

**UNITED STATES AIR FORCE
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Descriptive Analysis of Air Force Non-Fatal Suicide Events

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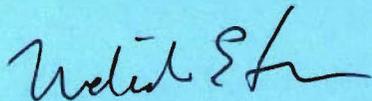
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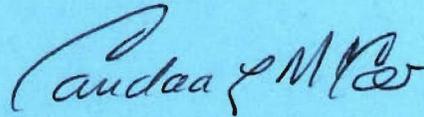
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14. ABSTRACT As a component of the Air Force Suicide Prevention Program, the Suicide Event Surveillance System (SESS) was developed in response to a peak in 1994 in the number of Active Duty Air Force (ADAF) suicides (16.4 per 100,000). The Suicide Event Surveillance System serves as the primary suicide event surveillance mechanism and is used to track all fatal and non-fatal suicide events (NFSE) that occur among Active Duty Air Force and related populations. Although all fatal suicides are reported, the purpose of this study is to assess the completeness and accuracy of non-fatal suicide event data in the Suicide Event Surveillance System. A listing of all non-fatal suicide events that occurred between 1 January 2003 and 30 June 2005 was exported from the Suicide Event Surveillance System and compared to outpatient and inpatient medical visit data. There was substantial variability and underreporting of non-fatal suicide events in all surveillance databases. Although the Suicide Event Surveillance System is the primary surveillance tool for suicide events, less than 60% of all recorded non-fatal suicide events were actually documented in this database. These results indicate that extreme caution should be exercised in utilizing and interpreting the non-fatal suicide event data in the Suicide Event Surveillance System, and highlight the need for improvement in non-fatal suicide event reporting.					
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DESCRIPTIVE ANALYSIS OF AIR FORCE NON-FATAL SUICIDE EVENTS

INTRODUCTION

Due to a peak in 1994 in the number of Active Duty Air Force (ADAF) suicides (16.4 per 100,000), a database was developed to track all suicide events occurring in ADAF and related populations. The Air Force Suicide Events Surveillance System (SESS) was implemented in January of 1999 with a second version following in July 2002 that included deployment information. SESS was placed on the AF Portal in August 2003 for web-based access by password-restricted users. Currently, SESS is designed to track suicide and non-fatal suicide events (NFSE). Various requests have been made to utilize the information available in SESS; however the release of NFSE data has been limited due to their questionable accuracy and completeness. This descriptive analysis was initiated to examine the extent of underreporting of NFSE in SESS.

METHODS

Forward Matching of SESS to Ambulatory Visits (Capture)

A listing of all NFSE that occurred between 1 January 2001 and 31 July 2005 was exported from SESS. Using each individual's Social Security Number (SSN), Family Member Prefix (FMP) and event date, the SESS data were matched with the Standard Ambulatory Data Record (SADR) database in order to acquire the International Classification of Disease, Ninth Revision (ICD-9-CM), including the External Cause of Injury (E) and Preventive Medicine (V) codes associated with each event. The SESS and SADR data were first matched on date of event. Matching records were excluded and the process repeated using SESS event date minus one day. Again matched records were removed and the remaining SESS events were sequentially matched and excluded in the following order: SESS event date minus two days, SESS event date minus three days, SESS event date plus one day, SESS event date plus two days, and SESS event date plus three days.

Both the SESS and SADR datasets were imported into Stata/SE 8.2 and individually compacted to remove duplicates so that a unique entry existed for each SSN, FMP, and event date. The two compacted datasets were then combined to consolidate the NFSE data available for each individual patient encounter. The SESS/SADR dataset, subsequently referred to as the Capture dataset, was then scrutinized for encounter dates, the date on which an individual was seen at a medical treatment facility, entered for the same SSN on consecutive days. For consecutive encounters assigned identical or similar ICD-9-CM codes, the entries were combined into one visit. Conversely, consecutive encounters assigned dissimilar ICD-9-CM codes were kept separate. With the exception of the E Codes extracted from SADR, the Capture dataset reflects the non-fatal suicide event information contained in SESS.

Use of E Codes to Identify Other Possible Non-Fatal Suicide Events (Recapture)

Using Microsoft SQL, the Standard Ambulatory Data Record (SADR) and Standard Inpatient Data Record (SIDR) databases were queried for outpatient and inpatient medical data, respectively. Due to limited availability, only data from January 2003 through November 2005 were used. Only visits that had been assigned an E code specifically associated with suicide or self-inflicted injury (E950-E959) were included in analysis. Refer to Appendix A for a complete suicide and self-inflicted injury E code listing.

