

E-Cigarette or Vaping Product Use-Associated Lung Injury (EVALI) Cases among Youth, Michigan, 2020-2023.

Background

E-cigarette or vaping product use-associated lung injury (EVALI) was first identified in the United States in 2019 when state health departments, the Centers for Disease Control (CDC) and the Food and Drug Administration (FDA) began investigating an outbreak of the newly identified syndrome.¹ Persons with EVALI reported cough, shortness of breath or chest pain.²⁻³ Additionally, some reported nausea, vomiting, diarrhea, fatigue, fever or abdominal pain. Symptoms developed over a few days to weeks and all cases reported using e-cigarette or vaping products within the few days prior to getting sick.²⁻³

Emergency department data from state health departments show an outbreak of EVALI cases starting in June 2019, peaking in September 2019 and gradually declining since then.⁴ From 2019 to 2021, the Michigan Department of Health and Human Services (MDHHS) identified 83 (46 confirmed and 37 probable) cases of severe lung disease associated with vaping, including three deaths (two confirmed and one probable) in Michigan.² Michigan cases during this timeframe ranged from 15 to 67 years old and the median age was 25 years old (see Appendix for EVALI case definitions used during this period).

In April 2020, the World Health Organization (WHO) implemented a new diagnosis code, U07.0, into the International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM) for reporting vaping-related disorder.⁵

E-cigarettes are the most used tobacco product among youth in the United States, with an estimated 6% of middle and high school students reporting use of e-cigarettes in 2024.⁶ Increased advertising of e-cigarette products, including flavored products or those designed to look like toys, has been documented among the youth population.⁷ Additionally, youth vaping of cannabis products is increasing.⁸ Concern regarding the health consequences of e-cigarette tobacco and cannabis use and vaping-related harms such as EVALI among youth is warranted. This analysis uses the recently implemented ICD-10-CM code to assess fatal and non-fatal vaping-related injuries among the Michigan youth population.

Methodology

Vaping lung injury deaths were assessed using finalized Michigan resident death certificate files provided by the Michigan Vital Records and Health Statistics Division within MDHHS. Deaths caused by or related to vaping lung injury were identified if the death certificate had an International Classification of Disease (ICD) code of U07.0 (Vaping-Related Disorder) in the underlying cause of death or any related cause of death of death fields. Death records were limited to Michigan residents between the ages of 0 and 17. Deaths from 2020 to 2023 were included.

Vaping injury-related emergency health care visits were assessed using the Michigan Inpatient and Outpatient Databases (MIDB/MODB) provided to MDHHS by the Michigan Health and Hospitalization Association (MHA). Outpatient emergency health care visits, hospitalizations admitted from the

emergency department and emergency hospitalizations among Michigan residents were included. Visits related to vaping injury were identified if the record had an ICD-10-CM code of U07.0 (Vaping-Related Disorder) in the principal or any secondary diagnosis field. Records were limited to Michigan residents between the ages of 0 and 17, with admissions from 2020 to 2023 included.

In both datasets, analyses were stratified by 0-12 years-old and 13-17 years-old age groups and by year (year of death for death records, year of admission for health care visits). For both death and health care data, the U07.0 code was new in 2020 and adoption of the code may have become more prevalent over time between 2020 and 2023. Counts between 1-5 are suppressed to protect confidentiality.

Results and Discussion

Table 1. Number of EVALI-related Deaths among Michigan Youth by Year and Age Group, 2020-2023.

Year	Ages 0-12	Ages 13-17
2020	0	0
2021	0	0
2022	0	<6
2023	0	0

Table 2. Number of EVALI-related Emergency Health care Visits among Michigan Youth by Year and Age Group, 2020-2023.

Year	Principal Diagnosis		Any Secondary Diagnosis	
	Ages 0-12	Ages 13-17	Ages 0-12	Ages 13-17
2020	0	<6	<6	15
2021	0	9	<6	23
2022	0	10	<6	32
2023	0	8	14	46

Between 2020-2023, death was an observed outcome with fewer than 6 deaths reported (Table 1) and 165 emergency health care visits (Table 2) related to EVALI among Michigan youth (ages 0-17). EVALI-related emergency health care visits increased from 2020 to 2023 in both youth age groups. Among Michigan residents ages 0-12, EVALI visits increased from a count less than six in 2020 to 14 in 2023. Among Michigan residents ages 13-17, EVALI visits increased from 18 in 2020 to 54 in 2023. The increase in EVALI-related emergency health care visits during this timeframe may be partially attributed to the newness of the diagnosis code in 2020 and adoption of the code increasing over time. These data will continue to be monitored in the future with specific attention to cases among youth.

