

Querying from Scratch - Cooking Up New Syndromes

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Council of State and Territorial Epidemiologists



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Development of Unintentional Injury Syndromes to Describe Drowning, Falls, and Hip Fracture-Related ED Visits

Briana Moreland, MPH

Cherokee Nation Operational
Solutions

Centers for Disease Control and
Prevention

November 17, 2021



Burden of Unintentional Injuries



of injury death among children
aged 1 to 4 years



injury death among older adults
(≥ 65 years)



adults are caused by falls

Developing Unintentional Injury Syndromes

- + **National Electronic Injury Surveillance System-All Injury Program (NISQARS)**

- + 2019

- + www.cdc.gov/injury/wisqars

- + **Healthcare Cost and Utilization Project-Nationwide Emergency Department Sample (HCUP-NEDS)**

- + 2018

- + www.hcup-us.ahrq.gov

Surveillance of Unintentional Injuries

Commonly used data sources for injury surveillance are not timely

Unintentional Drowning Syndrome (In Progress)

ICD-10-CM*	
T75.1	Drowning and nonfatal submersion
V90	Drowning and submersion due to accident to watercraft
V92	Drowning and submersion due to accident on board watercraft, without accident to watercraft
W16 with 6 th character=1 (except 16.4 and 16.9 where 5 th character=1)	Fall, jump, or diving into water causing drowning and submersion
W22.041	Striking against wall of swimming pool causing drowning or submersion
W65-W74	Accidental non-transport drowning and submersion

*7th Character of A or missing

Discharge Diagnosis
Field

Unintentional Drowning Syndrome (In Progress)

Inclusion	Exclusion
Drown	Feel like drowning, drown self, plan to drown, tried to drown Misspellings: withdrown, blood drown, indrown, syndrown
Found bottom of pool Underwater Water AND inhale, aspirate, cough, turn blue, AND lake, pool, tub, bath, swim, river, creek, pond, ocean, wave, spring	Ear, eye, bathroom, drink/ask for water, substance inhalation
Submerge	Burn, cast, splint, not/denies submerge, partially submerge, submerged object, sting ray
Fall/fell AND pool AND cough, resuscitate, wheeze	None
Swim AND unresponsive, struggle	None

Chief Complaint
Field

CDC Falls 65 and Older Version 1

Discharge Diagnosis Field

ICD-10-CM*	
V00.11-V00.89 with 6 th character=1	Falls related to pedestrian conveyance
W00-W15, W17, W19	Falls
W16 with 6 th character=2 (except W16.4 and W16.9 where 5 th character=2)	Fall, jump, or diving into water
W18.1, W18.2, W18.3	Other falls

*7th character of A or missing

CDC Falls 65 and Older Version 1

Inclusion	Exclusion
Rolled off/out of bed	None
Loss of balance Stumble	None
Slip	Dyslipidemia, pink slip, slipped disc, slip disc, disc slip, slipper
Trip	Atrip, amytrip, trip to, strip, lithotripsy, tripod, bus trip, triple
Fall/fell	Fallopian, no fall, denies fall, without fall, catheter fell, tube fell, asleep, W20, V80, assault, altercation, fight, suicide, seizure, heart attack, stroke (except history of stroke), ischemic attack (except history of ischemic attack), cardiac arrest (except Z86), motor vehicle collision

Chief Complaint
Field

CDC Hip Fracture 65 and Older Version 1

Discharge Diagnosis Field

ICD-10-CM*	
S72.0	Fracture of head and neck of femur
S72.1	Pertrochanteric fracture
S72.2	Subtrochanteric fracture
M97.0	Periprosthetic fracture around internal prosthetic hip joint

*7th character of A,B,C or missing

CDC Hip Fracture 65 and Older Version 1

Inclusion	Exclusion
Overall	Chip, metastata
Hip fracture, hip fx, fracture of right hip, fracture of left hip	Previous hip fracture, history of hip fracture, post hip fracture
Broken/broke hip, broken/broke left hip, broken/broke right hip	history of broken hip, history of broken right hip, history of broken left hip
intertroch, subtroch, pertroch femoral neck, neck of femur, head of femur, femoral head, trochanter AND fracture, fx, broke, break intracapsular fracture, fracture of epiphysis, midcervical fracture, apophyseal fracture AND femur	None
Hip deformity External rotation AND hip	S73

