



Over-the-Counter Caution: Self-Harm Hospitalizations Due to Acetaminophen Poisoning Among Virginia Youth

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Acetaminophen is commonly used, but there are considerable risks of ingesting too much.

Acetaminophen is a common household drug

- Pain management/inflammation/fever reduction
- Most widely used over-the-counter pain reliever drug in the world
- Good safety profile if used at therapeutic levels

Acetaminophen toxicity is the leading cause of liver transplantation in the United States

- Liver injury and acute liver failure are significant clinical problems of acetaminophen toxicity

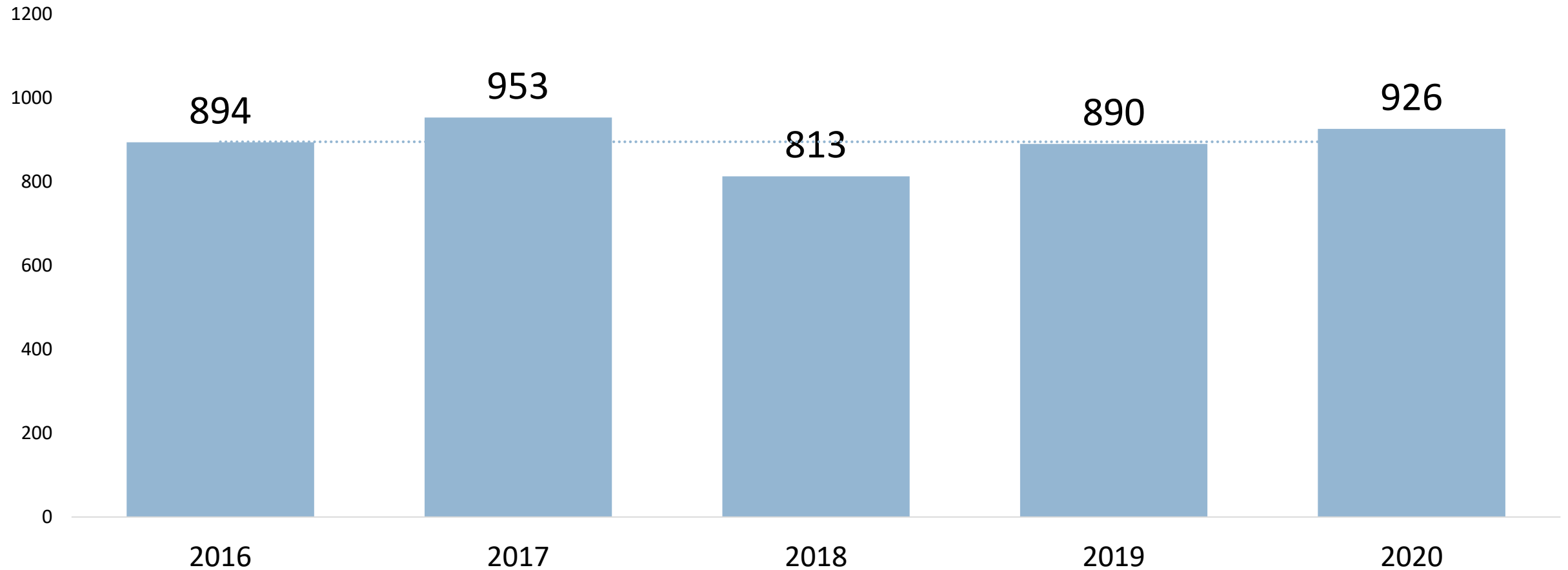
Treatment is available but time-sensitive

- Within **one hour** of ingestion: GI decontamination may be attempted or activated charcoal for alert patients
- N-acetyl-cysteine – fully protective against liver toxicity if given **within eight hours** after ingestion

