

Sex differences in patients with suicidal intent that are managed by toxicologists: An analysis of the Toxicology Investigators' Consortium (ToxIC) Registry

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Sex differences in patients with suicidal intent that are managed by toxicologists: An analysis of the Toxicology Investigators’ Consortium (ToxIC) Registry

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Background

- Females attempt suicide more frequently than males, but males complete it more frequently [1-3].
- While acute management is a large part of the management of an intentional overdose, many patients have a history of harmful use of medications or other substances, and underlying life stressors that led to substance use / suicidality [4,5].
- It is also important to consider sex differences in drug processing [6]; such as metabolic enzymes / transport proteins, volumes of distribution, and excretion rates [7,8].
- Furthermore, there are sex differences in psychological factors governing substance intake / exposure [9-11], as well as sex differences in risk tolerance [12,13].

Problem Statement

- We set out to characterize the differences in toxicological suicide attempts between men and women among adult patients with poisonings managed by medical toxicologists.

Methods

- This was an observational study of toxicological suicide attempts managed by toxicologists - to the exclusion of attempts that either did not result in hospitalization, or resulted in death prior to hospitalization.
- ToxIC database consults for adults aged 19-65 whose primary reasons for encounter were classified as suicide attempt were used for this study (1/2010-12/2016). Data used for analysis included primary agents of toxic exposure, routes of administration, and complications. The statistical analysis was limited to descriptive methods.
- Out of 51,440 registry cases, 33,259 cases remained for analysis after applying the ages 19-65 and removing those without complete data.

Results

Table 1 Demographics*				
Variable	Total N	Entire Sample (N = 4827)	Female (N = 2782)	Male (N = 2045)
Pregnancy Status	2782			
Pregnant			40 (1.4)	-
Not Pregnant			2742 (98.6)	-
Race	4178			
American Indian/Alaska Native		41 (1.0)	16 (0.7)	25 (1.4)
Asian		93 (2.2)	65 (2.7)	28 (1.6)
Australian Aboriginal		0	0	0
Black/African		500 (12.0)	273 (11.3)	227 (12.8)
Caucasian		2385 (57.1)	1387 (57.6)	998 (56.3)
Native Hawaiian or Pacific Islander		9 (0.2)	6 (0.2)	3 (0.2)
Mixed		24 (0.6)	15 (0.6)	9 (0.5)
Other		155 (3.7)	78 (3.2)	77 (4.3)
Unknown/Uncertain		970 (23.2)	585 (23.5)	485 (22.9)
Multiple Races		1 (0.02)	1 (0.04)	0
Hispanic/Latino	4178			
Yes		356 (8.5)	196 (8.1)	160 (9.0)
No		2820 (67.5)	1636 (68.0)	1184 (66.8)
Unknown		1002 (24.0)	574 (23.9)	428 (24.2)

Of the 4827 suicide attempts, 2782 were females (57.6%), and 2045 were males (42.4%). The demographics for the total number of suicide attempts of patients aged 19–65 overall and classified by sex can be found in Table 1 (above).