Using Stata/SE 8.2 and Microsoft Excel, each dataset was individually compacted so that duplicates were removed and a unique entry existed for each SSN, FMP, and encounter date. For consecutive SADR visits that had been assigned identical or similar ICD-9-CM codes, the entries were combined into one visit. Conversely, consecutive visits assigned dissimilar ICD-9-CM codes were kept separate. Data were excluded from analysis if the SADR or SIDR entry matched a fatal event in SESS, or if the FMP was coded as “civilian emergency” or “all other”. The SADR and SIDR datasets were individually merged with the Capture dataset and duplicate entries were removed. This dataset will be subsequently referred to as the Recapture dataset. The Recapture dataset reflects the total number of independent NFSE entered into SESS, SIDR and SADR databases.

The Capture and Recapture datasets were used in succeeding analyses. Preliminary assessment revealed that only limited NFSE information was available prior to January 2003 and that due to potential delays in event reporting, data after June 2005 were of questionable completeness. Therefore, the analyzed data were limited to events that occurred between 1 January 2003 and 30 June 2005.

LIMITATIONS

The actual number of NFSE that occurred in the ADAF and related populations between 1 January 2003 and 30 June 2005 is unknown, precluding calculation of the exact percentage of NFSE that are entered into any of the surveillance databases used in this analysis.

Data were gathered from SIDR and SADR, the respective inpatient and outpatient medical records databases, using E codes specifically associated with suicide or self-inflicted injury. However, if a provider did not make this designation, the data would not be included in analysis, further limiting the validity of estimating the actual number of NFSE-related encounters that occurred in the ADAF and related populations.

Data from hospitals outside the military medical treatment facilities are not captured in SIDR. Since many military bases no longer have inpatient capability, the data from hospitalizations is therefore severely limited.

RESULTS

Matched Records

As described in Table 1, the Capture dataset contained 1089 NFSE and the Recapture dataset contained 1842 NFSE that occurred between 1 January 2003 and 30 June 2005. Table 2 illustrates the considerable variation in reporting to each surveillance database. Specifically, of the 1089 NFSE in the Capture dataset, 658 (60.4%) had a corresponding entry in SADR. When suicide event-related E Codes were used to extract data from SIDR and SADR, 770 NFSE were identified, of which 753 (97.8%) events were not reported into SESS. This indicates limited agreement of the information in surveillance databases, and more importantly, that less than 60% of documented NFSE are captured in SESS, the primary AF suicide event surveillance mechanism.

Table 1. Summary of Data Sources

Dataset	Sources	Description of Data Contents	NFSE
Capture	SESS, SADR	SESS events matched to SADR data +/- 1, 2, 3 days from event date	1089
Recapture	SESS, SADR, SIDR	SADR/SIDR pulled by E code in E950-E959 range and rematched to capture dataset	1842

Table 2. Summary of Data Contents

Dataset	Total NFSE	Data Contents	N(%)
Capture	1089	SESS Only	431 (39.6)
		SESS Matched with SADR	658 (60.4)
Recapture	1842	Capture Only	1072 (59.0)
		Outpatient (SADR) Only	724 (39.3)
		Inpatient (SIDR) Only	27 (1.5)
		SADR/SIDR	2 (0.1)
		Other ¹	17 (0.9)

¹ Various combinations of SESS with SADR and/or SIDR

Hospitalization

Using the E code range of values associated with NFSE (E950-959), 43 events were identified in the SIDR database. Only 14 (32.6%) of these events were matched with entries in SESS. Therefore, although 29 (67.4%) patients suffered an event serious enough to warrant hospitalization, none of them were entered into SESS. The length of hospital stay was examined as a possible explanation for the observed disparity, but significant differences were not identified. The median length of stay was 2 days for both matched and unmatched data with a range of 0-39 and 0-35 days, respectively.

Entry and Completion Dates

The SESS dataset includes variables pertaining to the NFSE date, date data entry was commenced and date data entry was completed. Overall, 935 (85.6%) of the 1089 events had a completion date. The median interval between event date and entry date was 7 days (mean=25.15, SD=50.5), while the median interval between entry date and completion date was 0 days (mean=11.28, SD=47.3). As the majority of

events in SESS include a delay in entry ranging from one day to more than a year, these data cannot be used for real-time monitoring of NFSE.

