

Mortality Risk and Length of Stay Associated with Self-Inflicted Burn Injury: Evidence from a National Sample of 30,382 Adult Patients

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Running Title: Self-Inflicted Burn Injury

Key Words: Burns; Suicide, Attempted; Suicide; Hospital Mortality; Length of Stay

Financial Support for Study: None

Conflicts of Interest: The authors have not disclosed any potential conflicts of interest.

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ABSTRACT

Objective: Existing studies report contradictory findings regarding characteristics and outcomes of patients admitted with self-inflicted burn injuries. The objective of this study was to report demographic and medical characteristics of patients admitted to burn centers with self-inflicted burn injuries and to assess mortality risk and length of stay compared to patients whose injuries were not self-inflicted.

Design: Retrospective, cohort study.

Setting: 70 burn centers from the United States that contributed data to the American Burn Association National Burn Repository.

Patients: 30,382 adult patients (593 with self-inflicted injuries) who were admitted with a thermal injury from 1995 through 2005.

Interventions: None

Measurements and Main Results: Demographics, comorbidities, burn injury severity variables (total body surface area burned [TBSA], TBSA 3rd degree, inhalation injury), hospital mortality, intensive care length of stay, total hospital length of stay. Patients with self-inflicted injuries had larger TBSA burned (32.0% vs. 12.8%, P<.01) and larger 3rd degree TBSA burned (20.6% vs. 4.9%, P<.01) and were more likely to incur an inhalation injury (37.3% vs. 12.8%, P <.01). Prior to matching, patients with self-inflicted injuries were at greater risk of mortality (23.6% vs. 6.8%, P<.01) and required longer intensive care (median=4 days vs. 0 days, P<.01) and total hospital stays (median=23 days vs. 8 days, P<.01). After propensity score matching on demographic, medical, and burn injury variables, they were not more likely to die from their injuries (23.6% vs. 23.1%, P=.84), did

not require longer intensive care stays (4 days vs. 3 days, P=.75), and did not require longer total hospital stays (23 days vs. 18 days, P=.50).

Conclusions: Compared to patients with similar demographic and injury characteristics whose injuries are not self-inflicted, patients with self-inflicted burn injuries are not at greater risk of mortality and do not require longer intensive care or total hospitalizations.

INTRODUCTION

Between 2% and 14% of all burn injuries treated on burn units in Europe and North America are self-inflicted (1). Self-inflicted burn injuries encompass a range of behaviors from repeated self-mutilation with minimal injury to suicide via self-immolation. Patients with self-inflicted burn injuries present unique challenges to the burn care team due to the seriousness of their injuries (1) and because of the potentially complex social and psychological issues involved (2,3). Caring for this subset of patients requires the use of substantial medical and financial resources (4). In order to properly tailor in-hospital and long-term interventions to meet the specific needs of these patients, it is necessary to understand the association between self-inflicted burn injury and outcomes. Relatively little is known, however, about the characteristics of patients who are admitted with self-inflicted burn injuries or the relationship between self-inflicted burn injury and important outcomes, such as mortality and length of hospital stay.

Studies that have investigated patient characteristics and outcomes related to self-inflicted burn injuries have generally been limited by small samples from single burn centers. Only 2 existing studies have included more than 100 patients (5,6), and almost all other studies report data from fewer than 50 patients (1). As a result, these studies have produced contradictory descriptions of the characteristics of patients with self-inflicted burn injuries and have not agreed on whether patients with self-inflicted injuries require more extensive hospital stays or are more likely to die prior to discharge compared to other patients with similar burn injuries.

Estimates from previous studies of the percentage of patients with self-inflicted burns with psychiatric diagnoses range from 32% to 100%, of the mean age of patients

from 29 to 50, and of the male to female ratio from 0.2 to 2.5 (1). The mean total body surface area (TBSA) burned reported in these studies ranges from 25% to 68% (1,7). Most studies agree that patients with self-inflicted burns have more severe burn injuries and worse outcomes than other patients (2,5,6,8). Very few studies, however, have compared outcomes after controlling for important confounders, such as TBSA. Two studies (self-inflicted N= 184 and self-inflicted N = 31) evaluated mortality risk after adjusting for demographic and burn injury characteristics, and both found that patients with self-inflicted injuries had a higher risk of mortality (5,9). Three studies investigated the length of hospitalization among patients with self-inflicted burn injuries compared to patients with non-intentional burn injuries. Two of these studies, each with relatively small samples of patients with self-inflicted injuries (N = 57 and N = 36), found that patients with self-inflicted burn injuries required hospital stays almost twice as long as patients with accidental burn injuries after adjusting for demographic and burn injury factors (10,11). A study with a larger sample of patients with self-inflicted injuries (N = 185) (6), however, found that there was no difference in length of stay between patients with self-inflicted injuries compared to psychiatric patients with accidental injuries after controlling for age and TBSA.