Chief Complaint
Field

Comparing NSSP to HCUP-NEDS

Data Sets

HCUP-NEDS (2018)

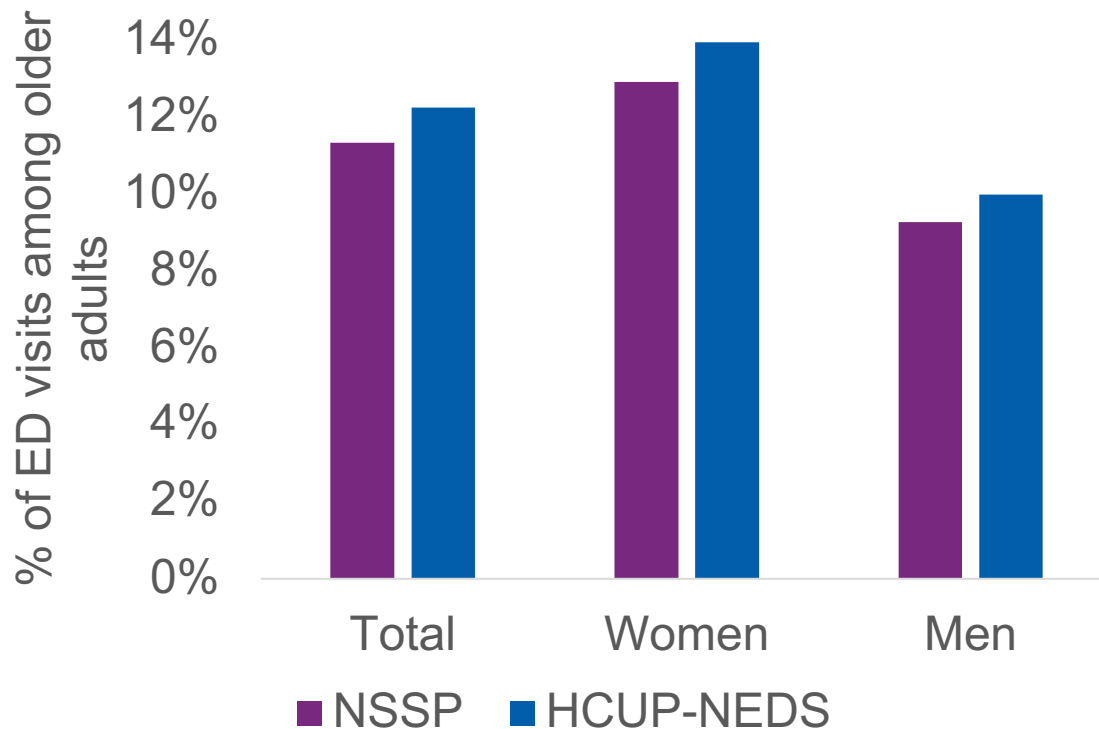
- + Nationally representative of U.S. EDs
- + Data from 990 hospital EDs across 36 states
- + ICD-10-CM codes were used to identify visits related to falls and hip fractures among older adults

NSSP (2018)

- + Covers about 71% of U.S. EDs
- + Data quality filters limited analysis to EDs with an average weekly informative discharge diagnosis $\geq 68\%$ and an average coefficient of variance of ≤ 35

