Nicotine Use Disorder

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Objectives

- What is nicotine use disorder (& why did we have to change to "nicotine" instead of tobacco use disorder?)?
- Brief overview of vapes & harms
- Screening for nicotine use disorder (Ask)
  - Asking the right questions
- Motivational Interviewing for nicotine cessation (Counsel)
- Treating nicotine use disorder (Treat)

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CASE: Sarah

- 18 year old young woman presents for "check up" and sore throat
- She has a history of anxiety and depression for which she is currently taking 50mg sertraline (an SSRI)
- She graduated from high school, works full time at Supercuts and recently lives with her boyfriend of 4 years
- When taking history, she reveals that she vapes e-cigarettes since early high school (4 years now), currently vaping Pink Lemonade flavored disposable Stigs, using one every two days
- She does not smoke cigarettes (rarely), she drinks 2-3 times per month, and no longer uses cannabis. No other drugs.

What is this? is this an issue for her? what are the harms?

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Tobacco (Nicotine) Use Disorder (DSM-5)

A problematic pattern of tobacco use leading to clinically significant impairment or distress, as manifested by at least 2 of the following, occurring within a 12-month period:

1. Tobacco (nicotine) is often taken in larger amounts or over a longer period than was intended.
2. There is a persistent desire or unsuccessful efforts to cut down or control tobacco (nicotine) use.
3. A great deal of time is spent in activities necessary to obtain or use tobacco (nicotine).
4. Craving, or a strong desire or urge to use tobacco (nicotine) .

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Tobacco (Nicotine) Use Disorder (DSM-5)

5. Recurrent tobacco (nicotine) use resulting in a failure to fulfill major role obligations at work, school, or home (e.g. - interference with work).
6. Continued tobacco (nicotine) use despite having persistent or recurrent social or interpersonal problems caused or exacerbated by the effects of tobacco (e.g. - arguments with others about tobacco (nicotine) use).
7. Important social, occupational, or recreational activities are given up or reduced because of tobacco (nicotine) use.
8. Recurrent tobacco (nicotine) use in situations in which it is physically hazardous (e.g. - smoking in bed).

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Tobacco (Nicotine) Use Disorder (DSM-5)

9. Tobacco (nicotine) use is continued despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by tobacco (nicotine).
10. **Tolerance**, as defined by either of the following:

    A. A need for markedly increased amounts of tobacco (nicotine) to achieve the desired effect.

    B. A markedly diminished effect with continued use of the same amount of tobacco (nicotine).
11. **Withdrawal**, as manifested by either of the following:

    A. The characteristic withdrawal syndrome for tobacco (nicotine)

    B. Tobacco (or a closely related substance, such as nicotine) is taken to relieve or avoid withdrawal symptoms.

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Why Do People Use Tobacco? Nicotine is a psychotropic that makes users feel good

- Nicotine effects have complex pharmacodynamics –
  - Neural stimulant at low doses and a depressant at high doses
    - Stimulates memory and alertness. *People who use tobacco often depend on it to help them accomplish certain tasks and perform well*
    - Many people feel a sense of well-being. *Boosts mood and may relieve minor depression.*
    - Decreases the appetite. *For this reason, the fear of weight gain affects some people's willingness to stop.*

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Nicotine:
HIGHLY addictive, and not using leads to WITHDRAWAL:
Irritability,
frustration,
anger,
increased appetite,
tremors,
depression,
insomnia,
anxiety,
difficulty concentrating

1. Heroin

The brain converts heroin into morphine, which binds to molecules on cells that affect how we perceive pain and reward – producing a surging sense of euphoria. But overdosing can kill, since it slows and can stop breathing.

Rank: 3 out of 3

2. Cocaine

In seconds, cocaine floods the brain with the feel-good chemical dopamine. The sensation of pleasure is so powerful that some lab animals choose cocaine over food until they starve. Cocaine appears to acutely affect the brain's key memory centers, which may help explain why it's so addictive.

Rank: 2.4 out of 3

3. Nicotine

The main addictive ingredient in tobacco, nicotine, is sucked up by the lungs and delivered to the brain, with drug levels peaking within 10 seconds. Because its effects vanish so quickly – including feelings of pleasure – scientists think smokers are more prone to repeated use. Some 85% of people who try to quit on their own relapse.

Rank: 2.2 out of 3

4. Barbiturates

Barbiturates, which are still prescribed temporarily for things like anxiety and insomnia, block some of the brain's chemical signalling, effectively muting several brain regions. At low doses, these drugs can induce a feeling of euphoria, but at higher doses they can suppress breathing and kill.

Rank: 2 out of 3

5. Alcohol

Alcohol interferes with messengers in the brain called "excitatory" messengers, slowing our thinking, breathing, and heart rate. At the same time, it boosts our "inhibitory" messengers, giving us feelings of pleasure.

Rank: 1.9 out of 3

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Nicotine is especially Addictive to Youth

- Adolescents are developmentally primed for *drug use* and developmentally susceptible to *addiction*
  - Vulnerable time period due to brain development
  - Myelination:
    - Speed up the highway
  - Synaptic pruning
    - Trim what isn't being used

Prefrontal cortex= "brakes"

Psychoactive Drugs

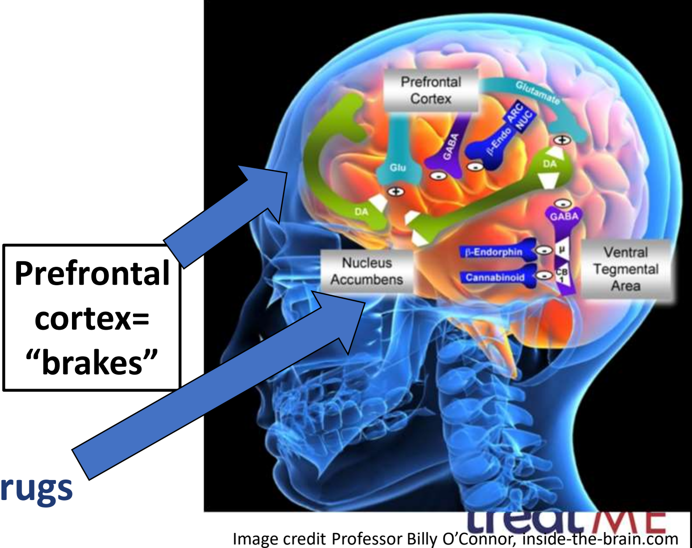

Image credit Professor Billy O'Connor, inside-the-brain.com

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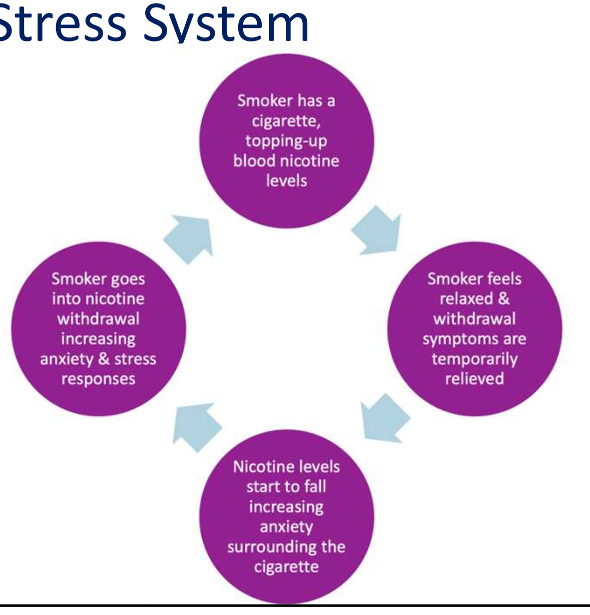
Nicotine Dependence and Addiction: Interfering with the Brain Stress System