The objective of this study was to use a large national registry, the American Burn Association National Burn Repository (ABA-NBR) in order to provide a summary of demographic, medical and burn-injury characteristics of patients admitted to burn centers with self-inflicted injuries and to assess mortality risk, length of intensive care, and length of total hospitalization stay compared to patients whose injuries were not self-inflicted.

MATERIALS AND METHODS

Data were extracted from the ABA-NBR database for all adult patients ages 18-88 who were admitted to 70 burn centers across the United States with thermal injuries (flame, contact, or scald) from 1995 through 2005. In addition to the circumstances of the injury (e.g., suicide attempt, accident), patient data in the ABA-NBR include age, sex, race, year of injury, the etiology of the burn injury (e.g., flame, scald), mortality status and cause, percent total body surface area (TBSA) burned, percent TBSA burned 2nd degree, percent TBSA burned 3rd degree, the presence or absence of an inhalation injury, and pre-existing medical conditions.

In this study, patients whose cause of injury was listed in the ABA-NBR as "suspected self-inflicted/suicide" were compared and matched based on demographic, burn injury, and pre-existing medical conditions to patients whose injuries were not classified as self-inflicted. Pre-existing conditions were defined as clinical conditions that pre-dated the burn injury and that could reasonably be expected to impact mortality and course of treatment (12). There was no limit to the number of different medical comorbidities that could be coded in the database for a given patient. Diagnosis codes for pre-existing medical conditions were selected from those included in the Deyo adaptation (13) of the Charlson Index (14) and the Elixhauser method of comorbidity measurement (12). The list of pre-existing medical conditions included in this study and their ICD-9 codes are shown in Appendix 1.

Patients age 89 years and over were not included in the study because ages of patients 90 and older were all recorded in the ABA-NBR as 89. The is due to the 1996 U.S. Health Insurance Portability and Privacy Act, which requires individual site internal review board waivers to record the ages of patients 90 years or over. Patient records with missing

data points and duplicate records were excluded from the analysis (See Appendix 2). A more complete description of the ABA-NBR database is provided elsewhere (15). The Internal Review Board of the Johns Hopkins University School of Medicine waived the need for approval for this study since it was conducted with de-identified data from a national databank.

Data are reported in the text as means ± standard deviation or as odds ratios. Demographic and clinical variables were compared between patients admitted with suspected self-inflicted burns and patients whose burns were not classified as self-inflicted. Chi-square and Fisher's exact tests were used to compare categorical variables, and 2-tailed *t* tests were used to compare continuous variables. To adjust for differences in demographic, burn injury, and clinical characteristics of patients with suspected self-inflicted burns and patients whose burns were not self-inflicted, we used a propensity score approach to generate a set of matched cases (16,17). The propensity score is a measure of the likelihood that a patient was classified as "suspected suicide/self-inflicted" based on relevant demographic, burn injury, and clinical variables. This approach reduces many covariates to a single variable, the propensity score. Since patients with similar propensity scores have similar characteristics, once matched, mortality and length of stay can be compared for patients whose injuries are self-inflicted compared to a matched sample of patients with non self-inflicted injuries. To generate the propensity score, logistic regression modeling was used to model the likelihood that patients were admitted with a suspected self-inflicted burn based on demographic, burn injury and clinical variables. A propensity score was generated for each patient and propensity score matching was conducted with an SPSS algorithm developed by John Painter, Ph.D. of the University of

North Carolina (http://sswnt5.sowo.unc.edu/VRC/Lectures/index.htm) based on nearest neighbor matching within caliper and without replacement. The caliper size for maximum allowable difference between propensity scores for matching was set at one quarter of the standard deviation of the propensity score being matched. When two or more patients whose injuries were not self-inflicted had an identical propensity score, the match patient was chosen randomly (18). The propensity score adjustment included burn injury variables because the intent of the study was to compare patients with self-inflicted and non self-inflicted burn injuries who had similar injuries rather than to assess whether patients with self-inflicted burns tended to incur worse burns, a known risk factor for mortality.

