Pediatric Tobacco Today

Addressing New Problems and Old Issues in a Changing Landscape

Rachel Boykan, MD

May 30, 2019
Disclosures

No financial relationships to disclose or conflicts of Interest to resolve
Objectives

1. Describe epidemiology of youth tobacco use and exposure, including new electronic products
2. Develop strategies to address parents’ and adolescents’ use of tobacco
3. Identify opportunities for advocacy in addressing youth tobacco use and exposure
Cancers

- Larynx
- Esophagus
- Oropharynx
- Trachea, bronchus, and lung
- Acute myeloid leukemia

Chronic Diseases

- Stroke
- Blindness, cataracts, age-related macular degeneration
- Congenital defects—maternal smoking: orofacial clefts
- Periodontitis
- Aortic aneurism, early abdominal aortic aneurysm and atherosclerosis in young adults
- Coronary heart disease
- Pneumonia
- Atherosclerotic peripheral vascular disease
- Chronic obstructive pulmonary disease, tuberculosis, asthma, and other respiratory effects

Diabetes

- Reproductive effects in women (including reduced fertility)
- Hip fractures
- Ectopic pregnancy
- Male sexual function—erectile dysfunction
- Rheumatoid arthritis
- Immune function
- Overall diminished health

James

• James, age 16, for yearly physical

• Hx significant for well-controlled asthma

• HEADSS: has been vaping for 9 months; mostly Juul

• Some friends use smokeless tobacco, a few smoke cigars
High School Student Current Tobacco Use
National Youth Tobacco Survey (NYTS)
High School Student Current Tobacco Use
National Youth Tobacco Survey (NYTS)
High School Student Current Tobacco Use
National Youth Tobacco Survey

Percentage of high school students

- Any tobacco product
- Any combustible
- ≥2 Types
- E-cigarettes
- Cigarettes
- Cigars
- Smokeless tobacco
- Hookahs
- Pipe tobacco

Cigars

• 7.6% of hs students smoked cigars in past 30 days

• In 30 states, cigar smoking is more prevalent than smoking among hs boys

• Flavors attract teens to use cigars

• Loopholes in language defining “little cigars” allow for marketing and less taxation of cigars

https://www.tobaccofreekids.org
High School Student Current Tobacco Use
National Youth Tobacco Survey (NYTS)
Smokeless Tobacco

• Current smokeless tobacco use (8.4%) among hs boys is comparable to cigarette use (8.8%)
• 29% of current ms users are frequent users
• Hs athletes use smokeless tobacco at higher rates than non-athletes – may be as high as 17.4% among male hs athletes
• Health harms include nicotine addiction, carcinogens, increased risk of progressing to smoking

https://www.tobaccofreekids.org
High School Student Current Tobacco Use
National Youth Tobacco Survey (NYTS)
Hookah

- AKA narghile, argileh, shisha, hubble-bubble, goza
- As harmful as smoking
- Flavored hookah appeals to youth
- May have increased risk of progressing to smoking

Image from American Lung Association, 2007

https://www.tobaccofreekids.org
High School Student Current Tobacco Use
National Youth Tobacco Survey (NYTS)
MS Students’ E-Cigarette use 2011-18

Cullen et al, MMWR, 2018
E-cigarette use Rhode Island

http://www.health.ri.gov/data/adolescenthealth/tobacco/
E-cigarette Anatomy
E-cigarette Anatomy

- Atomizer
- Battery
- Cartridge
- LED light
- Propylene glycol
- Vegetable Glycerin
- Flavoring
- Nicotine
GRAS??
<table>
<thead>
<tr>
<th>Category</th>
<th>Images</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chocolate</td>
<td>75</td>
</tr>
<tr>
<td>Ice Cream</td>
<td>96</td>
</tr>
<tr>
<td>Candy</td>
<td>259</td>
</tr>
<tr>
<td>Cookies</td>
<td>83</td>
</tr>
<tr>
<td>Donuts</td>
<td>90</td>
</tr>
<tr>
<td>Cupcakes</td>
<td>43</td>
</tr>
<tr>
<td>Breakfast</td>
<td>65</td>
</tr>
<tr>
<td>Mint</td>
<td>58</td>
</tr>
<tr>
<td>Soda Pops/Beverages</td>
<td>138</td>
</tr>
<tr>
<td>Flavor Varieties</td>
<td>290</td>
</tr>
<tr>
<td>eJuice Companies</td>
<td>244</td>
</tr>
</tbody>
</table>

http://tobacco.stanford.edu/tobacco_main/index.php
Fruit and Candy Flavors

- Fruit and candy flavors are preferred and perceived as less harmful\(^1\)
- Use of flavors significantly correlated with greater risk of dual and poly tobacco use, relative to single product use\(^2\)

\(^1\)Soneji et al, Public Health Reports 2019
\(^2\)Mantey et al, Addictive Behaviors, 2019
Toxicity with Flavors

- Different toxicant profiles, many yet to be determined
  - Menthol
  - Diacetyl
  - Cinnamaldehyde
  - Benzaldehyde
  - Furfural
  - 2,3-Pentanedione

Kaur et al, Toxicology Letters, 2018
What is nicotine?

