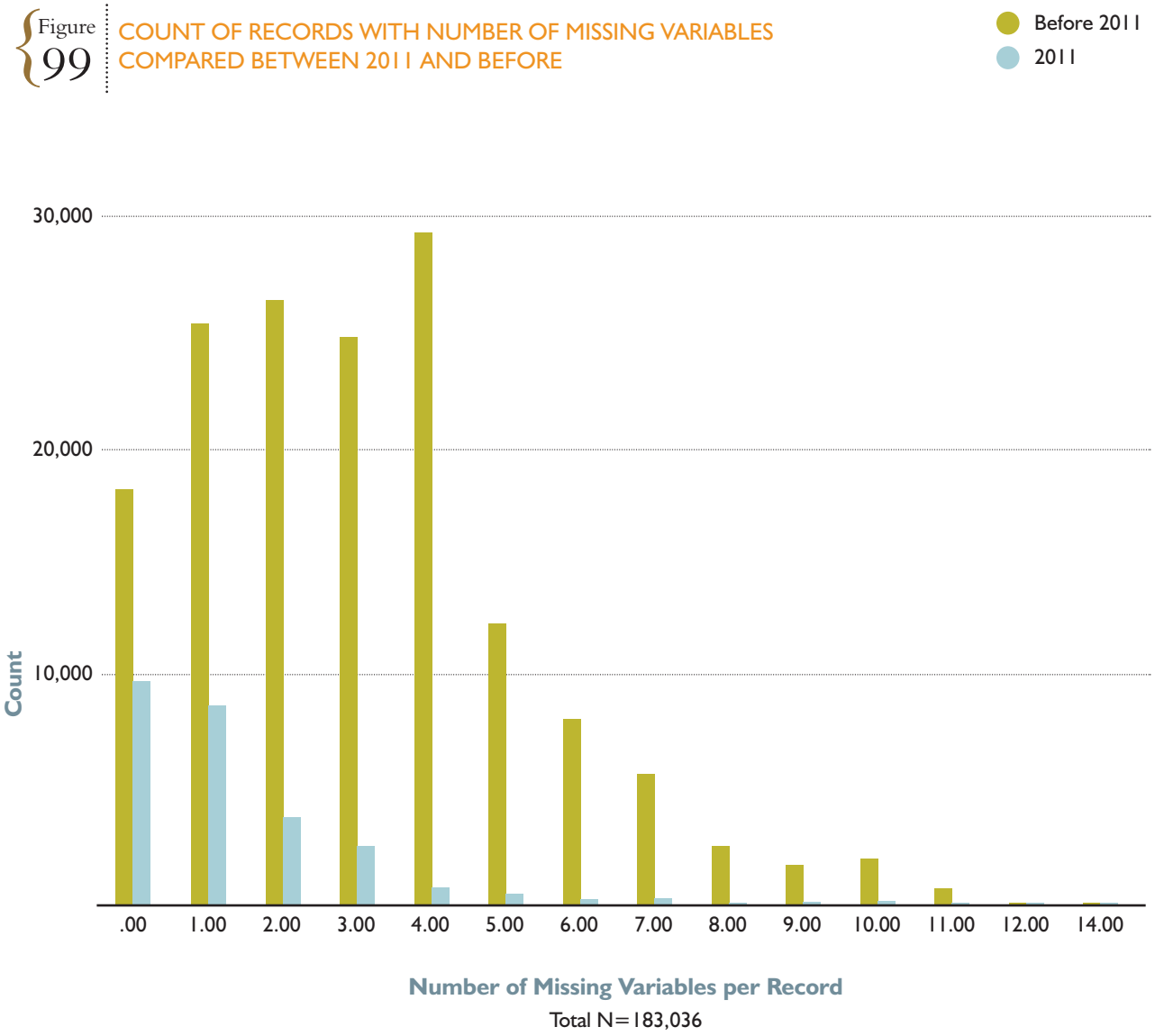
PERCENT OF RECORDS WITH NUMBER OF MISSING VARIABLES COMPARED BETWEEN DATA SUBMITTED IN 2011 AND BEFORE

