Lung illnesses and deaths linked to vaping nationwide have continued to rise as federal health officials expand lab testing to understand the mysterious afflictions, the Centers for Disease Control and Prevention said Thursday.

Cases Reported as of October 22, 2019

- 1,604 confirmed and probable lung injury cases associated with use of e-cigarette, or vaping, products were reported by 49 states (all except Alaska), the District of Columbia, and the U.S. Virgin Islands.
- Thirty-four deaths have been confirmed in 24 states (median age = 49 years, range, 17 - 75 years).
Case Characteristics

- 70% male.
- Median age 24 years (range 13 - 75 years)
- 79% of patients are under 35 years old; 54% under 25 years old
- Among 867 patients with information on substances used in e-cigarette, or vaping, products in the 3 months prior to symptom onset:
  - About 86% reported using THC-containing products; 34% reported exclusive use of THC-containing products.
  - About 64% reported using nicotine-containing products; 11% reported exclusive use of nicotine-containing products.

For updated data see: https://www.cdc.gov/tobacco/basic_information/e-cigarettes/severe-lung-disease.html

Case Characteristics as of October 8, 2019

- Among 1,043 cases with available data:
  - 79% of patients male
  - Median age 24 years (range = 13-75 yr)
- All patients reported history of using e-cigarette, or vaping, products
- Among 573 cases with data on substances used:
  - 76% reported tetrahydrocannabinol (THC) use; 32% exclusive use
  - 58% reported nicotine use; 13% exclusive use
Data updated Thursday, October 10, 2019

E-cigarette, or Vaping, Products: The Basics

- E-cigarette, or vaping, products include devices, liquids, flavorings, refill pods, and cartridges
- Using an e-cigarette is commonly called vaping
- Devices heat liquid to produce an aerosol that is inhaled by the user
- This aerosol can contain harmful or potentially harmful substances

E-cigarette, or Vaping, Products: Devices

- Devices vary in shape, size, type, and manufacturer
- Common names
  - E-cigs
  - Vapes
  - E-hookahs
  - Vape pens
  - Mods
  - Tanks
- Electronic nicotine delivery systems
E-cigarette, or Vaping, Products: Liquids, Cartridges, Pods

- E-cigarette, or vaping, liquid can contain
  - Nicotine
  - Flavorings
  - Propylene glycol and vegetable glycerin
  - Cannabinoids: Δ-9-tetrahydrocannabinol (THC), cannabidiol (CBD), butane hash oil (BHO)
  - Other substances

- E-cigarette liquid types
  - Commercial refillable e-liquid
  - Commercial non-refillable e-liquid
  - Homemade or street sources

E-cigarette, or Vaping, Products: Behaviors

- Hacking: modifying device in a way not intended by manufacturer
  - Refilling single-use cartridges
  - Dabbing: dropping liquid directly onto device heating coil

- Dabbing: superheating substances containing high concentrations of THC or other cannabinoids (e.g., budder, BHO, 710, CBD)

Overview of CDC’s Updated Interim Clinical Guidance

- Initial clinical evaluation
- Suggested criteria for hospital admission and treatment
- Special considerations for groups at high risk
- Patient follow-up
- Clinical and public health recommendations
Clinical Characteristics of Patients (N=339*)

- 95% of patients initially experienced respiratory symptoms
  - e.g., cough, chest pain, and shortness of breath
- 77% of patients had gastrointestinal symptoms
  - e.g., abdominal pain, nausea, vomiting, and diarrhea
- 85% patients had symptoms accompanied by constitutional symptoms
  - e.g., fever, chills, and weight loss
- Gastrointestinal symptoms preceded respiratory symptoms in some patients**

* As of October 9, 2019
** Luppes L et al. Pulmonary illness related to e-cigarette use in Illinois and Wisconsin - preliminary report. NEJM 2019