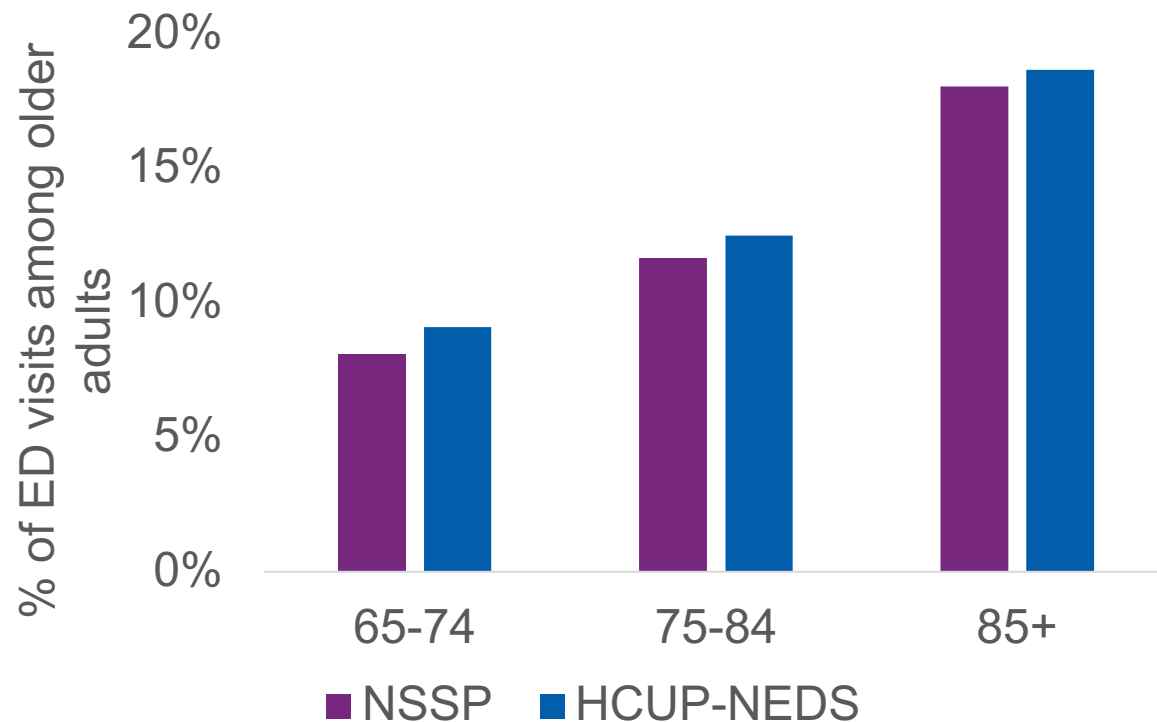
All analysis was limited to adults aged ≥ 65 years

Fall-Related ED Visits 2018



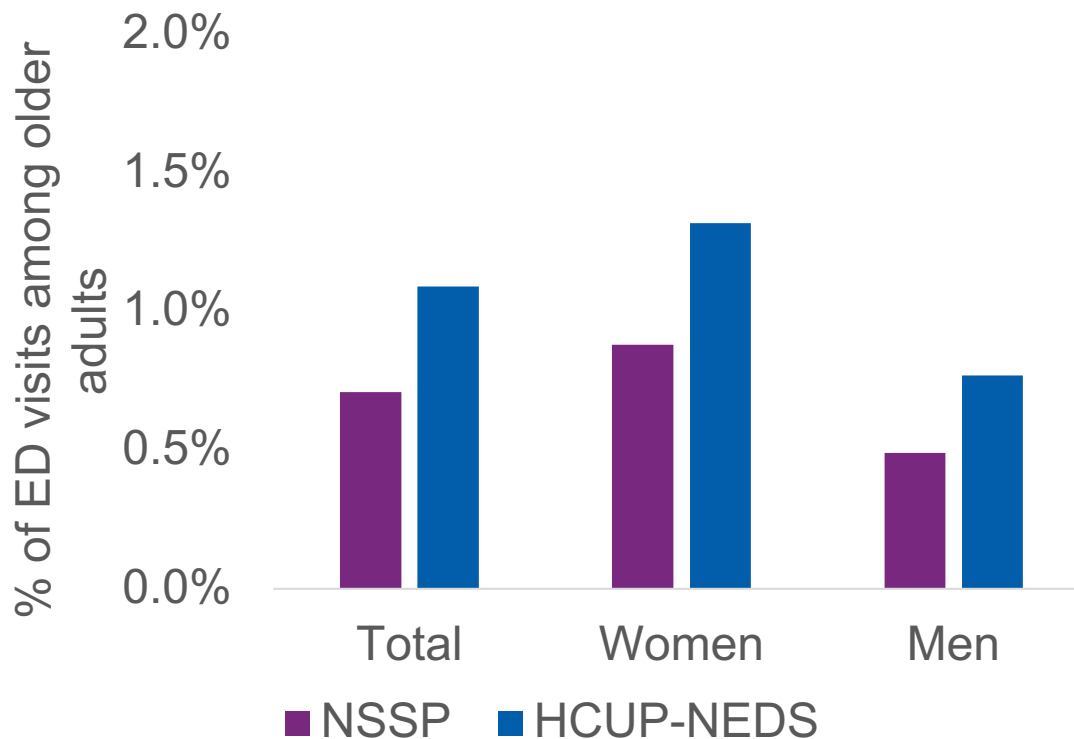
- The % of ED visits among older adults related to a fall was 7% less in NSSP compared to HCUP-NEDS
- A higher % of older women's ED visits were fall-related compared to older men's across both data sets

