



## Nicotine, not snuffed out

Daniel T. Weaver, MD, FACP, FASAM, SFHM  
Associate Professor  
Division of Hospital Medicine  
University of Kentucky

## Faculty Disclosure

- I do not have anything to disclose



## Educational Need/Practice Gap

- Currently most tobacco using patients get minimal guidance on smoking cessation
- Providers are often not focused/comfortable treating tobacco dependence



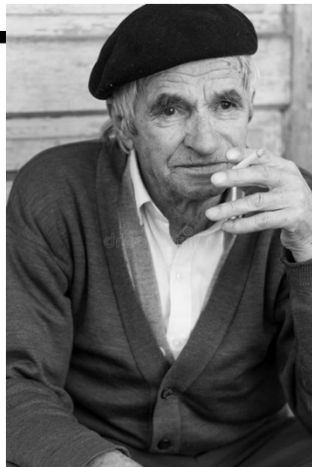
## Learning Objectives

- Upon completion of this lecture, you will be able to apply different treatment modalities to successfully treat tobacco dependence



## Expected Outcome

- More involvement in treating tobacco dependence



Portrait of an Old Man Smoking Cigarette, Outdoors, Close-up Stock Image - Image of look, addiction: 111352149



## Case

- 68 yo man with HTN, COPD, CAD that presents for hospital follow up for an MI
- Frequent Hospitalizations: COPD/MI
  - Unavailable for consultant evaluation
  - Frustrated nursing staff
  - Late antibiotic admin
  - Overall obstructive to care



## History

- *Nicotiana tabacum* & *Nicotiana rustica*
- Native of Americas: Andes Peru/Ecuador
- Cultivated since 5000-3000 BC and universal at the time of Columbus



## History

- Early Uses
  - Snuffing, smoked, chewed, eaten, tea, smeared, eye drops, enemas
  - Analgesic and antiseptic
  - Insecticide in agriculture
  - Religious ceremonies



## History

- Europeans thought evil and harmful but with purported medicinal properties eventually brought to Europe
- Sir Walter Raleigh brought tobacco back from Virginia in 1586
- Major cash crop in Kentucky
  - Most tobacco farms in the US



## History

- Manufactured cigarettes 1850s made smoking more convenient
- World War 1 further popularized
- Primary nicotine delivery system since



## Cost

- Leading cause of preventable disease, disability and death in the USA
- **>480,000** deaths from smoking related illnesses each year
- **\$600 billion** cost to the US in 2018
- **\$240 billion** was spent on healthcare
- Lost productivity due to death and illness



Office on Smoking and Health  
(OSH) | CDC

## KY Tobacco Related Disparities

- Smoking prevalence 21.4% in KY
  - 24.3% among adults "having any disability"
  - 24.7% among adults "less than high school"
  - 25.2% among adults "severe mental distress"
  - 32.5% among adults "unemployed"
  - 35.2% among adults "less than \$20,000"



## Vaping in Kentucky

- **29.7%** of KY High school youth reported using any tobacco product including e-cigarettes.
  - **8.9%** currently smoking cigarettes



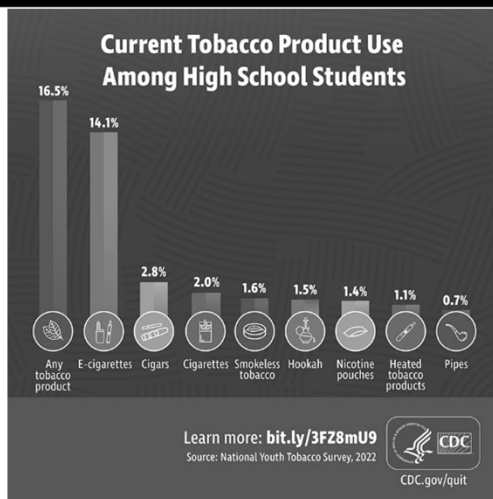
Office on Smoking and Health  
(OSH) | CDC

## Vaping in Kentucky

- 6% KY adults vape daily
  - TN and WV also have very high rates
- 17.9% of young adults vape daily
- 11.6% of young adults some days



## Youth Tobacco Use





## Good News!

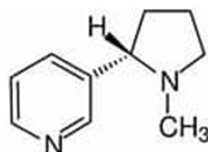
- Decline in youth e-cigarette use among High schoolers (from 2023-2024)
  - 10.0% to 7.8%



Notes from the Field: E-Cigarette and Nicotine Pouch Use Among Middle and High School Students — United States, 2024

## Why?

- Smoking
  - Immediate access to brain
  - Large surface area of resp epithelium
  - Rapid absorption, thus more addictive