Ask Patients about Exposure

- Ask about the use of e-cigarette, or vaping, products and types of substances used
  - THC/Cannabis [oil, dab], nicotine, modified products or the addition of substances not intended by the manufacturer
- Suggested history items
  - product source
  - specific product brand and name
  - duration and frequency of use
  - time of last use
  - product delivery system
  - method of use (inhalation, dripping or using)
- Empathetic, non-judgmental, and private questioning of patients*
- Standardized approaches for interviewing adolescents
- Continue to ask questions during hospitalization and follow-up visits


Physical Examination

- Should include vital signs and pulse-oximetry
- Vital signs findings seen in patients reported to the CDC*
  - 55% had tachycardia (N=130)
  - 45% had tachypnea (N=172)
  - 51% had O2 saturation <90% at rest on room air (N=153)
- Pulmonary findings on auscultation exam have been unremarkable, even among patients with severe lung injury

* As of December 1, 2019

Laboratory Testing

- Should be guided by clinical findings
- Strongly consider respiratory viral panel (including influenza during flu season)
- Additional testing should be based on published guidelines for evaluation of community-acquired pneumonia*
  - Strepococcus pneumoniae, Legionella pneumophila, Mycoplasma pneumoniae, endemic mycoses and opportunistic infections

Clinical Laboratory Testing

- Abnormal laboratory tests reported in patients with EVALI:
  - 87% (45/52) had a WBC >11,000/mm³
  - 93% (14/15) had an ESR >30 mm/hr
  - 50% (20/40) had elevated liver transaminases (aspartate aminotransferase or alanine aminotransferase >50 IU/L)
- At present, laboratory testing cannot be used to distinguish EVALI from infectious etiologies
- Consider, with informed consent, urine toxicology testing (including THC)


Imaging

- Radiographic findings consistent with EVALI:
  - Pulmonary infiltrates on CXR
  - Opacities on chest computed tomography (CT) scan
- Obtain chest radiograph (CXR):
  - All patients with respiratory or gastrointestinal symptoms and history of using e-cigarettes, or vaping, products
  - Particularly decreased O₂ saturation (<95%) on room air

Chest CT Might Be Useful

- Decision to obtain a chest CT made on a case-by-case basis
- To evaluate
  - CXR result not correlating with clinical findings
  - Severe or worsening disease
  - Complications such as pneumothorax or pneumomediastinum
  - Other illness in the differential diagnosis (e.g., pneumonia or pulmonary embolism)

Consultation with Pulmonology

- Consider consultation with pulmonology to
  - Guide further evaluation
  - Discuss empiric treatment
  - Determine whether bronchoscopy would be appropriate
- Decision to perform bronchoscopy and bronchoalveolar lavage (BAL) should be made on a case-by-case basis:
  - Value of staining BAL cells or fresh lung biopsy tissue for lipid-laden macrophages (e.g., using oil red O or Sudan Black) in evaluation of EVALI remains unknown
Specialized Care

- Critical care physicians
  - 47% of patients admitted to ICU (N=342)
  - 22% required endotracheal intubation and mechanical ventilation (N=138)
- Medical toxicology
- Infectious disease
- Psychology
- Psychiatry
- Addiction medicine

* As of Oct 3, 2019

Hospital Admission Criteria

- Among 1,002 cases reported to CDC with available data
  - 96% of patients hospitalized
- Hospital admission recommended for patients with:
  - Decreased O₂ saturation (<95%) on room air
  - Respiratory distress
  - Comorbidities that compromise pulmonary reserve

* As of Oct 6, 2019

Medical Treatment: Antibiotics, Antivirals

- Early initiation of antibiotic treatment for community-acquired pneumonia
- During influenza season, consider influenza and antivirals as needed
- Annual vaccination for influenza for all persons ≥6 months of age
- Pneumococcal vaccine should be considered according to current guidelines

Corticosteroid Use and Improvement Reported to CDC

- Corticosteroids (N=287)
  - 252 patients (88%)
  - Improved after corticosteroids (N=140)
  - 114 patients (82%)