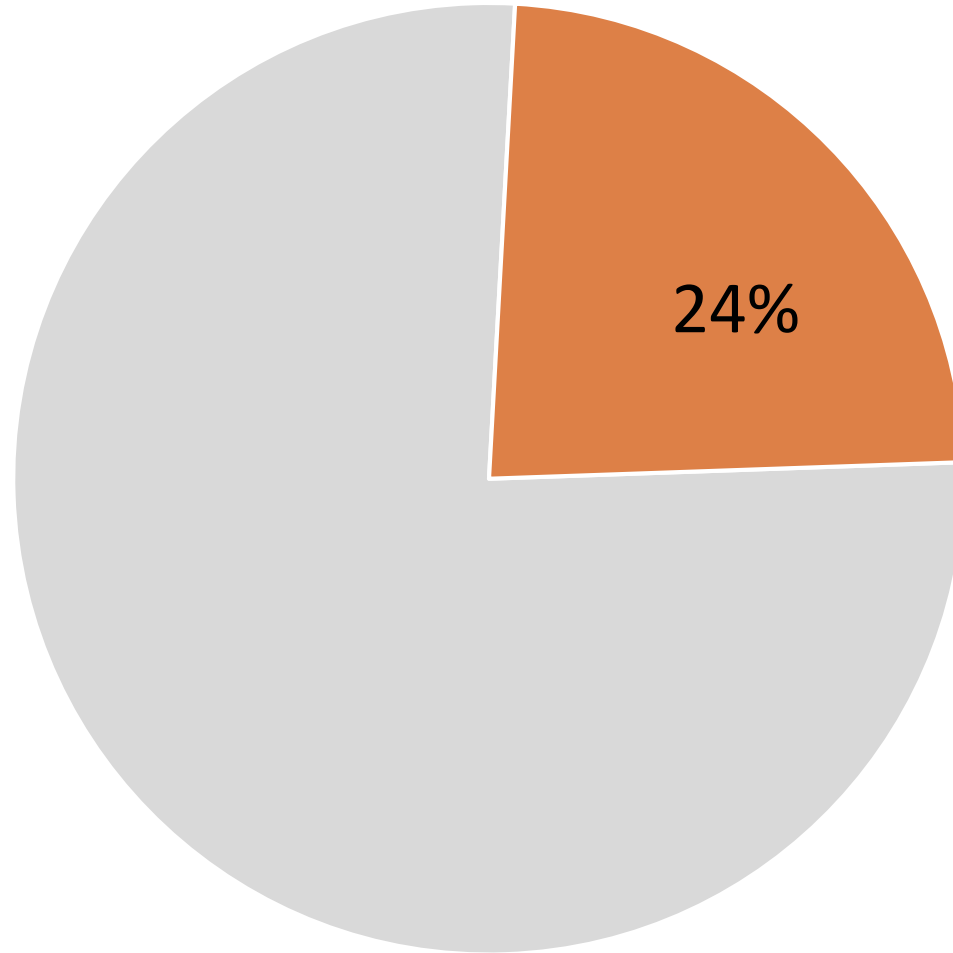


<https://www.ncbi.nlm.nih.gov/books/NBK441917/>
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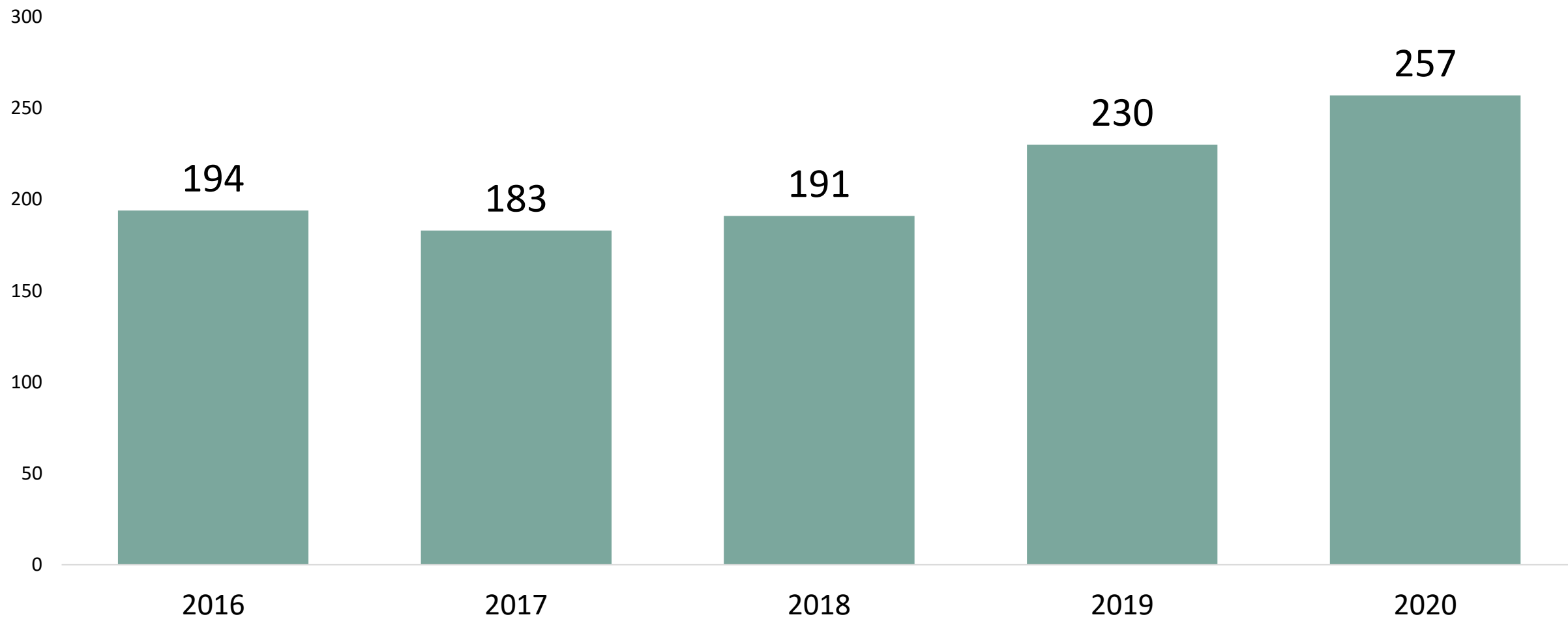
Self-harm hospitalizations among Virginia youth remained relatively stable during 2016-2020; but each year, approximately **two youth** were hospitalized for self-harm in Virginia **every day**.



