A Comparison of Poisoned Patients at Military and Veterans Administration Hospitals

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Introduction

The state of California is home to greater than 168,000 active-duty military personnel, more than any other state in the United States of America[1]. Additionally, there are more than 2 million military veterans in California[2], many of whom utilise Veterans Administration hospitals for their healthcare[3]. Little, if any, has been published in the medical literature regarding poisoning in these potentially unique patient populations. It is not known whether the active-duty population differs from the veteran population in terms of frequency and types of toxicologic exposures. We sought to compare poisoned patients at military and Veterans Administration hospitals that were reported to the California Poison Control System in order to determine whether any differences exist between the two populations with respect to frequency or types of exposures, as well as age and gender distributions.

Methods

The University of California-San Francisco Committee on Human Research (CHR) approved this retrospective observational case series. A retrospective chart review of the California Poison Control System (CPCS) electronic database (Visual Dotlab, Madera, CA) for cases between January 1, 2013 and December 31, 2013 was performed. Hospital codes specific to military and Veterans Administration hospitals were used to identify patients who presented to these hospitals. Cases were assessed by the principal investigator only after removal of all patient identifiers. Inclusion criteria included patients ≥18 years of age who presented to either a military (MH) or Veterans Administration (VA) hospital within the state of California for suspected poisoning or toxic exposure. Exclusion criteria included inability to follow the patient to a known outcome.

Descriptive data collected included demographic data, type of exposure (e.g., oral, dermal, inhalational, ocular), number of substances exposed to, whether or not the exposure was intentional, outcome, and type of hospital (MH or VA). Medical outcomes were coded as no effect, minor effect ("minimally bothersome to the patient, symptoms resolve rapidly and usually involve skin or mucous membrane manifestations"), moderate effect ("more pronounced, more prolonged or more of a systemic nature than minor symptoms and usually some form of treatment is or would have been indicated"), major effect ("symptoms were life-threatening or resulted in significant residual disability or disfigurement") or death according to the criteria set forth by the American Association of Poison Control Centers (AAPCC)[4]. Coded outcomes were verified by the principal investigator to ensure that selected outcomes followed AAPCC criteria. All data abstracted were transcribed into a standardised Microsoft Excel 2011 for Mac (Microsoft, Redmond, WA) spreadsheet. Pearson's chi-square testing was used to compare differences between groups.

Results

A total of 500 cases meeting inclusion criteria were reported to the CPCS during 2013 (Table 1). Forty-one percent of MH patients were female, whereas only 13% of VA patients were female. A total of 280 MH exposures were recorded: 191 single-substance (SS) (68%) and 89 multiple-substance (MS). Mean age was 29.7 yr (range, 18-86 yr) in the SS group and 30.3 yr (range, 18-78 yr) in the MS group (p=NS). Eighty-four percent of MS exposures had suicidal intent, compared with 42% of SS exposures. A total of 220 VA exposures were recorded: 159 SS (72%) and 61 MS. Mean age was 53.3 yr (range, 21-90 yr) in the SS group and 48.6 yr (range, 21-72 yr) in the MS group (p=NS). Thirty-one percent of SS exposures had suicidal intent, compared with 49% of MS exposures. Likelihood of suicidal intent was significantly higher in MH patients for both SS [χ^2=44.1, p<0.001] and MS [χ^2=41.1, p<0.001] exposures.

Proportions of occupational and environmental single-substance exposures (inhalational, ocular, dermal, or bite/sting) were significantly higher in the MH group (57 pts, 29.8%) compared to the VA

Table 1.
Demographic, exposure, and outcome data of exposed patients.

	Military Hospitals (%), n=280	VA Hospitals (%), n=220	Total (%), n=500
SEX (χ_2 = 48.5; p<0.0001)			
Male	165 (58.9)	192 (87.3)	357 (71.4)
Female	115 (41.1)	28 (12.7)	143 (28.6)
AGE (years) (χ_2 = 7.9; p = 0.02)			
18-40	228 (81.4)	58 (26.4)	286 (57.2)
41-59	38 (13.6)	87 (39.5)	125 (25.0)
≥60	14 (5.0)	75 (34.1)	89 (17.8)
ROUTE OF EXPOSURE (χ_2 = 9.0; p = 0.11)			
Oral	215 (76.8)	190 (86.4)	405 (81.0)
Parenteral	6 (2.1)	6 (2.7)	12 (2.4)
Ocular	10 (3.6)	6 (2.7)	16 (3.2)
Inhalational	30 (10.7)	11 (5.0)	41 (8.2)
Dermatologic	6 (2.1)	3 (1.4)	9 (1.8)
Bite/Sting	11 (3.9)	4 (1.8)	15 (3.0)
OUTCOME (χ_2 = 4.7; p = 0.20)			
None	39 (13.9)	33 (15.0)	72 (14.4)
Minor	171 (61.1)	144 (65.5)	315 (63.0)
Moderate	53 (18.9)	38 (17.3)	91 (18.2)
Major	17 (6.1)	5 (2.3)	22 (4.4)
Death	0 (0.0)	0 (0.0)	0 (0.0)