* Natural progression of lung injury is not known
* Consider pulmonologist input re: range of corticosteroid doses, durations, and taper plans
* May withhold while evaluating for certain infectious etiologies that might worsen with corticosteroid treatment (fungal pneumonia)
Table: Clinical Course of Patients with EVALI*

- Admission to ICU: 159 of 342 patients (47%)
  - Age group:
    - 13-17: 45 of 80 patients (56%)
    - 18-24: 49 of 130 patients (38%)
    - 25-50: 54 of 115 patients (47%)
    - >51: 9 of 13 patients (69%)
  - Past cardiac disease: 8 of 16 patients (50%)
  - No past cardiac disease: 151 of 326 patients (46%)

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Follow-up From Hospital Admission

- Initial: within 1–2 weeks after discharge
  - Repeat pulse-oximetry
  - Consider repeat CXR
- Additional follow-up: 1–2 months after discharge
  - Consider spirometry, diffusion capacity testing, and CXR
- Long-term effects and the risk of recurrence of EVALI are not known
  - Many patients’ symptoms resolved
  - Some patients relapsed during corticosteroid tapering after hospitalization
  - Some patients had persistent hypoxemia (O₂ saturation <95% on room air at rest), requiring home oxygen

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Outpatient Management

- Outpatient management can be considered on a case-by-case basis
  - Clinically stable, less severe injury
  - Follow-up within 24–48 hours can be assured
  - Normal O₂ saturation
  - Consider empiric use of antimicrobials, including antivirals
  - Steroids for outpatients could be considered on a case-by-case basis
- 72% of 50 patients* had either an outpatient or emergency department visit before hospital admission

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*National Council for Patient Safety paper on EVALI, 2019
Address Exposures for Patients with Known or Suspected EVALI

- Advise EVALI patients to discontinue use of e-cigarette, or vaping, products
  - During inpatient admission
  - Re-emphasized during outpatient follow-up visits
- Cessation of e-cigarette, or vaping, products might speed recovery
- Resuming use of e-cigarette, or vaping, products has potential to cause recurrence of symptoms or lung injury

Cessation Resources

- Evidence-based tobacco product cessation strategies include*
  - Behavioral counseling
  - FDA approved cessation medications
- Adults using e-cigarette, or vaping, products to quit cigarette smoking should not return to smoking cigarettes

* https://www.cdc.gov/tobacco/campaign/tips/partners/health/index.html

Cessation Resources Continued

- Patients who have addiction to THC-containing or nicotine-containing products*
  - Cognitive-behavioral therapy
  - Contingency management
  - Motivational enhancement therapy
  - Multidimensional family therapy
  - Consultation with addiction medicine services


Summary: Patients Suspected to have EVALI

- Ask patients about the use of e-cigarette, or vaping, products, particularly those containing THC
- Order a CXR
- Admit to hospital if low O2 saturation or respiratory distress
- Consider combination of antibiotics, antivirals and/or corticosteroids depending on clinical context
- Provide education and cessation assistance for known or suspected EVALI patients for nicotine addiction and marijuana-use-disorder*

* SAMHSA Behavioral Health Treatment Locator - https://findtreatment.samhsa.gov/*
Laboratory Testing and Public Health Considerations

Chemical Testing of BAL Fluid, Serum and Urine
- CDC is now offering additional laboratory testing of bronchoalveolar lavage (BAL) fluid, blood, and urine samples
  - Diluents and additives such as vitamin E acetate, food oils, squalene, terpenes, and petroleum distillates
  - Endogenous lipids and surfactants such as triglycerides, cholesterol, phospholipids, and phosphatidylcholines
  - Metabolites of nicotine and cannabinoids

