Tobacco Addiction and Dependence

Alena Williams, MSW, CTTS-M
Tobacco Treatment Specialist
MHealthy Tobacco Consultation Service
Michigan Medicine
Objectives

- Describe the epidemiology of tobacco addiction and dependence
- Describe the neurobiological process underlying tobacco dependence
- Briefly review evidence-based tobacco cessation treatment strategies.
Tobacco Use

The World Health Organization describes smoking as an EPIDEMIC that currently causes nearly 6 million deaths per year and will lead to 8 million deaths annually by 2030 if current trends continue.

Tobacco Use in the U.S.

- In 2015, about 15 of every 100 U.S. adults aged 18 years or older (15.1%) smoked cigarettes
  - 36.5 million adults in the United States smoke cigarettes
  - 16 million Americans live with a smoking-related disease.

- Current smoking has declined from nearly 21 of every 100 adults (20.9%) in 2005 to about 15 of every 100 adults (15.1%) in 2015
Tobacco Use in the U.S.

- Cigarette smoking accounts for more than 480,000 deaths every year, or 1 of every 5 deaths
  - Since 1964, cigarette smoking has killed more than 20 million Americans, including 2.5 million nonsmokers and more than 100,000 babies

- Tobacco costs the U.S. $170 billion in health care expenditures and $156 billion in lost productivity for a total economic impact of over $300 billion each year

Tobacco Use in the U.S.

Tobacco use is the leading cause of disease and death

![Chart showing the number of deaths from various causes, with tobacco being the leading cause.](image-url)
Tobacco Use in Michigan

- 20.7% of adults smoked cigarettes in Michigan
  - 16,200 die from smoking-related illnesses each year
  - $4.6 billion in healthcare costs related to smoking

- Tobacco Nation
  - 12 states with the highest adult smoking prevalence including Michigan
  - 22% smoking prevalence compared to 15% national average
  - On average, Tobacco Nation residents live shorter lives (76.6 years) and face a higher risk of dying than other Americans (79.3 years)

Tobacco Nation
Tobacco Products

- Cigarettes
- Smokeless Tobacco
- Cigars and pipes
- Hookah
- E-cigarettes and other Electronic Nicotine Delivery Systems (ENDS)
Electronic Nicotine Delivery Systems

- Electronic nicotine delivery systems (ENDS) are considered tobacco products by the U.S. FDA.
  - E-cigarettes, e-pipes, e-cigars
  - Vape Pens and Tank Devices

- ENDS are now the most commonly used form of tobacco by youth in the U.S.
  - In 2016, more than 2 million U.S. middle and high school students used e-cigarettes in the past 30 days, including 4.3% of middle school students and 11.3% of high school students
  - Youth who use a tobacco product, such as e-cigarettes, are more likely to go on to use other tobacco products like cigarettes.

Electronic Nicotine Delivery Systems
The e-cigarette aerosol can contain harmful and potentially harmful substances, including:

- Nicotine
- Ultrafine particles that can be inhaled deep into the lungs
- Flavoring such as diacetyl, a chemical linked to a serious lung disease
- Volatile organic compounds
- Cancer-causing chemicals
- Heavy metals such as nickel, tin, and lead
Nicotine

- **Where is it found?**
  - Virtually all nicotine (including nicotine replacement therapies) is from tobacco plants
    - Also found in tomatoes, potatoes, and eggplant

- **Chemical structure**
  - Readily crosses cell membranes (including placental and blood/brain barriers)
  - Binds to nicotine acetylcholine receptors (nAChR) throughout body, primarily in the brain and muscles and triggers release of dopamine
The Cycle of Nicotine Addiction

- **Nicotine** binding causes an increase in release of **Dopamine**\(^1,2\)
- **Dopamine** gives feelings of pleasure and calmness\(^1\)
- The **Dopamine** decrease between cigarettes leads to withdrawal symptoms of irritability and stress\(^1\)
- The smoker craves **Nicotine** to release more **Dopamine** to restore pleasure and calmness\(^1\)
- Competitive binding of **Nicotine** to nicotinic acetylcholinergic receptors causes prolonged activation, desensitization, and upregulation\(^2\)
- As **Nicotine** levels decrease, receptors revert to an open state causing hyperexcitability leading to cravings\(^1,2\)