- Negative affect, or STRESS, is the leading reason for relapse for all drugs
- Smokers/vapers may perceive and report that smoking/vaping reduces stress because abstinence from smoking/vaping causes stress



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FUN FACT

In spite of what you've heard about risks (more upcoming), teens do not perceive vaping as a risky behavior

- They view vaping as the "LOWEST RISK" of available substances
- That they are a "Healthier alternative to smoking"
- That vapes are "edgy and cool"

(This False Narrative is brought to you by advertising and social media)

Benoza G. Empowering Youth and Youth Influencers to Prevent the Use of Emerging Tobacco Products. 2019.

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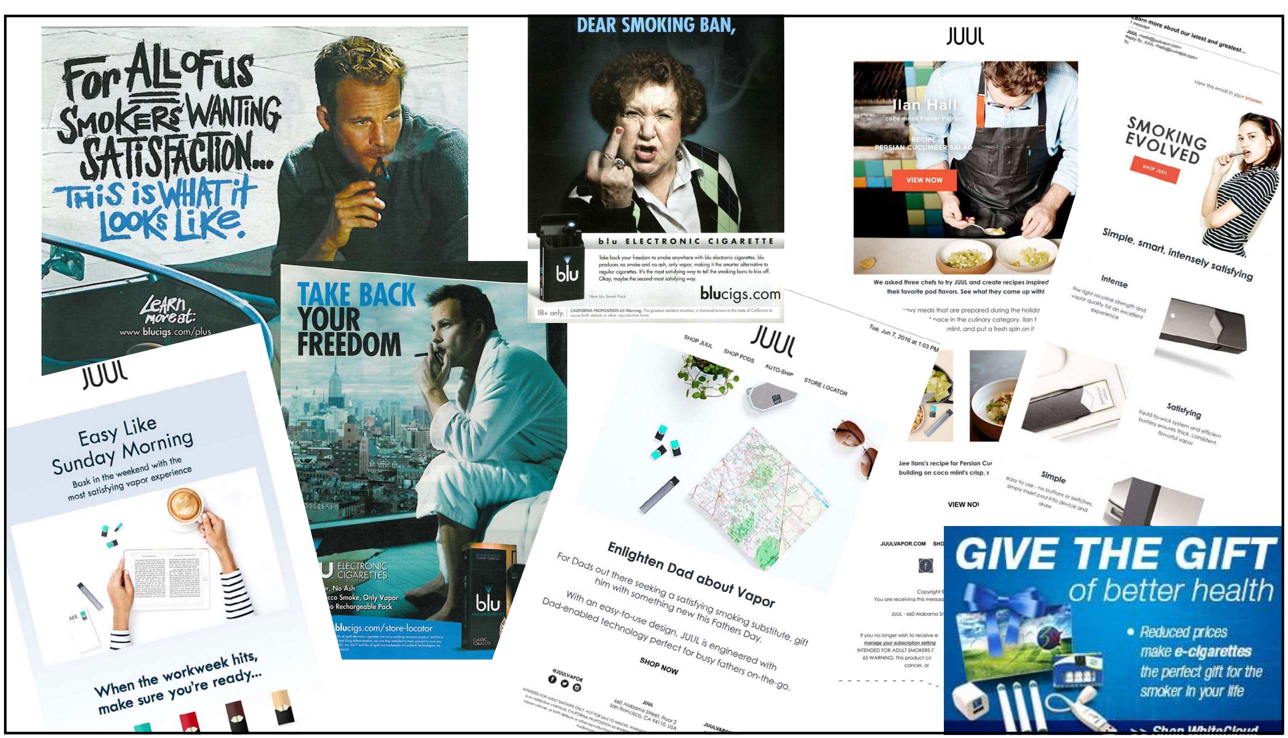

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Electronic Cigarettes/Vapes

- Invented in 2003 by a Chinese inventor
- "Ruyan" introduced e-cigarettes to China in 2004
- Introduced to the United States in 2006
- As of 2023, much of the e-cigarette market still comes from China

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https://www.fda.gov/TobaccoProducts/Labeling/ProductsIngredientsComponents/ucm456610.htm

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The Anatomy of a Vape:
Engineered to deliver nicotine (and/or other substances)