Risk for death was assessed by calculating odds ratios for patients with a suspected self-inflicted burn injury compared to propensity-score matched patients without suspected self-inflicted injury. Length of intensive care and total hospital stay were compared between patients with self-inflicted and non-self-inflicted injuries using Kaplan-Meier survival analysis and the log-rank test with censoring for the occurrence of death. For comparison, the Kaplan-Meier estimated median and interquartile range were reported for length of intensive care and total hospital stays. All analyses were performed with SPSS version 14.0 (Chicago, Illinois).

RESULTS

A total of 30,382 adult patients ages 18-88 admitted to 70 burn centers were included in the analysis. The mean age of adult patients in the ABA-NBR was 43.4 ± 17.2 years (range, 18-88 years), 72.8% of patients were male, and 65.7% were white. The mean percent TBSA burned was 13.2% ± 16.2% (range, 0%-100%), and 13.2% of the sample incurred an inhalation injury. A total of 593 (2.0%) of admitted patients from all burn

centers were classified as having suspected self-inflicted injuries. Table 1 shows demographic, burn injury, and medical characteristics of patients with self-inflicted injuries compared to patients without self-inflicted injuries, both prior to and after propensity score matching. Compared to patients without self-inflicted injuries, patients admitted with self-inflicted injuries were significantly ($P < .01$) more likely to be younger, female, have larger TBSA burned, have an inhalation injury, have incurred a flame burn, and to have a pre-burn history of alcohol abuse, drug abuse, hypertension, liver disease, and/or a psychiatric diagnosis. The percentage of males among patients with self-inflicted burns was 65.0% for fatalities and 66.7% for non-fatalities.

The final propensity score model for matching patients included 19 individual predictor variables (age, sex, race, total TBSA burned, TBSA burned 3rd degree, burn etiology, inhalation injury, congestive heart failure, cardiac arrhythmias, hypertension, neurological disorder, chronic pulmonary disease, diabetes mellitus, renal disease, liver disease, obesity, alcohol abuse, drug abuse, a psychiatric diagnosis) and 23 interactions of pre-existing medical conditions with age and sex. The c-statistic for the propensity score model was 0.85, indicating adequate discrimination. Collinearity analysis showed that the variables included in the propensity score were not highly correlated; the highest bivariate correlation between any two variables was 0.30. All 593 patients with self-inflicted injuries were successfully matched. The average propensity score for the patients with self-inflicted injuries (0.106) differed only slightly from the average propensity score for matched patients without self-inflicted injuries (0.105, $P = .90$). After propensity score matching, there were no significant differences on demographic, medical, and burn injury variables

between the 593 patients with self-inflicted injuries and the comparison group of 593 patients without self-inflicted injuries (Table 1).

Prior to adjustment through matching, patients with self-inflicted injuries were between 3 and 4 times as likely to die from their burn injury compared to patients without self-inflicted injuries (self-inflicted, 23.6%; non self-inflicted, 6.8%, $P < .01$). After propensity score matching, however, there was no difference in mortality rates between patients with self-inflicted burns and matched controls (non self-inflicted, 23.1%, $P = .84$). Length of intensive care was significantly longer for patients with self-inflicted injuries compared to all other patients (self-inflicted, Kaplan-Meier estimated median = 4 days, interquartile range = 0 to 29 days; non self-inflicted, Kaplan-Meier estimated median = 0 days, interquartile range = 0 to 2 days, log-rank $P < .01$), as was total hospital stay (self-inflicted, Kaplan-Meier estimated median = 23 days, interquartile range = 9 to 44 days; non self-inflicted, Kaplan-Meier estimated median = 8 days, interquartile range = 2 to 17 days , log-rank $P < .01$). After matching, there were no significant differences in intensive care stay (non self-inflicted, Kaplan-Meier estimated median = 3 days, interquartile range = 0 to 26 days , log-rank $P = .75$) or in total length of stay (non self-inflicted, Kaplan-Meier estimated median = 18 days, interquartile range = 6 to 49 days , log-rank $P = .50$) (Table 2).

DISCUSSION

The major finding of this study was that patients who are admitted to burn units with self-inflicted burn injuries were not more likely to die and did not require longer intensive care or total hospital stays compared to a propensity score matched sample of patients whose burn injuries were not self-inflicted. Prior to propensity score matching, however, patients with self-inflicted injuries were almost 4 times as likely to die in the

