Child Fatality Task Force meeting
11/15/16
Objectives

- Describe changing demographics of North Carolina (NC) e-cigarette use, including new data from 2015 NC Youth Tobacco Survey
- Explain health effects of e cigarettes and concerns for youth
E-Cigarette – Components

- **Microprocessor**: controls heater and light
- **Sensor**: detects when smoker takes a drag
- **Heater**: vaporises liquid and nicotine
- **Cartridge**: holds nicotine dissolved in propylene glycol
- **LED Lights**: up when the smoker draws on the cigarette
- **Battery**:
- **Steam Aspiration**
E-Cigarette Products

CIG-A-LIKES & DISPOSABLES
1st generation

PENS
2nd generation

TANKS
3rd generation

HEAT STICKS
4th generation
Other ENDS Products
E-Cigarette E-Juice

- E-Juice typically Propylene Glycol and/or Vegetable Glycerin, flavors, and nicotine
  - **Propylene Glycol (PG)** used in ice cream, liquid sweetener, whipping cream, and soda. Not FDA approved for inhalation. *Boiling Point* = 370°F (188°C)
  - **Vegetable Glycerin (VG)** “Glycerin” is from soybeans or is synthetic. It is in laxatives, cough syrup, toothpaste, mouth wash, shaving cream, hand lotion, soap. The “vapor” cloud. *Boiling Point* = 554°F (290°C)
  - **Nicotine** - *Boiling point* 476°F (247°C)
  - **Flavors**

- E-cig juice varies between 250°C during a puff and 100°C between puffs
E-Cigarette E-Juice

- Poisonings with e-juice and traditional cigarettes
E-Cigarette E-Juice

- North Carolina Legislation (12/2015)
  - child resistant packaging on any e-liquid container sold, for any liquid intended to be vaporized and inhaled, whether or not it contains nicotine.
E-Cigarette Nicotine Content

- Most commonly marketed liquid contains 1.2% nicotine (range 0%-5%)
- Amount nicotine also dependent on voltage
- Higher nicotine = harsher
- Uptake of nicotine less per puff e-cig than cigarette but self-titration occurs
- The higher the nicotine, greater potential for addiction
### E-Cigarette Flavorings

- **Flavors**: over 8000 flavors including traditional tobacco, menthol, coffee, chocolate, fruit, candy
- **Flavored tobacco products**: strongly appeal to youth
- **Availability of flavors**: strongly linked to youth e-cigarette use
E-Cigarette Flavorings

- Research at UNC- 5 of 13 flavors decreased cells’ ability to reproduce or perform cellular functions
- 75 percent of flavored e-cigarettes and refill liquids contain Diacetyl
  - linked to respiratory disease
E-cigarette- Carcinogens and Potential Dangers

- Most worrisome effects come from heating of tobacco and inhalation of constituents

- Majority of research shows that e-cigarettes contain less numbers and levels of carcinogens than combustible cigarettes
  - Carcinogens created from Cigarettes include:
    - Nitrosamines (NNN, NNK); Aromatic Amines; Polycyclic Aromatic Hydrocarbons; Heavy Metals; Heterocyclic Amines
  - Carcinogens found from E-Cigarette (heating of elements) & Vapor include:
    - Nitrosamines & Aromatic Amines
    - Vapor also contains glycols, aldehydes, & heavy metals (Breland 2016)
    - At higher temperatures (700C) Propylene Glycol creates formaldehydes (Janson 2015)
E-cigarette - Concerns for Adolescents

- Unknown long-term health effects
- Perceptions that product is safe
- Initiation among those not susceptible
- Dual use tobacco products
- Causal factor leading to cigarette smoking
  - Initiation of e-cigarette use among 16 to 26 year olds
    - Associated with progression to cigarette use
    - 8.3 X more likely progress to cigarette smoking (Primack 2015)
- Renormalization of tobacco use
- Nicotine addiction
- Exposure to vapor
Teen Use of E-Cigarettes (CDC 2016)

The graph shows the percentage of students using various tobacco products over the years 2011 to 2015. The data indicates a significant increase in the use of E-cigarettes among teenagers during this period, as highlighted by the red ellipse.
NC Youth Tobacco Survey (YTS)
Public school-based survey of students in grades 6-12
Conducted every two years since 1999 by NC DHHS and NC DPI

Sample Design
A 2-stage cluster probability sampling design:
- Schools selected proportional to enrollment size
- Classes randomly selected within selected schools
- All students within selected class surveyed

Response rates for the 2015 survey:
6,916 students (3,496 middle school (MS) & 3,420 high school (HS))
School response rates: 83.33% and 90.2% for MS and HS
Student response rates: 85.0% and 82.53% for MS and HS, respectively.
Overall response rate: 70.83% for MS and 74.44% for HS, respectively
NC High School Students Currently Using Tobacco Products (YTS, 2015)