Figure 98



Appendix A

Figure 99 COUNT OF RECORDS WITH NUMBER OF MISSING VARIABLES COMPARED BETWEEN 2011 AND BEFORE



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

Colorado
University of Colorado Hospital Burn Center
Western States Burn Center

Connecticut
Panettieri Burn Center

District of Columbia
Children's National Medical Center
The Burn Center at 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
St. Joseph's Burn Center
Wishard Health Services

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

Maryland
Johns Hopkins Bayview Medical Center Burn Center

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

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

Minnesota
Dawn Burn Center
Hennepin County Medical Center Burn Center
The Burn Center-Regions Hospital

Mississippi
Delta Regional Medical Center

Missouri
George David Peak Memorial Burn Care Center

Nebraska
The Nebraska Medical Center
St. Elizabeth Regional Burn Center

Nevada
Lion's Burn Center

New Jersey
The Burn Center at St. 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
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

Ohio
Children's Hospital Medical Center of Akron

Appendix B

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

Oregon
Oregon Burn Center

Pennsylvania
Lehigh Valley Hospital Burn Center
St. Christopher's Hospital for Children
Temple University Hospital Burn Center
UPMC Mercy
The Nathan Speare Regional Burn Treatment Center
The Western Pennsylvania Hospital 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
Vanderbilt University Burn Center

Texas
John S. Dunn, Sr. Burn Center
Parkland Memorial Hospital 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
Evans-Haynes Burn Center

Washington
University of Washington Burn Center, Harborview Medical Center

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

Canada and Other International Contributors
Firefighter's 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
Linkoping University Hospital, Linkoping, 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

Bloemsma GC, Dokter J, Boxma H, Oen IMMH. 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.

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.

Edelman LS, Cook L, Saffle JR. Using Probabilistic Linkage of Multiple Databases to Describe Burn Injuries in Utah. J Burn Care Res. 2009; 30: 983-992.

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.

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.

Jaskille AD, Shupp JW, Pavlovich AR, Fidler P, Jordan MH, Jeng JC. Outcomes from Burn Injury-Should Decreasing Mortality Continue to be Our Compass? Clinics in Plastic Surgery. 2009 Oct; 36 (4): 701.

Jeng JC; Advisory Committee to the National Burn Repository. "Open for business!" a primer on the scholarly use of the National Burn Repository. J Burn Care Res. 2007 Jan-Feb;28(1):143-4.

Jeng JC. Patrimonie de Docteur Baux--Baux scores >> 100 gleaned from 170,791 admissions: a glimmer from the National Burn Repository. J Burn Care Res. 2007 May-Jun;28(3):380-1.

Jeng JC. From qualitative contemplation to relational database: one approach to harnessing the National Burn Repository. J Burn Care Res. 2008 Jan-Feb;29(1):267-8.

Jeng JC. Growth rings of a tree: progression of burn care charges abstracted from a decade of the National Burn Repository. J Burn Care Res. 2007 Sep-Oct;28(5):659-60.

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.

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.

Jeng JC, Phillips B. Dead-Reckoning the Distance Between the National Burn Repository and a True Population-Based Registry: A Challenge and an Opportunity. J Burn Care Res. 2009 Jan-Feb; 30(1):139-140.

Jeng JC, Phillips B. Title: From Psychedelic Data Visualization to Hypothesis: All-At-Once Contemplation of Vast Amounts of Information From the National Burn Repository. J Burn Care Res. 2008; 29 (6): 872-873.

Jeng JC, Shoham S. Leveraging the Unique Expertise of Our Clinical Colleagues: A Real-World Example for Collaborative Harnessing of the National Burn Repository. J Burn Care Res. 2008 Sep-Oct; 29(5):704-705.

Jeng JC, Schurr MJ, Phillips B. The Noise Floor, Signal-to-Noise Ratio, and Demonstrating That Burn Care is Getting Better: A Glimmer from the National Burn Repository. J Burn Care Res. 2008 July-Aug; 29(4):572-573.