group (24 pts, 15.1%) [χ^2=10.6, p=0.001]. Details of occupational and environmental exposures are listed in Table 2. There were 17 major (6.1%) and 53 moderate (18.9%) outcomes in the MH group, versus 5 major (2.3%) and 38 moderate (17.3%) outcomes in the VA group. No deaths were reported in either group.

Discussion

Occupational and environmental exposures were fairly common among military personnel; indeed, the proportion of occupational or environmental exposures was twice as high at MH compared to VA. Perhaps more significantly, the percentage of exposures due to suicidal intent was higher in patients attending MH compared to VA following both single- and multiple-substance exposures. Female patients accounted for a disproportionate number of MH exposures compared to their proportion within the military as a whole (41% vs. 15%)[5], whereas the number of VA patients who were female (13%) was more consistent with the veteran population as a whole (10%)[6]. However, many of the female patients presenting to MH may have been spouses of active-duty personnel. Due to the limitations of poison centre data, it is not possible to delineate which patients were active duty and which were civilian.

Some recent studies have suggested that both active-duty military personnel and military veterans may be at increased risk of suicidal ideation and suicide attempt[7-12]. However, other studies have found no increased risk of suicide [13, 14]. Our cohort demonstrated more intentional exposures with suicidal intent in patients attending MH compared to VA patients. The reasons for this are unclear; however, our data show a larger number of females in the MH patient group compared to the number of females in the VA patient group. This may be due in part to an increase in the number of active-duty female military personnel compared to the number of former military females currently utilising VA services. The vast majority of veterans from previous conflicts such as World War II, the Korean War, and the Vietnam War were male. These patients are now at an age where they are likely to utilise VA services more frequently than their younger cohort of former military members from the Gulf War and the wars in Afghanistan and Iraq.

Additionally, females generally attempt suicide more often than males in the so-called "gender paradox"

of suicide [15, 16]. These suicide attempts often include self-poisoning with medications or other substances and are usually non-fatal. This is in contrast to attempted suicide in males, which is often by violent means (e.g., self-inflicted gunshot wounds or other intentional traumatic injuries) and thereby more commonly fatal.

Our study has several limitations. This was a retrospective study, which limits the amount of data that we were able to retrieve from each case. Our data set covers only a single year, so it is possible that the incidence of various types of exposures (e.g., route of exposure, intentional vs. unintentional) is not reflective of their long-term incidence over time. Our study likely did not capture all toxic exposures evaluated in military or VA facilities, given that reporting of such cases by healthcare practitioners to CPCS is voluntary. By the same token, some military and VA patients may have presented to non-military/non-VA hospitals with poisonings, so it is likely that a proportion of our patient population was not captured for this reason.

In this data set, there appeared to be an increased incidence of attempted self-harm following intentional exposures in patients attending MH compared to VA, although a large number of suicidal exposures were also seen at VA. Our data suggest a need for increased identification and treatment of both MH and VA patients at risk for intentional self-harm via toxicologic methods.

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Table 2.

Substances recorded in occupational exposures.

	Military Hospitals	VA Hospitals
BITE/STING		
Centipede	1	0
Jellyfish	1	0
Parrot	1	0
Scorpion	4	0
Sculpin (fish)	0	1
Spider	2	1
Stingray	1	0
Venomous snake	1	2
INHALATIONAL		
Carbon monoxide	0	1
Ethylene oxide	0	2
Halogenated hydrocarbon	19	1
Industrial cleaner	3	7
Fuel	4	0
Pesticide	1	0
Other (unspecified)	3	0
OCULAR		
Caustics (acid/alkali)	2	1
Cyanoacrylate (Super glue)	1	0
Glyphosate (herbicide)	0	1
Hydrocarbons	6	4
Soap	1	0
DERMATOLOGIC		
Alkali	3	1
Hydrofluoric acid	0	1
Mercuric cyanate	0	1
Fuel	3	0

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