Fall-Related ED Visits 2018



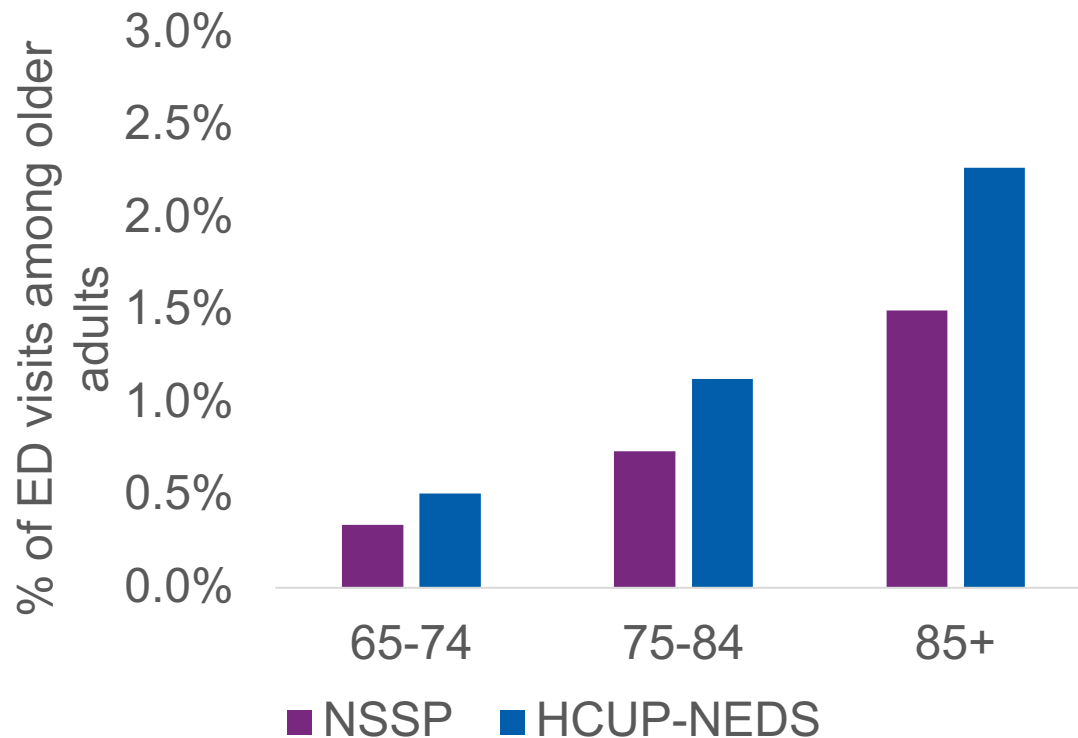
The % of ED visits related to a fall increased with age across both data sets

Hip Fracture-Related ED Visits 2018



- The % of ED visits among older adults related to a hip fracture was 35% less in NSSP compared to HCUP-NEDS
- A higher % of older women's ED visits were hip fracture-related compared to older men's across both data sets

Hip Fracture-Related ED Visits 2018



The % of ED visits related to hip fractures increased with age across both data sets

Conclusion

- NSSP can be used to provide real time fall and hip fracture ED data
- Prevalence of falls and hip fractures among older adults was lower in NSSP compared to HCUP-NEDS
- Lessons learned from developing the fall and hip fracture syndromes will be applied to the drowning syndrome

References

Slide 2

CDC. Web-based Injury Statistics Query and Reporting System (WISQARS) [online]. [Accessed 2021 Oct 1]. National Center for Injury Prevention and Control, Atlanta, GA. <https://www.cdc.gov/injury/wisqars/>