Appendix C

Johnson LS, Shupp JW, Pavlovich AR, Pezzullo JC, Jeng JC, Jordan MH. Hospital length of stay--does 1% TBSA really equal 1 day? J Burn Care Res. 2011 Jan-Feb;32(1):13-9.

Kagan RJ, Edelman L, Solem L, Saffle JR, Gamelli R.DRG 272: Does it Provide Adequate Burn Center Reimbursement for the Care of Patients with Stevens. J Burn Care Res. 2007 Jul.

Kagan RJ, Edelman L, Solem L, Saffle JR, Gamelli R.DRG 272: does it provide adequate burn center reimbursement for the care of patients with Stevens-Johnson syndrome and toxic epidermal necrolysis? J Burn Care Res. 2007 Sep-Oct;28(5):669-74.

Kagan RJ, Gamelli R, Kemalyan N, Saffle JR. Tracheostomy in thermally injured patients: does diagnosis-related group 483 adequately estimate resource use and hospital costs? J Trauma. 2004 Oct;57(4):861-6.

Kagan RJ, Gamelli R, Saffle JR.DRG 504: the effect of 96 hours of mechanical ventilation on resource utilization. J Burn Care Res. 2007 Sep-Oct;28(5):664-8.

Kerby JD, McGwin G Jr, George RL, Cross JA, Chaudry IH, Rue LW 3rd. Sex differences in mortality after burn injury: results of analysis of the National Burn Repository of the American Burn Association. J Burn Care Res. 2006 Jul-Aug;27(4):452-6.

Kramer B, Rivara F, Klein M.Variations in U.S. Pediatric Burn Injury Hospitalizations Using the National Burn Repository Data. J Burn Care Res. 2010 Sept-Oct; (5): 734-9.

Latenser BA, Miller SF, Bessey PQ, Browning SM, Caruso DM, Gomez M, Jeng JC, Krichbaum JA, Lentz CW, Saffle JR, Schurr MJ, Greenhalgh DG, Kagan RJ. National Burn Repository 2006 Report Dataset Version 3.0. J Burn Care Res. 2007 Jul.

Latenser BA, Miller SF, Bessey PQ, Browning SM, Caruso DM, Gomez M, Jeng JC, Krichbaum JA, Lentz CW, Saffle JR, Schurr MJ, Greenhalgh DG, Kagan RJ. National Burn Repository 2006: a ten-year review. J Burn Care Res. 2007 Sep-Oct;28(5):635-58.

Lezotte DC, Hills RA, Heltshe SL, Holavanahalli RK, Fauerbach JA, Blakeney P, Klein MB, Engrav LH. Assets and liabilities of the Burn Model System data model: a comparison with the National Burn Registry.Arch Phys Med Rehabil. 2007 Dec;88(12 Suppl 2):S7-17.

Light TD, Latenser BA, Heinle JA, Stolpen MS, Quinn KA, Ravindran V, Chacko J. Demographics of Pediatric Burns in Vellore, India. J Burn Care Res. 2009 Jan-Feb; 30(1):50-54.

Light TD, Latenser BA, Kealey GP, Wibbenmeyer LA, Rosenthal GE, Sarrazin MV. The Effect of Burn Center and Burn Center Volume on the Mortality of Burned Adults-An Analysis of the Data in the National Burn Repository. J Burn Care Res. 2009 Sept-Oct; 30(5):776-782.

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.

McKibben JBA, Bresnick MG, Wiechman A, Shelley A, Fauerbach JA. Acute Stress Disorder and Posttraumatic Stress Disorder: A Prospective Study of Prevalence, Course, and Predictors in a Sample With Major Burn Injuries. J Burn Care Res. 2008 Jan-Feb; 29(1):22-35.

McGwin G Jr, George RL, Cross JM, Rue LW. Improving the ability to predict mortality among burn patients. Burns. 2008 May;34(3):320-327. Epub 2007 Sep 14.

Miller SF, Bessey PQ, Schurr MJ, Browning SM, Jeng JC, Caruso DM, Gomez M, Latenser BA, Lentz CW, Saffle JR, Kagan RJ, Purdue GF, Krichbaum JA. National Burn Repository 2005: a ten-year review. J Burn Care Res. 2006 Jul-Aug;27(4):411-36.

