Management of Tobacco Dependence

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“Difficult to identify any other condition that presents such a mix of lethality, prevalence, and neglect, despite effective and readily available interventions”

Fiore et al, U.S. Dept of Health and Human Services
Learning Objectives

To be able to:

• Understand pharmacology of nicotine
• Describe factors contributing to dependence on tobacco smoking
• Recognise tobacco dependence
• Provide brief interventions for people who smoke
• Manage tobacco dependence using pharmacotherapy and psychological approaches
FACTS ABOUT NICOTINE
Nicotine Dependence Differs From Other Drug Dependencies

• First, nicotine does not cause behavioral intoxication. As a result, nicotine-dependent persons rarely seek or are referred to psychiatrists.

• Second, much of society's response to drug problems is based on how much damage drug-dependent users inflict on others.
Third, nicotine via tobacco is a legal drug openly promoted by several large transnational corporations.

Thus, nicotine use appears legitimate, and deviant behaviors are not needed to acquire the drug.
Addiction Potential - Drug Dependence Among Ever-users

- Tobacco: % Dependence
- Heroin: % Dependence
- Cocaine: % Dependence
- Alcohol: % Dependence
- Stimulants: % Dependence
- Cannabis: % Dependence

% Dependent
Prevalence of Various Disorders - NMHS, 2016

- Any Mental Disorder: 10.6%
- F10-F19 Mental and behavioural disorders due to psychoactive substance use (Except F17 Tobacco): 5.0%
- F10 Alcohol Use Disorder: 4.6%
- F17.2 Tobacco Use Disorder: 13.1%
- F11-19 (Except 17) Other Substance Use Disorder: 0.6%
- F20-F29 Schizophrenia other psychotic disorders: 0.4%
- F30-F39 Mood [affective] disorders: 2.8%
  - F30-31 Bipolar Affective Disorder: 0.3%
  - F32-33 Depressive Disorder: 2.7%
- F40-F48 Neurotic, stress-related disorders: 3.5%
  - F40 Phobic Anxiety disorders: 1.9%
  - F41 Other Anxiety Disorders: 1.2%
  - F42 Obsessive compulsive disorder: 0.8%
  - F43.1 Post Traumatic Stress Disorder: 0.2%
- High Risk Moderate suicidal risk: 0.9%
Linking Behavior to Biology
Pharmacokinetics

• Readily crosses the BBB
• Reach brain in ~ 7 secs
• ½ life is around 2 hours
• Average cigarette yields about 1 mg of absorbed nicotine
• One of the most toxic drugs known – 60 mg is lethal and death follows intake within a few minutes
Nicotine enters brain

Stimulation of nicotine receptors

Dopamine release

Dopamine Reward Pathway

Prefrontal cortex

Nucleus accumbens

Ventral tegmental area

Nicotine enters brain
Biology of Nicotine Addiction: Role of Dopamine

Nicotine stimulates dopamine release

Pleasurable feelings

Repeat administration

Tolerance develops

Nicotine addiction is not just a bad habit.

Discontinuation leads to withdrawal symptoms.
Nicotinic Receptor- Cigarette Length

Three states of the nAChR ion channels:

– Closed (at rest)
– Open (cations flow into the cell)
– Desensitised (closed and not responsive to agonists)
Chronic Administration of Nicotine: Effects on the Brain

Human smokers have increased nicotine receptors in the prefrontal cortex.

Image courtesy of George Washington University / Dr. David C. Perry

Neurochemical and Related Effects of Nicotine

- **Dopamine**: Pleasure, reward
- **Norepinephrine**: Arousal, appetite suppression
- **Acetylcholine**: Arousal, cognitive enhancement
- **Glutamate**: Learning, memory enhancement
- **Serotonin**: Mood modulation, appetite suppression
- **β-Endorphin**: Reduction of anxiety and tension
- **GABA**: Reduction of anxiety and tension

Nicotine Addiction Cycle

Standard Elements of Dependence

- Context
- Ritual behaviours
- Sensory stimulation
- Reinforcing (nicotine) stimulus
Context

• Some places, times and situations are closely associated with smoking and enhance craving:
  – Morning coffee with breakfast
  – Coffee shop
  – Tea breaks

