# Nicotine Addiction in Adolescents

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## Disclosures: Martin

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## Disclosures: Upadhyaya

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Learning Objectives

At the conclusion of this presentation participants should be able to:

• Identify the extent of adolescent nicotine addiction;
• Describe the symptoms and physiology of adolescent nicotine addiction;
• Discuss how to assess levels of adolescent nicotine addiction; and
• Recall treatment strategies for adolescent nicotine addiction.

Nicotine Use in Adolescents: Overview

• Severity of the Problem
• Nicotine: Why is it Abused
• Associated Psychiatric Disorders
• Symptoms and Measurement of Use
• Treatment
  – Family
  – Community
  – Medication

Extent of Adolescent Nicotine Addiction: A Pediatric Epidemic

• The modal age for starting tobacco use is between 11 and 15
• Early initiation of cigarette smoking is associated with increased frequency and persistence of use even in the case of early, very light, experimental use¹
• 80% of adult smokers started smoking in early and mid adolescence
• Only 5% of adolescent smokers view themselves as smokers in 5 years, while 75% are actually smoking 8 years later²

Adolescents smoke about 1.1 billion packs of cigarettes a year
- 200 billion dollars in future healthcare costs
- For example, the onset of smoking in adolescence is associated with increased risk of lung cancer because of physiological changes that are not seen in later onset smokers

Nicotine has been identified as a potential “gateway” to other drug use

1 Doll R. & Peto R. Mortality in relation to smoking: 20 years’ observations made on male British doctors.


Nicotine Concentration: Perfect Delivery System


Increase in dopamine release in the CNS
- Stimulates the pleasure and reward centers

Increase in Glutamate, GABA, ß-Endorphin
- Reduces anxiety, enhances concentration, reduces appetite, activates pleasure and reward centers

Psychoactive Effects of Nicotine

Symptoms and Physiology of Adolescent Nicotine Addiction: Measuring Nicotine Withdrawal in Adolescents

Symptoms have included self-reports of:
- Craving
- Headaches
- Nervousness
- Drowsiness
- Restlessness
- Upset Stomach
- Irritability or Anger
- Hunger
- Inability to Concentrate
- Increased Appetite
- Sadness
- Weight Gain
- Depression
- Hands Shaking
- Feeling Down
- Sleep Disturbance
- Feeling light-headed
- Dizzy and Feeling Stressed


Symptoms and Physiology of Adolescent Nicotine Addiction: Withdrawal and Relapse

- Stanton found that the three most commonly reported withdrawal symptoms experienced by adolescents were craving, feeling stressed and restlessness and these symptoms were related to failures at past smoking cessation attempts.

Assess Levels of Adolescent Nicotine Addiction: Adolescent Fagerstrom

1. How many cigarettes a day do you smoke?
   - Over 26 cigarettes a day
   - About 16-25 cigarettes a day
   - Less than 16 cigarettes a day

2. Do you inhale?
   - Always
   - Quite often
   - Seldom
   - Never

3. How soon after you wake up do you smoke your first cigarette?
   - Within the first 30 minutes
   - More than 30 minutes after waking but before noon
   - In the afternoon
   - In the evening

4. Which cigarette would you (most) hate to give up?
   - First cigarette in the morning
   - Any other cigarette before noon
   - Any other cigarette after noon
   - Any other cigarette in the evening

5. Do you find it difficult to refrain from smoking in places where it is forbidden (church, library, movies, etc.)?
   - Yes, very difficult
   - Yes, somewhat difficult
   - No, not usually
   - No, never

6. Do you smoke if you are so ill that you are in bed most of the day?
   - Yes, always
   - Yes, quite often
   - No, not usually
   - No, never

7. Do you smoke more during the first two hours that awake the rest of the day?
   - Yes
   - No

Assess Levels of Adolescent Nicotine Addiction
piCo +Smokerlyzer Breath Carbon Monoxide Monitor

<table>
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<th>CO parts per million (ppm)</th>
<th>Adult</th>
<th>Adolescent</th>
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<tr>
<td>Non-smoker</td>
<td>0-6</td>
<td>0-4</td>
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<tr>
<td>Low-dependence Smoker</td>
<td>7-15</td>
<td>5-6</td>
</tr>
<tr>
<td>Strong-dependence Smoker</td>
<td>≥ 16</td>
<td>≥ 7</td>
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Assess Levels of Adolescent Nicotine Addiction
Semi-Quantitative Urine Cotinine Test

NicAlert™ in vitro diagnostic semi-quantitative determination of cotinine in urine to determine if an individual has been exposed to tobacco products

Treatment Strategies:
A Comprehensive Community Approach

- Adopt and enforce local and statewide policies
  - School policies
  - Tobacco tax increases
  - Restrictions on commercial access to tobacco by youth
  - Smoke-free public places
- Use evidence-based anti-tobacco curricula in grades K-12
- Counter pro-tobacco norms through a high-quality media campaign

12th Grade Daily Smoking Prevalence and Price
**Treatment Strategies: A Family Involvement**

- Encourage parents to establish no-smoking expectations and home policies
- Parental disapproval of smoking was more effective in discouraging progression to established smoking than parental non-smoking and even attenuated the effect of peer smoking
- If adolescents perceived parents becoming more lenient toward smoking, they were more likely to progress to become established smokers