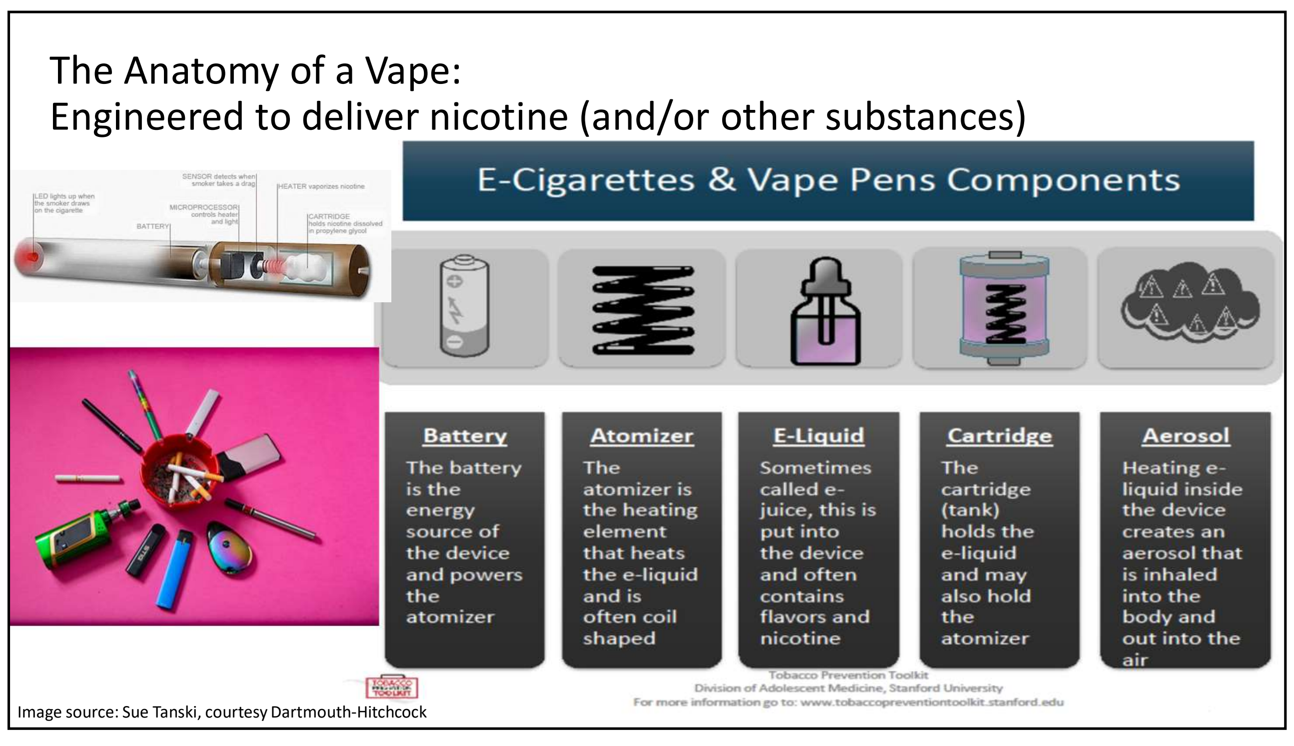

Image source: Sue Tanski, courtesy Dartmouth-Hitchcock

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Aerosol/vape delivery is dependent on power (Battery + coil) and e-liquid composition

- Higher power boils off nicotine faster
- Low nicotine x high power can equal HIGH NICOTINE
- DIFFERENT temperatures create DIFFERENT by-products due to heat breakdown, so a different aerosol is breathed in than the product content list

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There are additional chemicals DELIVERED by e-cigarettes/vapes, many introduced by the delivery system itself

- Humectant
- Flavoring
- +/- Nicotine
- Toxicants
- Carcinogens
- Metallic nano-particles (from the coil/heating element)
- Other psychoactive ingredients (can also added by users)
- Other medications: Melatonin? Essential oils?

VOLATILE ORGANIC COMPOUNDS
NICOTINE
ULTRAFINE PARTICLES
CANCER-CAUSING CHEMICALS
HEAVY METALS SUCH AS NICKEL, TIN, AND LEAD
FLAVORING SUCH AS DIACETYL, A CHEMICAL LINKED TO A SERIOUS LUNG DISEASE

CDC Infographic 2018

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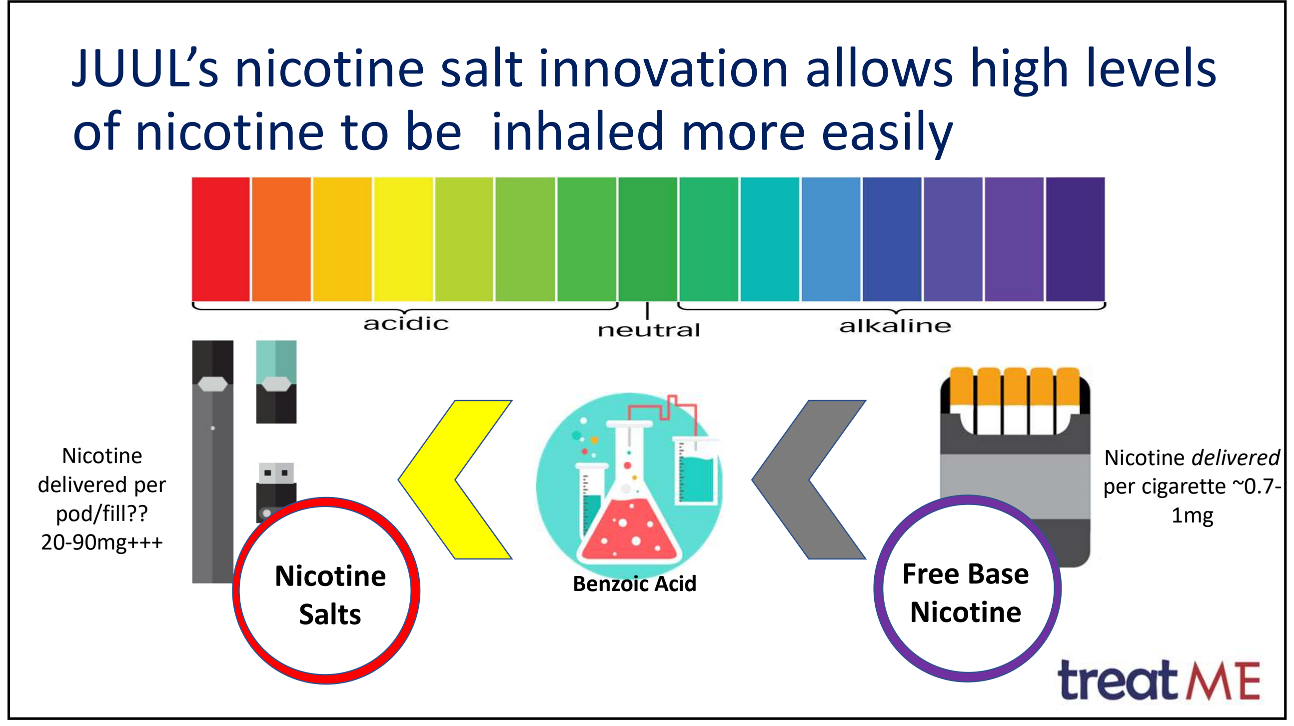

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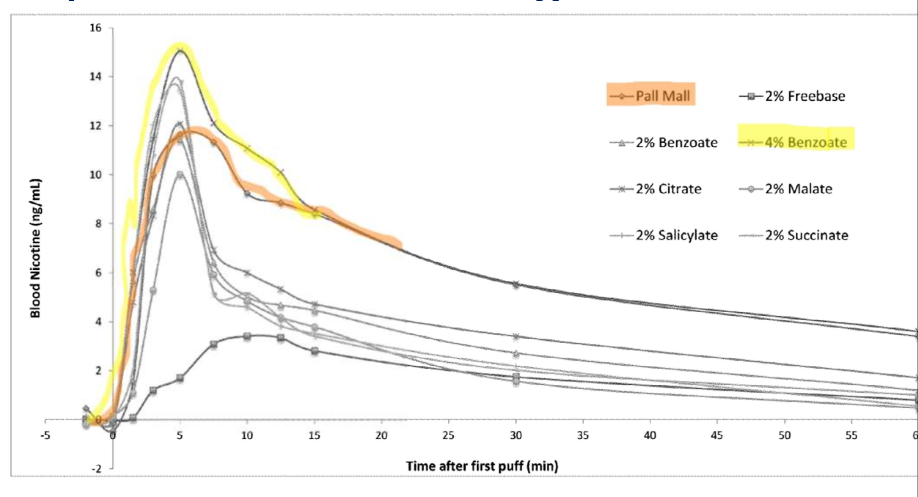
Benzoate Nicotine Salt also Closely Mimics Nicotine Delivery of a Combusted Cigarette