- Nicotine is considered a toxin
- Primary psychoactive ingredient in tobacco
- Commercially available almost exclusively from the *Nicotiana tabacum*, commonly known as the tobacco plant
Nicotine is addictive!

WITHDRAWAL:
Irritability,
frustration,
anger,
increased appetite,
tremors,
depression,
insomnia,
anxiety,
difficulty concentrating

https://www.sciencenewsforstudents.org
Pods

“Incredibly easy to use”

“Fairly cheap”

“Nicotine salts – an all-new delivery method that allows for higher concentrations of nicotine without sacrificing smoothness or flavor. In fact, a 24mg mixture of nicotine in a vape pen will almost surely provide an unpleasant vaping experience for the newbie. That same newbie could try a 50mg mixture of nicotine salts and not even bat an eye. Such is the joy of nicotine salts.”

Cotinine in pod users as high or higher than smokers

→ Median cotinine concentration = 244.8 ng/mL (IQR 8.4-1,255.8)

→ Cigarette median cotinine concentration = 155.2 ng/mL (IQR 68.8-579.2) (Benowitz)

Goniewicz, Boykan, et al, Tob. Control, 2018; Benowitz et al, Cancer Epidemiology, 2018
JUUL: Why so popular?
Then and Now
JUUL: Spreading the word via Twitter

Chu et al, Journal of Adolescent Health, 2018
Huang et al, Tob Control, 2019
## JUUL: Spreading the word via Twitter

### Table. Predicted Age Category of Twitter Users Following @JUULvapor Who Were Classified as Individuals

<table>
<thead>
<tr>
<th>Model</th>
<th>Individual Accounts, No. (%) (n = 9077)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-Age category, y</td>
<td></td>
</tr>
<tr>
<td>13-17</td>
<td>4078 (44.9)</td>
</tr>
<tr>
<td>18-24</td>
<td>3957 (43.6)</td>
</tr>
<tr>
<td>≥25</td>
<td>1042 (11.5)</td>
</tr>
<tr>
<td>2-Age category, y</td>
<td></td>
</tr>
<tr>
<td>13-20</td>
<td>7313 (80.6)</td>
</tr>
<tr>
<td>≥21</td>
<td>1764 (19.4)</td>
</tr>
</tbody>
</table>
Teens: Perception

- 73% believed e-cigs less harmful than cigarettes
- 47% believed that e-cigs less addictive than cigarettes
- 19% believed aerosol from e-cigs is water
- 23% believed e-cigs aren’t a tobacco product
- 41% believed e-cigs for cessation
- 43% believed e-cigs were safer than cigarettes
- E-cig users had significantly more favorable attitudes towards them

Amrock et al, Pediatrics, 2016
Gorukanti et al, Prev Med. 2017
Parker. Et al, Pediatrics, 2018
Vaping → Smoking
James

- James, age 16, for yearly physical
- Hx significant for well-controlled asthma
- HEADSS: has been vaping for 9 months; mostly Juul
- Some friends use smokeless tobacco, a few smoke cigars
**Meta-analysis: Four-fold increase in cigarette smoking initiation among teens**

<table>
<thead>
<tr>
<th>Source</th>
<th>Probability of Cigarette Smoking Initiation, %</th>
<th>Unadjusted OR (95% CI)</th>
<th>Adjusted OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ever e-Cigarette Users</td>
<td>Never e-Cigarette Users</td>
<td></td>
</tr>
<tr>
<td>Miech et al, 2017</td>
<td>31.1</td>
<td>6.8</td>
<td>6.23 (1.57-24.63)</td>
</tr>
<tr>
<td>Spindle et al, 2017</td>
<td>29.4</td>
<td>10.6</td>
<td>3.50 (2.41-5.09)</td>
</tr>
<tr>
<td>Primack et al, 2016</td>
<td>37.5</td>
<td>9.0</td>
<td>6.06 (2.15-17.10)</td>
</tr>
<tr>
<td>Barrington-Trimis et al, 2016</td>
<td>40.4</td>
<td>10.5</td>
<td>5.76 (3.12-10.66)</td>
</tr>
<tr>
<td>Wills et al, 2016</td>
<td>19.5</td>
<td>5.4</td>
<td>4.25 (2.74-6.61)</td>
</tr>
<tr>
<td>Primack et al, 2015</td>
<td>37.5</td>
<td>9.6</td>
<td>5.66 (1.99-16.07)</td>
</tr>
<tr>
<td>Leventhal et al, 2015</td>
<td>31.8</td>
<td>5.6</td>
<td>7.78 (6.15-9.84)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>30.4</strong></td>
<td><strong>7.9</strong></td>
<td><strong>5.12 (4.41-5.95)</strong></td>
</tr>
</tbody>
</table>