Nicotine Addiction Cycle

![Graph showing nicotine addiction cycle](image)

- **Plasma Nicotine Concentration (ng/ml)**
- **Hour**
- **8am**
- **6pm**
- **4am**

- **Pleasure/Arousal**
- **Neutral Zone**
- **Abstinence symptoms**
Tobacco/Nicotine Dependence

Tobacco dependence is “a chronic disease with remission and relapse.

“Nicotine dependence warrants medial treatment as does any drug dependence disorder or chronic disease.”
The "Biopsychosocial" Model of Tobacco Dependence

- **Biological**
  - Physical Addiction
  - Withdrawal Symptoms
  - Use = Relief
  - Reward

- **Psychological**
  - Paired Activities
  - Routines/Habits
  - Triggers
  - Stress Management
  - Coping with Emotions

- **Social**
  - Connections
  - Fitting in
  - Family/Partners
  - Cultural Norms
There are four tobacco-related disorders

1. Tobacco Use Disorder
2. Tobacco Withdrawal
3. Other Tobacco-Induced Disorders
4. Unspecified Tobacco-Related Disorder
Tobacco Use Disorder: Diagnostic Criteria

1. Taken in larger amounts or over longer period than intended
2. Persistent desire or unsuccessful efforts to cut down or quit
3. Great deal of time spent to obtain or use
4. Craving
5. Recurrent use resulting in failure to fulfill major role obligations
6. Use despite persistent social or interpersonal problems
7. Giving up or reducing important activities because of use
8. Recurrent use in physically hazardous situations
9. Use despite persistent physical or psychological problems
The PHS Guideline provides evidence for three major strategies for intervening with patients in the clinical setting:

1. Counseling
   - Routine, brief interventions with all patients
   - More intensive behavioral counseling, including telephone counseling

2. Pharmacological support

3. Systems support
Cessation Rates Across Interventions

<table>
<thead>
<tr>
<th>Treatment Format</th>
<th>Abstinence Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unaided</td>
<td>4-7%</td>
</tr>
<tr>
<td>Self-Help</td>
<td>11-14%</td>
</tr>
<tr>
<td>Quitline</td>
<td>11-15%</td>
</tr>
<tr>
<td>Individual counseling</td>
<td>15-19%</td>
</tr>
<tr>
<td>Group counseling</td>
<td>12-16%</td>
</tr>
<tr>
<td>Medication alone</td>
<td>22%</td>
</tr>
<tr>
<td>Medication/Counseling</td>
<td>25-30%</td>
</tr>
</tbody>
</table>
The PHS Guideline provides evidence for three major strategies for intervening with patients in the clinical setting:

1. **Counseling**
   - Routine, brief interventions with all patients
   - More intensive behavioral counseling, including telephone counseling

2. **Pharmacological support**

3. **Systems support**
## 5 A’s

### USPHS Clinical Practice Guidelines

<table>
<thead>
<tr>
<th>ASK about tobacco use (&lt;1 minute)</th>
<th>Identify and document tobacco use for EVERY patient at EVERY visit.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADVISE to quit smoking (&lt; 30 seconds)</td>
<td>In a clear, strong, personalized manner, urge EVERY user to quit.</td>
</tr>
<tr>
<td>ASSESS willingness to make a quit attempt (&lt;1-2 minutes)</td>
<td>Is the tobacco user willing to make a quit attempt at this time?</td>
</tr>
<tr>
<td>ASSIST in quit attempt (&lt;1-3 minutes)</td>
<td>Give all patients a brochure. For the patient willing to make a quit attempt, provide pharmacotherapy and counseling if possible.</td>
</tr>
<tr>
<td>ARRANGE follow-up (&lt;1 minute)</td>
<td>Schedule follow-up contact, preferably within first week after the quit date.</td>
</tr>
</tbody>
</table>
## Treatment Efficacy x Contact Time