Testing of Pathologic Specimens by CDC
- If a lung biopsy or autopsy is performed, consider submission of fixed lung biopsy tissues or autopsy tissues to CDC for evaluation.
- Testing can include evaluation for lipids on formalin-fixed (wet) lung tissues that have not undergone routine processing.
- Routine microscopic examination will be performed, as well as infectious disease testing, if indicated, on formalin-fixed (wet) tissues, or formalin-fixed, paraffin-embedded tissue specimens.
- See: Guidance for submission of autopsy and biopsy specimens is posted on the CDC Lung Injury website

Submission of BAL Fluid, Serum, and Urine to CDC
- Consider submission of any collected specimens, including bronchoalveolar lavage, blood, or urine, to CDC for evaluation
- Clinical institutions should consider saving any residual clinical specimens from patients with suspected vVILI
- Sample submission should be coordinated through state public health laboratories or health departments
- See: Guidance for clinical sample collection, storage, and submission is available on CDC’s Lung Injury website
**Aerosol Emissions Testing of E-cigarette, or vaping, Products by CDC**

- CDC is now offering testing of aerosol emissions from e-cigarette, or vaping, products associated with the outbreak.
- Results will complement FDA’s work to characterize e-liquids, and may provide insights into the nature of the chemical exposure(s) contributing to the outbreak.
- Sample submission should be coordinated through state public health laboratories or health departments.

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**2019 Lung Injury Surveillance Primary Case Definition (CDC) – 9/18/19**

- Using an e-cigarette (“vaping”) or dabbing* in 90 days prior to symptom onset
- Pulmonary infiltrate on CXR or ground-glass opacities on chest CT
- Absence of pulmonary infection on initial work-up*.

* Minimum criteria are: 1) A negative respiratory viral panel AND 2) negative influenza PCR or rapid test, if local epidemiology supports influenza testing AND 3) all other clinically indicated respiratory infectious disease testing (e.g., urine Ag for S. pneumoniae and Legionella, sputum culture, BAL culture if done, blood culture, HIV-related opportunistic respiratory infections if appropriate) are negative; AND no evidence in medical record of alternative plausible diagnoses (e.g., cardiac, rheumatologic, or neoplastic process).

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**2019 Lung Injury Surveillance Probable Case – 9/18/19**

- Using an e-cigarette (“vaping”) or dabbing in 90 days prior to symptom onset
- Pulmonary infiltrate on CXR or ground-glass opacities on chest CT
- 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 AND
- No evidence in medical record of alternative plausible diagnoses (e.g., cardiac, rheumatologic, or neoplastic process).

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**Case Reporting to Public Health Authorities**

- Reporting cases of lung injury is critical for accurate surveillance of EVALI.
- Obtaining and sending products, devices, and clinical and pathologic specimens for testing can help determine cause or causes of EVALI.
- CDC developing International Classification of Diseases, Tenth Edition, Clinical Modification coding guidance for encounters related to EVALI.

* Updates, when available, can be found at CDC’s Lung Injury website.
Public Health Recommendations

Outbreak Might Have More than One Cause

- FDA and CDC have not identified the cause or causes of these lung injuries
- Only commonality is report of use of e-cigarette, or vaping, products
- No one compound or ingredient has emerged as the cause of these illnesses to date
- It may be that there is more than one cause of lung injury

CDC Public Health Recommendations

- Most patients report a history of THC-containing products
- THC has been identified in most samples tested by FDA to date
- National and state data suggest that products containing THC, particularly those obtained off the street, are linked to most of the cases and play a major role in the outbreak
- CDC recommends that persons should NOT
  - Use e-cigarette, or vaping, products that contain THC
  - Buy any type of e-cigarette, or vaping, products, particularly those containing THC, off the street
  - Modify or add any substances to e-cigarette, or vaping, products

CDC Public Health Recommendations Continued

- Since the specific cause or causes of lung injury are not yet known, the only way to assure that people are not at risk while the investigation continues is to consider refraining from use of all e-cigarette, or vaping, products
Deaths caused by drug overdose or alcohol 2008 through 2018, King County, WA