Heterogeneity: $\tau^2 = 0.15; Q_6 = 15.04; P = .02; I^2 = 60\%$

Test for overall effect: $z=6.25; P < .001$

Soneji et al, JAMA Pediatr. 2017
E-cigarettes are recruiting teen smokers

- Ever use of e-cigarettes strongly associated with subsequent initiation
- Higher nicotine e-cigarettes were more likely to progress to cigarettes

Conner et al, Tob Control, 2017
Goldenson et al, JAMA Pediatr, 2017
Watkins et al, JAMA Pediatr, 2018
E-Cigarettes: a one way door to cigarette use

• Kids who used e-cigarettes were more likely to be smoking cigarettes at the next time they were observed, but...

• Kids who smoked cigarettes were not more likely to be smoking e-cigarettes at a later time

Bold, Pediatrics, 2018
Cigarette experimenters using e-cigs were more likely to progress to smoking

- Among adolescent cigarette experimenters, using e-cigarettes was positively and independently associated with progression to current established smoking

Chaffee et al, Pediatrics, 2018
Nicotine addiction?

• Morean, 2018: Associated with dependence symptoms:
  – Longer duration of use
  – More frequent vaping
  – Nicotine use
  – Current cigarette smoking

• Vogel, 2019:
  – Dependence measures correlated with cotinine levels

Morean et al, 2018
Vogel et al, 2019
Pod users used more frequently than other e-cigarette users

- “Use a lot”
  - 67% are pod users
- “Use sometimes”
  - 37% pod users
  - 44% e-cig users
- Used a few times or not anymore
  - 19% pod users
  - 52% e-cig users
- Past day use
  - 77% of pod users
  - 30% of e-cig users
  - 43% of dual users

Boykan et al, SRNT, 2019
More pod users were daily users

• Daily use
  – 63% of pod users
  – 11% of e-cig users
  – 33% of tobacco users
  – 50% of dual users

Boykan et al, SRNT, 2019
Cotinine is highest in pod users, comparable to smokers and dual users

![Graph showing cotinine levels in different groups: Pod users (n=21), E-cig users (n=27), Tob users (n=6), Pod & Tob (n=3), E-cig & Tob (n=6). The graph indicates that cotinine levels are highest in pod users, followed by smokers and dual users.](image)
Cotinine is higher in daily vs. non-daily pod users

Boykan et al, SRNT, 2019
## Dependence

<table>
<thead>
<tr>
<th></th>
<th>Total (%)</th>
<th>Pod users (%)</th>
<th>E-cig users (%)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Desire interrupts thinking</td>
<td>3/42 (7)</td>
<td>3/20(15)</td>
<td>0/22 (0)</td>
<td>.06</td>
</tr>
<tr>
<td>Need to vape again</td>
<td>2/42 (5)</td>
<td>2/20 (10)</td>
<td>0/22 (0)</td>
<td>.13</td>
</tr>
<tr>
<td>Irritable without</td>
<td>5/42 (12)</td>
<td>4/20 (20)</td>
<td>1/22 (5)</td>
<td>.122</td>
</tr>
<tr>
<td>Stressed without</td>
<td>6/42 (14)</td>
<td>4/20 (20)</td>
<td>2/22 (9)</td>
<td>.32</td>
</tr>
<tr>
<td>Vape on awakening</td>
<td>6/42 (14)</td>
<td>6/20 (29)</td>
<td>0/22 (0)</td>
<td>.006</td>
</tr>
</tbody>
</table>
“Yes” on dependence questions $\rightarrow$ Higher cotinine

Boykan et al, SRNT, 2019
Vaping upon awakening → Higher cotinine

Boykan et al, SRNT, 2019
Tobacco Dependence Treatment
The 5 As

• ASK (important to ask the right questions)
• ADVISE (to not use any of these products)
• ASSESS (products, patterns of use, comorbidities)
• ASSIST (MI, nicotine replacement)
• ARRANGE (follow up, other forms of assistance)
Tobacco Dependence Treatment