Comparison of NFSE Reporting by Base.

Table 3 provides a listing of the number of NFSE reported by each base between 1 January 2003 and 30 June 2005. Four bases did not report any events during this time period, and an additional 29 bases had at least one year in which no NFSE were recorded.

Table 3. Comparison of NFSE Reporting in SESS by Base

Location	2003	2004	2005	Total	Location	2003	2004	2005	Total
Air Force Academy	5	6	2	13	Laughlin AFB (AETC)		1		1
Altus AFB (AETC)	3	6	1	10	Little Rock AFB (AETC)	4	7	2	13
Andersen AFB (PACAF)	2	3	2	7	Los Angeles AFB (AFSPC)		1	1	2
Andrews AFB (AMC)	3	3	1	7	Luke AFB (AETC)	2	10	2	14
Aviano AB (USAFE)	1	6	1	8	Maccidill AFB (AMC)	9	4	1	14
Barksdale AFB (ACC)	2	3		5	Malmstrom AFB (AFSPC)	2	1	1	4
Beale AFB (ACC)	10	6	5	21	Maxwell AFB (AETC)		1		1
Bolling AFB (11WG)		3		3	Mcchord AFB (AMC)	9	7	1	17
Brooks City-Base (AFMC)		3		3	Mcconnell AFB (AMC)	7	3		10
Buckley AFB (AFSPC)	6	1	1	8	Mcguire AFB (AMC)				
Cannon AFB (ACC)					Minot AFB (ACC)	5	1		6
Charleston AFB (AMC)	4	8	4	16	Misawa AB (PACAF)	3		4	7
Columbus AFB (AETC)					Moody AFB (ACC)	4	2		6
Davis-Monthan AFB (ACC)	2			2	Mt Home AFB (ACC)	26	6		32
Dover AFB (AMC)	1			1	Nellis AFB (ACC)	6			6
Dyess Afb (ACC)	10	3		13	Offutt AFB (ACC)	28	12	4	44
Edwards AFB (AFMC)	2	4	2	8	Osan AB (PACAF)	15	8	3	26
Eglin AFB (AFMC)	14	8	9	31	Patrick AFB (AFSPC)	3	1	1	5
Eielson AFB (PACAF)	5	5	6	16	Peterson AFB (AFSPC)	3	3		6
Ellsworth AFB (ACC)	3	2		5	Pope AFB (AMC)	4	4	1	9
Elmendorf AFB (PACAF)		1	12	13	Ramstein AB (USAFE)	15	19	9	43
F. E. Warren AFB (AFSPC)	5	3	1	9	Randolph AFB (AETC)		2	1	3
Fairchild AFB (AMC)	8	4	4	16	Robins AFB (AFMC)	10	5		15
Goodfellow AFB (AETC)	18	9	5	32	Scott AFB (AMC)	6	5	6	17
Grand Forks AFB (AMC)	2	3	3	8	Seymour Johnson AFB (ACC)				
Hanscom AFB (AFMC)		1		1	Shaw AFB (ACC)	10	10	4	24
Hickam AFB (PACAF)	6	5		11	Sheppard AFB (AETC)	3	4	2	9
Hill AFB (AFMC)	8	1		9	Spangdahlem AB (USAFE)	1	4	2	7
Holloman AFB (ACC)	3	3	1	7	Tinker AFB (AFMC)	6	13	1	20
Hurlburt Field (AFSOC)	7	5	4	16	Travis AFB (AMC)	21	12	18	51
Incirlik AB (USAFE)	1			1	Tyndall AFB (AETC)	1	1		2
Kadena AB (PACAF)	5	3	5	13	Vance AFB (AETC)	1	1		2
Keesler AFB (AETC)	24	15	2	41	Vandenberg AFB (AFSPC)	2	1	1	4
Kirtland AFB (AFMC)	1		2	3	Whiteman AFB (ACC)	2	3	3	8
Kunsan AB (PACAF)	5	1	2	8	Wright-Patterson AFB (AFMC)	7	7	16	30
Lackland AFB (AETC)	41	26	2	69	Yokota AB (PACAF)			2	2
Lajes Field (USAFE)	4	1	1	6	Other	38	64	22	124
Lakenheath RAF (USAFE)	7	13	6	26	Unknown	9	9	3	21
Langley AFB (ACC)	3	13	2	18	Grand Total	482	410	197*	1089