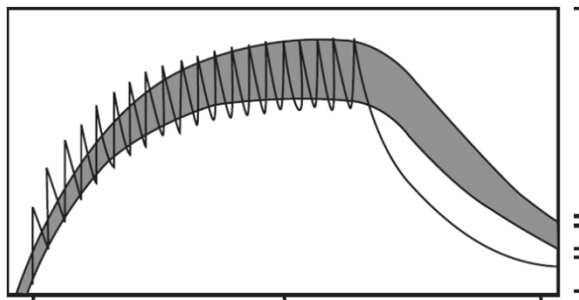
## Pharmacokinetics

- Volume of distribution 180L
- Nicotine  $T_{1/2}$  2 hours
- First pass metabolism



## Pharmacokinetics

- Accumulates during day and persists for 6-8 hrs after smoking ceases



ASAM Principles of Addiction Medicine, pg 192, fig 14.2

## Pharmacokinetics

- Nicotine-----CYP2A6----->Cotinine
  - Lung, **liver** and brain
- Metabolism varies by race, gender
- 16 hr  $T_{1/2}$  of cotinine
  - Marker for nicotine intake
- Cotinine blood levels avg 250-300ng/mL and persist 7 days after smoking



## Pharmacologic Actions

- Nicotinic acetylcholine receptor agonist
- Stimulant effect in CNS
  - Enhances concentration, alertness, arousal
- Increase dopamine in brain



## Primary Effect

- Arousal
- Relaxation (stressful situations)
- Enhancement:
  - Mood
  - Attention
  - Reaction time
- Chronic Use: relief of withdrawal



## Reinforcing Effect

- Causes stimulation when fatigued
- Relaxation when anxious
- People therefore increase consumption at low and high arousal conditions



## Tobacco Addiction

- Avg age first smoking 15
- Precedes other drug use
- Earlier begin, harder to quit
- Important Factors
  - Cigarettes per day
  - Time from waking to first cigarette
    - <30 min=moderate, <5 min=severe



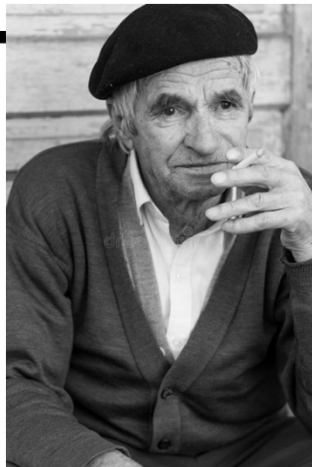
## Nicotine Withdrawal

- Neg. Reinforcement (avoid withdrawal)
- Distressing but not life threatening
- Reach max intensity 24-48 hrs after cessation and last for weeks
- Corticotropin releasing factor produces anxiety



## Withdrawal Symptoms

- Depression
- Anxiety
- Insomnia
- Poor concentration
- Irritability
- Restlessness
- Anger
- Appetite/weight gain
- Frustration



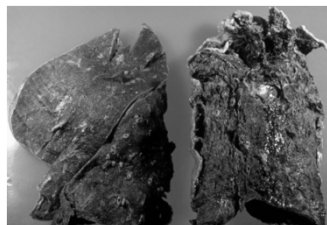
## Toxicity

- Tobacco Smoke:
  - Volatile= 500 compounds
    - nitrogen, CO, CO<sub>2</sub>, ammonia, hydrogen cyanide, benzene
  - Particulates: >3,500
    - Anabasine, anatabine, myosmine
- Tar: numerous carcinogens



## Pulmonary Toxicity

- Imbalance of preteolytic/antiproteolytic
- Increases airway responsiveness
- COPD
- DNA damage from aromatic hydrocarbons



Gross specimen of normal & smoker's ... – Bild kaufen –  
12068498 | Science Photo Library (science-photo.de)

## Heart Toxicity

- Exposure of oxidant chemicals causing:
  - endothelial dysfunction
  - Platelet activation
  - Thrombosis
  - Coronary Vasoconstriction
- Reductions of oxygen delivery with CO



## Other

- Early menopause
- Osteoporosis
- Yellow staining of fingers
- Aging skin



John G, Pasche S, Rothen N, *et al*  
Tobacco-stained fingers: a clue for smoking-related disease or harmful  
alcohol use? A caseâ€”control study  
*BMJ Open* 2013;**3**:e003304. doi: 10.1136/bmjopen-2013-003304



Smoking can cause cancer almost anywhere in your body.

You can quit.  
For free help: 1-800-QUIT-NOW.

