

Hospitalizations and Deaths Associated with EVALI

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Background

- e-cigarette/vaping products
 - introduced into the US market in 2007 - rapid rise in popularity
 - contain nicotine, flavorings, additives
 - can also deliver THC, CBD
 - few regulations in place
- EVALI - e-cigarette/vaping product use-associated lung injury
- investigated by the CDC since 2019

Aims of the study

- Descriptive study – comparing fatal and non-fatal cases
- Aims to improve identification of patients at risk for fatal outcomes
- 3 exemplary case reports

Methods

- voluntary reports of patients hospitalized for EVALI to the CDC
 - through standardized case-report form
 - medical records
 - patient (or proxy) interviews

- descriptive analysis

Results

- higher median age for fatal cases

Table 1. Case Status, Demographic Characteristics, and Substance Use History of Patients with Fatal or Nonfatal Cases of EVALI.*

Variable	Patients with Fatal Cases	Patients with Nonfatal Cases
Case status		
Confirmed — no./total no. (%)	34/60 (57)	1344/2558 (53)
Probable — no./total no. (%)	26/60 (43)	1214/2558 (47)
Demographic characteristics		
Sex — no./total no. (%)		
Male	32/60 (53)	1666/2498 (67)
Female	28/60 (47)	832/2498 (33)
Age group — no./total no. (%)		
<35 yr	16/60 (27)	1963/2514 (78)
≥35 yr	44/60 (73)	551/2514 (22)
Median age (range) — yr		
Male	51 (15–75)	24 (13–85)
Female	48 (15–73)	23 (13–77)
Female	52 (18–75)	25 (13–85)
Race and ethnic group — no./total no. (%)†		
White, non-Hispanic	39/49 (80)	1104/1818 (61)
Other	10/49 (20)	714/1818 (39)

Results

- more comorbidities in fatal outcomes
 - respiratory
 - cardiac
 - mental health conditions
- no data on BMI in non-fatal cases

Table 2. Medical and Mental Health Conditions in Fatal or Nonfatal Cases of EVALI.

Medical History	Patients with Fatal Cases	Patients with Nonfatal Cases
	<i>no./total no. with data (%)</i>	
Any preexisting medical condition*	44/58 (76)	NA
Any chronic respiratory disease†	25/57 (44)	371/1429 (26)
History of asthma	13/57 (23)	102/1297 (8)
History of chronic obstructive pulmonary disease	12/57 (21)	25/1297 (2)
Any cardiac disease‡	26/55 (47)	115/1169 (10)
Hypertension	25/55 (45)	NA
Heart failure	4/57 (7)	NA
Myocardial infarction	1/57 (2)	NA
Any mental health condition§	32/49 (65)	575/1398 (41)
Depression	22/52 (42)	375/1183 (32)
Anxiety	14/51 (27)	434/1189 (37)
Overweight¶	9/50 (18)	NA
Obese	26/50 (52)	NA

Results

- gastrointestinal symptoms more common in non-fatal cases

Table 3. Clinical Course, Initial Vital Signs, and Initial Laboratory Results in Hospitalized Patients with Fatal or Nonfatal Cases of EVALI.*

Variable	Patients with Fatal Cases [†]	Patients with Nonfatal Cases
	<i>no./total no. with data (%)</i>	
Clinical course		
Presented initially in an outpatient setting without being admitted for symptoms [‡]	25/54 (46)	479/2320 (21)
Reported any respiratory symptoms [§]	55/56 (98)	1707/1779 (96)
Reported any gastrointestinal symptoms [¶]	26/49 (53)	1343/1681 (80)
Admitted to an ICU	52/57 (91)	638/1504 (42)
Received ventilatory support with CPAP or BiPAP	32/56 (57)	179/1068 (17)
Underwent endotracheal intubation ^{**}	47/58 (81)	131/755 (17)
Received antibiotics	57/57 (100)	1154/1183 (98)
Received glucocorticoids	45/58 (78)	1252/1419 (88)
Location of death		
Hospital, ICU, or ED	56/60 (93)	—
Other	4/60 (7) ^{††}	—

Results

- 71% of fatal cases had leukocytosis
- 64% had neutrophil predominance

Initial vital signs		
Oxygen saturation <95% while breathing ambient air	40/55 (73)	NA
Tachycardia, heart rate >100 beats/min	25/54 (46)	NA
Tachypnea, respiratory rate >20 breaths/min	26/52 (50)	NA
Evidence of hypotension, SBP <90 mm Hg or DBP <60 mm Hg	12/54 (22)	NA
Body temperature ≥38°C	11/53 (21)	NA
Initial laboratory results††		
White-cell count >11,000/mm ³	37/52 (71)	NA
White-cell count with >80% neutrophils	29/45 (64)	NA
White-cell count with >10% lymphocytes	15/44 (34)	NA
Aspartate aminotransferase level, alanine aminotransferase level, or both		
>35 U/liter	36/49 (73)	NA
>105 U/liter	16/49 (33)	NA

Limitations

- any patient who died with EVALI counted as fatal case
 - not accounting for pre-existing conditions
- data from proxy interviews may be flawed
 - more proxy interviews for patients who died
- reporting from fatal cases more in-depth

Case report

- ~35y
- morbid obesity, chronic obstructive pulmonary disease (COPD), asthma, HFPEF, hypertension, and bipolar disorder
- presents 8 days after symptom onset
 - 38.5°C, heart rate 121 beats/minute,
 - respiratory rate 42 breaths/minute,
 - oxygen saturation 91%

Case report

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- presents 8 days after symptom onset
 - 38.5°C, heart rate 121 beats/minute,
 - respiratory rate 42 breaths/minute,
 - oxygen saturation 91%
- reports smoking conventional tobacco and vaping products containing nicotine, THC, CBD

Case report

- extensive opacities on CXR
- admitted for acute respiratory failure, COPD exacerbation, susp. pneumonia, susp. acute congestive heart failure
- treatment with broad spectrum antibiotics, diuretics, bronchodilators, and systemic corticosteroids
- placed on bilevel positive airway pressure (BIPAP), could not tolerate device

Case report

- Within 48 hours of admission, increasing oxygen needs
 - mechanical ventilation
- diagnosis of acute respiratory distress syndrome (ARDS)

- adequate oxygenation challenging
 - despite prone positioning
- patient died on the 21st hospital day