E-cigarettes: Effects on Bystanders and Users

About E-cigarettes

- Battery operated devices that heat liquid nicotine, solvents, flavorings and other chemicals to form an aerosol that users and bystanders inhale. Device designs evolve rapidly\(^1\) and simulate the visual, sensory, and behavioral aspects of smoking.\(^4\)
- Nicotine intake is altered by choice of device design, e-liquid and users' puffing style.\(^2\)
- E-cigs are further customizable with replacement parts and other adjustments,\(^1\) but customizing can result in explosion and injuries.\(^5\)
- Exhaled aerosol (secondhand aerosol), leaves residue on surfaces which later releases cancer-causing chemicals into the air.\(^6\)

The World Health Organization\(^2\) calls e-cigarette aerosol a “new air contamination source”

<table>
<thead>
<tr>
<th>Constituents</th>
<th>Health Effects on Bystanders</th>
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<tbody>
<tr>
<td>Formaldehyde and other carbonyls</td>
<td>Cancer risk(^2,7,8)</td>
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<tr>
<td>Acrolein</td>
<td>Risk of cardiovascular disease, cancer, &amp; emphysema(^8,10)</td>
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<tr>
<td>Metal and silicate particles</td>
<td>Toxic to human cells;(^2,11) some metals higher in SHA than in secondhand tobacco smoke(^2)</td>
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<tr>
<td>Nicotine</td>
<td>Highly addictive; cardiovascular effects; harmful to fetal lung &amp; brain development; permanent effects on developing brains of children, teens, and young adults(^8,12-14)</td>
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Health Effects on Users: Evolving Research

- **Cardiovascular effects include:** poor circulation and wound healing,\(^15\) arteries clogged with fatty deposits,\(^16\) aortic stiffness and high blood pressure,\(^17\) and changes in the way the heart pumps blood\(^16\) and how the blood vessels respond.\(^19\)
- **Oxidative stress damages cells,** contributing to heart and blood vessel diseases, lung diseases (i.e. COPD), cancer and neurodegenerative disorders (i.e. Alzheimers).\(^10,18\)
- **Lung cells are impaired** and have less capacity to fight infection.\(^20\)
- **Toxic flavoring chemicals** (e.g., diacetyl) have been found in the aerosols of 47 of 51 flavored e-cigarettes tested. Over 7000 flavoring chemicals still need to be tested.\(^21\) The Flavoring Extracts Manufacturing Association (FEMA) issued a warning for workers who may inhale flavoring chemicals, but the public remains unprotected.

Generally Recognized as Safe (GRAS) does NOT mean a chemical is safe to inhale, only that it may be safe to eat.\(^3\)

Mixed Evidence for E-cigarettes as a Quit Aid

- Recent review articles show e-cigarettes as ineffective quit aids,\(^8\) and dual users (use cigarettes and e-cigarettes) are significantly less likely to quit conventional cigarettes.\(^22\)
- However, in the 2014-15 U.S. Population Survey, e-cigarette users were more likely to make a conventional cigarette quit attempt and more likely to succeed than non-users.\(^23\)
  - **Note:** 11.5% of the survey sample\(^23\) were dual users who have **double the risk** of dying from heart disease compared to smokers who quit completely.\(^24\)
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Recommendations for Clinicians Whose Patients Wish to Quit Smoking

- Instead of using e-cigarettes to quit, advise patients to use evidence-based treatments: FDA-approved medications and counseling (e.g. individual, online, 1-800-QUITNOW).
- If the patient is a dual user, encourage them to stop using e-cigarettes as they may lead to relapse to conventional cigarette smoking.

Policy Recommendation

“… e-cigarettes emit harmful chemicals into the air and need to be regulated in the same manner as tobacco smoking.”

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