There were 4,476 self-harm hospitalizations among Virginia youth in 2016-2020. Almost **one out of four** involved **acetaminophen**.



The number of self-harm hospitalizations due to acetaminophen poisoning among Virginia youth increased by **32%** from 2016 to 2020.



The four questions in mind:

Was the increase in the number of self-harm hospitalizations due to acetaminophen poisoning (SHA) from 2016 to 2020 significant?

Which populations were at higher odds for being hospitalized for SHA?

- Among Virginia youth aged 10-24 years during 2016-2020
- Characteristics: sex, age group, race/ethnicity, rural-urban, more than one drug

Of those hospitalized for SHA, which populations were at higher odds for acute hepatotoxicity (AH)?

Of those hospitalized for SHA, which populations were at higher odds for coded self-harm history?

Methods: Here are the tests we used:

Mann-Kendall test for temporal trend of 2016-2020 time period

Three multivariate logistic regression models:

- **Model A:** Demographic characteristics and SHA hospitalization
- **Model B:** Those hospitalized with SHA and AH outcomes
- **Model C:** Those hospitalized with SHA and coded self-harm history outcomes

Methods: The variables and ICD-10-CM codes used:

Characteristics

- Sex: male, female; Age group: 10-14, 15-19, 20-24; Race/ethnicity: Black, non-Hispanic, White, non-Hispanic, Hispanic/Latino, Other race(s); Rural-urban: National Center for Health Statistics six-category rural-urban classification; more than one drug

SHA hospitalization

- Primary diagnosis of injury with external cause of injury code in any field of T39.1 (4-aminophenol derivatives) with 5th character=2, 7th character of A or missing (initial encounter, active treatment); Did include fatal and nonfatal hospitalizations

AH

- Hepatic necrosis (K71.1); Toxic hepatitis (K71.2, K71.6, K71.9); Hepatic encephalopathy (K72.0, K72.9); Hepatorenal syndrome (K76.7); Jaundice (R17); Coagulopathy (D68.4, D68.9); Adult respiratory distress syndrome (J80); Any mention approach