Table 2 Suicide Attempt Info* N(%)				
Variable	Total N	Entire Sample (N = 4827)	Female (N = 2782)	Male (N = 2045)
Pharmaceutical Suicide Attempt		4612 (95.5)	2718 (97.7)	1894 (92.6)
Nonpharmaceutical Suicide Attempt		215 (4.5)	64 (2.3)	151 (7.4)
Single or Multiple Exposure?	4692			
Single Exposure		2304 (49.1)	1326 (48.9)	978 (49.4)
Multiple Exposure		2388 (50.9)	1385 (51.1)	1003 (50.6)
Type of Exposure	4760			
Acute		3860 (81.1)	2211 (80.3)	1649 (81.4)
Chronic		22 (0.5)	10 (0.4)	12 (0.6)
Acute-on-chronic		809 (17.0)	473 (17.3)	336 (16.6)
Unknown		69 (1.4)	39 (1.4)	30 (1.5)
Agent #1 Class	4672			
Alcohol Ethanol		96 (2.1)	40 (1.5)	56 (2.8)
Alcohol Toxic		85 (1.8)	27 (1.0)	58 (2.9)
Amphetamine-like Hallucinogen		1 (0.02)	0	1 (0.1)
Anesthetic		912 (19.5)	587 (21.7)	325 (16.5)
Anticholinergic/Antihistamine		2 (0.04)	2 (0.1)	0
Anticoagulant		306 (6.5)	182 (6.7)	124 (6.3)
Anticonvulsant		38 (0.8)	17 (0.6)	21 (1.1)
Antidepressant		253 (5.4)	135 (5.0)	118 (6.0)
Antimicrobials		743 (15.9)	446 (16.5)	297 (15.1)
Antipsychotic		8 (0.2)	4 (0.1)	4 (0.2)
Cardiovascular		412 (8.8)	225 (8.3)	187 (9.5)
Cautic		317 (6.8)	182 (6.7)	135 (6.9)
Chemical		17 (0.4)	5 (0.2)	12 (0.6)
Chemotherapeutic & Immune		0	0	0
Cholinergic/Parasympathomimetic		17 (0.4)	13 (0.5)	4 (0.2)
Cough & Cold		0	0	0
Diabetic Med		20 (0.4)	9 (0.3)	11 (0.6)
Endocrine		106 (2.3)	55 (2.0)	51 (2.6)
Envenomation		5 (0.1)	2 (0.1)	3 (0.2)
Foreign Objects		0	0	0
Fungicide		0	0	0
Gases/Vapors/Irritants/Dust		11 (0.2)	1 (0.04)	10 (0.5)
GI		4 (0.1)	2 (0.1)	2 (0.1)
Herbal/Dietary Suppl/Vitamins		22 (0.5)	15 (0.6)	7 (0.4)
Herbicide		1 (0.02)	0	1 (0.1)
Household		24 (0.5)	10 (0.4)	14 (0.7)
Hydrocarbon		8 (0.2)	2 (0.1)	6 (0.3)
Insecticide		8 (0.2)	2 (0.1)	6 (0.3)
Lithium		100 (2.1)	55 (2.0)	45 (2.3)
Marine Toxin		0	0	0
Metals		19 (0.4)	16 (0.6)	3 (0.2)
Opioid		245 (5.2)	131 (4.8)	114 (5.8)
Other Non-pharmaceutical		4 (0.1)	1 (0.04)	3 (0.2)
Other Pharmaceutical		5 (0.1)	4 (0.1)	1 (0.1)
Parkinson's Med		0	0	0
Photosensitizing Agents		0	0	0
Plants & Fungi		4 (0.1)	2 (0.1)	2 (0.1)
Psychotropic		11 (0.2)	4 (0.1)	7 (0.4)
Pulmonary		0	0	0
Rodenticide		15 (0.3)	2 (0.1)	13 (0.7)
Sed-Hypnotic/Muscle Relaxant		729 (15.6)	407 (17.3)	262 (13.3)
Sympathomimetic		99 (2.1)	42 (1.6)	57 (2.9)
WMD/NBC/Riot		1 (0.02)	0	1 (0.1)
Unknown Agent		24 (0.5)	15 (0.6)	9 (0.5)
Route of Administration	4364			
Oral		4034 (92.4)	2326 (93.1)	1708 (91.5)
Inhalation		22 (0.5)	7 (0.3)	15 (0.8)
Parenteral		56 (1.3)	24 (1.0)	32 (1.7)
Intranasal		12 (0.3)	4 (0.2)	8 (0.4)
Dermal		3 (0.1)	2 (0.1)	1 (0.1)
Unknown		219 (5.0)	123 (4.9)	96 (5.1)
Rectal		2 (0.05)	1 (0.04)	1 (0.1)
Other		16 (0.4)	11 (0.4)	5 (0.3)

The breakdown of suicide attempts overall and by sex, and defined by pharmaceutical vs nonpharmaceutical, single vs multiple exposure, type of exposure, drug class of primary agent of toxicity and route of administration can be found in Table 2 (above). Males had a much greater frequency of nonpharmaceutical suicide attempts than females (7.4% vs. 2.3%).

Table 3 Complications* N(%)				
Variable	Total N	Entire Sample (N = 4827)	Female (N = 2782)	Male (N = 2045)
Major Vital Sign Abnormalities	3105			
Hypotension		273 (8.8)	152 (8.6)	121 (9.0)
Hypertension		27 (0.9)	11 (0.6)	16 (1.2)
Bradycardia		89 (2.9)	47 (2.7)	42 (3.1)
Tachycardia		409 (13.2)	239 (13.5)	170 (12.7)
Tachypnea		0	0	0
Bradypnea		67 (2.2)	34 (1.9)	33 (2.5)
Hypothermia		0	0	0
Hypothermia		0	0	0
None		2009 (64.7)	1145 (64.8)	864 (64.5)
Multiple Symptoms		231 (7.4)	138 (7.8)	93 (6.9)
Death	4489			
Yes		60 (1.3)	35 (1.4)	25 (1.3)
No		4429 (98.7)	2548 (98.6)	1881 (98.7)
Life Support Withdrawn	61			
Yes		31 (50.8)	21 (58.3)	10 (40.0)
No		22 (36.1)	11 (30.6)	11 (44.0)
Unknown		8 (13.1)	4 (11.1)	4 (16.0)
CPR	4827			
Yes		47 (1.0)	29 (1.0)	18 (0.9)
No		4780 (99.0)	2753 (99.0)	2027 (99.1)
ECMO	4827			
Yes		4 (0.1)	2 (0.1)	2 (0.1)
No		4823 (99.9)	2780 (99.9)	2043 (99.9)
Intubation/Ventilation	4827			
Yes		843 (17.5)	446 (16.0)	397 (19.4)
No		3984 (82.5)	2336 (84.0)	1648 (80.6)