EDC  
cdc.gov/quit

**UK** HealthCare.

## Health Consequences

- Coronary artery disease
- Stroke
- Cancer
- COPD
- Approx 10 years of life lost

**UK** HealthCare.

## Drug Interactions

- Speeds metabolism of many drugs
- Induces metabolism of:
  - Theophylline, propranolol
  - Flecainide, caffeine, olanzapine
  - Clozapine, imipramine, haloperidol, pentazocine estradiol
- Quitting will increase these levels



## Drug Interactions

- Smoking (not nicotine) causes induction of CYP1A2
- Nicotine metabolized by CYP2A6



## Other interactions

- Synergy w/ OCPs---> stroke, MI
- Nicotine inhibits reductions in BP and HR from  $\beta$ -blockers
- Less sedation from benzos
- Less analgesia from some opioids
- Less therapeutic effect of H2 blockers
- Vasoconstriction affects insulin absorp



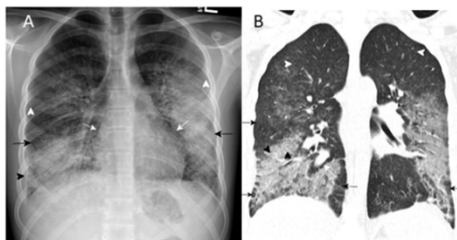
## Vaping Woes

- Highly addictive
- Harmful carcinogens
  - Formaldehyde, benzene, cadmium
  - Chlorine, arsenic, mercury, ultrafine particle
- Heavy metals: nickel, tin and lead



## Vaping Woes

- Harm brain development
- Flavorings linked to serious lung disease
  - EVALI (E-cig/vaping associated lung injury)



EVALI with organizing pneumonia in an 18-year-old.

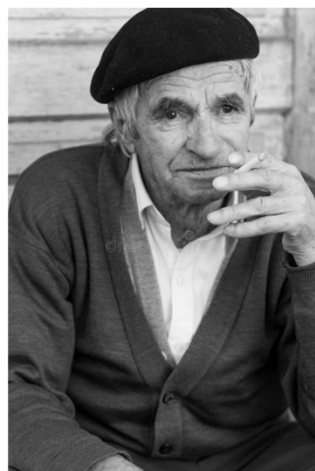


## Cessation

- 75% of adults who smoke want to stop
- Only 1/3 try to stop
- <3% succeed unaided
- Poor utilization of treatment



## Hospital Time=Quitting Time



## Typical Treatment Scheme

- Is patient motivated to quit?
  - If not, motivate to quit
- Set a Quit Date
- Treatment planning
  - Pharmacotherapy
  - Counseling



## Hospital Medicine Scheme

- Stuck in the hospital in stressful situation
- Reasons why opportune time
  - Removed from normal environs with cues
  - Acute illness may initially preclude smoking
  - Illness could be motivator
  - Daily contact with medical professionals



## 5As-if motivated to quit

- Ask
- Advise
- Assess
- Assist
- Arrange
- Quit Date-day of admission



[Five Major Steps to Intervention \(The "5 A's"\) | Agency for Healthcare Research and Quality \(ahrq.gov\)](#)

## Motivational Interviewing-5Rs

- Personal **Relevance** of quitting to patient
- **Risks** of Smoking
- **Rewards** of quitting
- **Roadblocks** to quitting
- **Repeat**



## Treat Tobacco Dependence

- Nicotine Replacement Therapy
- Varenicline
- Bupropion



## Nicotine Replacement

- Patches
  - 7 mg, 14 mg, 21 mg/24hrs



## Gum

- 2- and 4-mg





## Lozenges

- 2- and 4-mg



## Other

- Inhaler
- Nasal Spray



## Correct Dose Matters

Initial Dose of Nicotine Patch Based on Cigarettes Smoked Daily

Cigarettes per Day	Patch Dose (mg/d)
<10	7-14
10-20	14-21
21-40	21-42
>40	≥42

Doses of nicotine patches: 7, 14, and 21 mg.



## Patch Dose Based on Blood Cotinine

Cotinine (ng/mL)	Nicotine Patch Dose (mg/d)
<200	14-21
200-300	21-42
>300	≥42

Doses of Nicotine patches: 7, 14, and 21 mg



## NRT Pearls

- Manage Previous Failures
  - Don't Underdose (e-cigs hard)
  - Correct administration
    - Nocturnal Use
    - Chew and cheek
    - Rotate Patch
- Patches + Gum/Lozenges



## Varenicline

- Blocks nicotine from binding to the receptor and stimulates receptor mediated activity
- Reduces cravings and withdrawal symptoms
- Start 1-5 weeks before quit date



## Varenicline

- Dose
  - Days 1-3: 0.5 mg daily
  - Days 4-7: 0.5 mg BID
  - Day 8 and further: 1 mg BID
- Adverse Effects
  - Nausea
  - Vivid Dreams



 HealthCare.