hospital, remained in intensive care significantly longer, and stayed in the hospital significantly longer than patients whose injuries were not self-inflicted. These differences were likely due to differences in burn injury severity. Many studies have shown that older age, greater burn size, and the presence of an inhalation injury are the most important predictors of mortality and length of hospital stay following an acute burn injury (19-22). Patients with self-inflicted injuries in the ABA-NBR were younger than patients whose injuries were not self-inflicted. Mean TBSA, however, was 2-3 times larger, mean 3rd degree TBSA was over 4 times larger, and the likelihood of an inhalation injury was over 3 times as great for patients whose injuries were self-inflicted. In addition, patients with self-inflicted burns were approximately 10 times as likely to have a psychiatric disorder, which is known to be associated with longer hospital stays in patients with burn injuries (2, 23). An earlier study of this cohort found that patients with a psychiatric diagnosis required 42% longer total hospital stays (23) after adjusting for burn injury and medical comorbidity characteristics. Patients with self-inflicted injuries were also significantly more likely to have a diagnosis of alcohol and/or drug abuse, which increase length of stay by 36% and 20%, respectively (23). It is surprising that patients with self-inflicted injuries were more likely to have a diagnosis of alcohol abuse, but less likely to have a history of liver disease. It is possible that this is related to the younger age of patients with self-inflicted burns, although it may be a spurious finding based on a very small number of patients with liver disease in the sample.

The mean age of patients with self-inflicted wounds was 39.1 years, in the middle of the range reported in previous studies of patients with self-inflicted burn injuries from Europe and North America (29 to 50 years) (1) and approximately 4 years younger than

patients in the ABA-NBR whose injuries were not self-inflicted. The ratio of men to women was 1.97, which is close to the upper end of ratios reported in previous studies (0.2 to 2.5) (1), but lower than the ratio of men to women in the ABA-NBR whose burn injuries were not self-inflicted (2.70). The mean TBSA burned among patients with self-inflicted burns was 32% compared to a range of 25% to 68% reported in previous studies (1,7).

Characteristics of patients in the ABA-NBR with fatal and non-fatal self-inflicted burn injuries differed from persons who have used other methods to injure themselves based on national data from fatal (1995-2003) and non-fatal injuries (2000-2003) obtained from the Center for Disease Control's National Vital Statistics System and National Electronic Injury Surveillance System, respectively (24). Among patients in the ABA-NBR, approximately two-thirds of both fatal and non-fatal injuries were male, which is consistent with population-based estimates for self-inflicted fatal burn injuries (69.6%) and non-fatal burn injuries (61.8%). Among persons in the general population who attempted suicide by all methods, on the other hand, 80.5% of those who died were male, whereas only 46.2% of non-fatalities were male. In addition, as we demonstrated in an earlier publication (25) there are important age differences across methods. The risk of suicide by burning was highest in population-based estimates between the ages of 30 and 59 years (odds by decile of age compared to 18-29 years, 1.47 to 1.82) whereas risk by all methods was highest for ages 70 and older (odds, 1.26 to 1.55).

These patterns, along with admittedly incomplete diagnostic data for patients with psychiatric diagnoses in the ABA-NBR, led us to hypothesize that self-inflicted burn injury may be best characterized as an impulsive act and that psychotic and/or substance-related disorders are likely to be present in a substantial proportion of those who attempt suicide by

burning (25). This hypothesis contradicts conclusions from a recent review, which found that the most commonly reported diagnosis among patients with self-inflicted burn injuries is depression (1). No studies of reasonably large samples that used rigorous diagnostic or psychiatric autopsy methods (26) to document specific psychiatric disorders among patients with self-inflicted burn injuries, however, were included in the review. The few case series that have carefully documented psychiatric diagnoses in small samples of patients with self-inflicted burns (N = 14 to15) have indeed found that the majority had psychotic illnesses (27-29). More rigorous study of patients with self-inflicted burn injuries among a larger cohort, ideally from multiple centers, is needed to better understand the psychiatric background of these patients and other important issues.

The finding that patients with self-inflicted injuries were not at greater risk of mortality after propensity score matching across demographic, clinical, and burn injury variables is contrasted with findings from 2 previous studies that found an association between self-inflicted burns and greater mortality risk (5,9). One of these studies, however, included too few patients with self-inflicted injuries to reliably estimate mortality risk using the statistical methods that it employed (9), and the other study used a statistical control paradigm that only considered age category and total TBSA burned (5). It is possible that results from these studies may have reflected characteristics of single burn centers and very small samples. It is also feasible that, compared to these studies, the propensity score matching paradigm used in the present study more completely controlled for factors other than the self-inflicted nature of the injury that may have contributed to mortality risk.