A breakdown of suicide by symptomologies, completion, and lifesaving measures taken can be found in Table 3 (above). Among deaths, whether life support was withdrawn is also included.

Discussion

- Among 19–65-year-olds included in this study, females made up 57.6%, and males just 42.4%, of the cases whose toxic exposures were classified as suicide attempts.
- The completion rates of toxicological suicide attempts between the sexes (1.4% in females and 1.3% in males) were similar.
- Males were more likely to attempt suicide using alcohol as the primary agent of toxicity (2.8% in males vs. 1.5% in females).
- Our findings suggest that interventions such as prescribing smaller quantities of analgesics, sedative-hypnotics/muscle relaxants, and antidepressants may have advantage for at risk females.

Conclusions

- SELECT: The results affecting prescription considerations (as seen in the discussion above) relate to the Health Systems domain in terms of understanding how treatment decisions differentially impact different patient populations (i.e., different sexes). In addition, this relates to the Values-Based Patient Centered Care domain in that it highlights the importance of identifying risk factors in conversations about treatment plans with patients.
- Self-Directed Learning: This project was an opportunity to reflect on the course of a project from the proposal and planning stages, to producing finished materials ready for review.

REFERENCES

- Centers for Disease Control and Prevention. National Center for Injury Prevention and Control. Web-based Injury Statistics Query and Reporting System (WISQARS); 2017. www.cdc.gov/injury/wisqars.
- Suicide Statistics. American Foundation for Suicide Prevention; 2019. <https://afsp.org/about-suicide/suicide-statistics/>.
- Suicide in America: Frequently Asked Questions. NIH, National Institute of Mental Health. <https://www.nimh.nih.gov/health/publications/suicide-faq/index.shtml>
- Sinha R. Chronic stress, drug use, and vulnerability to addiction. Ann N Y Acad Sci 2008;1141:105–30. <https://doi.org/10.1196/annals.1441.030>.
- Conner KR, Houston RJ, Swogger MT, Conwell Y, You S, He H, et al. Stressful life events and suicidal behavior in adults with alcohol use disorders: role of event severity, timing, and type. Drug Alcohol Depend 2012;120(1–3):155–61. <https://doi.org/10.1016/j.drugalcdep.2011.07.013>.
- Vahter M, Gochfeld M, Casati B, Thiruchelvam M, Falk-Filipsson A, Kavlock R, et al. Implications of gender differences for human health risk assessment and toxicology. Environ Res 2007;104(1):70–84. <https://doi.org/10.1016/j.envres.2006.10.001>.
- Gandhi M, Aweke F, Greenblatt RM, Blaschke TF. Sex differences in pharmacokinetics and pharmacodynamicsAnnu Rev Pharmacol Toxicol 2004;44:499–523. <https://doi.org/10.1146/annurev.pharmtox.44.101802.121453>.
- Rademaker M. Do women have more adverse drug reactions? Am J Clin Dermatol 2001;2:349–51. <https://doi.org/10.2165/00028074.20010206000001>.
- Verma R, Balhara YP, Gupta CS. Gender differences in stress response: role of developmental and biological determinants. Ind Psych J 2011;20(1):4–10. <https://doi.org/10.4103/0972-6748.98407>.
- Kajantie E, Phillips DIW. The effects of sex and hormonal status on the physiological response to acute psychosocial stress. Psychoneuroendocrinology 2006;31(2):151–78. <https://doi.org/10.1016/j.psneuro.2005.07.002>.
- Becker JB, Hu M. Sex differences in drug abuse. Front Neuroendocrinol 2008;29(1):36–47. <https://doi.org/10.1016/j.ynme.2007.07.003>.
- Charness G, Gneezy U. Strong evidence for gender differences in risk taking. J Econ Behav Organ 2012;83(1):50–8. <https://doi.org/10.1016/j.jebo.2011.05.007>.
- Pawlowski B, Atwal R, Dunbar RM. Sex differences in everyday risk-taking behavior in humans. Evol Psych 2008;6(1):29–42. <https://doi.org/10.1177/147470490806000104>.