**Treatment Strategies: In the Clinic Setting**

- AMA-CDC protocol for healthcare settings
- 4 brief, clinic-based, 1-on-1 sessions with health professional
- Content tailored to teen’s motivation, factors that influence use
- Coping skills, awareness of tobacco use, quit date
- Not evaluated in adolescents

**Treatment Strategies: Five A’s**

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<th>Five A’s</th>
<th>Strategy</th>
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<tr>
<td>Ask</td>
<td>Ask about tobacco use by the patient and their families, and record in the chart (including environmental exposure)</td>
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<tr>
<td>Advise</td>
<td>Provide clear, unambiguous Advice to quit smoking</td>
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<tr>
<td>Assess</td>
<td>Assess, repeatedly if necessary, patient’s readiness to quit</td>
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<tr>
<td>Assist</td>
<td>Assist by providing treatment, referral, and/or self-help information for those ready to quit</td>
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<td>Arrange follow-up</td>
<td>Arrange for follow-up visits for relapse-prevention among those who have quit</td>
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Treatment Strategies: Five R’s

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<tbody>
<tr>
<td>Relevance</td>
<td>Personal relevance</td>
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<tr>
<td>Risks</td>
<td>Ask patient to identify negative consequences</td>
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<tr>
<td>Rewards</td>
<td>Ask patient to identify potential benefits of quitting</td>
</tr>
<tr>
<td>Roadblocks</td>
<td>Ask patient to identify barriers to quitting</td>
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<tr>
<td>Repetition</td>
<td>Ask at every clinic visit</td>
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Treatment Strategies: Medications

- FDA approved medications in adults
  - Nicotine replacement therapies
    - (e.g., gum, lozenge, patch)
    - Bupropion SR
    - Varenicline
  - Effective but not FDA approved
    - Nortriptyline
    - Clonidine – most efficacy (women?)

Nicotine Replacement (NRT): Administration

Nicotine patch
- 7, 14 to 21 mg patch
- Patient smokes ≥10 cpd: 21 mg daily for 6 weeks, then 14 mg daily for 2 weeks, then discontinue
- Patient smokes <10 cpd: 14 mg/d for 6 weeks, then 7 mg/d for 2 weeks, then discontinue
- Watch for skin irritation

Nicotine gum
- 2 to 4 mg
- 1 piece every 1-2 hours up to 9 per day
- Watch for irritation of oral mucosa

Slow taper to decrease chance of relapse
**NRT: Promise in Adolescents**

- N = 120
- 13 to 17 year olds who smoked ≥ 10 cpd
- Patch + CBT x 12 weeks led to marginally significant (OR = 8.36, p = 0.055) difference in self-report of numbers of cigarettes per day from placebo for cessation at 3 months post treatment
- Nicotine gum + CBT was ineffective in either CBT + placebo; CBT + Patch; or CBT + gum
- No significant decrease in Cotinine or CO levels in any treatment arm
- **Suggests promise but not definitive**


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**Bupropion Administration**

- Patient weight ≥ 90 lbs: 150 mg once in the morning for 3 to 6 days, then 150 mg bid for 12 weeks
- Patient weight < 90 lbs: Maximum 150 mg once in the morning, if tolerated
- XL dosing has not been studied in smokers but once a day dosing is ideal in adolescents
- Impacts on nicotine withdrawal symptoms
- Treats co-morbidity related to risk for nicotine use
- Cannot be used in eating disorders or if there is a history of seizures (NB: adolescents, especially females, may smoke for weight reduction)

**Bupropion: Promise in Adolescents**

- 312 Adolescents without co-morbid psychiatric disorders
- Ages 14-17 who smoke 6+ cigarettes/day
- 2 previous quit attempts
- 7 day smoking cessation confirmed by Cotinine was greater in adolescents who had received 300 mg Bupropion SR as compared to placebo
- Rapid relapse after stopping medication was observed
- Higher dose of Bupropion is promising

Bupropion + NRT: Not Promising Yet

- 15 to 18 year olds (N = 211)
- Who smoked ≥10 cpd
- All subjects were assigned to nicotine patch (dose 7-21 mg depending on level of cigarette use and then tapered) + Group Skills training for not smoking
- + Bupropion SR 150mg vs. placebo
- Decreased smoking in both groups
- 150 mg Bupropion SR did not enhance treatment
- Compliance was low: only 22% used the Bupropion for 6 or more weeks of the 9 week study
- This dose of Bupropion was likely non-therapeutic


Psychiatric Co-Morbidity

- Psychiatry co-morbidity common among adolescent smokers
- Depressive disorders, disruptive disorders (including ADHD), anxiety disorders¹
- Virtually no studies involving pharmacotherapy of smoking and psychiatric co-morbidities in adolescents


Does ADHD Co-morbidity Relate to Decreased Quit Rates?

- Less than 10% with ADHD able to abstain at 4 weeks vs. 80% without ADHD

Upadhyaya HP. Do patients with ADHD have a harder time quitting cigarettes? J Am Acad Child Adolesc Psychiatry. 2006; 45(8):891.
Conclusions

• Adolescent nicotine use is a deadly disease
• Early identification and monitoring over time is essential
• There are no robust single treatment interventions at this time
• Need to pull out all the stops in assessing and treating
• Behavioral, family, pharmacological
• Further research is imperative

Thank You

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