The results reported here related to length of stay were concordant with those from a study of 185 patients with self-inflicted injuries who were compared to a matched sample

of psychiatric patients with accidental injuries, adjusting for age and TBSA (6), but differed from two smaller studies of 57 (10) and 36 (11) patients with self-inflicted injuries that reported significantly longer lengths of stay compared to patients with accidental injuries. One of these studies (11) excluded patients with psychiatric disorders from the control group, which may have confounded issues related to self-harm and factors related to a psychiatric history regardless of the etiology of the burn injury.

We were surprised to find that patients with self-inflicted injuries were not at greater risk of death and did not require longer hospitalizations compared to similar patients whose burns were not self-inflicted. Managing patients with psychiatric problems and self-injurious behavior is complex. Patients often require acute psychiatric care and may present with difficult behaviors related to poor motivation and treatment non-compliance, disruptiveness, or ongoing self-harm (3, 30). Previous studies that have reported greater lengths of stays for patients with self-inflicted burn injuries may have confounded factors related to psychiatric disorder and factors independently related to self-injury. Studies that have explicitly matched patients for the presence of psychiatric disorder, including our study and a study by van de Does et al. (6) have not found that patients with self-inflicted burn injuries fare any worse than comparable patients whose injuries are not self-inflicted.

There are limitations that should be taken into consideration in interpreting the results from this study. The data are from a large registry, and are to some degree less accurate than data gathered using other methods. Patient comorbidity and injury variables, such as TBSA burned or the presence or absence of inhalation injury, were extracted by chart review, and diagnoses were documented with ICD-9 coding from data in charts rather than by more precise methods. Data collected in large registries that are based on chart

review of medical records may under document relevant medical comorbidities (12, 31). Failure to include all cases with a given comorbidity would be expected to only minimally bias the estimates of odds ratios in a study of mortality risk (23). Under-documentation would, however, render estimates of prevalence meaningless. We suspect that psychiatric diagnoses are under-reported in the ABA-NBR since the 23% prevalence among patients with self-inflicted injuries reported is well below the rate reported in any other single study (1).

An additional limitation is that differences in mortality across burn care centers related to differences in standard burn management or differences in patient characteristics were not explicitly incorporated into the analysis. The ABA-NBR does not include data on important factors that may differ across centers, such as time from burn to admission or fluid resuscitation. To the extent that a large number of burn centers were included in the current study, however, it is not unreasonable to think that the results of this study are representative of typical patterns across burn centers in the United States.

Health care professionals charged with caring for patients with self-inflicted burn injuries may be skeptical about the benefits of an expensive and lengthy treatment with likely long-term disability and may assume that they are treating the injuries against the patient's will (32-34). Indeed, it is well known that a high proportion of survivors of non-fatal self-inflicted injuries repeat their self-harming behaviors and that many die by suicide (35). Negative attitudes towards patients with self-inflicted injuries, including irritation and less-willingness to help, have been documented among physicians and nurses (36-40), particularly when patients are perceived to have had control over their actions or are perceived to have had manipulative intent (39). Negative attitudes may be less pronounced

among nurses than among physicians (39), and some studies have found that nurses are generally supportive (41-43).

Physicians and nurses may often misunderstand factors that lead to serious self-harm injuries. A study by Schnyder et al. (38), for example, found that “loss of control” was reported as an important factor by 3 of 4 patients following a suicide attempt, but only recognized as a possible reason by 2 of 5 physicians and nurses. In contrast, reasons aimed at influencing others were rejected by most patients, but mentioned frequently by doctors and nurses.

It is also possible that, based on re-attempt data for all self-harm, physicians and nurses may also underestimate the potential for patients with self-inflicted burn injuries to recover well. No studies have investigated subsequent self-injury among patients with self-inflicted burn injuries. One study, however, followed a sample of 35 patients with severe multiple blunt trauma following suicide attempt from similarly violent mechanisms, primarily leaps from substantial heights or in front of trains, for an average of 6.1 years and reported that there were no subsequent attempts (33, 34). It may be that this was because, similar to burning, these were impulsive actions driven by chaotic thinking rather than a calculated will to die. Another important factor is that all patients in this study received psychiatric examination, diagnosis, and treatment on the intensive care unit as soon as their medical condition permitted and were followed regularly by the attending psychiatrist. Patients in the study also indicated that the support and dedication of personnel involved in their care was an important motivating factor. Thus, although recommendations for pharmacological and/or behavioral interventions must be patient-specific, these results suggest that the early involvement of psychiatric consultation liaison services and

aggressive psychiatric treatment can improve results even in severely injured patients (32). Furthermore, they emphasize the need to strengthen training for physicians and nurses in emergency departments and critical care units to facilitate empathetic care and provide support for a difficult task. One study found that a 6-hour educational and training program for nursing personnel affected positive attitudinal changes and that these changes were maintained at a 6-month follow-up evaluation (44), suggesting that cost-effective intervention is feasible.