* Only Jan - Jun 2005

Comparison of NFSE Recorded in SESS and SADR by Base

Table 4 compares the total number of NFSE entered into SESS and the additional number that were recorded only in SADR between 1 January 2003 and 30 June 2005. A total of 14 bases were excluded from further categorization because, over the two and a half year study period, less than five NFSE were indicated in *any* of the surveillance databases. Eleven bases reported less than 45% of their recorded NFSE into SESS. Although the majority of bases (N=41) recorded at least 66% of their NFSE into SESS, only ten installations had 100% reporting into SESS. The substantial variation in these numbers illustrates the differential reporting of NFSE, both into SESS and through the use of suicide event-related E code designations, that is occurring between installations across the Air Force.

Table 4. Comparison of NFSE Recorded in SESS and SADR by Base

AF Installation	NFSE recorded in SESS	NFSE recorded in SADR only	TOTAL Recorded NFSE	AF Installation	NFSE recorded in SESS	NFSE recorded in SADR only	TOTAL Recorded NFSE
Yokota AB (PACAF)	2	25	27	Mt Home AFB (ACC)	32	5	37
Nellis AFB (ACC)	6	39	45	Kadena AB (PACAF)	13	2	15
Elmendorf AFB (PACAF)	13	71	84	Robins AFB (AFMC)	15	2	17
Scott AFB (AMC)	17	67	84	Aviano AB (USAFE)	8	1	9
Andrews AFB (AMC)	7	23	30	Goodfellow AFB (AETC)	32	4	36
Davis-Monthan AFB (ACC)	2	5	7	F.E. Warren AFB (AFSPC)	9	1	10
Eglin AFB (AFMC)	31	68	99	Pope AFB (AMC)	9	1	10
Misawa AB (PACAF)	7	13	20	McConnell AFB (AMC)	10	1	11
Sheppard AFB (AETC)	9	16	25	Little Rock AFB (AETC)	13	1	14
Lackland AFB (AETC)	69	122	191	Fairchild AFB (AMC)	16	1	17
Whiteman AFB (ACC)	8	12	20	McChord AFB (AMC)	17	1	18
Barksdale AFB (ACC)	5	6	11	Travis AFB (AMC)	51	3	54
Air Force Academy	13	15	28	Andersen AFB (PACAF)	7		7
Wright-Patterson AFB (AFMC)	30	32	62	Beale AFB (ACC)	21		21
Hanscom AFB (AFMC)	1	1	2	Buckley AFB (AFSPC)	8		8
Luke AFB (AETC)	14	14	28	Edwards AFB (AFMC)	8		8
Patrick AFB (AFSPC)	5	5	10	Eielson AFB (PACAF)	16		16
Langley AFB (ACC)	18	17	35	Hickam AFB (PACAF)	11		11
Keesler AFB (AETC)	41	37	78	Hurlburt Field (AFSOC)	16		16
Holloman AFB (ACC)	7	6	13	Moody AFB (ACC)	6		6
Spangdahlem AB (USAFE)	7	6	13	Osan AB (PACAF)	26		26
Offutt AFB (ACC)	44	26	70	Ramstein AB (USAFE)	43		43
MacDill AFB (AMC)	14	7	21	Cannon AFB (ACC)		1	1
Vandenberg AFB (AFSPC)	4	2	6	Columbus AFB (AETC)		1	1
Ellsworth AFB (ACC)	5	2	7	Rhein-Mein AB (USAFE)		1	1
Tinker AFB (AFMC)	20	8	28	McGuire AFB (AMC)		2	2
Grand Forks AFB (AMC)	8	3	11	Seymour Johnson AFB (ACC)		4	4
Bolling AFB (11WG)	3	1	4	Incirlik AB (USAFE)	1	2	3
Hill AFB (AFMC)	9	3	12	Laughlin AFB (AETC)	1	1	2
Kirtland AFB (AFMC)	3	1	4	Tyndall AFB (AETC)	2	1	3
Minot AFB (ACC)	6	2	8	Vance AFB (AETC)	2	1	3
Dyess Afb (ACC)	13	4	17	Dover AFB (AMC)	1		1
Altus AFB (AETC)	10	3	13	Maxwell AFB (AETC)	1		1
Charleston AFB (AMC)	16	4	20	Los Angeles AFB (AFSPC)	2		2
Kunsan AB (PACAF)	8	2	10	Brooks City-Base (AFMC)	3		3
Malmstrom AFB (AFSPC)	4	1	5	Randolph AFB (AETC)	3		3
Shaw AFB (ACC)	24	6	30	Other	124	6	130
Lakenheath RAF (USAFE)	26	5	31	Unknown	21		21
Lajes Field (USAFE)	6	1	7				
Peterson AFB (AFSPC)	6	1	7				
				Grand Total	1089	724	1813