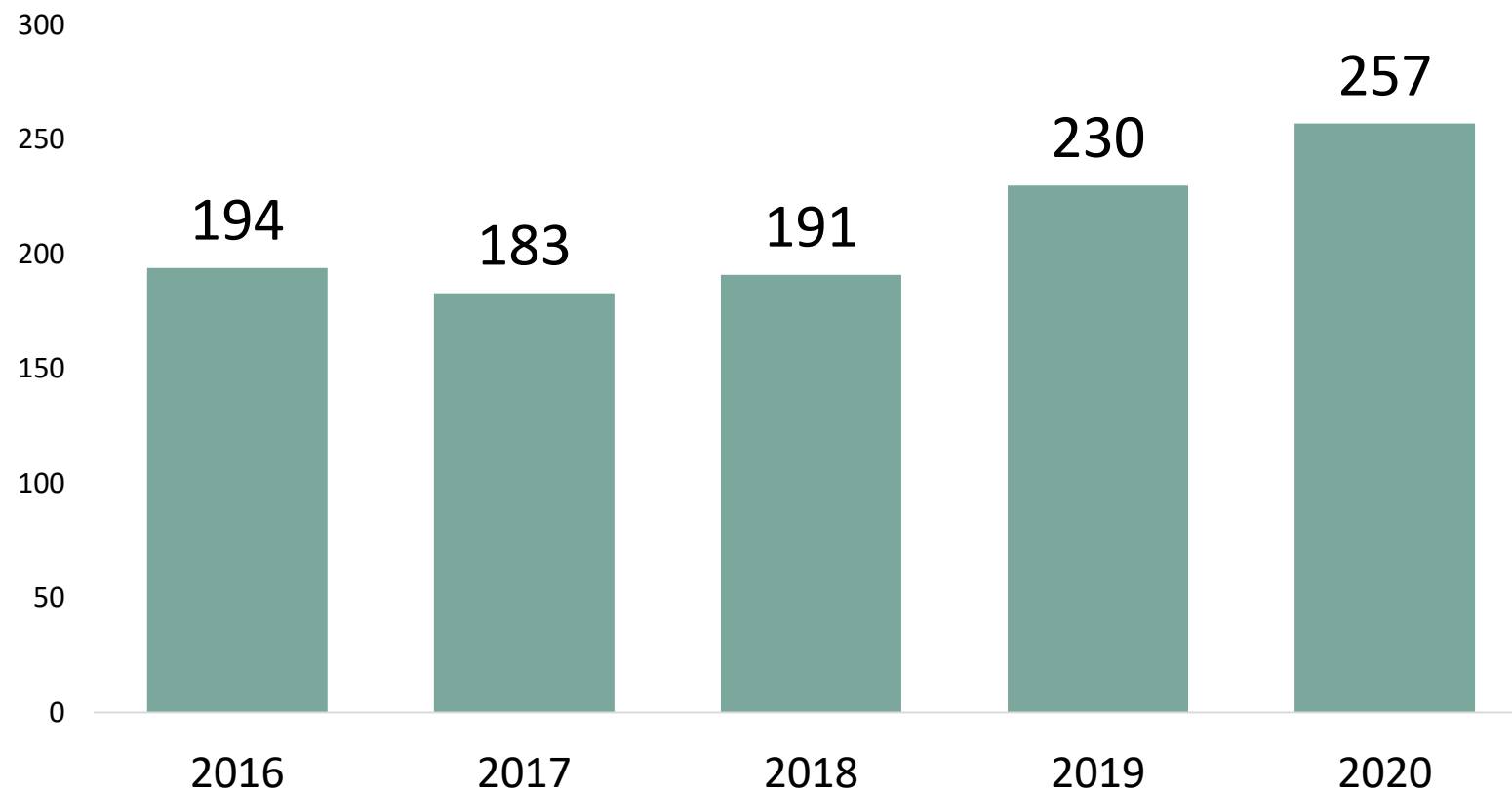
Self-harm history

- Personal history of self-harm (Z91.5); Any mention approach

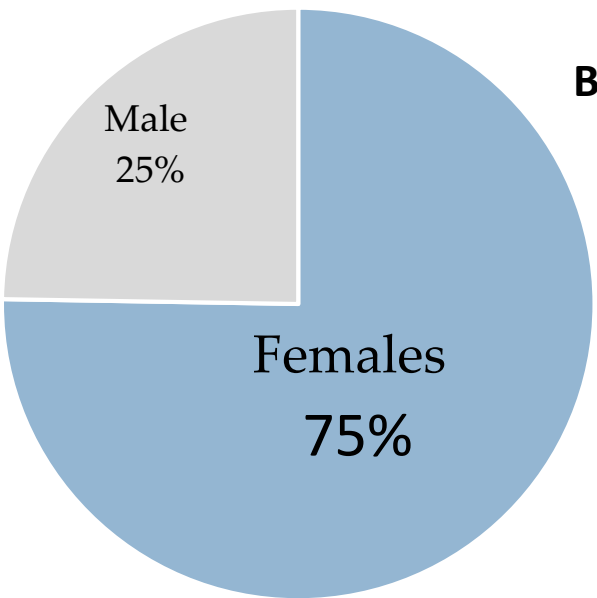
Results: There was no statistically significant temporal trend in the number of SHA hospitalizations from 2016 to 2020.