- Using the nicotine salt 4% benzoic acid enables much higher concentrations of nicotine – 5%
  - (56mg/mL)
- Improves the absorption to better simulate a cigarette



Bowen and Xing, US Patent 9,215,895
Juul Website, 2016

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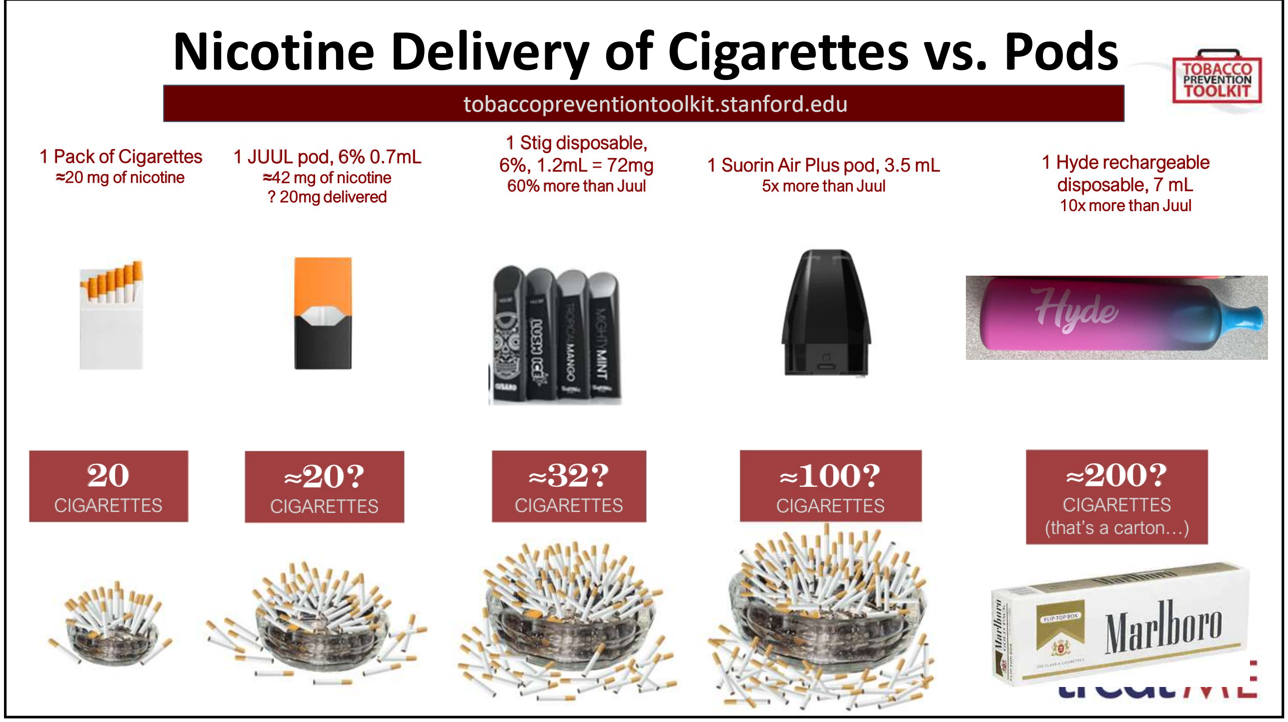

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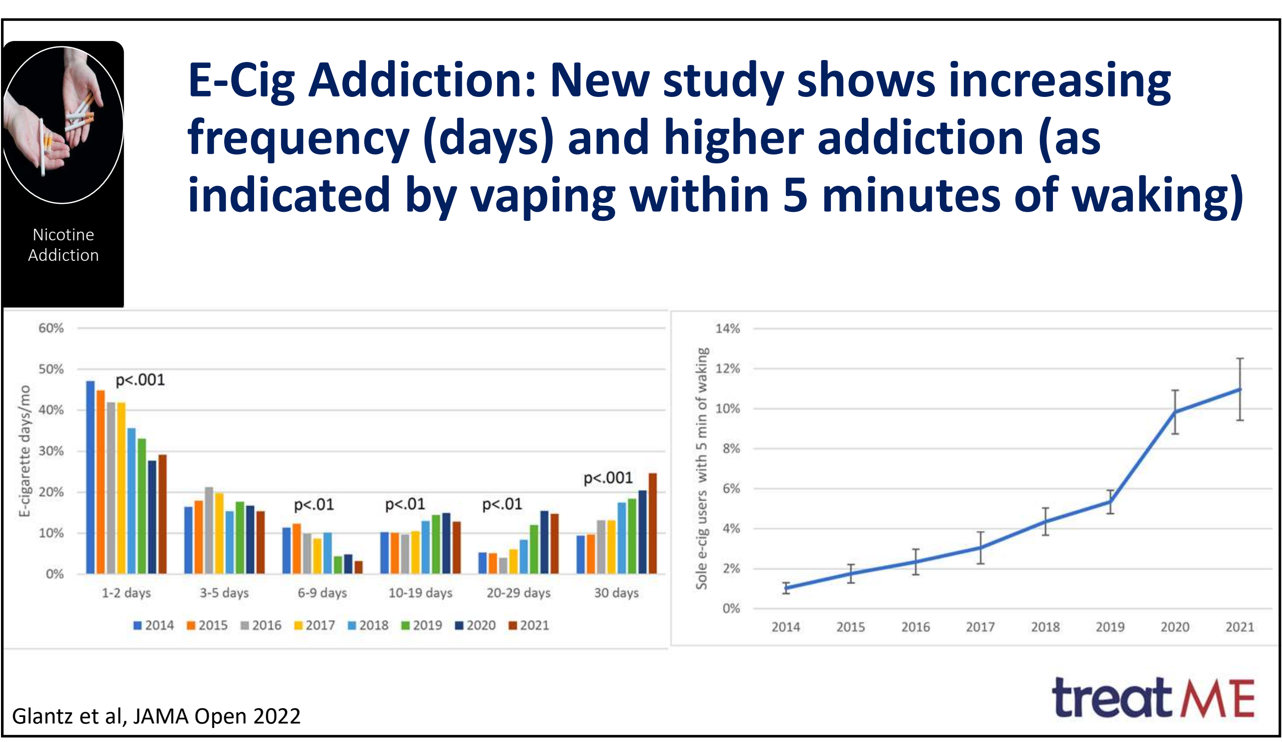

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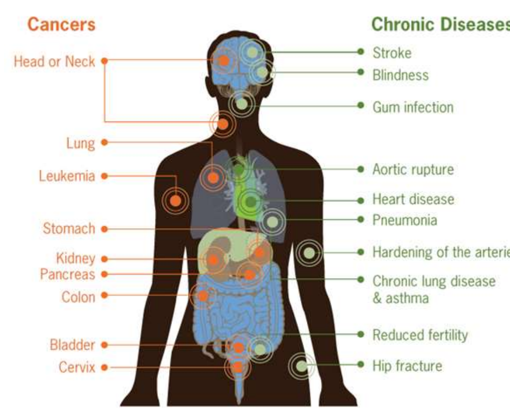
Toxic exposures of E-cigarettes to the user?