Parkkari J, Kannus P, Palvanen M, Natri A, Vainio J, Aho H, et al. Majority of Hip Fractures Occur as a Result of a Fall and Impact on the Greater Trochanter of the Femur: A Prospective Controlled Hip Fracture Study with 206 Consecutive Patients. *Calcif Tissue Int* 1999;65(3):183–7. DOI: 10.1007/s002239900679

Slides 5, 7, 9

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Slide 12

NEDS Overview. Healthcare Cost and Utilization Project (HCUP). [Accessed 2021 Oct 1]. Agency for Healthcare Research and Quality, Rockville, MD. www.hcup-us.ahrq.gov/nedsoverview.jsp

CDC. National Syndromic Surveillance Program (NSSP) [online]. [Accessed 2021, Oct 1]. Atlanta, GA: US Department of Health and Human Services, CDC. <https://www.cdc.gov/nssp/index.html>

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Thank you!

Questions?
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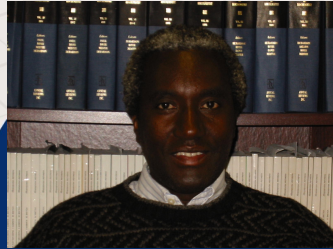
The findings and conclusions in this presentation are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.





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Defining diphenhydramine overdoses in Tennessee

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Background

- Diphenhydramine (DPH) - antihistamine used mainly as a sedative, hypnotic, and antiemetic
- Reports of misuse of DPH and cough or cold medications
 - About 4% of youth 12-17 years reported lifetime over-the-counter cough/cold medication misuse in a 2006 national survey (1).
 - 63% increase of intentional DPH exposures in individuals 10 years or older, for 2005–2016 period (2).
 - DPH was the 11th most frequently mentioned drug in overdose deaths nationally in 2016 (3).

Background ...

- ***FDA warning, Sept 2020*** - Teen misuse of diphenhydramine “sparked by dangerous “Benadryl Challenge” promoted on social media” (4).
- Anticipatory guidance is the “most valuable tool against the “Benadryl Challenge” - The American Academy of Pediatrics (5).
- In 2021, in TN - Concern from the field on the misuse of Benadryl® and similar products by youth
 - *Conducted an exploratory investigation on the extent of the problem* - using emergency department records reported to the TN ESSENCE.

Methods

- Names including brand names and street names and ICD-10-CM codes for diphenhydramine were gathered
 - T45.0X.. - Poisoning by antiallergic and antiemetic drugs
 - Not specific for diphenhydramine
- The Chief Complaints and Discharge Diagnosis (CC and DD) field in ESSENCE were used to create the definition for diphenhydramine overdoses.

Methods ...

- Different combinations of queries were developed and used to identify the records in ESSENCE:
 - Text only
 - Systemized Nomenclature of Medicine (SNOMED) codes only
 - ICD-10-CM codes only
 - “SNOMED or Text”
 - “ICD codes or SNOMED codes”
 - “ICD codes or SNOMED codes or Text”
 - “ICD codes or Text”
 - “ICD codes and Text”
- Data for the various queries was analyzed for the period between the beginning of January 2019 to end of June 2021.

