DEATHS AND INJURIES DUE TO NON-FIRE BURNS

John R. Hall, Jr.

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National Fire Protection Association
Fire Analysis and Research Division

Abstract

In 2003-2007, an estimated 224,200 burn injuries were reported to hospital emergency rooms, of which 193,900 (86%) had no fire involvement. In 2005, 102 people died of unintentional injuries due to contact with hot objects and substances.

Keywords: Burn, injury, death, statistics.

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National Fire Protection Association
One-Stop Data Shop
1 Batterymarch Park
Quincy, MA 02169-7471
www.nfpa.org
e-mail: osds@nfpa.org
phone: 617-984-7443

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Deaths and Injuries Due to Non-Fire Burns

In 2003-2007, an estimated 224,200 burn injuries – 30,300 with fire involvement and 193,900 (86%) without fire involvement – were reported to hospital emergency rooms. Thermal burns account for just over half (54%) of total burns, just under half (47%) of burns without fire involvements, and nearly all (95%) burns with fire involvement. (See Table 1.) These statistics are derived from the U.S. Consumer Product Safety Commission's National Electronic Injury Surveillance System (NEISS), a sample of U.S. hospital emergency rooms.

Thermal burns not caused by fire effects can be caused by contact with hot objects such as space heaters, stove burners, or clothes irons. Scald burns can be caused by any hot liquid, fluid, or vapor, including hot tap water, overheated beverages, steam, and hot oil. "Radiation" burns rarely involve radiation but include sunburn and flash burns to eyes, the latter involving causes such as welding without use of eye protection.

Table 1. Burn Injuries, by Type of Burn
With or Without Fire Involvement
Annual Average of 2003-2007 Injuries Reported to Hospital Emergency Rooms

Type of Injury	All Burn Injuries		With Fire Involvement		Without Fire Involvement	
Thermal burns	120,400	(54%)	28,700	(95%)	91,700	(47%)
Scald burns	63,700	(28%)	1,100	(3%)	62,700	(32%)
Chemical burns	20,900	(9%)	300	(1%)	20,600	(11%)
Radiation burns	14,600	(6%)	100	(0%)	14,500	(7%)
Electrical burns	3,300	(1%)	100	(0%)	3,100	(2%)
Unknown type burns	1,400	(1%)	100	(0%)	1,300	(1%)
Total burns	224,200	(100%)	30,300	(100%)	193,900	(100%)

Emergency room burn injuries of all types generally declined from 1997 to 2007, after allowing for expansion of the data base from consumer-product-related injuries to all injuries in 2000-2001. (See Table 2.)

From 1965-1967 to 1991-1993, the estimated number of medically attended burn injuries per year declined by about half, from 1,932,000 to 1,073,000.
These statistics are estimated from the National Health Interview Survey (NHIS), a home in-person survey conducted by the National Center for Health Statistics. (See Table 3.) "Medically attended" injuries are injuries that were brought to the attention of some medical professional, whether or not treatment was received. The NHIS is not subject to the under-reporting that affects statistics limited to injuries reported to a fire department or the previously cited burn injury statistics based on reports to hospital emergency rooms.

The 1991-1993 analysis results were provided to the author by telephone but were never published. The most recent analysis, also not yet published and provided to the author by telephone, was conducted in 2000-2003 and estimated 318,000 injuries. However, this sharp decline probably reflected use of a much longer recall period, which would be expected to result in much greater under-reporting.