CONCLUSIONS

Patients with self-inflicted burn injuries have more extensive injuries, are more likely to incur an inhalation injury, are more likely to die, and, among survivors, tend to require significantly longer ICU and total hospital stays than patients whose injuries are not self-inflicted. After matching for demographic, clinical, and burn injury variables, however, there are no significant differences in mortality risk or length of stay between patients whose injuries are self-inflicted and patients whose injuries are not self-inflicted. Future research is needed that includes larger samples from multiple centers and rigorous diagnostic methodologies to better understand the characteristics of patients with self-inflicted injuries, as well as to determine best-practice management and follow-up protocols.

ACKNOWLEDGMENTS

The National Burn Repository of the American Burn Association is the source of the data contained in this document. The conclusions and opinions derived from National Burn Repository data represent the authors' views and are not necessarily those of the American Burn Association. No outside funding was received for this study.

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Table 1. Demographic, Clinical and Burn Injury Characteristics

		Pre-Propensity Score Matching		Post-Propensity Score Matching	
	Self-Inflicted Injuries (n=593)	Non Self-Inflicted Injuries (n=29,789)	*P* value	Non Self-Inflicted Injuries (n=593)	*P* value
Age, *mean years* (*SD)*	39.1 (13.2)	43.4 (17.3)	<.01	39.3 ± 15.2	.73
Female gender, *n* (%)	200 (33.7)	8051 (27.0)	<.01	188 (31.7)	.46
White, *n* (%)	406 (68.5)	19554 (65.6)	.15	395 (66.6)	.50
Total TBSA, *mean % (SD)*	32.0 (28.2)	12.8 (15.6)	<.01	34.1 ± 28.5	.21
FT-TBSA, *mean % (SD)*	20.6 (28.3)	4.9 (12.5)	<.01	21.9 ± 29.0	.45
Inhalation injury *n* (%)	221 (37.3)	3803 (12.8)	<.01	247 (41.7)	.12
Fire/Flame or inhalation, *n* (%)	556 (93.8)	19074 (64.0)	<.01	561 (94.6)	.54
Alcohol abuse, *n* (%)	76 (12.8)	1690 (5.7)	<.01	76 (12.8)	1.00
Cardiac arrhythmias, *n* (%)	11 (1.9)	587 (2.0)	.84	17 (2.9)	.25
Cerebrovascular disease, *n* (%)	0 (0.0)	102 (0.3)	.27	5 (0.8)	.06
Chronic pulmonary disease, *n* (%)	22 (3.7)	1530 (5.1)	.12	30 (5.1)	.26
Congestive heart failure, *n* (%)	4 (0.7)	467 (1.6)	.08	5 (0.8)	.74
Dementia, *n* (%)	3 (0.5)	80 (0.3)	.22	3 (0.5)	1.00
Diabetes mellitus, *n* (%)	16 (2.7)	1306 (4.4)	.05	18 (3.0)	.73
Drug abuse, *n (%)*	67 (11.3)	923 (3.1)	<.01	68 (11.5)	.93
HIV/AIDS, *n* (%)	2 (0.3)	61 (0.2)	.35	2 (0.3)	1.00

Hypertension, *n* (%)	33 (5.6)	2886 (9.7)	<.01	36 (6.1)	.71
Hypothyroidism, *n* (%)	3 (0.5)	269 (0.9)	.31	10 (1.7)	.05
Liver disease, *n* (%)	8 (0.3)	167 (0.6)	.02	6 (1.0)	.59
Metastatic cancer, *n* (%)	0 (0.0)	44 (0.1)	.42	2 (0.3)	.50
Non-metastatic malignancy, *n* (%)	1 (0.2)	130 (0.4)	.53	3 (0.5)	.37
Obesity, *n* (%)	8 (1.3)	371 (1.2)	.82	8 (1.3)	1.00
Old myocardial infarction, *n* (%)	3 (0.5)	257 (0.9)	.35	5 (0.8)	.73
Other neurological disorders, *n* (%)	8 (1.3)	462 (1.6)	.69	7 (1.2)	.80
Paralysis, *n* (%)	2 (0.3)	206 (0.7)	.45	1 (0.2)	.56
Peptic ulcer disease, *n* (%)	1 (0.2)	127 (0.4)	.53	2 (0.3)	.56
Peripheral vascular disease, *n* (%)	2 (0.3)	190 (0.6)	.60	3 (0.5)	.69
Psychiatric diagnosis, *n (%)*	137 (23.1)	723 (2.4)	<.01	119 (20.1)	.20
Pulmonary circulation disorders, *n* (%)	0 (0.0)	53 (0.2)	.63	1 (0.2)	.50
Renal disease, *n* (%)	2 (0.3)	172 (0.6)	.78	1 (0.2)	.56
Rheumatologic disease, *n* (%)	2 (0.3)	104 (0.3)	.96	0 (0.0)	.50
Valvular disease, *n* (%)	4 (0.7)	111 (0.4)	.29	2 (0.3)	.69