If at least 5 NFSE reported:

Excellent: >85% of NFSE reported in SESS
Good: 66-84% of NFSE reported in SESS
Average: 45-65% of NFSE reported in SESS
Inadequate: 26-44 % of NFSE reported in SESS
Poor: <25% of NFSE reported in SESS
Less than 5 total NFSE reported

Method Used Designations

Self-poisoning with solid or liquid substances (N=626, 60.2%) and cutting/piercing (N=313, 30.1%) were the most commonly reported NFSE methods in SESS. Only 140 (21.2%) of NFSE in the Capture dataset had both an E code and method designation. As described in Table 5, a substantial proportion of these entries (N=53, 37.9%) had E codes that did not correspond with the method reported in SESS. Cells in bold indicate agreement between SESS and the E code NFSE method designation.

Table 5. Comparison of Method Used Designations

Diagnosis	ICD-9-CM Code	Method Used As Entered in SESS						Total
		Cutting or Piercing	Firearm or Explosive	Hanging, Strangulation, or Suffocation	Poisoning by Vehicle Exhaust	Poisoning by Solid/Liquid Substance	Other	
Suicide and self-inflicted poisoning by solid or liquid substances	E950	3	1			63	2	67
Suicide and self-inflicted poisoning by gases in domestic use	E951							0
Suicide and self-inflicted poisoning by other gases and vapors	E952				1			1
Suicide and self-inflicted injury by hanging, strangulation, and suffocation	E953			1				1
Suicide and self-inflicted injury by submersion [drowning]	E954							0
Suicide and self-inflicted injury by firearms and explosives	E955					1		1
Suicide and self-inflicted injury by cutting and piercing instrument	E956	22				1		23
Suicide and self-inflicted injuries by jumping from high place	E957							0
Suicide and self-inflicted injury by other and unspecified means	E958	9				3		12
Late effects of self-inflicted injury	E959	2						0
Other E Code, not suicide or self-inflicted specific	Multiple codes	11				20		31
Total	--	47	1	1	1	88	2	140

Event Coding

The most commonly reported ICD-9-CM codes in both the Capture and Recapture datasets were unspecified neurotic disorder (300.9) and depressive disorder, not elsewhere classified (311). When the Capture dataset was stratified by ICD-9-CM codes, 10.4% had suicide event-related E code designation (E950-E959), 39.2% had a mental disorder related ICD-9-CM (290-319) or V code, and 10.8% had an ICD-9-CM, E code, or V code that did not relate to a mental disorder. Therefore, considering most of the reported ICD-9-CM codes were vague and non-descriptive and E codes were used so infrequently, it is unreliable to identify NFSE in the SIDR or SADR databases using only these coding systems.

Description of NFSE Reported in SESS

Based on the information available in SESS, 1089 NFSE occurred between 1 January 2003 and 30 June 2005. The vast majority of NFSE occurred in ADAF and related populations (N=969, 89.8%) and, more specifically, among the active duty member (N=856, 78.6%). Of the 856 records with a rank designation, the majority of NFSE occurred in enlisted personnel (N=813, 95.0%), with the median value being Senior Airman (E3). The majority of NFSE occurred in individuals ages 18-24 (N=673, 62.1%) and females, although only slightly (50.9%) A small number of were labeled as repeat NFSE (N=50, 4.8%).

CONCLUSIONS

There is substantial variability and underreporting of NFSE into the SESS, SADR and SIDR databases. Although SESS is the primary surveillance tool for suicide events in the AF, less than 60% of the recorded NFSE were actually documented in this database. This constitutes a significant hindrance to the prognostic and preventive capabilities of SESS.