Table 2. Burn Injuries Reported to Hospital Emergency Rooms

A. All Injuries Regardless of Fire Involvement

Type of Injury	1997	1998	1999	2000	2001	2002
Thermal burns	127,600	133,500	133,000	131,900	129,300	128,500
Scald burns	61,600	69,000	67,000	69,400	75,900	67,600
Chemical burns	27,100	30,100	30,400	28,400	29,100	25,900
Radiation burns	10,400	11,300	11,100	10,800	14,800	14,500
Electrical burns	6,300	5,500	4,600	4,800	4,600	3,900
Unknown type burns	3,500	2,600	2,100	3,300	2,900	2,700
Total burns	236,400	252,000	248,300	248,600	256,600	243,200

Type of Injury	2003	2004	2005	2006	2007
Thermal burns	122,900	125,200	115,800	119,400	118,800
Scald burns	62,400	68,300	65,400	63,100	59,600
Chemical burns	23,000	21,600	20,400	21,000	18,300
Radiation burns	15,600	15,900	15,400	12,900	13,100
Electrical burns	2,900	3,600	3,600	3,500	2,800
Unknown type burns	2,200	600	1,600	1,100	1,500
Total burns	229,000	235,200	222,100	220,900	214,000

B. Injuries With Fire Involvement

Type of Injury	1997	1998	1999	2000	2001	2002
Thermal burns	24,300	27,400	26,700	27,100	27,900	30,600
Scald burns	1,300	1,400	1,300	900	2,200	1,600
Chemical burns	200	300	500	600	300	300
Radiation burns	100	100	200	200	200	100
Electrical burns	200	0	100	100	0	300
Unknown type burns	100	0	100	100	200	200
Total burns	26,300	29,200	28,900	29,100	30,800	32,900

Type of Injury	2003	2004	2005	2006	2007
Thermal burns	28,900	31,000	27,600	27,700	28,400
Scald burns	1,600	1,000	900	1,000	1,100
Chemical burns	400	300	200	500	100
Radiation burns	100	100	100	0	0
Electrical burns	200	200	200	100	0
Unknown type burns	100	0	200	100	0
Total burns	30,800	32,600	29,100	29,400	29,700

Table 2. Burn Injuries Reported to Hospital Emergency Rooms (Continued)

C. Injuries Without Fire Involvement

Type of Injury	1997	1998	1999	2000	2001	2002
Thermal burns	103,300	106,100	106,400	104,800	101,400	97,900
Scald burns	60,300	67,700	65,700	68,500	73,700	66,000
Chemical burns	26,800	29,800	29,900	27,800	28,800	25,700
Radiation burns	10,300	11,200	10,900	10,700	14,700	14,400
Electrical burns	6,100	5,500	4,500	4,700	4,600	3,700
Unknown type burns	3,500	2,600	2,000	3,200	2,700	2,500
Total burns	210,200	222,800	219,400	219,500	225,800	210,300

Type of Injury	2003	2004	2005	2006	2007
Thermal burns	94,000	94,200	88,200	91,700	90,400
Scald burns	61,200	67,200	64,500	62,200	58,400
Chemical burns	22,700	21,400	20,200	20,500	18,200
Radiation burns	15,500	15,800	15,300	12,900	13,000
Electrical burns	2,700	3,300	3,400	3,400	2,800
Unknown type burns	2,100	600	1,300	1,000	1,500
Total burns	198,200	202,500	193,000	191,600	184,300

Note: These are projections from a sample of U.S. hospital emergency rooms. The sample was changed in 1997, and that is why statistics on this table begin with that year. The data base was expanded in 2000-2001 to include all injuries, not just injuries involving consumer products, and much of the increase from 2000 to 2001 may reflect that change. A sample of 2003 radiation burn cases were nearly all flash burns to the eyes due to welding without the use of eye protection. Sunburn was also recorded as radiation burn. "Radiation" refers primarily to radiated heat, not to atomic radiation.

Source: National Electronic Injury Surveillance System (NEISS), queried on http://www.cpsc.gov.