## Bupropion Sustained Release

- Norepinephrine and dopamine reuptake inhibitor
- Start 1 week before stop date at 150 mg/d for 3 days and then 150 mg twice daily
- Usual length of treatment 6-12 weeks

 HealthCare.

## Bupropion Sustained Release

- Adverse Effects
  - Dry mouth
  - Insomnia
  - Lowers seizure threshold



## Quick Tips

- Combine therapy
  - Varenicline and NRT
- Long acting and short acting agent
- Don't forget to ask about other forms of tobacco to help with dosing

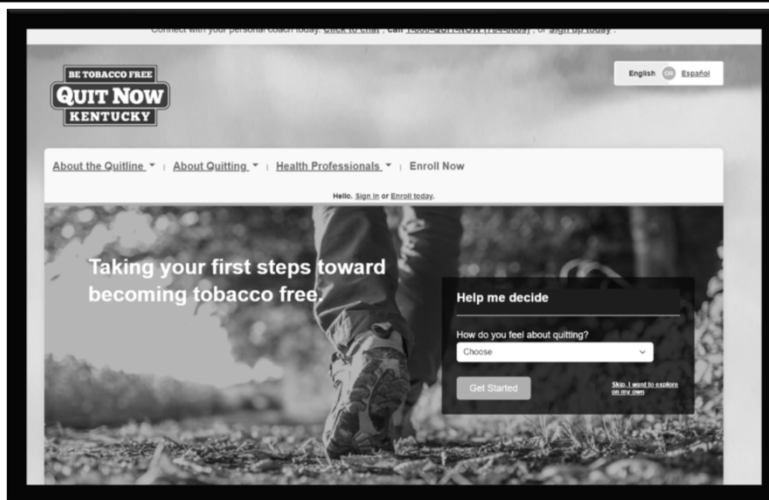


## Add Behavioral Therapy

- Increases success by 10-20%
- Unaided 3-6%
- Cochrane Review: 1.83 relative risk with optimal therapy



## Behavioral Therapy

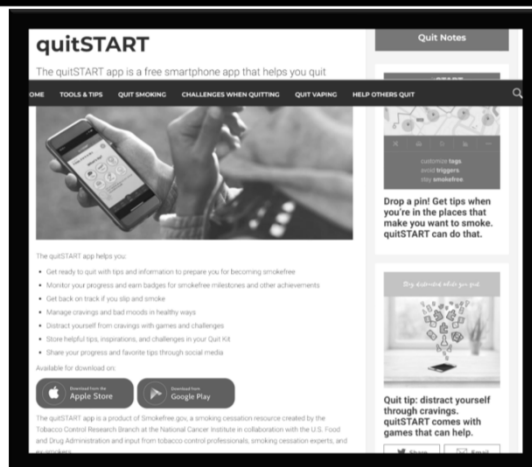


## 1-800-Quit-Now

- 1-800-784-8669
- Perform Intake 45 minutes
- Develop Quit Plan/Date
- 5-7 coach calls (approx 1x per week)
- 2-12 weeks of NRT



## QuitStart App



## Hospitalized Patients

- Cochrane Review in 2012 of hospitalized pts.
  - NRT 1.54 RR of cessation
  - Varenicline 1.28 RR
  - Bupropion 1.04 RR



## Hospitalized Patients

- Smokers who received NRT, more likely to continue (58% vs 17%)
  - Ever used NRT: ARR 5.64
  - Never used NRT: ARR 4.68





## Billing

- Tobacco Counseling 3-10 mins (99406)
- Tobacco Counseling >10 mins (99407)



## Billing-Documentation

- Willingness to attempt
- Discussion
- Time spent
- Tobacco Use
- Advised to quit and impact provided
- Methods & Skills suggested
- Medication Mgmt
- Setting quit date
- Follow up arranged
- Resources made available



[www.lung.org](http://www.lung.org)





Ready to quit smoking? St. Mary's certified specialists can help you break the habit. | Healthsource | herait-dispatch.com



