Adolescents and Tobacco – 2019

Who is winning?

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Tobacco and Secondhand Smoke

• ~1.1 billion people smoke
  80% are in low/middle-income countries
• ~6 million deaths / year
  • entirely preventable
  • 10% of deaths are due to second hand smoke
  • 25% of those are among children <5

Harms from Tobacco - Since 1604

• “Loathsome to the eye, hateful to the nose, harmful to the brain, dangerous to the lung...”
  - King James I of England - 1604
• 1655 – Royal Society of London experiment – gave a cat distilled oil of tobacco – the cat died
• 1964 – US Surgeon General report on the health effects of tobacco use
• 1998 – WHO (OMS) Tobacco Free Initiative

US Surgeon General 2014
50th Anniversary report

• Over 20 million Americans died of smoking, including
  - 2.5 million nonsmokers
  - >100,000 children
• Smoking is still the leading cause of preventable disease and death in the US (and elsewhere)
• The epidemic is sustained by the tobacco industry, which deliberately misleads the public about the risks of smoking
What We've Learned in 50 Years

- Smoking is more deadly than 50 years ago
- Smokers inhale > 7,000 chemical compounds – 70 are carcinogens
- Secondhand smoke (SHS) kills 41,000 nonsmokers/year
- There is no safe level of smoke exposure and NO SAFE CIGARETTE
- There are many missed opportunities for prevention

E-Cigarette
E-hookah
Vape Pen

Inside the e-cigarette
Compounds in Smoke

**Gases**
- Carbon monoxide
- Hydrogen cyanide
- Ammonia
- Benzene
- Formaldehyde
- Nicotine
- Nitrosamines
- Lead
- Cadmium
- Polonium

**Particles**
- 70 proven human carcinogens

E-cigarettes – different – still unsafe

Excretion of metabolites of acrylonitrile, acrolein, propylene oxide, acrylamide, and crotonaldehyde are higher in e-cigarette–only users compared to controls.

- Rubinstein et al., Pediatrics, 2018

Proportion of children and non-smoking adults exposed to secondhand smoke

<table>
<thead>
<tr>
<th>Region</th>
<th>Children (%)</th>
<th>Adults (%)</th>
<th>Non-smokers (%)</th>
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<td>World</td>
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**Effect of a Single Cigarette on Indoor Air Quality**

- It takes TWO hours for the air quality to return to minimum federal safety standard for levels of CO, fine particles and particulate aromatic hydrocarbons.

**Maternal Tobacco Use/Exposure and Pregnancy Outcomes**

<table>
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<th>SHS Exposure related to:</th>
<th>Tobacco Use related to:</th>
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<tr>
<td>Low birthweight</td>
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<td>Premature birth</td>
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<td>Stillbirth</td>
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<td>Recurrent mortality</td>
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<td></td>
<td>Abnormal bleeding during pregnancy and delivery</td>
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<td>Damage to child's developing brain &amp; lungs</td>
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<td>Birth conditions, including cleft lip and cleft palate</td>
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**Effects of Tobacco and SHS on Children**

- **Short-term Health Effects**
  - Respiratory tract infections
  - Decreased lung function
  - Decreased immune response
  - Asthma attacks
  - Ear infections
  - Tooth Decay

- **Indirect Health Effects**
  - Malnutrition, food insecurity due to money spent on tobacco
  - Illness/death of parents from tobacco use

- **Long-term Health Effects**
  - Sudden Infant Death Syndrome
  - Death from respiratory infection
  - Asthma
  - Cognitive, Behavioral issues
  - More likely to become smokers
  - Leukemia and lung cancers
  - Metabolic syndrome

**Why Do People Use Tobacco?**

- Nicotine is physically addictive
  - Tolerance/withdrawal symptoms
- Nicotine causes dopaminergic activation and CNS stimulation
- Use is reinforced by social cues
- Youth are more susceptible to addiction
First Puff...
- >80% of smokers start before age 18
- Nicotine in 1-2 puffs occupies 50% of nicotinic receptors in the brain
- Nicotine goes to brain 6 seconds after inhalation
- Smokers control their nicotine levels
- Media teaches children smoking is pleasurable

Electronic cigarettes
- Marketed as
  - “safe”
  - “no carcinogens”
  - “harmless water vapor”
  - “could help smokers quit”
- None of these claims are true...

E-liquid Toxicity – heating creates carcinogenic compounds

Figure 6. Effects of nicotine-vapor and heated e-liquid on levels of carcinogenic compounds emitted from EC (5 puff).
PG: 50% propylene glycol, PG: 30% propylene glycol. Nicotine palmitate (1%)
Kosmidis Nicotine & Tobacco Research 2014
What are the health harms?