- Puff for puff relative to combusted tobacco:

  No tar, so far fewer carcinogens, but….
  - Nicotine: cardiovascular consequences
  - Ultrafine particles: cardiovascular, pulmonary and inflammatory effects
  - VOCs/acrolein/formaldehyde/other aldehydes / flavoring chemicals: inflammatory effects, growing concerns for decreased lung function



Relative to NO tobacco or medical NRT: MUCH CONCERN

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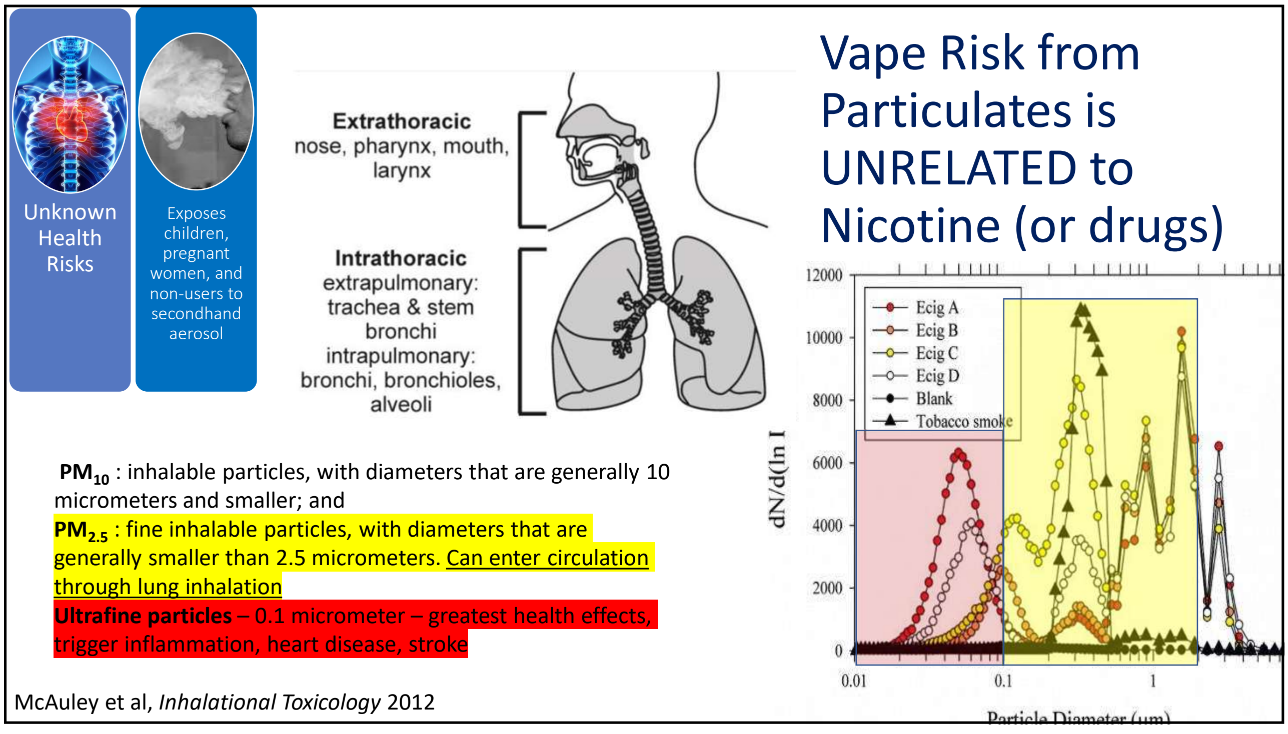

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So nicotine is addictive, smoking is a known hazard, and vaping is also a problem…

So what about Sarah?

- *Tobacco (nicotine) is often taken in larger amounts or over a longer period than was intended.*
- *There is a persistent desire or unsuccessful efforts to cut down or control tobacco (nicotine) use.*
- *Craving, or a strong desire or urge to use tobacco (nicotine).*
- *Tolerance: A need for markedly increased amounts of tobacco (nicotine) to achieve the desired effect.*

Sarah meets criteria for Nicotine Use Disorder

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Case 2: Robert, 15 yo male here for WCC

- ADHD, has IEP but school is not going well and he stopped his Vyvanse
- Quit boy scouts and karate
- Substance use screening: friends smoking and vaping. Denies for himself.

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Robert, 16 yo WCC

- CRAFFT: 3 – smoking, vaping, cannabis use, drinking every weekend "I've lied for the past two years"
- PHQ-9: 18
- GAD-7: 15
- Cutting, new therapist, lots of family conflict, has been caught at school vaping and had in-school suspension
- No interest in stopping anything: "It helps my anxiety, and it's all fine – it's not heroin or pills. Would you rather me do that? I get my weed from someone who gets it at a dispensary. It's totally safe."

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So What do we do with this???

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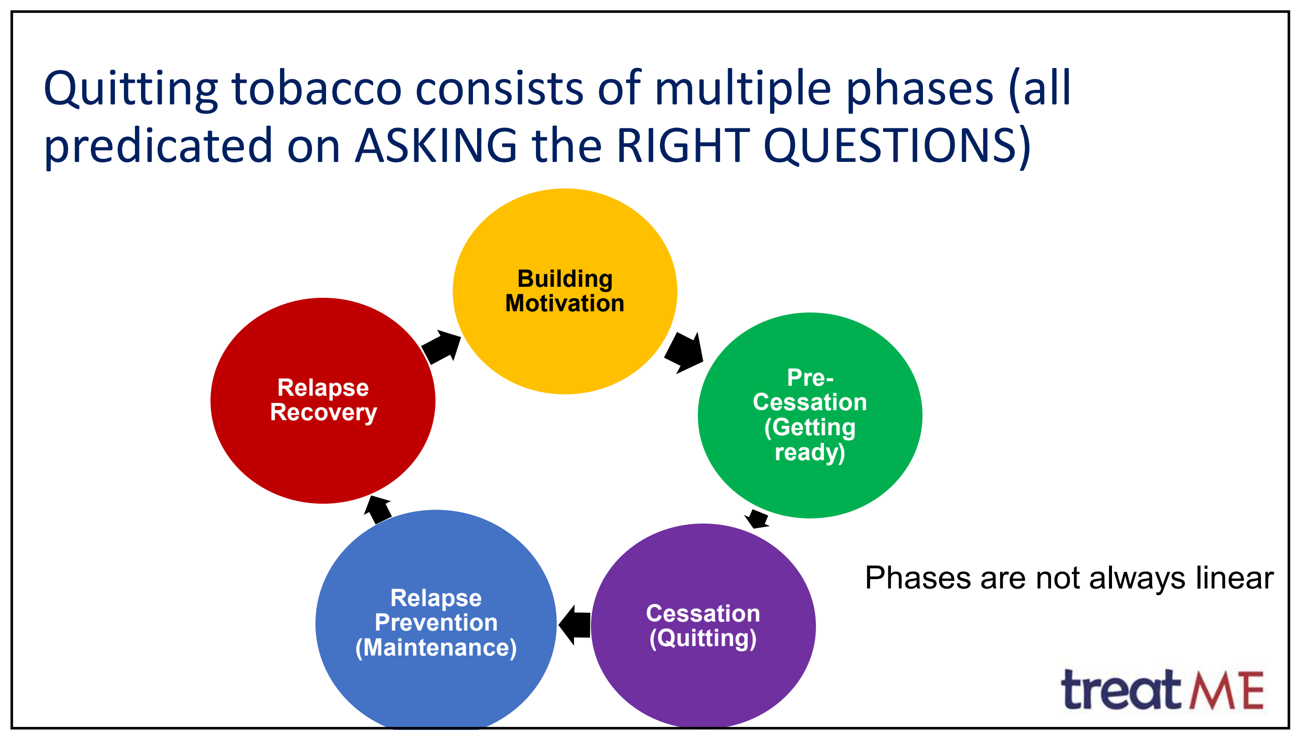