## Citations

- Musk A, De Klerk N. Invited Review Series: Tobacco and Lung Health. History of tobacco and health
- [www.cdc.gov/tobacco](http://www.cdc.gov/tobacco)
- Centers for Disease Control and Prevention (CDC), Office on Smoking and Health. Tobacco Disparities Dashboard. U.S. Department of Health and Human Services. Accessed August 09, 2024. <https://www.cdc.gov/tobacco-health-equity/data-research/index.html>
- [States With The Most And Least E-Cigarette Use In 2024 – Forbes Advisor](#)
- [Notes from the Field: E-Cigarette and Nicotine Pouch Use Among Middle and High School Students — United States, 2024](#)
- Dani J. The Pharmacology of Nicotine and Tobacco. In: Herron A, Brennan T. The ASAM Essentials of Addiction Medicine. 3rd edition. Philadelphia: Wolters Kluwer; 2020; 72-77.
- [Five Major Steps to Intervention \(The "5 A's"\) | Agency for Healthcare Research and Quality \(ahrq.gov\)](#) Access Aug 9, 2024
- Bloom et al. Behavioral Interventions for Nicotine/Tobacco Use Disorder. In: Miller S, Fiellin D, Rosenthal R, Saitz R. The ASAM Principles of Addiction Medicine. 6th edition. Philadelphia: Wolters Kluwer; 2019; 951-968.
- U.S. Department of Health and Human Services. [E-Cigarette Use Among Youth and Young Adults: A Report of the Surgeon General](#). Centers for Disease Control and Prevention; 2016. Accessed Feb 14, 2024
- Kligerman S, Raptis C, Larsen B, Henry TS, Caporale A, Tazelaar H, Schiebler ML, Wehrli FW, Klein JS, Kanne J. Radiologic, Pathologic, Clinical, and Physiologic Findings of Electronic Cigarette or Vaping Product Use-associated Lung Injury (EVALI): Evolving Knowledge and Remaining Questions. Radiology. 2020 Mar;294(3):491-505. doi: 10.1148/radiol.2020192585. Epub 2020 Jan 28. PMID: 31990264.
- Ebbert J, Hays J, McFadden D, Hurt R, and Hurt R. Pharmacological Interventions for Tobacco Use Disorder. In: Miller S, Fiellin D, Rosenthal R, Saitz R. The ASAM Principles of Addiction Medicine. 6th Edition. Philadelphia: Wolters Kluwer; 2019; 863-871.



## Citations

- Leone FT, Zhang Y, Evers-Casey S, Evins AE, Eakin MN, Fathi J, Fennig K, Folan P, Galiatsatos P, Gogineni H, Kantrow S, Kathuria H, Lamphere T, Neptune E, Pacheco MC, Pakhale S, Prezant D, Sachs DPL, Toll B, Upson D, Xiao D, Cruz-Lopes L, Fulone I, Murray RL, O'Brien KK, Pavalagantharajah S, Ross S, Zhang Y, Zhu M, Farber HJ. Initiating Pharmacologic Treatment in Tobacco-Dependent Adults. An Official American Thoracic Society Clinical Practice Guideline. *Am J Respir Crit Care Med*. 2020 Jul 15;202(2):e5-e31. doi: 10.1164/rccm.202005-1982ST. PMID: 32663106; PMCID: PMC7365361.
- Hartmann-Boyce J, Hong B, Livingstone-Banks J, Wheat H, Fanshawe TR. Additional behavioural support as an adjunct to pharmacotherapy for smoking cessation. *Cochrane Database Syst Rev*. 2019 Jun 5;6(6):CD009670. doi: 10.1002/14651858.CD009670.pub4. PMID: 31166007; PMCID: PMC6549450.
- Stead LF, Koilpillai P, Fanshawe TR, Lancaster T. Combined pharmacotherapy and behavioural interventions for smoking cessation. *Cochrane Database Syst Rev*. 2016 Mar 24;3(3):CD008286. doi: 10.1002/14651858.CD008286.pub3. PMID: 27009521; PMCID: PMC10042551.
- Rigotti NA, Clair C, Munafò MR, Stead LF. Interventions for smoking cessation in hospitalised patients. *Cochrane Database Syst Rev*. 2012 May 16;5(5):CD001837. doi: 10.1002/14651858.CD001837.pub3. Update in: *Cochrane Database Syst Rev*. 2024 May 21;5:CD001837. doi: 10.1002/14651858.CD001837.pub4. PMID: 22592676; PMCID: PMC4498489.
- Regan S, Reyen M, Richards AE, Lockhart AC, Liebman AK, Rigotti NA. Nicotine replacement therapy use at home after use during a hospitalization. *Nicotine Tob Res*. 2012 Jul;14(7):885-9. doi: 10.1093/ntr/ntr244. Epub 2011 Nov 25. PMID: 22121242; PMCID: PMC3390546.
- [www.lung.org](http://www.lung.org)