FT-TBSA = % total body surface area burned, full thickness; TBSA = % total body surface area burned.

Table 2. Mortality and Length of Stay of Patients Admitted with Self-Inflicted Injury (n = 593) Compared to All Other Patients (n = 29,789) and to a Matched Sample of Patients with non Self-Inflicted Injuries (n = 593)

	Self-Inflicted Injury (n=593)	**Non Self-Inflicted Injury Pre-Match (n = 29,789)**	**Odds Ratio (95% CI) Pre-Match**	***P* value**	**Non Self-Inflicted Injury Post-Match (n = 593)**	**Odds Ratio (95% CI) Post-Match**	***P* value**
Mortality, *n* (%)	140 (23.6)	2012 (6.8)	4.27 (3.51 – 5.19)	<.01	137 (23.1)	1.03 (0.79 – 1.35)	.84

	Self-Inflicted Injury (n=593)	**Non Self-Inflicted Injury Pre-Match (n = 29,789)**	**Difference Pre-Match**	***P* value**	**Non Self-Inflicted Injury Post-Match (n = 593)**	**Difference Post-Match**	***P* value**
Length of Stay – ICU, *median days (interquartile range)**	4 (0 to 29)	0 (0 to 2)	4	<.01	3 (0 to 26)	1	.75
Length of Stay – Total, *median days (interquartile range)**	23 (9 to 44)	8 (2 to 17)	15	<.01	18 (6 to 49)	5	.50

ICU = intensive care unit; 95% CI = 95% confidence interval.

* Kaplan-Meier estimated median and interquartile range.