Mann-Kendall test:

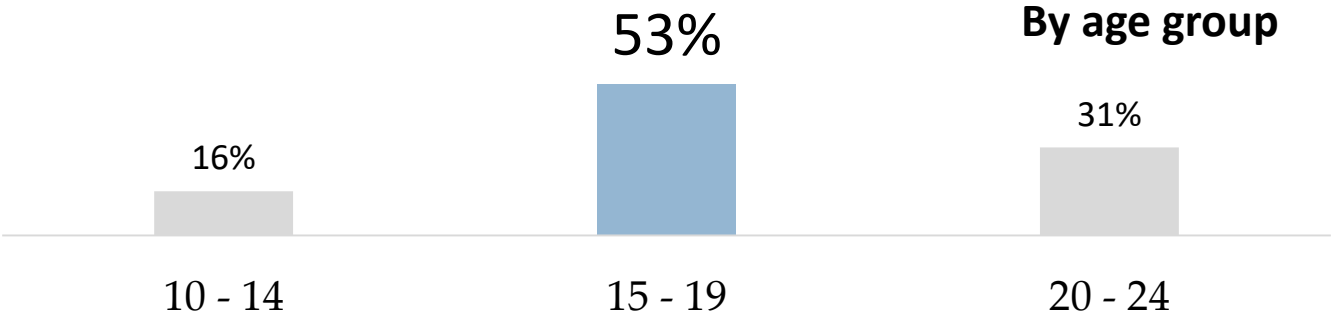
Kendall tau= 0.60, p=0.14



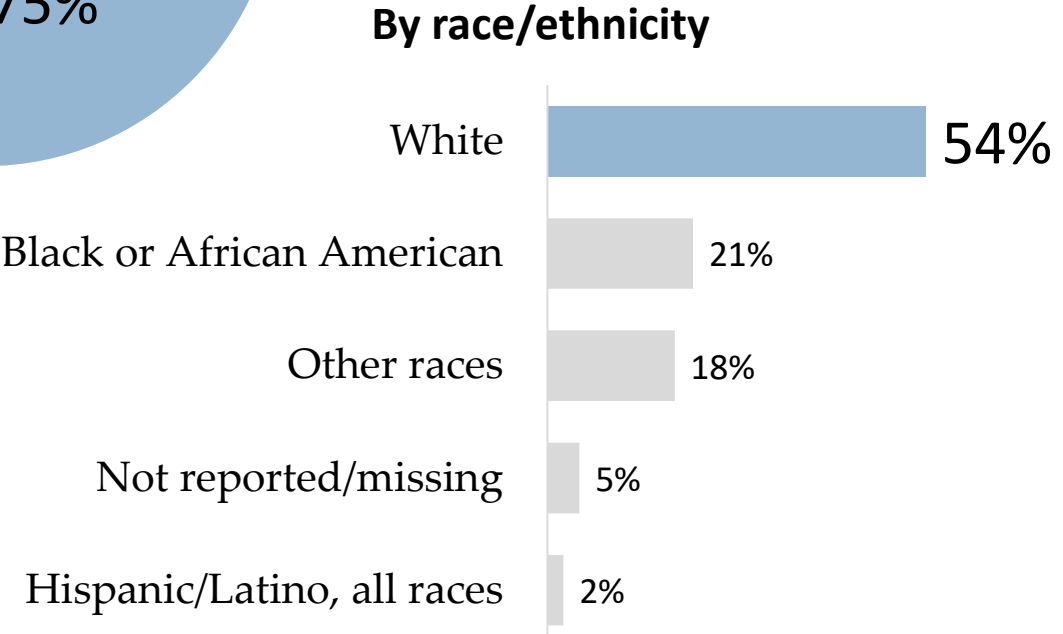
Results: Of the 1,055 SHA hospitalizations from 2016-2020, a majority were female, white, and between the ages of 15-19 years. They also were mostly from large fringe metro areas.