- Between 2008 to 2018:
  - # of deaths increased from 271 to 415
  - Rate increased from 14 to 19 deaths/100,000
  - In 2018, 67% involved an opioid & 54% involved a stimulant
  - Deaths involving a combination of opioids and stimulants has increased
    - 57% in 2008 to 32% in 2018 (p<.0001).
  - 67% between 30-59 years old
  - 67% male
  - 16% among persons living homeless
- Compared to NH Whites:
  - Rate 4X greater among AI/AN
  - Rate 22% greater among NH Black

Fentanyl-spiked drugs cause increase in King County overdose deaths

"We feel like there’s a serial killer on the street." Fentanyl’s death toll in the Seattle area

CDC Public Health Recommendations
- There is no safe tobacco product. All tobacco products, including e-cigarettes, carry a risk
- E-cigarette, or vaping, products should never be used by youths, young adults, or women who are pregnant
- Adults addicted to nicotine using e-cigarettes should weigh all risks and benefits, and consider utilizing FDA approved nicotine replacement therapies.*
- If people continue to use e-cigarette, or vaping, products, they should:
  - Carefully monitor themselves for symptoms
  - See a health care provider immediately if symptoms develop.

*Many tobacco products contain nicotine, an addictive or harmful substance.
77% of 2018 deaths involved multiple substances.

Number of Fentanyl-Involved Deaths, 2016-2018
(Note: Grey indicates pending toxicology results)

- 65 fentanyl-involved overdoses YTD in 2019
- 7 among persons <18 years old
- Nearly all fatal fentanyl overdoses occurred among people who are housed
- Fentanyl-involved overdoses are occurring all over the county, often in suburbs and residential areas.

Location of Fatal Overdoses, 2019
- Fentanyl
- Fentanyl not detected

Location of 2018 Drug & Alcohol Caused Deaths
- Nearly half occurred in Seattle
- Rates greatest in SeaTac, Tukwila, Seattle, & Auburn

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- Nearly half occurred in Seattle
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Health alert for pill users

- Available at kingcounty.gov/overdose
- Distribution to date:
  - >1100 posters ordered
  - >18,000 postcards ordered
- Distributed via:
  - EMS agencies
  - Treatment providers
  - Public Health Clinics & FQHC
  - Social service agencies
  - Pharmacies
  - Law Enforcement
  - ... many more
- Your agency can order materials here:
  - is.gd/fentanyl_warning

WARNING
FENTANYL IS KILLING
KING COUNTY RESIDENTS

“Opioids” and “heroin” pills sold on the street or online may look real but could contain fentanyl. Fentanyl can also be found in white powders.

HOW TO PREVENT OVERDOSE
- Don’t use pills purchased from the street or online.
- Don’t mix drugs.
- Don’t use alone.
- Keep naloxone (Narcan) readily available.
- Call 911 if overdose suspected.

Social Media Alert

Fake looks like real.

"Prescription pills" sold online and on the street look like the real thing.

Health Alerts for Schools

Don't be faked out.

Never let someone “sleep it off”.

Naloxone saves lives

Naloxone is recommended for persons who:
- Use opioids illicitly, including heroin and fentanyl
- Are in treatment for opioid use disorder (OUD), including those prescribed buprenorphine or methadone
- Chronically use prescribed opioids at higher dosages or use extended-release or long-acting preparations
- Are friends with, family members of, or service providers of people who use opioids
- Patients at highest risk for opioid overdose are those who:
  - Have survived a prior opioid overdose
  - Have reduced opioid tolerance due to recent hospitalization, incarceration, or OUD treatment
  - Use opioids concurrently with benzodiazepine, alcohol, or other sedating drug

Naloxone Prescribing Practice Guidelines

Anyone can get Naloxone without a prescription.

