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Sex Differences in Adverse Drug Events in Older Adults: A Retrospective Review of National Poison Data System Cases 2007-2016

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BACKGROUND

Physiological, hormonal, and genetic differences between male and female patients may affect the rate of adverse drug events (ADE), with female patients experiencing higher drug concentrations and more ADEs, even after accounting for weight differences.

METHODS

National Poison Data System (NPDS) data were extracted for ADEs to single substance exposures in adults age 60 years and older, categorized as more serious (outcome = moderate, major, or death), between Jan 1, 2007 and December 31, 2016. Descriptive statistics, graphical displays, linear regression, and multivariate analysis of variance were performed for exposure year and sex (male versus female) using SAS JMP version 12.0.1 (Cary NC).

CONCLUSIONS

Among patients age 60 years and over with ADEs reported to the NPDS for 2007-2016, ADEs occurred in more females than males and increased over time for both. These results may guide both provider awareness, and efforts to prevent adverse drug events. More research is needed to determine the underlying reasons for increased ADEs in females versus males, with possible etiologies including lack of pharmaceutical research in female patients, increased susceptibility to ADEs, increased exposure to pharmaceuticals, and polypharmacy.

For 2007-2016, NPDS reported 105,548 single exposures with more serious outcomes among those age 60 years and over, including 59,410 females, 46,092 males, and 46 of unknown sex. Of the males and females, 17,034 were ADEs, of which 89.8% were associated with a drug, 2.9% with a food, and 7.3% with other. ADEs were consistently (p<0.0001) increasing over this decade at a rate of 3.5 to 4% per year. From the multivariate analysis, R² was 0.981, LogWorth for sex was 14.6 and year 9.61 (p<0.0001) with a female:male ratio of 1.53.

Fig. 1: Overlay Plot of Sex Differences in Adverse Drug Events in **Older Adults Over Time: A Retrospective Review of National Poison** Data System Cases from 2007-2016.



Adverse Drug Events Over Time	ADEs	Slope and 95% Confidence Interval			
	Mean/year	%/year	#/year	95% CI	Rsquare
Females	2,001	3.47%	69.4	[54.8 <i>,</i> 83.9]	0.938
Males	1,303	3.88%	50.5	[38.7, 62.3]	0.924
Males+Females	3,304	3.63%	119.9	[97.2, 143]	0.949

able 1: Sex differences in Adverse Drug Events in Older Adults Over Time: A Retrospective Review of National Poison Data System Cases from 2007-2016.



Fig. 3: Multivariate Regression Model Plot for Exposures/Year vs. Sex and Reporting Year for Adverse Drug Events in Older Adults (Effect Summary, Regression Plot, Actual by Predicted Plot).

Fig 3a: Effect Summary

Source	LogWort
Gender	14.571
Year	9.608

Fig 3b: Regression Plot





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Fig 3c: Actual by Predicted Plot

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