Findings

Suspected diphenhydramine overdose records identified by various queries*

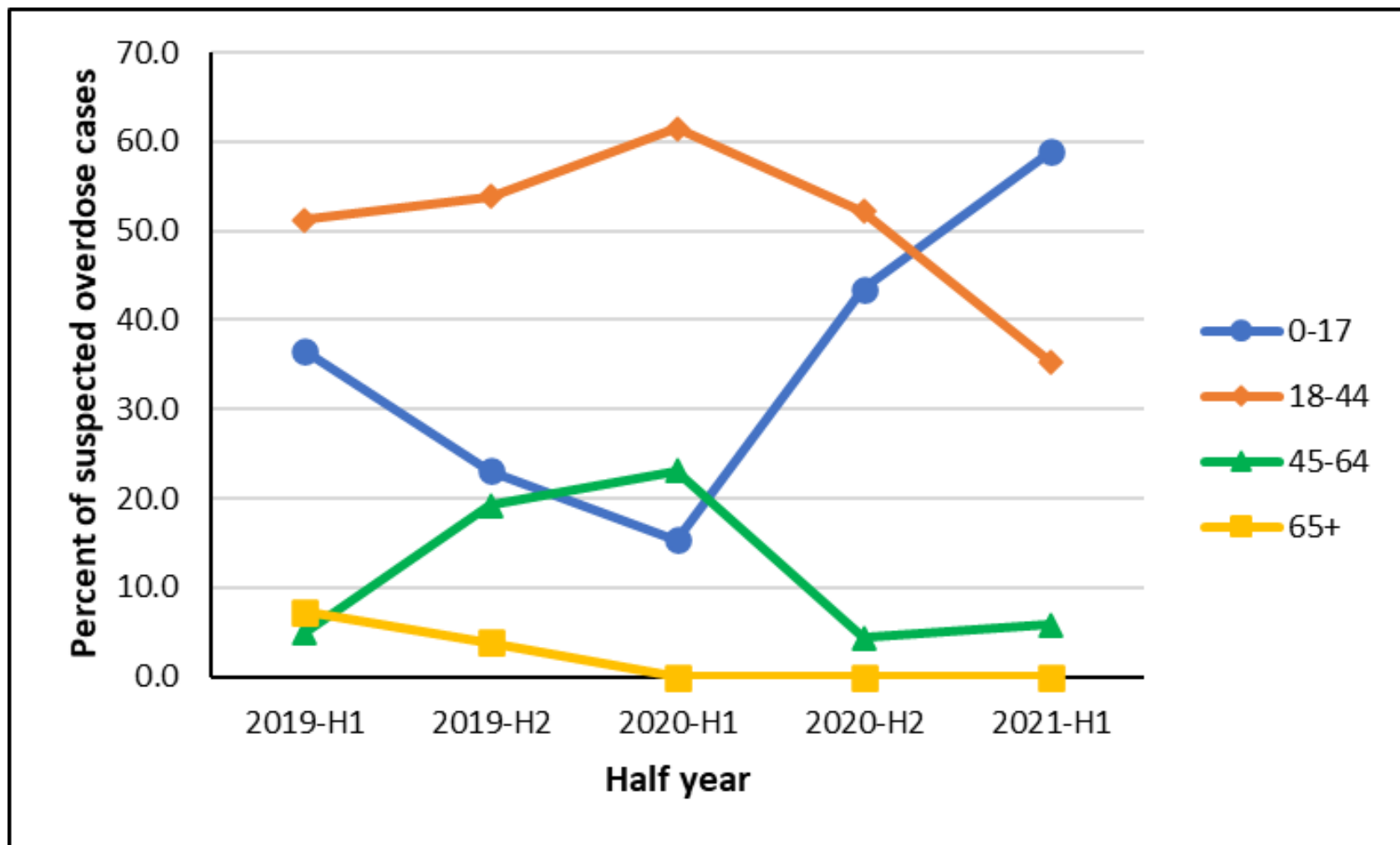
Query	Jan 2019-June 2021
Text only	2,810
ICD-10-CM	819
ICD-OR-Text	3,509
ICD-AND-Text	120