Table 3. Medically Attended Burn Injuries, by Year Group

Year Group	Injuries per Year
1965-1967	1,932,000
1980-1981	1,615,000
1985-1987	1,614,000
1991-1993	1,073,000

Sources: *Types of Injuries, Incidence and Associated Disability, United States*: July 1965-June 1967, Series 10, No. 57, 1970; *Types of Injuries and Impairments Due to Injuries – United States*, Series 10, No. 159, 1986; *Types of Injuries by Selected Characteristics, 1985-1987*, Series 10, No. 175, 1990; advance data from John Gary Collins, U.S. Department of Health and Human Services, National Center for Health Statistics (NCHS), author of 1991-93 data analysis and previous two studies.

In 2005, 102 people received fatal unintentional injuries from contact with a hot object or substance.

This number is down by roughly half from 1980. (See Table 4.) Hot tap water accounted for the largest share (42%) of these fatal injuries in 2005. (See Figure 1.) For more discussion of thermal and scald burns involving cooking or food preparation, see Marty Ahrens et al., *Behavioral Mitigation of Cooking Fires Through Strategies Based on Statistical Analysis*, EME-2005-CA-0343, project report to U.S. Fire Administration, National Fire Protection Association, Quincy, MA, 2007.

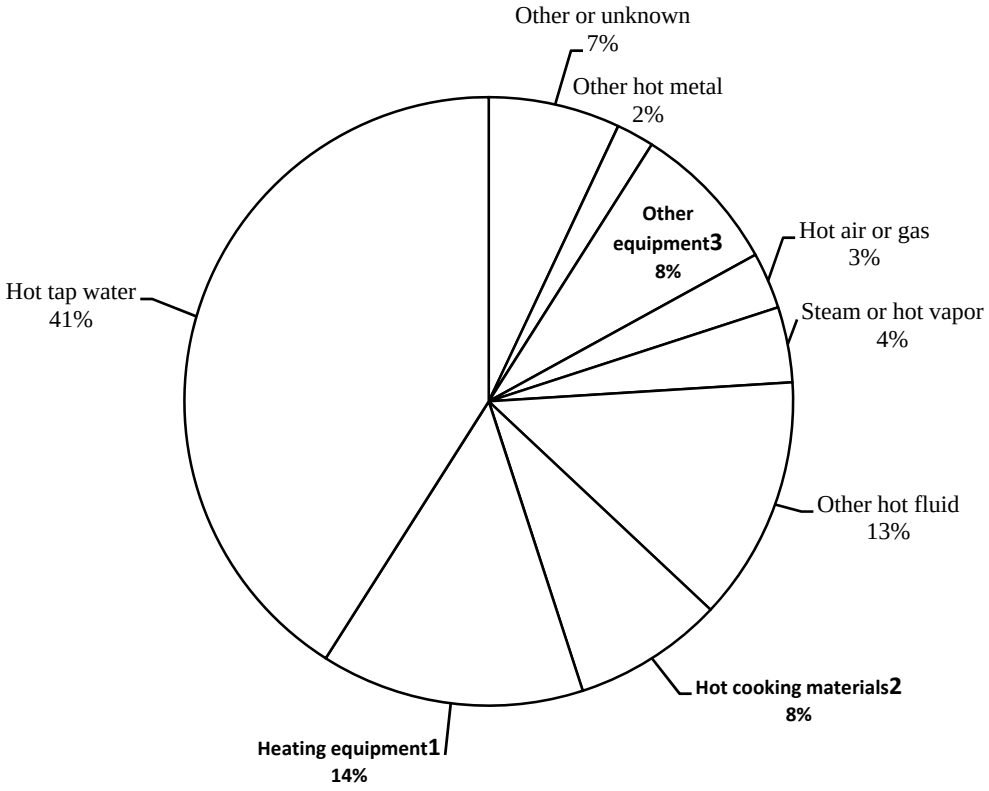
Table 4. Unintentional Injury Deaths Involving Contact with Hot Objects or Substances

Year	Total	Year	Total	Hot Tap Water
1980	194	1996	104	
1981	192	1997	111	
1982	154	1998	108	
1983	139	1999	123	51
1984	142	2000	110	55
1985	176	2001	114	57
1986	134	2002	102	40
1987	137	2003	88	26
1988	122	2004	93	30
1989	142	2005	102	43
1990	131			
1991	125			
1992	131			
1993	130			
1994	107			
1995	97			

Note: Corrosive substances are included.