Public Health

To order Naloxone for your family:

Public Health

To get Naloxone for your friends:

Public Health
Indirect Effects on IPD in Adults ≥65 Years Old
IPD Incidence Among Adults ≥65 Years Old: 1999–2015

Key Points
- Nine-fold reduction in PCV13-type IPD from 2000 through 2014
- Three-fold reduction in PCV13-type IPD after PCV13 introduction for children (2010-2014)

Indirect Effects by Age
PCV13-type IPD Incidence by Age Group, 1999–2015

Key Points
- Indirect effects observed for all age groups
- Disparities by age in PCV13-type disease reduced but not eliminated

Population-Level Impact on IPD
IPD Incidence Among Adults ≥65 Years Old, 2013–2017

Key Point
- No changes in IPD incidence since 2014
- No direct or indirect effects observed at the population level since 2014
- Non-PCV13 serotypes now make up the majority of the disease burden
### Population-Level Impact on PCV13-type IPD Associated Deaths

**PCV13-type Mortality Among Adults 65 Years Old, 2013-2017**

- No population-level impact on mortality associated with PCV13-type IPD since 2014
- No changes in case fatality ratio

**Key Points**

- Almea Matanock, ACIP, June 2019

![Graph showing PCV13-type mortality trends among adults 65 years old.](image)

### Population-Level Impact on Non-Invasive and Invasive Pneumonia

**Non-invasive pneumococcal pneumonia**

- Decline in non-invasive pneumonia observed between 2013 and 2014 (indirect effect)
- No further population-level impact on non-invasive or invasive pneumonia since 2014

**Key Points**

- Almea Matanock, ACIP, June 2019

![Graph showing non-invasive pneumococcal pneumonia trends.](image)

### Current PCV13 Burden Among Adults ≥65 Years Old

- PCV13-type IPD incidence 5/100,000 (20% of all IPD)¹
  - Common PCV13 serotypes (% of PCV13-types): 6A (66%), 19A (13%), 7F (13%), 19F (12%)²

- PCV13-type pneumonia incidence ~17-76/100,000 (~4% of all pneumonia)
  - Common PCV13 serotypes (% of PCV13-types): 19A (28%), 6A (12%), 5 (9%), 7F (7%)³

¹Mortality: Almea Matanock, ACIP, June 2019
²Mortality: Almea Matanock, ACIP, June 2019
³Mortality: Almea Matanock, ACIP, June 2019

### Estimated Public Health Impact: Cases Averted Over the Lifetime of the Cohort (2.7 Million Adults 65 Years Old)

- **IPD Cases**:
  - CDC 2018 (pool for 50yr olds)
  - CDC 2018 (pool for 70yr olds)
  - PM 2018 (pool for 70yr olds)

- **Non-Hospitalized Pneumonia Cases**:
  - CDC 2018 (pool for 50yr olds)
  - CDC 2018 (pool for 70yr olds)
  - PM 2018 (pool for 70yr olds)

- **Deaths due to Pneumonia**:
  - CDC 2018 (pool for 50yr olds)
  - CDC 2018 (pool for 70yr olds)
  - PM 2018 (pool for 70yr olds)

<table>
<thead>
<tr>
<th>Category</th>
<th>CDC 2018 (50yr olds)</th>
<th>CDC 2018 (70yr olds)</th>
<th>PM 2018 (70yr olds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IPD cases</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hospitalized cases</td>
<td>0.14</td>
<td>0.12</td>
<td>0.13</td>
</tr>
<tr>
<td>Non-hospitalized cases</td>
<td>2.25</td>
<td>2.50</td>
<td>2.25</td>
</tr>
<tr>
<td>Deaths due to pneumonia</td>
<td>0.01</td>
<td>0.01</td>
<td>0.02</td>
</tr>
<tr>
<td>Vaccinated</td>
<td>30,000</td>
<td>49,000</td>
<td>10,000</td>
</tr>
</tbody>
</table>