Ask

• ASK (important to ask the right questions)
  – Juul?
  – How often?
  – When last?
  – In school?
  – In the morning?
Tobacco Dependence Treatment
Advise and Educate

• ADVISE (to not use any of these products)
Tobacco Dependence Treatment
Assess

- ASSESS (products, patterns of use, comorbidities)
Tobacco Dependence Treatment
Assist

- ASSIST (MI, nicotine replacement)
Truth Initiative: This is Quitting

QUIT ANYTHING

This is Quitting features:

- Real quitters, revealed
  Rage tweets and brag blogs straight from people trying to quit and stay quit. Inspiration, commiseration, all the feels. We couldn't make this stuff up.

- Texts you actually want to get
  Set your quit date and get advice tailored to your quit status. Not ready yet? We've got texts for that, too. Be anonymous. Your quitting secrets are safe with us.

- Tons of training tools
  Whether you need 1 try or 50 to take smoking or vaping down, we've got you covered. Our coaching crew, training exercises, and punching bags are open 24/7.

http://www.thisisquitting.com/
Curb the urge to vape

- **Delay** – urges usually last a few minutes
- **Drink Water** – or other low-cal drink
- **Do something else** – exercise, project with hands
- **Deep Breathe** – relaxation techniques
- **Discuss** – get help from a friend, or quit line, quit app, text to quit
Dealing with other teens who vape...

• Ask a friend or relative to quit with you
• Ask others not to vape around you
• Leave the room when others vape
• Keep hands and mouth busy
Tommy

- New patient, Tommy, age 1 week
- Mother cut back smoking from 1 pack/day to 3 cigs/day
- Father stopped smoking but is now vaping instead
Tobacco Dependence Treatment

1-800-QUIT-NOW
It's free. It's personalized.
It's up to you.

Looking for data about quitlines?
Each year NAQC collects information from quitlines across North America. Survey topics include the types of services offered, financing, and utilization of services. This survey data is available on our Quitline Facts page.

You can also view summarized content from all the quitline profiles included in the map above. Choose one of the following topics:
- Free and Discounted Cessation Medication
- Quitline Administration and Financing
- Web-Based Services
- Specialized Material
- Service Providers

Taking your first steps toward becoming tobacco free.

QUITWORKS™-RI
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http://map.naquitline.org/
**Rhode Island**

**Quitline Profile**

### Telephone Numbers

<table>
<thead>
<tr>
<th>Line</th>
<th>Phone Number</th>
<th>Language/Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1-800-784-8669</td>
<td>English/Spanish</td>
</tr>
<tr>
<td>2</td>
<td>1-800-879-8678</td>
<td>English/Spanish</td>
</tr>
<tr>
<td>3</td>
<td>1-800-833-5256</td>
<td>Spanish</td>
</tr>
</tbody>
</table>

**Supported Languages**

Counseling offered in: English, Spanish, Arabic

Third-party counseling: Mandarin, Cantonese, Korean, Vietnamese, French, Russian.

Language Line services with translation in over 140 languages.

Deaf/Hard of hearing: Video relay interpreter

### Services Provided

**Phone Counseling**

- Types:
  - brief intervention
  - multi-session (client-initiated)
  - Text Msg to cell phone (two-way)

- Length of standard first session: 45 min
- Length of standard follow-up session: 20 min

**Counseling session topics:**

- tobacco history
- setting a quit date
- relapse prevention
- use of cessation medication
- other

**Web-Based Services**

- quitline information
- self-help tools
- interactive counseling

- cessation information
- automated e-mail messages
- chat rooms

### Eligibility Criteria

**To receive counseling:** Resident of state

**To receive medication:** Resident of state, Age 18+. No medical conditions preventing use

### Specialized Materials

**Specialized Materials**

- youth, under 18
- older tobacco users, 55+
- pregnant tobacco users
- racial/ethnic populations
- chronic health conditions
- youth, 18-25
- smokeless tobacco users
- multiple addictions
- lesbian, gay, bisexual or transgender
- low socioeconomic status or Medicaid

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[http://map.naquitline.org/](http://map.naquitline.org/)
Schools try new strategies to reduce vaping, e-cigarette use

CNY SCHOOL REMOVES BATHROOM DOORS TO DISCOURAGE VAPING AND BULLYING
How to help schools with vaping

• Education about vaping and nicotine
• Ensure the school district has a 100% tobacco-free policy, which includes outdoor spaces and non-school hours
• Discuss local resources and strategies to address youth nicotine addiction
• Work with students, parents, students, community leaders and elected officials on solutions to promote health, not merely punish students
Resources: Addressing Vaping in Schools