While base closures, the high rate of patient and employee turnover in the military, and a true absence of NFSE may account for some of the observed reporting patterns, it is also apparent that NFSE are extremely underreported. This severely limits the value of NFSE in data in SESS because missing information may significantly influence any observed associations. Although they can be used to identify individuals and match them with other databases, these data should not be used on an aggregate level to report AF-wide statistics – these data are useful only for hypothesis generation. Furthermore, the results from any NFSE data requests are of questionable validity and must be interpreted in light of this significant limitation.

Proper medical coding is critical to identifying NFSE that have not been entered into SESS. In order to partially account for underreporting, SIDR and SADR databases can be queried for additional NFSE using suicide-related ICD-9-CM and E codes. However, the utility of these databases is also limited considering that appropriate and/or descriptive codes are often not provided, and that there are oftentimes discrepancies in the NFSE information available from each source.

RECOMMENDATIONS

SESS is the primary tracking tool for all suicide events in the Air Force. For it to be effectively used to monitor and ultimately prevent suicides, base-level guidelines should be implemented to promote and ensure standardized, timely and complete reporting of NFSE into SESS.

Providers both in clinic and Emergency Room settings should be counseled on how to correctly code visits or hospitalizations in order for appropriate NFSE designations to be made and these data to serve as a useful adjunct to what is contained within SESS.

Thorough epidemiologic assessments are needed to better understand the demographic and risk factors associated with NFSE. However, the current limitations of the SESS data mandate the use of additional data resources to achieve this end.

APPENDIX A
E CODES FOR SUICIDES AND SELF-INFLICTED INJURIES

Diagnosis	ICD-9-CM Code
SUICIDE AND SELF-INFLICTED INJURY () +Includes: injuries in suicide and attempted suicide self-inflicted injuries specified as intentional	E950-E959
Suicide and self-inflicted poisoning by solid or liquid substances	E950
Analgesics, antipyretics, and antirheumatics	E950.0
Barbiturates	E950.1
Other sedatives and hypnotics	E950.2
Tranquilizers and other psychotropic agents	E950.3
Other specified drugs and medicinal substances	E950.4
Unspecified drug or medicinal substance	E950.5
Agricultural and horticultural chemical and pharmaceutical preparations other than plant foods and fertilizers	E950.6
Corrosive and caustic substances Suicide and self-inflicted poisoning by substances classifiable to E864	E950.7
Arsenic and its compounds	E950.8
Other and unspecified solid and liquid substances	E950.9
Suicide and self-inflicted poisoning by gases in domestic use	E951
Gas distributed by pipeline	E951.0
Liquefied petroleum gas distributed in mobile containers	E951.1
Other utility gas	E951.8
Suicide and self-inflicted poisoning by other gases and vapors	E952
Motor vehicle exhaust gas	E952.0
Other carbon monoxide	E952.1
Other specified gases and vapors	E952.8
Unspecified gases and vapors	E952.9
Suicide and self-inflicted injury by hanging, strangulation, and suffocation	E953
Hanging	E953.0
Suffocation by plastic bag	E953.1
Other specified means	E953.8
Unspecified means	E953.9
Suicide and self-inflicted injury by submersion [drowning]	E954
Suicide and self-inflicted injury by firearms and explosives	E955
Handgun	E955.0
Shotgun	E955.1
Hunting rifle	E955.2
Military firearms	E955.3
Other and unspecified firearm Gunshot NOS Shot NOS	E955.4
Explosives	E955.5
Unspecified	E955.9
Suicide and self-inflicted injury by cutting and piercing instrument	E956
Suicide and self-inflicted injuries by jumping from high place	E957
Residential premises	E957.0
Other man-made structures	E957.1
Natural sites	E957.2
Unspecified	E957.9
Suicide and self-inflicted injury by other and unspecified means	E958
Jumping or lying before moving object	E958.0
Burns, fire	E958.1
Scald	E958.2
Extremes of cold	E958.3
Electrocution	E958.4
Crashing of motor vehicle	E958.5
Crashing of aircraft	E958.6
Caustic substances, except poisoning Excludes: poisoning by caustic substance (E950.7)	E958.7
Other specified means	E958.8
Unspecified means	E958.9
Late effects of self-inflicted injury	E959

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