Miller SF, Bessey P, Lentz CW, Jeng JC, Schurr M, Browning S. National Burn Repository 2007 Report: A Synopsis of the 2007 Call for Data. J Burn Care Res. 2008 Nov-Dec; 29(6):862-870.

Moss LS. Outpatient management of the burn patient. Crit Care Nurs Clin North AM. 2004 Mar;16(1):109-17.Review.

Modjarrad K, McGwin G Jr, Cross JM, Rue LW 3rd. The descriptive epidemiology of intentional burns in the United States: an analysis of the National Burn Repository. Burns. 2007 Nov;33(7):828-32. Epub 2007 May 24.

Osler T, Glance LG, Hosmer DW. Simplified estimates of the probability of death after burn injuries: extending and updating the baux score. J Trauma. 2010 Mar;68(3):690-7.

Pannucci C, Osborne N, Jaber R, Cederna P, Wahl Wendy. Early Fasciotomy in Electrically Injured Patients as a Marker for Injury

Appendix C

Severity and Deep Venous Thrombosis Risk: An Analysis of the National Burn Repository. J Burn Care Res. 2010 Nov-Dec; (6): 882-7.

Pannucci CJ, Osborne NH, Wahl WL. Venous thromboembolism in thermally injured patients: analysis of the National Burn Repository. J Burn Care Res. 2011 Jan-Feb;32(1):6-12.

Pavlovich, AR, Shupp JW, Jeng JC. A Novel Approach to Discerning Burn Mortality: A Glimmer From the National Burn Repository. J Burn Care Res. 2009 Jul-Aug; 30(4):574-575.

Pavlovich AR, Shupp JW, Jeng JC. Is Length of Stay Linearly Related to Burn Size? A Glimmer From the National Burn Repository. J Burn Care Res. 2009 Mar-Apr; 30(2):229-230.

Pham TN, Kramer CB, Wang J, Rivara FP, Heimbach DM, Gibran NS, Klein MB. Epidemiology and Outcomes of Older Adults With Burn Injury: An Analysis of the National Burn Repository. J Burn Care Res. 2009 Jan-Feb; 30(1):30-36.

Price LA, Thombs B, Chen CL, Milner SM. Liver disease in burn injury: evidence from a national sample of 31,338 adult patients. J Burns Wounds. 2007 Jun 12;7.

Saffle JR. Invited Critique: Burn Unit Size and Census: Too Much of a Good Thing? J Burn Care Res. 2009 Sept-Oct; 30(5):783-784.

Santaniello JM, Luchette FA, Esposito TJ, Gunawan H, Reed RL, Davis KA, Gamelli RL. Ten year experience of burn, trauma, and combined burn/trauma injuries comparing outcomes. J Trauma. 2004 Oct;57(4):696-700; discussion 700-1.

Shupp J, Pavlovich A, Jeng J, Pezzullo J, Oetgen W, Jaskille A, Jordan M, Shoham S, Epidemiology of Bloodstream Infections in Burn-Injured Patients: A Review of the National Burn Repository. J Burn Care Res. 2010 Jul-Aug; (4):521-8.

Thombs BD. Patient and injury characteristics, mortality risk, and length of stay related to child abuse by burning: evidence from a national sample of 15,802 pediatric admissions. Ann Surg. 2008 Mar;247(3):519-23.

Thombs BD, Bresnick MG. Mortality risk and length of stay associated with self-inflicted burn injury: evidence from a national sample of 30,382 adult patients. Crit Care Med. 2008 Jan;36(1):118-25.

Thombs BD, Bresnick MG, Magyar-Russell G. Who attempts suicide by burning? An analysis of age patterns of mortality by self-inflicted burning in the United States. Gen Hosp Psychiatry. 2007 May-Jun;29(3):244-50.

Thombs BD, Singh VA, Halonen J, Diallo A, Milner SM. The effects of preexisting medical comorbidities on mortality and length of hospital stay in acute burn injury: evidence from a national sample of 31,338 adult patients. Ann Surg. 2007 Apr;245(4):629-34.