Type of Tobacco Product

<table>
<thead>
<tr>
<th>Product</th>
<th>Percentage of Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cigarettes</td>
<td>9.3</td>
</tr>
<tr>
<td>Smokeless Tobacco</td>
<td>6.5</td>
</tr>
<tr>
<td>Cigars</td>
<td>8.8</td>
</tr>
<tr>
<td>Roll-your-Own Cigarettes</td>
<td>4.3</td>
</tr>
<tr>
<td>Flavored Little Cigars</td>
<td>3.1</td>
</tr>
<tr>
<td>Flavored Cigarettes</td>
<td>3.8</td>
</tr>
<tr>
<td>Hookah/Waterpipe</td>
<td>3.5</td>
</tr>
<tr>
<td>E-cigarettes</td>
<td>16.6</td>
</tr>
<tr>
<td>Other Emerging Products</td>
<td>1.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Product Type</th>
<th>Current Users in 2011</th>
<th>Current Users in 2013</th>
<th>Current Users in 2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any Emerging Product</td>
<td>23.8</td>
<td>22.4</td>
<td>23.8</td>
</tr>
<tr>
<td>Flavored Cigarettes</td>
<td>7.5</td>
<td>5.5</td>
<td>3.8</td>
</tr>
<tr>
<td>Flavored Little Cigars</td>
<td>5.2</td>
<td>4.6</td>
<td>3.1</td>
</tr>
<tr>
<td>Hookah/Waterpipe</td>
<td>3.6</td>
<td>6.1</td>
<td>3.5</td>
</tr>
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<td>4.4</td>
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</tr>
<tr>
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<td>3.2</td>
<td>3.6</td>
<td>1.9</td>
</tr>
<tr>
<td>Other Emerging Products</td>
<td>18.7</td>
<td>5.5</td>
<td>4.6</td>
</tr>
</tbody>
</table>

Initial analyses - Draft - not for citation
Current e-cigarette use by racial group, sex and grade (NC YTS 2015)

Initial analyses - Draft - not for citation
NC Middle and High School Current E-Cigarette Use (YTS, 2011-2015)
Percent of NC Middle and High School Students *Considering* E-Cigarette Use in Next Year: (YTS, 2013-2015)

Initial analyses - Draft - not for citation
Youth Not Susceptible to Smoking Cigarettes and Currently Using E-cigarettes (%)
NC YTS 2011-2015

Youth Not Susceptible to Smoking Cigarettes and Considering Using E-cigarettes (%)
NC YTS 2011-2015

*Considering e-cigarette use data not available in 2011
I was curious about the product
Friend or family member used them
To help me cut down on smoking
They cost less than other tobacco products, such as cigarettes
Famous people on TV or in movies use them
They might be better for my health than cigarettes
They are available in flavors I like, such as mint, candy, fruit, or chocolate
They can be used in areas where other tobacco products, such as cigarettes, are not allowed
They look cool
They don’t smell as bad as cigarettes
I used them for some other reason

Percent of Students

I was curious about the product 52.6
Friend or family member used them 29.9
To help me cut down on smoking 4.8
They cost less than other tobacco products, such as cigarettes 3.3
Famous people on TV or in movies use them 2.0
They might be better for my health than cigarettes 15.6
They are available in flavors I like, such as mint, candy, fruit, or chocolate 36.7
They can be used in areas where other tobacco products, such as cigarettes, are not allowed 12.5
They look cool 12.6
They don’t smell as bad as cigarettes 17.5
I used them for some other reason 16.0

Reasons for using e-cigarettes among NC middle and high school students (YTS 2015)

Initial analyses- Draft not for citation
Access to e-cigarettes among NC high school students currently using e-cigarettes (YTS 2015)

Percentage of Students

<table>
<thead>
<tr>
<th>Access Method</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A gas station or convenience store</td>
<td>7.7</td>
</tr>
<tr>
<td>A grocery store</td>
<td>1.1</td>
</tr>
<tr>
<td>A drugstore or pharmacy</td>
<td>0.8</td>
</tr>
<tr>
<td>A mall or shopping center kiosk/stand</td>
<td>1.4</td>
</tr>
<tr>
<td>Over the Internet</td>
<td>2.6</td>
</tr>
<tr>
<td>A store that sells electronic cigarettes, such as a “vape shop”</td>
<td>18.6</td>
</tr>
<tr>
<td>I was given a free sample</td>
<td>3.1</td>
</tr>
<tr>
<td>Some other place</td>
<td>3.0</td>
</tr>
<tr>
<td>From a family member</td>
<td>6.1</td>
</tr>
<tr>
<td>From a friend</td>
<td>47.6</td>
</tr>
<tr>
<td>Some other person that is not a family member or a friend</td>
<td>8.2</td>
</tr>
</tbody>
</table>
E Cigarette Packaging, Marketing

E-cigarette use among youth is rising as e-cigarette advertising grows

Dollars spent on e-cigarette advertising
Past 30-day e-cigarette use among youth

E Cigarette Regulation

- Little current regulation = 400 manufacturers with
  - No quality control
  - Nicotine amounts listed vary considerably
- August, 2016, FDA extended authority = Deeming- to include e cigarettes
  - Good
    - Sales to children under 18 (retail & online)
    - Vending machines (except in adult-only facilities)
    - No free samples
    - No health claims unless scientifically demonstrated
  - Not good
    - No universal product standards for safety or content
    - No marketing restrictions
    - No national standards for child-resistant packaging