Appendix 1

ICD-9-CM Codes of Comorbidities

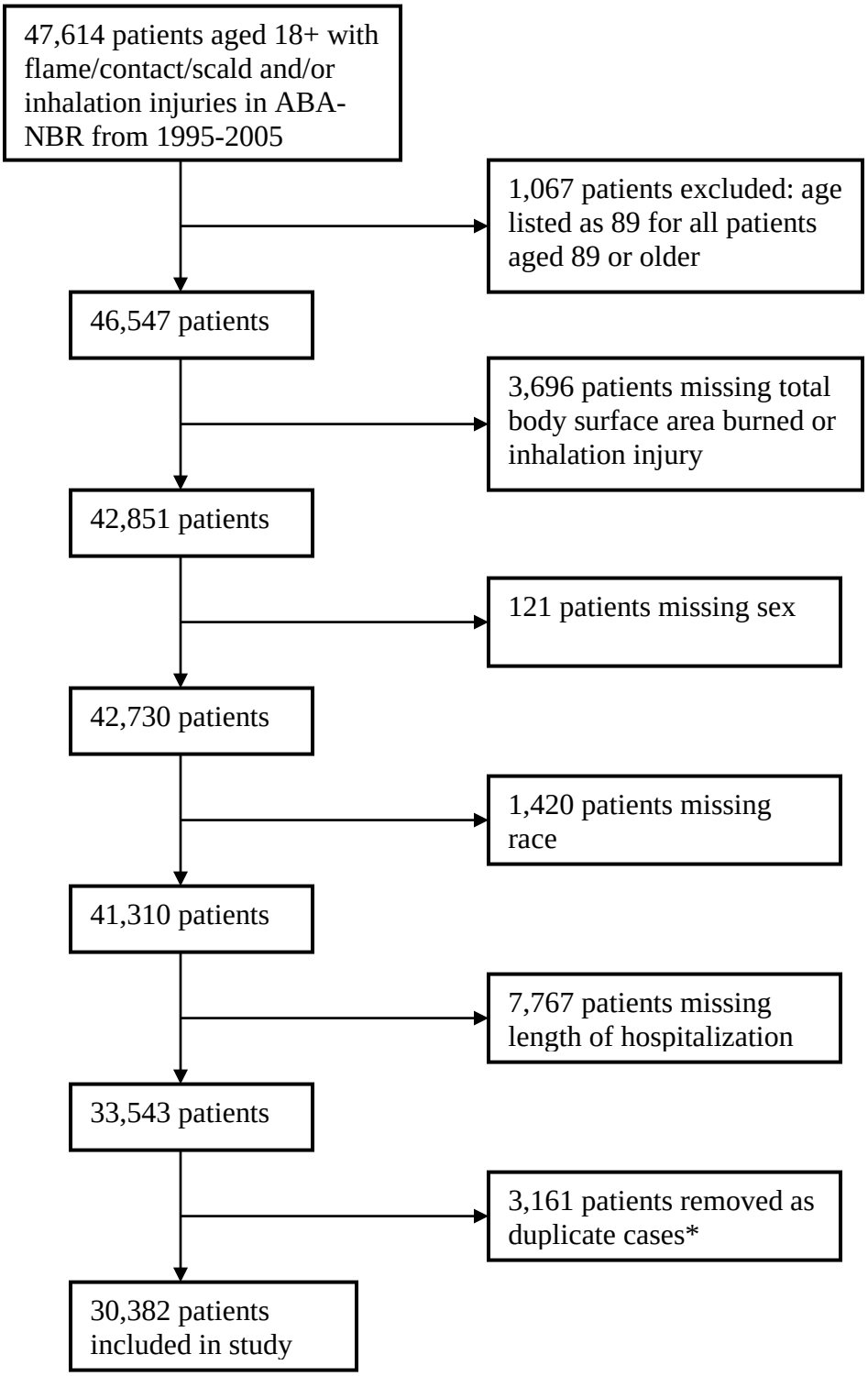
Comorbidity	ICD-9-CM Codes
Alcohol abuse	291.1, 291.2, 291.5, 291.8, 291.9, 303.90-303.93, 305.00-305.03, V113
Cardiac arrhythmias	426.10, 426.11, 426.13, 426.2-426.53, 426.6-426.89, 427.0, 427.2, 427.31, 427.60, 427.9, 785.0, V45.0, V53.3
Chronic pulmonary disease	490-496, 500-505, 506.4
Congestive heart failure	398.91, 402.11, 402.91, 404.11, 404.13, 404.91, 404.93, 428.0-428.9
Dementia	290-290.9
Diabetes	250-250.33, 250.40-250.73, 250.90-250.93
Drug abuse	292.0, 292.82-292.89, 292.9, 304.00-304.93, 305.20-305.93
HIV/AIDS*	042
Hypertension	401.1, 401.9, 402.10, 402.90, 404.10, 404.90, 405.11, 405.19, 405.91, 405.99
Hypothyroidism	243-244.2, 244.8, 244.9
Cerebrovascular disease	438.0
Liver disease	070.32, 070.33, 070.54, 456.0, 456.1, 456.20, 456.21, 571.0, 571.2, 571.3, 571.40-571.49, 571.5, 571.6, 571.8, 571.9, 572.2-572.8, V42.7
Metastatic cancer†	196.0-199.1
Non-metastatic malignancy†	140-172.9, 174-195.8, 200-208.9, 238.6, 273.3, V10.00-V10.9
Obesity	278.0
Old myocardial infarction	412.0
Other neurological disorders	331.9, 332.0, 333.4, 333.5, 334.0-335.9, 340, 341.1-341.9, 345.00-345.11, 345.40-345.51, 345.80-345.91
Paralysis	342.0-342.12, 342.9-344.9

Peptic ulcer disease	531-534.9, V12.71
Peripheral vascular disease	440.0-440.9, 441.2, 441.4, 441.7, 441.9, 443.1-443.9, 447.1, 557.1, 557.9, V43.4
Psychiatric diagnosis	295.0-295.9, 296.0, 296.2-298.9
Pulmonary circulation disorders	416.0-416.9, 417.9
Renal disease	403.11, 403.91, 404.12, 404.92, 582-582.9, 583-583.7, 585, 586, 588-588.9, V42.0, V45.1, V56.0, V56.8
Rheumatologic disease	701.0, 710.0-710.9, 714.0-714.9, 720.0-720.9, 725
Valvular disease	093.20-093.24, 394.0-397.1, 424.0-424.91, 746.3-746.6, V42.2, V43.3

*Excludes asymptomatic HIV infection status.
† If both solid tumor without metastatis and metastatic cancer are present, only metastatic cancer is counted.

Appendix 2.

Exclusions Due to Missing Data.



* Based on equivalent data for all items, including percent burned for each of 19 different areas of bo