**Costs**:

- **Vaccine costs**:
  - $540
- **Total cost**:
  - $5,980

**Costs Averted**:

- **Vaccine cost**:
  - $540
- **Total cost**:
  - $5,980

**Estimated Public Health Impact Averted**:

- $1,464,672
- $1,021,253
- $570,880

Almea Matanock, ACIP, June 2019

![Table showing public health impact calculations.](image)
ACIP PCV13 – Bottom Line (for now)

• June, 2019 ACIP voted to:
  • No longer recommend PCV13 for all adults 65 years or older who have not previously received PCV13 with PCV13 given first, followed by a dose of PPSV23.
  • Recommend PCV13 based on shared clinical decision making for adults 65 years or older who do not have an immunocompromising condition* and who have not previously received PCV13.
  • All adults 65 years or older should receive a dose of PPSV23. If the decision is to give PCV13, it should be given first, followed PPSV23.

*Immunocompromising conditions defined as chronic renal failure, nephrotic syndrome, immunodeficiency, iatrogenic immunosuppression, generalized malignancy, HIV, Hodgkin disease, leukemia, lymphoma, multiple myeloma, solid organ transplants, cochlear implants, CSF leaks, congenital or acquired asplenia, sickle cell disease, or other hemoglobinopathies.

ACIP voted to:
1) Harmonize the upper age for catch-up through age 26 years across genders
2) Recommend HPV vaccination based on shared clinical decision making for persons aged 27 through 45 years that are not adequately vaccinated. HPV vaccines are not licensed for use in adults older than age 45 years.

Considerations for shared clinical decision-making regarding human papillomavirus (HPV) vaccination of adults aged 27 through 45 years

• Ideally, HPV vaccination should be given in early adolescence because vaccination is most effective before exposure to HPV through sexual activity. For adults aged 27 through 45 years who are not adequately vaccinated, clinicians can consider discussing HPV vaccination with persons who are most likely to benefit. HPV vaccination does not need to be discussed with most adults aged >26 years.

• HPV is a very common STI. Most HPV infections are transient and asymptomatic and cause no clinical problems.
• Although new HPV infections are most commonly acquired in adolescence/young adulthood, some adults are at risk for acquiring new HPV infections. At any age, having a new sex partner is a risk factor for acquiring a new HPV infection.
• Persons in a long-term, mutually monogamous sexual partnership are not likely to acquire a new HPV infection.
Considerations for shared clinical decision-making regarding human papillomavirus (HPV) vaccination of adults aged 27 through 45 years

- Most sexually active adults have been exposed to some HPV types, although not necessarily all of the HPV types targeted by vaccination.
- Antibody tests cannot determine whether a person is already immune or still susceptible to any given HPV type.
- HPV vaccine efficacy is high among persons who have not been exposed to vaccine-type HPV before vaccination.
- Vaccine effectiveness might be low among persons with risk factors for HPV infection or disease (e.g., adults with multiple lifetime sex partners and likely previous infection with vaccine-type HPV), as well as among persons with certain immunocompromising conditions.
- HPV vaccines are prophylactic (i.e., they prevent new HPV infections). They do not prevent progression of HPV infection to disease, decrease time to clearance of HPV infection, or treat HPV-related disease.

2018-19 Influenza Vaccine Effectiveness: A and B Viruses

<table>
<thead>
<tr>
<th>Age group (years)</th>
<th>Influenza positive Total</th>
<th>Influenza positive (%) Vaccinated</th>
<th>Influenza negative Total</th>
<th>Influenza negative (%) Vaccinated</th>
<th>Adjusted VE %</th>
<th>Adjusted 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>All ages</td>
<td>1342</td>
<td>(43)</td>
<td>7246</td>
<td>(54)</td>
<td>44%</td>
<td>(38, 51)</td>
</tr>
</tbody>
</table>

Estimated Influenza Illnesses, Medical visits, and Hospitalizations Averted by Vaccination

- During the 2017-2018 flu season, influenza vaccination prevented:
  - approximately 7 million flu illnesses
  - 109, 000 flu hospitalizations
  - 8,000 flu deaths.