Technical Notes

Data sources

2020-2023 Finalized Michigan Resident Death files, Office of Vital Records and Health Statistics, Michigan Department of Health and Human Services.

2020-2023 Michigan Inpatient and Outpatient Database (MIDB/MODB), Michigan Health and Hospital Association (MHA).

Limitations

U07.0 (Vaping-Related Disorder) diagnosis code was implemented in 2020; therefore, previous years were not included in this analysis. Adoption of the new code may increase over time.

Michigan Resident Death files are limited to Michigan residents.

MIDB/MODB excludes emergency department and hospitalization discharges of out-of-state residents admitted to a Michigan MHA-member hospital. Michigan residents who were treated and discharged from an out-of-state facility are not included.

References

1. Surveillance Provides Clues on Vaping-Associated Lung Injury. National Syndromic Surveillance Program (NSSP). Centers for Disease Control (CDC). March 31, 2024. <https://www.cdc.gov/nssp/php/story/surveillance-provides-clues-vaping-lung-injury.html>
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3. Christiani DC. Vaping-Induced Lung Injury. *New England Journal of Medicine*. 2019;382(10). doi:<https://doi.org/10.1056/nejme1912032>
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8. Sharma P, Mathews DB, Nguyen QA, Rossmann GL, A Patten C, Hammond CJ. Old Dog, New Tricks: A Review of Identifying and Addressing Youth Cannabis Vaping in the Pediatric Clinical

Setting. *Clin Med Insights Pediatr.* 2023 Mar 25;17:11795565231162297. doi: 10.1177/11795565231162297. PMID: 36993933; PMCID: PMC10041590.

9. 2019 Lung Injury Surveillance Primary Case Definitions; Centers for Disease Control (CDC). September 18, 2019. <https://stacks.cdc.gov/view/cdc/153173>

Appendix

Table A1. 2019 Lung Injury Surveillance Primary Case Definitions.⁹

Case type	Case definition
Confirmed case	Using an e-cigarette (“vaping”) or dabbing* in 90 days prior to symptom onset <u>AND</u> Pulmonary infiltrate, such as opacities, on plain film chest radiograph or ground-glass opacities on chest CT <u>AND</u> Absence of pulmonary infection on initial work-up. Minimum criteria are: 1. A negative respiratory viral panel <u>AND</u> 2. A negative influenza PCR or rapid test, if local epidemiology supports influenza testing <u>AND</u> All other clinically indicated respiratory infectious disease testing (e.g., urine Antigen for <i>Streptococcus pneumoniae</i> and <i>Legionella</i> , sputum culture if productive cough, bronchoalveolar lavage (BAL) culture if done, blood culture, HIV-related opportunistic respiratory infections if appropriate) are negative <u>AND</u> No evidence in medical record of alternative plausible diagnoses (e.g., cardiac, rheumatologic, or neoplastic process).
Probable case	Using an e-cigarette (“vaping”) or dabbing* in 90 days prior to symptom onset <u>AND</u> Pulmonary infiltrate, such as opacities, on plain film chest radiograph or ground-glass opacities on chest CT <u>AND</u> Infection identified via culture or PCR, but clinical team** believes this infection is not the sole cause of the underlying lung injury OR minimum criteria to rule out pulmonary infection not met (testing not performed) and clinical team** believes infection is not the sole cause of the underlying lung injury <u>AND</u> No evidence in medical record of alternative plausible diagnoses (e.g., cardiac, rheumatologic, or neoplastic process).
<p>*Using an electronic device (e.g., electronic nicotine delivery system (ENDS), electronic cigarette, e-cigarette, vaporizer, vape(s), vape pen, dab pen, or other device) or dabbing to inhale substances (e.g., nicotine, marijuana, THC, THC concentrates, CBD, synthetic cannabinoids, flavorings, or other substances).</p> <p>**Clinical team caring for the patient.</p>	