By sex



By age group



By race/ethnicity

Geography	Percentage
Large fringe metro	55%
Large central metro	15%
Small metro	10%
Medium metro	10%
Noncore	7%
Micropolitan	3%

Results: There were significant differences by certain populations (characteristics) and odds of being hospitalized with SHA.

Youth aged 15-19 years

[adjusted odds ratio (AOR): 1.33, 95% confidence interval (CI): 1.14-1.56]

Higher odds of being hospitalized for SHA than youth 20-24 years

Females

[AOR: 1.66, CI: 1.38-1.90]

Higher odds of being hospitalized for SHA than males

People of other race(s)

[AOR: 1.82, CI: 1.49-2.22]

Higher odds of being hospitalized for SHA than people who were white

More than one drug

[AOR: 1.48, CI: 1.28-1.72]

Higher odds of being hospitalized for SHA than acetaminophen only

Results: Seven percent (n=76) of the SHA hospitalizations during 2016-2020 also had AH. Some populations (characteristics) had higher odds of being diagnosed with AH; but, self-harm hospitalizations with more than one drug had lower odds of having an AH diagnosis.

Males

AOR: 1.93, CI: 1.17-3.19

Higher odds of being diagnosed with AH than females

Youth in medium metro areas

AOR: 2.30, CI: 1.18-4.46

Higher odds of being diagnosed with AH than large fringe metro areas

Hospitalizations with more than one drug

AOR: 0.45, CI: 0.25-0.79

Lower odds of AH than acetaminophen only

Results: Over one-third (35%, n=366) of SHA hospitalizations also had a coded history of self-harm. There were some significant differences by populations (characteristics) and odds of a coded self-harm history.

Males

[AOR, 0.73; CI, 0.53-0.99]

Lower odds of having a history of self-harm

Black or African American

[AOR: 0.64; CI, 0.45-0.91]

Lower odds of having a history of self-harm

There are limitations and notes to consider.

- **Not every self-harm hospitalization may be a suicide attempt**
 - Self-harm hospitalizations do potentially include non-suicidal self-harm
- **Geographical data are based on where the patient lived**
 - Localities bordering other states/jurisdictions may have an underestimate because Virginia residents in those localities may be hospitalized out-of-state
- **Hospitalization data are by hospitalization, not by patient**
 - It is possible that the same patient could be hospitalized more than once
- **Using a Mann-Kendall test for temporal trends may need more data points**
 - Possible that there is a statistically significant trend but there were only five data points
- **Acute hepatotoxicity could potentially be due to a separate health issue**
 - 'Any mention' approach was used
- **Self-harm history is limited**
 - Self-harm history may not be coded because there is no self-harm history, or healthcare provider/hospital/system does not code Z-codes

Conclusions: Some populations had higher odds of being hospitalized for SHA, being diagnosed with AH, or being coded with a history of self-harm. Although, there are some characteristics that seem to show lower odds for AH or coded self-harm history.

SHA hospitalization trends

Even though SHA hospitalizations are increasing in Virginia among youth, the trend was not significant.

SHA hospitalization

Being an older teenager (15-19 years), female, and using more than one drug was associated with increased risk of SHA hospitalization.

Acute hepatotoxicity

Among youth hospitalized with SHA, being male and from a less urban area was associated with increased risk for AH.

Self-harm history

Among youth hospitalized with SHA, being male and Black or African American was associated with lower odds of having a self-harm history.

Recommendations: There are prevention and data recommendations around this work.

Prevention:

Identify and work to reduce risk factors and increase protective factors for self-harm from a social-ecological model perspective and with a health equity lens

- Example: Social isolation (individual risk factor) and promoting connectedness (protective factor)
- Family- and school-based programs and efforts to address youth mental health and suicide prevention, including identifying risks and signs for self-harm

Limit access to means

- Lock Your Meds program- include over-the-counter drugs

Develop public health communication campaigns

- Dangers of liver toxicity if taking medications outside of their therapeutic doses; Need for timely access to healthcare if overdose occurs

Data:

Consider asking about self-harm history and encourage coding of Z-codes

- Helps to identify priority populations at risk for a SHA (or other drug) overdose

Acknowledgments, contact information, and questions

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