• Stanford Tobacco Prevention Toolkit
• Public Health Law Center Model Policy for a Tobacco-free Environment in Minnesota’s K-12 Schools
• Minnesota Department of Health Toolkit: Addressing Student Use of E-cigarettes and Vaping Products
• Massachusetts Toolkit for Schools : Addressing Student Use of E-Cigarettes and other Vaping Products
475+ Cities & Counties in 29 States
Local flavor bans

- Barrington
- Central Falls
- Johnston
- Middletown
- Providence
- Woonsocket

Court Upholds Providence, R.I., Flavor, Coupon Bans
Plaintiffs argued infringement of First Amendment free speech
Dec. 14, 2012

PROVIDENCE, R.I. -- A federal district judge upheld two city ordinances in Providence, R.I., that ban the sale of certain flavored tobacco products and the acceptance and redemption of coupons, according to a report from the National Association of Tobacco Outlets.

Barrington's tobacco ban: 'You have to start somewhere'
New law: People must be 21 to buy tobacco in Barrington

MIDDLETOWN, R.I. ADOPTS FLavored TOBACCO RESTR REQUIRES TOBACCO RETAILER LICENSES

By Patrick Lagreid  @phxicarguy  On June 22, 2017

www.tobaccofreekids.org
AAP Recommendations

• FDA must regulate e-cigarettes; ban sales to people under 21 years old
• Ban Internet sales of e-cigarettes and e-cigarette solutions
• Reduce youth demand by banning flavors, including menthol
• Ban advertising and promotions to youth
• Apply existing tobacco control laws to e-cigarettes
• Pediatricians should screen for e-cigarette use, counsel about health effects and should not recommend e-cigarettes as a treatment option for tobacco cessation.

Walley & Jenssen et al, E-cigarettes and similar devices, Pediatrics 2019
AAP Julius B. Richmond Center of Excellence
Mission and Goal

• To improve child health by eliminating children’s exposure to secondhand smoke (SHS) and tobacco through research in clinical practice of pediatrics

• To ensure that all pediatric clinicians are aware of the consequences of SHS exposure, and that they have the skills and tools to help families and communities protect children and their families from tobacco
American Academy of Pediatrics
Julius B. Richmond Center of Excellence

- Founded in 2006 through a grant from the Flight Attendant Medical Research Institute (FAMRI)
- Named in honor of Julius B. Richmond, MD
- National Center with work at federal, state, community, and practice levels
- Housed at AAP, but is a “virtual center” with scientific investigators across the US
- Funded by grants from FAMRI, NIH, Truth Initiative, Pfizer, and other sources
- Center Director: V. Fan Tait, MD FAAP, Chief Medical Officer of AAP
AAP Julius B. Richmond Center of Excellence Activities

• Research
• Policy and advocacy
• Training and education
• Communication and dissemination
• Funding opportunities
• Technical assistance to AAP State Chapters and local communities

Jessica H., 2010 AAP Art Contest Winner
Richmond Center Resources

- AAP Section on Tobacco Control
- Physician Training and Educational Resources
- Patient/Family Resources
- Visiting Lectureships
- Webinar series (topics: hot topics in tobacco prevention and control, communication, best practices, and point of care issues)
- Solving the Puzzle: A Guide to Tobacco Pediatric Control (interactive guide pediatric tobacco control)
- State-specific Tobacco Information (prevalence data, policies, quitline information, tobacco control report card)
Richmond Center Resources

The American Academy of Pediatrics Julius B. Richmond Center of Excellence is committed to protecting children from tobacco and secondhand smoke. Clinicians, researchers, advocates, and families play a critical role. The Richmond Center offers tools and resources to help clinicians and communities, as well as supports research and policy development to create a healthy environment for children, adolescents, and families. The Richmond Center was named for former Surgeon General Dr. Julius B. Richmond, and was established with generous support from the Flight Attendant Medical Research Institute in 2008.

Our Mission

Our mission is to improve child health by eliminating children’s exposure to tobacco and secondhand smoke.

Learn more.

Clinical
Find resources to help you ask patients and families the right questions about tobacco use and secondhand smoke exposure.

Education
Discover general information on tobacco use, and access fact sheets, webinars and powerpoint presentations about tobacco control.

IN THE NEWS

October 13, 2017
2018 AAP RCE New Investigator Grant Program currently accepting applications.

October 13, 2017
2018 Visiting Lectureship Award Program currently accepting applications.

February 16, 2017
2017 RCE New Investigator Grant Recipients and Visiting Lectureship Awardees have been selected.