<table>
<thead>
<tr>
<th>No minutes</th>
<th>11% est. abstinence rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-3 minutes</td>
<td>14.4%</td>
</tr>
<tr>
<td>4-30 minutes</td>
<td>18.8%</td>
</tr>
<tr>
<td>31-90 minutes</td>
<td>26.5%</td>
</tr>
<tr>
<td>91-300 minutes</td>
<td>28.4%</td>
</tr>
<tr>
<td>&gt; 300 minutes</td>
<td>25.5%</td>
</tr>
</tbody>
</table>

*PHS Guideline, 2008*
5 A’s
USPHS Clinical Practice Guidelines

Clinician’s Actions to Help Patients Quit Tobacco Use

- Ask every patient about tobacco status—document in medical chart

    Current tobacco user?

    Yes → Advise to quit

    No → Assess: Read to quit?

    Yes → Refer to tobacco treatment specialist or assist by providing:
    - Help patient set a quit date
    - Personalized advice
        - Review prior quit attempts
        - Anticipate challenges
        - Prepare environment
    - Pharmacotherapy as appropriate
    - Information on community programs

    Arrange follow-up

    Abstinent at follow-up?

    Yes → Congratulate on success
    - Review/reinforce reasons for quitting
    - Adjust pharmacotherapy, as appropriate

    No → Assess reasons for failure and:
    - Consider referral for more intense counseling
    - Reassess pharmacotherapy
    - Advise to make another quit attempt

    If recent quit, congratulate and reinforce reasons for quitting

Patient is not ready to quit and requires motivational intervention. Review:
- Relevance of quitting
- Risks of tobacco use
- Rewards of quitting
- Roadblocks to quitting
- Repetition of above strategies
The PHS Guideline provides evidence for three major strategies for intervening with patients in the clinical setting:

1. Counseling
   - Routine, brief interventions with all patients
   - More intensive behavioral counseling, including telephone counseling

2. Pharmacological support

3. Systems support
Pharmacotherapy

“Clinicians should encourage all patients attempting to quit to use effective medication for tobacco dependence treatment, except where contraindicated or for specific populations* for which there is insufficient evidence of effectiveness.”

*Includes pregnant women, smokeless tobacco users, light smokers, and adolescents.
Pharmacootherapies

- Nicotine patch
- Nicotine gum
- Nicotine lozenge
- Nicotine inhaler
- Nicotine spray
- Bupropion
- Varenicline
NRT Use

- Reduces physical withdrawal from nicotine
- Eliminates the immediate, reinforcing effects of nicotine that is rapidly absorbed via tobacco smoke
- Allows patients to focus on behavioral and psychological aspects of tobacco cessation
Can the patient get addicted to NRT?

- NRT dependence potential is low: not absorbed through the lungs, does not mimic a cigarette’s rapid delivery of nicotine to arterial circulation which contributes to addictiveness.

- Patient education is important regarding low addictive potential, so it will not be a barrier to trying NRT.
The PHS Guideline provides evidence for three major strategies for intervening with patients in the clinical setting:

1. **Counseling**
   - Routine, brief interventions with all patients
   - More intensive behavioral counseling, including telephone counseling

2. **Pharmacological support**

3. **Systems support**
System Support

Five specific strategies will help ensure that tobacco intervention is consistently integrated into health care delivery:

▪ Tobacco-User Identification System

▪ Promote Provider Intervention

▪ Dedicate Staff to Provide Tobacco Dependence Treatment

▪ Promote Hospital Policies That Support and Provide Inpatient Tobacco Dependence Services

▪ Include Tobacco Dependence Treatments as Paid or Covered Services in All Subscribers or Members of Health Insurance Packages
Summary

- Tobacco dependence is an addictive disorder
  - Long term and chronic treatment

- Clinician have the opportunity to make a significant impact on their patients’ tobacco use
  - Pharmacological support
  - Counseling and referral
Contact Us

MHealthy Tobacco Consultation Service
P: (734) 998-6222
E: quitsmoking@med.umich.edu
www.mhealthy.umich.edu/tobacco