- Relative to smoked tobacco, less harmful
  - No tar
  - Variable levels of nicotine
- Relative to NO tobacco or medical NRT
  - Decreased lung function (aldehydes)
  - Long term effects - nicotine is toxic to heart/lungs
  - Safety of flavors when heated and inhaled
- Non- and former smokers become addicted
- Maintains combusted tobacco use

Impact of secondhand aerosol

Nicotine adsorbed + Alveolar growth & lung function is impaired and overall growth is affected in newborn mice exposed 2x/day for 10 days

False advertising - to profession and public

Vaping Is 95% Healthier and 40% Cheaper Than Smoking
JUUL
- Deliver peak nicotine in 5 minutes
- Less aversive & higher nicotine per puff than other products
- 25% past month use in 15-19 year olds
- Rise in total tobacco use rates
- Many teens do not know Juul always contains nicotine

Juuling
- Ads and flavors target youth and re-normalize smoking
- Very little ‘smoke’ – easy to hide
- Can be used for marijuana too

But don’t e-cigarettes help in smoking cessation?
- Very limited evidence
- Most suggests that people cut down and don’t stop completely...

E-cigs & smoking cessation
- UK study – first evidence - NEJM Jan ‘19
- Smokers assigned nicotine replacement of their choice versus e-cigarette
- Both got behavioral support
- 1 year abstinence – 18% in e cig group versus 10% in NRT group
- 80% of e-cig group using product at 1 year/versus 9% of NRT group
**Meta-analyses – Glantz et al 2015; 2017**

11 → 19 studies = OR = 0.72 (95% CI 0.57, 0.91)

**New e-cigarette respiratory illness**

- 9/17/19: 530 confirmed and probable cases of vaping-related lung injury in 38 states, 7 deaths
- > 50% are younger than 25 years
- Males > Females
- Cough, shortness of breath, chest pain, nausea, GI symptoms, fever, abdominal pain
- Many patients report use of multiple substances, including both THC and nicotine

**Exploding e-cig batteries**

A 15-year-old says he suffered third-degree burns to his leg when a vape pen battery exploded in the pouch.

The teenager’s left leg was charred from his thigh to his calf, and he suffered second- and third-degree burns.

**Source:** WHO Report on the Global Tobacco Epidemic, 2008 - The MPOWER package.
Offer help to quit: Are we asking the right questions?

- 66% of adult smokers advised to quit
- Only 23% of adults asked about SHS
- 64% of parents asked about SHS
- 33% parents advised to keep homes and/or cars smoke-free

Tobacco control programs must be more than cessation/ quitting for adults

- Cessation counseling is effective
  - Include secondhand smoke - Ask and Advise
- Tobacco control programs
  - Include child health clinicians
- Quit-lines and other resources
  - Include motivation to protect others as a primary factor for behavior change

Raise minimum sale of tobacco to age 21

- Tobacco 21 prevents or delays initiation of tobacco use
- 12% reduction in overall smoking prevalence
- 10% reduction in premature deaths
- 4.2 million years of life saved in US

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<th>Projected drop in initiation rates by age</th>
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<td>Younger than 15</td>
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<td>Ages 15-17</td>
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AAP 2018 Policy Recommendations

- Ask the right questions about tobacco including e-cigs and vapor
- Act immediately to regulate e-cigs similar to combustible sigs
- Do not recommended E-cigs for cessation
- Tax e-cigs like other tobacco products
- Ban all tobacco sales to children and youth less than age 21
What should we do about e-cigs and other new tobacco products?

- Ban them?
- Until we know more about “e-anything” and cessation, recommend medicinal NRT, quit lines and cessation support to smokers
- Without regulation of marketing, flavoring, and promotion to youth, “debate” over possible harm reduction benefit supports the tobacco industry effort to delay effective regulation and addict youth to nicotine

Where are we in 2019?

- Strong evidence for policy and practices that would help achieve tobacco free generation and prevent related disease and deaths
- E-cigs harms users and Secondhand vapor harms growing lungs
- Many missed opportunities for prevention/policy
- We cannot afford to be complacent nor to only focus on cessation of combustible products
- Policies are needed to protect non-smokers from SHS and to prevent adolescents from becoming addicted to nicotine – including e-Cigarettes
“Tobacco use is unlike other threats to global health. Infectious diseases do not employ multinational public relations firms. There are no front groups to promote the spread of cholera. Mosquitoes have no lobbyists.”

—WHO Zeltner Report, 2000