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Approach Should be the Same as for All Tobacco Products

5 A's Approach:	**Simpler:**	**NEW from AAP: "A.C.T."**
ASK ADVISE ASSESS ASSIST ARRANGE	"2A's and an R" ASK ASSIST REFER	ASK COUNSEL TREAT

Ask – Tobacco use & document
Advise – Tobacco users to quit
Assess – Readiness to quit
Assist – Counseling & Pharmacotherapies
Arrange – Follow-up

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A.C.T. "New" Branding Emphasizes the Urgency of INTERVENTION

A.C.T. for Tobacco Cessation:		
ASK	COUNSEL	TREAT
Screen for tobacco use with all youth/young adults, during every clinical encounter.	Advise all youth/young adults who use tobacco to quit and encourage them set a quit date within two weeks.	Link youth/young adults to behavioral treatment extenders and prescribe pharmacological support when indicated. After the visit, follow-up to assess progress and offer support.

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Ask: Confidential, Non-Judgmental, Specific Questions Starting at Age 11

"Do your friends or family use tobacco or vaping products?"

"Have you ever tried a tobacco or vaping product like Puff Bar, Stig, Hyde, Phix, Suorin, Juul or something else? Which one(s)?"

"How many times have you used [name of product]?"

All staff screening for tobacco use should use the SAME LANGUAGE.

Avoid "You don't use tobacco products, do you?"

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"Ask" Best Scenario: Standardized, Confidential Patient-reported Data via Tablet or Portal (S2BI)

In the past year, how many times have you used tobacco, vape pen, or e-cig?

Never | Once or twice | Monthy | Weekly or more

In the past year, how many times have you used alcohol

Never | Once or twice | Monthly | Weekly or more

In the past year how many times have you used marijuana

Never | Once or twice | Monthly | Weekly or more

Continue | Back | Finish later | Cancel

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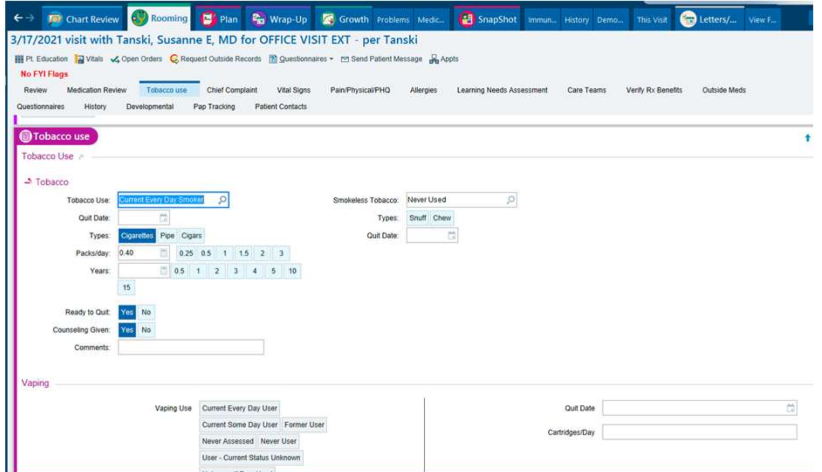
"Ask" Better Scenario: Standardized Screening via HER (although this is not confidential)



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Ask: “Where are you with your vaping/tobacco use?” Meet them where they are, listen and get some details

- Amount vaped/smoked - number of pods (or fills or disposables) & strength
- Other substances?
- Prior attempts to quit?
  - Have they tried the *two-week challenge*?
- Screen for depression, anxiety and co-morbidities

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Back to Robert – I asked, he told.

- Problematic nicotine use, depression, anxiety, cannabis use, alcohol use… Where to start???

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COUNSEL: We are Building Motivation for Change

- For many youth and young adults, they do not see vaping as a problem
  - Need to help them recognize the costs (financial, physical, mental, future)
- For some, we are suggesting they give up a coping mechanism for anxiety/depression or an aspect of their identity/social life
  - As noted, nicotine is a psychoactive
- For those who are ready, describe that you CAN help, HOW each element works

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COUNSEL: Guide patient to self-efficacy for best results

- Support – "I can help you" Use MI techniques to frame discussion
  - Maintain patient autonomy
- Readiness to quit
  - Quit date – avoid tests, high stress times
  - Social support – quit with a friend?
  - Removing vaping/tobacco products from home, backpack
  - Anticipate withdrawal symptoms
  - Avoid triggers – what will they be?
  - Explore & problem solve challenges "contingency management"