• Some places and situations are now negatively associated and cravings can be less severe:
  – Places of worship
  – Sporting stadiums
  – In aircraft
  – Smoke-free homes
  – Around children
Ritual Behaviours

• Going to a place where smoking is possible
• Accessing the cigarette – e.g. opening handbag
• Getting match or lighter
• Lighting cigarette
Sensory Stimuli

- Touch/feel of cigarette
- Light from flame
- Smell of smoke
- Direct airway stimulation from smoke
  - Anaesthetising the airway reduces reported smoking satisfaction
- These all travel to brain at nerve speed preceding the arrival of nicotine
Addictive Qualities

• Fast absorption of nicotine and short time needed to reach receptor targets (and hence to exert pleasurable effects) are important factors in development of addiction.

• When linked with context/ritual/sensory stimuli they produce a strong reinforcing effect.

• In animals, random boluses of IV nicotine without the context associations cannot establish addiction and self-administration of nicotine does not occur.
What Is Dependence???

• Tolerance*
• Withdrawal*
• Larger amounts/longer period than intended
• Inability to, or persistent desire to, cut down or control
• A great deal of time spent obtaining, using, or recovering
• Important activities given up or reduced
• Use despite problems caused or exacerbated by use
To summarize......
Cycles of Pleasure and Withdrawal

Nicotine used for pleasure, enhanced performance, mood regulation

Tolerance and physical dependence\(^1,2\)

Nicotine used to self-medicate withdrawal symptoms\(^1\)

Abstinence produces withdrawal symptoms and cravings\(^1\)

Tobacco Dependence: 2-part Problem

Treatment should address the physiological and the behavioral aspects of dependence.

**Physiological**
- The addiction to nicotine
  - Treatment
  - Medications for cessation

**Behavioral**
- The habit of using tobacco
  - Treatment
  - Behavior change program
Wisdom Pearls…

- Even brief advice to quit offered by a physician can produce abstinence rates of 5-10%, which would have a significant public health impact if it were provided routinely.

- Unfortunately, surveys of smokers indicate that they receive such advice from their physicians less than half the time.

- Physicians hesitate to advise smoking cessation is that they have become demoralized because so few of their patients follow this advice.
• Successful cessation may take a number of attempts.

• Most former smokers report a history of several relapses.

• The most effective cessation interventions combine behavioural support with drug treatment.
Brief Intervention + Pharmacotherapy

- **Ask** about tobacco use
- **Advise** to stop smoking
- **Assess** willingness to quit
- **Assist** with quit plan
- **Arrange** follow up

*Clinical Practice Guidelines: Treating Tobacco Use and Dependence, U.S. Dept of Health and Human Services, Public Health Service 2000*
How to Approach

THOSE UNWILLING TO QUIT

• “5 R’s” motivational intervention
  • Relevance,
  • Risks,
  • Rewards,
  • Roadblocks,
  • Repetition

THOSE READY TO QUIT

STAR recommendations

• S - setting date to quit
• T - tell friend, family, coworker
• A - anticipate challenges**
  **Cognitive/behavioural strategies
• R - remove tobacco from environment
Cognitive Strategies

• Keeping a diary for one or several days prior to the Quit Day
  – More aware of their smoking pattern and risk situations
• Consider benefits of quitting
• Challenge the perceived benefits of smoking
• Coping with cravings
  – Thought stopping
    • Conscious decision not to think about smoking
  – Thought substitution
    • Deciding to think about something else
Behavioural Strategies

Suggest 4Ds

- **Delay** acting on the urge to smoke. After five minutes the urge to smoke weakens and your resolve to quit will come back.

- **Deep breathe.** Take a long slow breath in and slowly release it out again. Repeat three times.

- **Drink** water slowly holding it in your mouth a little longer to savour the taste.

- **Do something else** to take your mind off smoking. Doing some exercise is a good alternative.
Behavioural Strategies

• Suggest removing environmental cues where possible (e.g. ashtrays)

• Ask to remember that thinking "I can have just one" can lead to relapse
Essential Components- Tobacco Free Society

- Public Education Efforts
- Community-Based Programs
- Helping Smokers Quit (Cessation)
- School-Based Programs
- Enforcement
- Monitoring and Evaluation
- Related Policy Efforts
Thank you

Practice what you preach