Source: National Safety Council, *Accident Facts* and *Injury Facts*, 1981-2009 editions, 1121 Spring Lake Drive, Itasca, IL 60143; and http://www.cdc.gov/nchs.

Figure 1. Unintentional Injury Deaths Involving Contact with Hot Objects or Substances by Type of Object or Substance Annual Average of 2000-2004 Deaths



[1] Including pipes.
[2] Including beverages, food, fat, and cooking oil.
[3] Household equipment other than heating equipment.

Note: Corrosive substances are included.

Source: National Safety Council, *Accident Facts* and *Injury Facts*, 1981-2009 editions, 1121 Spring Lake Drive, Itasca, IL 60143; and http://www.cdc.gov/nchs.

Electrical current led to 398 unintentional-injury deaths in 2005.
None of the sub-categories of electric current deaths available through 1998 can still be separately tracked. (Statistics are taken from the national death certificate database.) Lightning deaths, which are counted separately, have generally declined over the past two decades. The years 2003-2005 represented three of the four lowest years in the 25 years studied, for both electric current deaths and lightning deaths.[4] See Table 5.

Table 5. Unintentional-Injury Deaths by Electrical Current

Year	Home Equipment	Industrial Equipment	Generating Plants or Distribution	Other or Unknown	Total*	Lightning
1980	177	106	122	690	1,095	94
1981	150	120	156	582	1,008	87
1982	151	89	150	589	979	100
1983	160	70	158	484	872	93
1984	148	68	215	457	888	91
1985	146	69	196	391	802	85
1986	150	89	182	433	854	78
1987	121	64	177	398	760	99
1988	122	75	165	352	714	82
1989	143	61	143	355	702	75
1990	100	54	160	356	670	89
1991	82	74	132	338	626	75
1992	66	37	139	283	525	53
1993	82	46	142	278	548	57
1994	84	42	144	291	561	84
1995	88	26	158	287	559	76
1996	66	15	135	266	482	63
1997	53	27	139	269	488	58
1998	59	27	144	318	548	63

Year	Electric Transmission Lines	Other or Unknown	Total*	Lightning
1999	127	310	437	64
2000	99	296	395	50
2001	83	326	409	44
2002	109	322	431	66
2003	96	280	376	47
2004	94	288	384	46
2005	105	293	398	48

* Lightning not included in total.

Note: The sub-categories used in coding changed in 1999 in such a way that only the total can be tracked from 1980 to 2005.

Source: National Safety Council, *Accident Facts* and *Injury Facts*, 1981-2009 editions, 1121 Spring Lake Drive, Itasca, IL 60143, and http://www.cdc.gov/nchs.

[4] For more information on home fire deaths involving electrical failure or lightning, see John R. Hall, Jr., *Home Electrical Fires*, NFPA Fire Analysis and Research Division, March 2009; and Marty Ahrens, *Lightning Fires and Lightning Strikes*, NFPA Fire Analysis and Research Division, January 2008.

Data Sources and Methodology

The national death certificate database, maintained by the U.S. National Center for Health Statistics (NCHS), is coded according to the International Classification of Diseases (ICD), which was substantially revised in 1999. These modifications changed the categories that can be used to analyze trends in deaths involving gases.

The U.S. Consumer Product Safety Commission (CPSC) maintains the National Electronic Injury Surveillance system (NEISS), which provides sample-based estimates of injuries reported to hospital emergency rooms.

NCHS also conducts the National Health Interview Survey every year. Estimates of the incidents of health conditions are sensitive to changes in definitions and to the length of the recall period used. Even with multiple years of data, there has not been enough data on burn injuries to support a published analysis since the 1980s.