***SNOMED query did not identify any records**

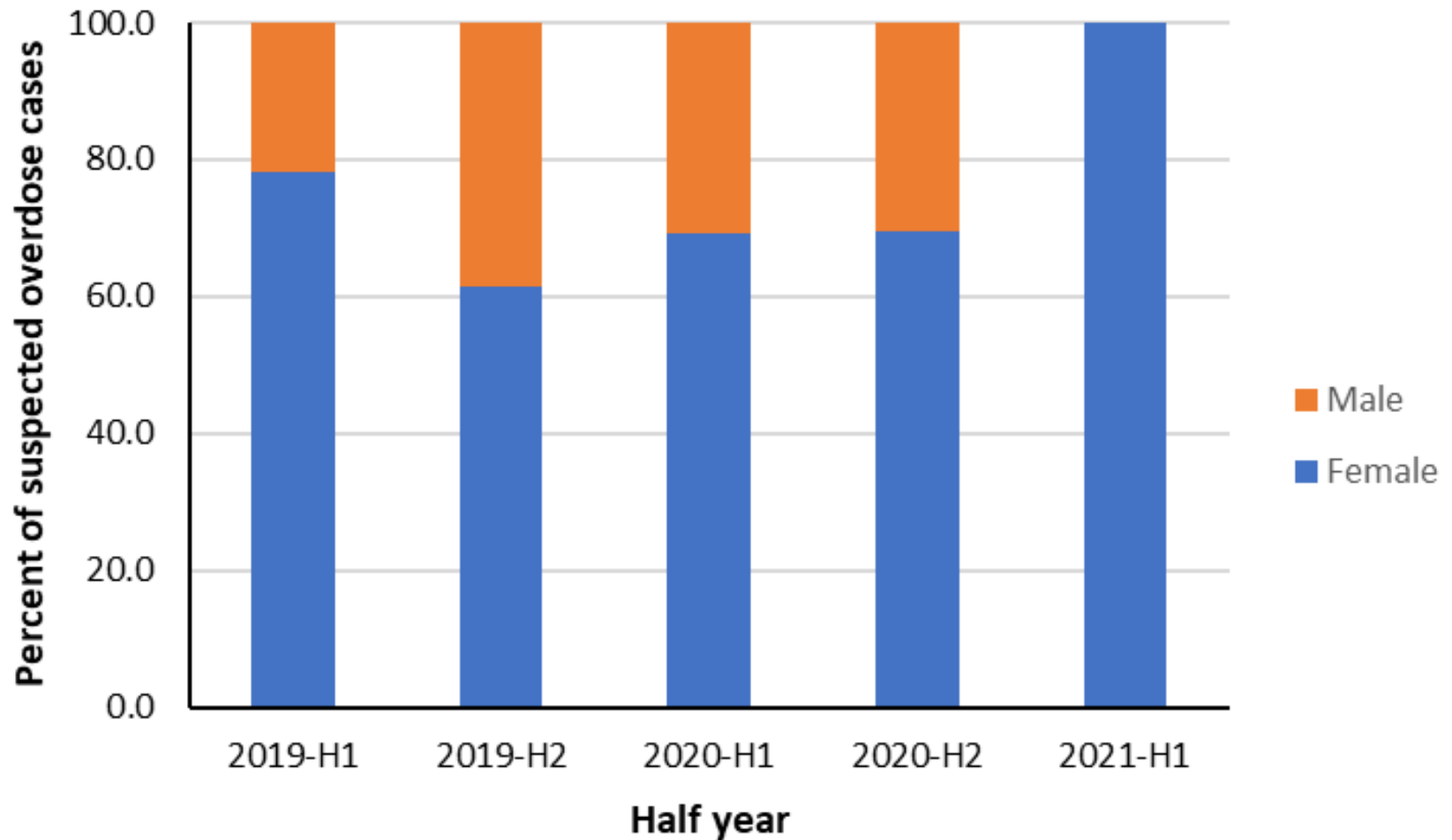
More on queries...

- For the “Text only” query there were 223 records which although they had the search text in the CC field, their DD field was blank
 - Such records (also those without correct ICD-10-CM codes) would not be picked up in the “ICD-10-CM codes-AND-Text” query
- For the “ICD-10-CM” code query, there were a number of records which although they had the right ICD-10-CM code in the DD field they did not have the search “ text in the CC field.
 - Instead, the text present were such as overdose, “feel sick”, ingestion, “eye problems”, unresponsive, etc.
 - Such records would not be picked up in the “ICD-10-CM codes-AND-Text” query.