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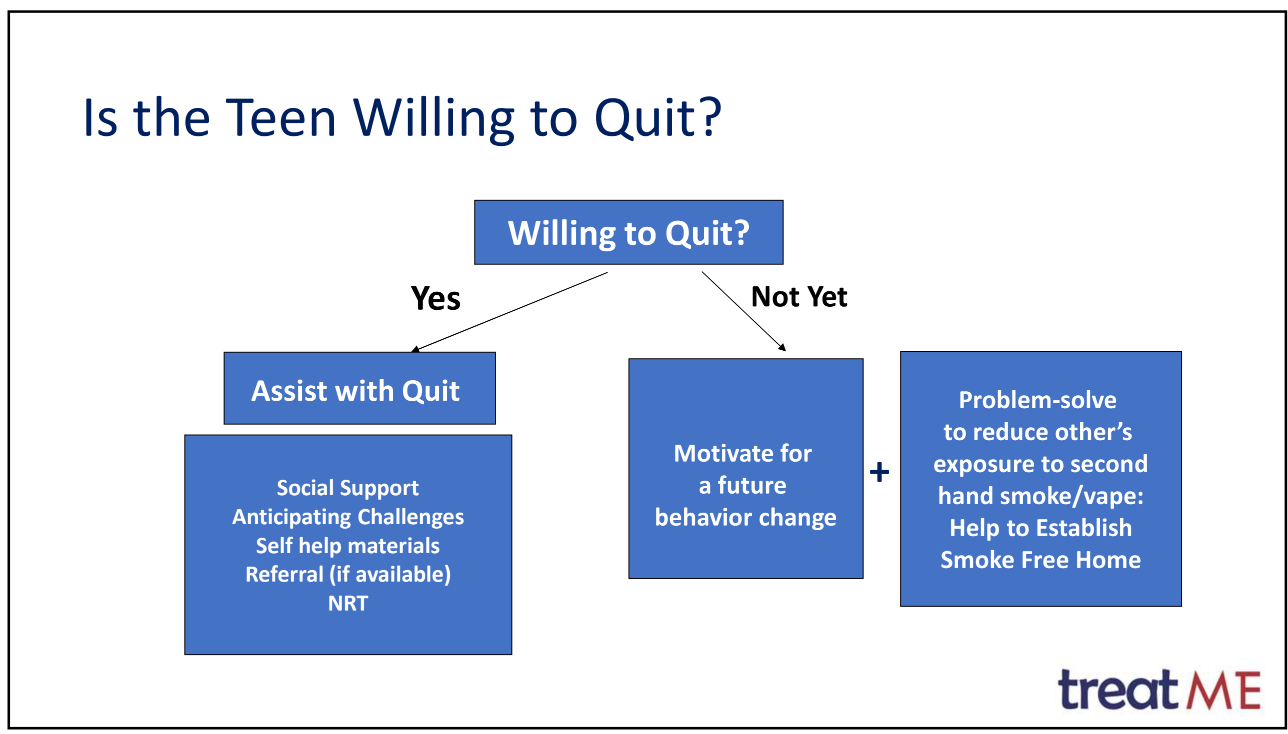

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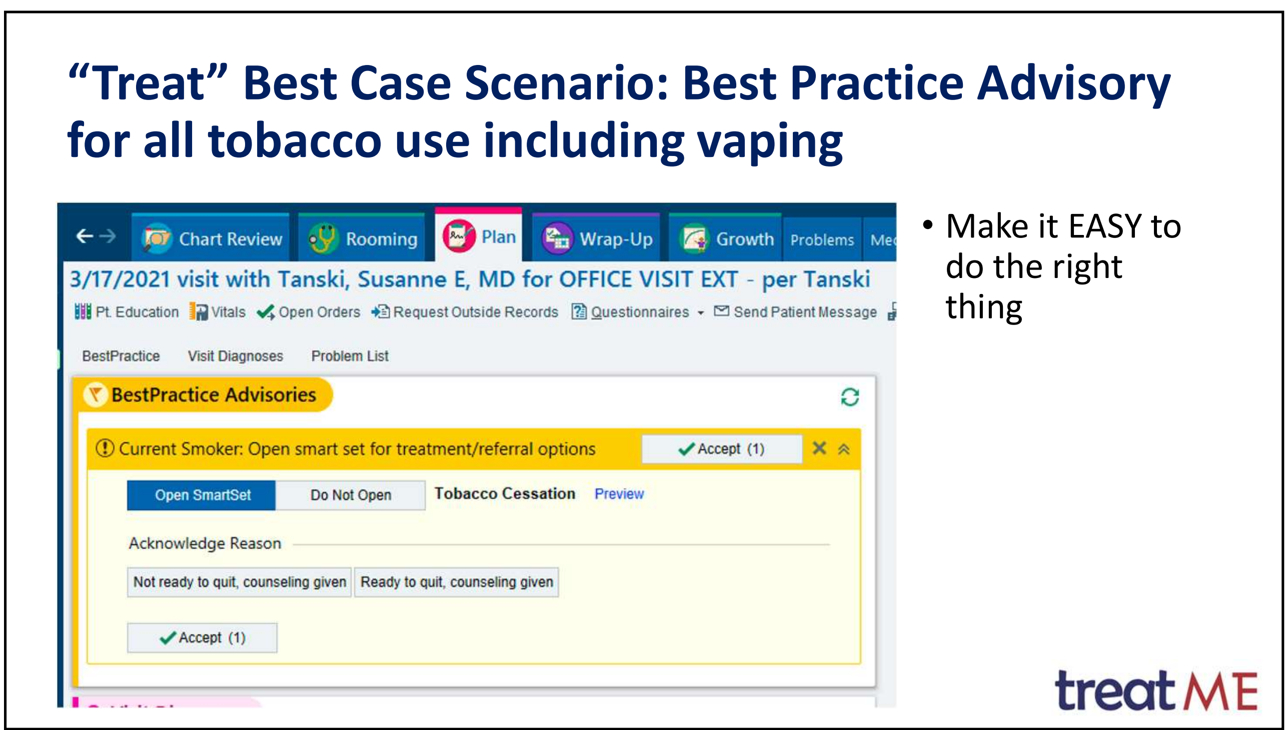

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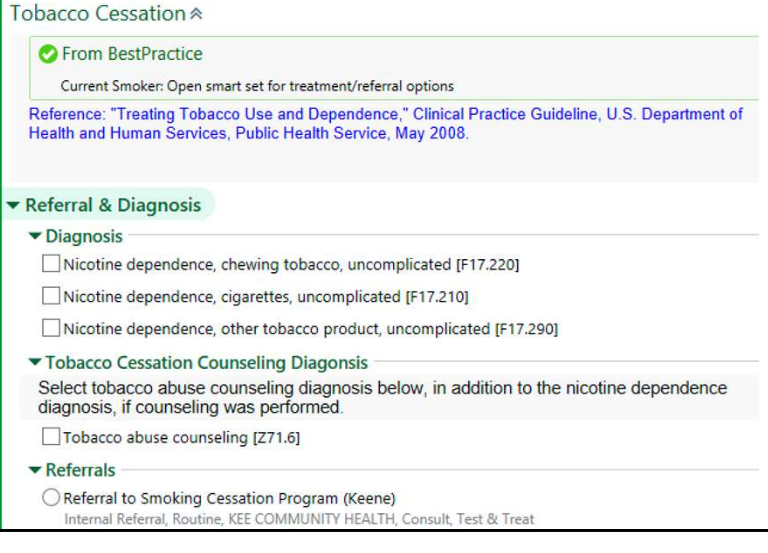
"Treat" Best Case Scenario: a "Smartset" or similar bundle with links, Rx and follow up



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TREAT: The Concept

Ask	Elicit	Offer	Help
Ask for permission to make suggestions and offer help • "May I make a suggestion…?" • Offer help – not "rules"	Elicit ideas from the teen	Offer alternatives or preparatory steps, such as making the home and car tobacco free, or not smoking around siblings	Help the teen to set their own goals for behavior change

Miller, Rollnick, Conforti.
Motivational Interviewing: Preparing People for Change.

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TREAT: Teen is Not Ready to Quit (or doesn't think they need to quit)

Set an Intermediate Goal

Cutting down? Delaying?

Try a two week period of abstinence – FOLLOW UP to see how it went, and this can be a persuader that they have lost control over their nicotine use.