Percent of suspected diphenhydramine overdose cases by age



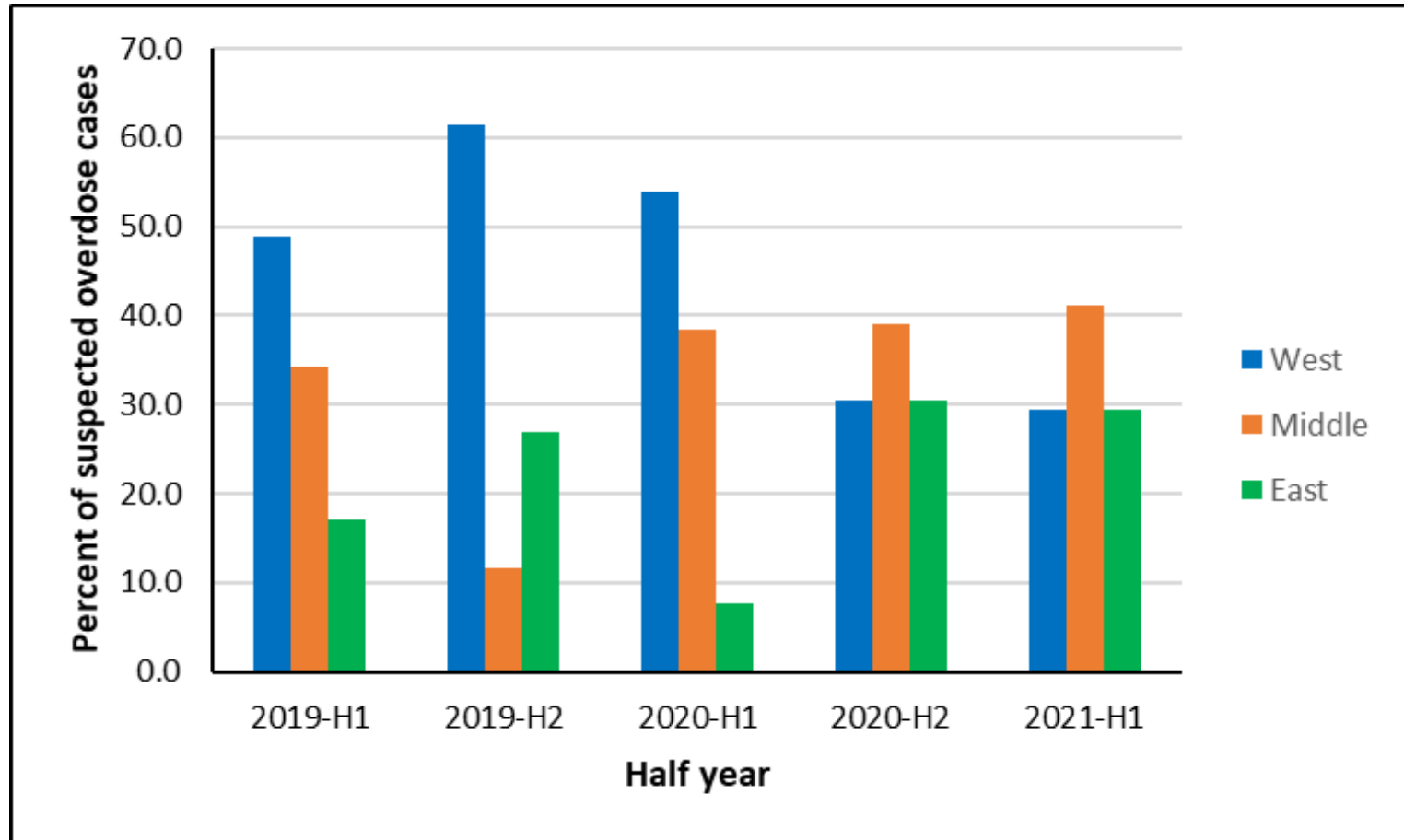
Percent of suspected diphenhydramine overdose cases by sex



Percent of suspected diphenhydramine overdose cases by Grand Divisions of TN



East Middle West



Conclusion

- The most conservative estimate of diphenhydramine overdoses was obtained when ICD-10-CM codes were paired with text, in the “ICD-10-CM codes and Text” query, was used.
- The findings of this exploratory inquiry led to alerting of stakeholders about the potential of misuse of diphenhydramine in the 0-17 age group in the state of Tennessee.

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1. Ford JA. Misuse of over-the-counter cough or cold medications among adolescents: prevalence and correlates in a national sample. *J Adolesc Health*, May 2009; 44(5): 505-7.
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4. U.S Food and Drug Administration. FDA warns about serious problems with high doses of the allergy medicine diphenhydramine (Benadryl). The 9-24-2020 FDA Drug Safety Communication; <https://www.fda.gov/drugs/drug-safety-and-availability/fda-warns-about-serious-problems-high-doses-allergy-medicine-diphenhydramine-benadryl>.
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Questions?

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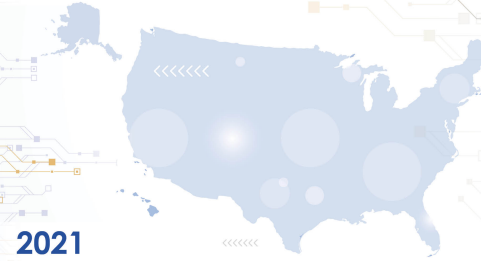
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