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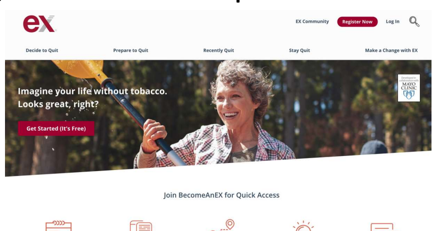
Treat: Link with behavioral treatments

- Text-based, app-based & telephone programs for teens, young adults, adults & parents
- MyLife, MyQuit
- This is Quitting – teens & young adults
- Ex Program – adults & parents



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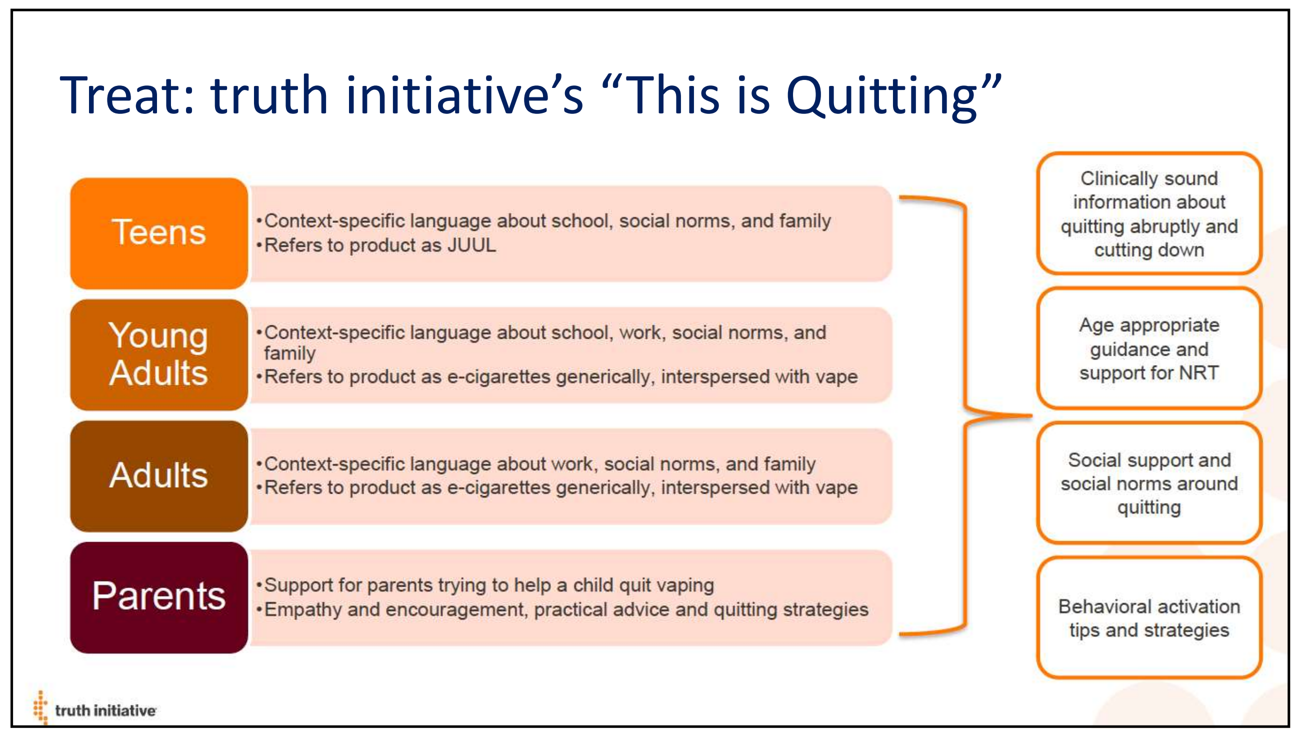

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Why Text Messaging?

- Evidence-based method
- Tailored to quitting progress
- On-demand support
- Supports quitters of all ages and SES
- Easy opt-in via existing tobacco cessation services
- Long enrollment period
- Combines the best of what we know engages and supports users from EX and TIQ

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Treat: Why Prescribe? High nicotine delivery in vapes = worse withdrawal symptoms

- Irritability
- Frustration
- Anger
- Increased appetite
- Depression/anxiety
- Difficulty concentrating
- Insomnia

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Treat: How and to Whom to Prescribe? No evidence-based guidelines for NRT for cessation

- But there also aren't evidence-based for teens wanting to quit combustible cigarettes
- Pediatricians are used to 'off-label use'
- Expert opinion – may need nicotine patch and gum/lozenge combined to ameliorate withdrawal symptoms
- Consider for those who have tried and failed

Patch for "maintenance", gum/lozenge for craves

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Treat: Curb the urge to vape

- **Delay** – urges usually last a few minutes
- **Drink Water** – or other low-cal drink (hard candy or gum, too)
- **Do something else** – exercise, keep your hands busy (games), express yourself (write, talk), Cat videos, Tik Tok
- **Deep Breathe** – relaxation techniques, meditation
- **Discuss** – get help from a friend, or quit line, quit app, text to quit

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Robert

- Was willing to consider using NRT to stop smoking cigarettes when he didn't have vapes
  - I prescribed NRT for Robert AND his dad!
- Listened to my spiel about cannabis and anxiety
- Tentatively agreed to resume sertraline
- Declined suggestion to resume therapy
- Follow up plan in 4 weeks…

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Treat: Follow up is key for accountability and success

- Make a follow up plan to talk – patient messaging? Telehealth? Face to face?
- Lots of options, but goal is accountability and emphasizing the IMPORTANCE of cessation
- At Follow-up: Explore any discrepancy between goals and slips
- Review use of behavioral links and/or pharmacotharapy dosage and usage

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Treat: @Follow up, check on slips vs. relapse

- It is important to distinguish between a slip and a relapse
- Slip - one (or several) instances of smoking/vaping after quit date
  - Left unchecked slips can lead to self-doubt, guilt, feelings of personal failure, so that the teen/young adult gives up --> full relapse
- Relapse - a return to the usual smoking/vaping pattern
- A slip should reframed as "learning what works" – each slip can become a tool to move forward
- Quitting is HARD, and every success should be celebrated

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4 weeks later…

- Still vaping, NOT smoking, and he has only used cannabis twice in the last four weeks…
  - (Dad has not used the NRT, and had not done "jack", Robert proudly declares)
- Did not fill sertraline
- Has since been expelled from school for vandalism…
- Agrees to follow up in another month

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Take Home Points: A.C.T. for Cessation

- **ASK –** confidential and patient-reported is best
- **COUNSEL**
- **TREAT -** Link, prescribe and follow up
- In spite of no evidence-based clinical guidelines (yet) in helping these teens, it is our job!
- Extrapolate from recommended behavioral strategies to assist nicotine-dependent youth from combustibles - Pharmacotherapy is off-label but can be used safely
- Apps, texts, and internet can help!

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