

## e-Cigarettes: Public Health Boon or Bane?

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### Overview

- What are e-cigarettes and how do they work?
- History: "cigalikes," "vape pens," "tanks"
- Growth and usage
- Field trips, "Big Tobacco" and FDA
- Harms and benefits
- What should family doctors do?
- Discussion

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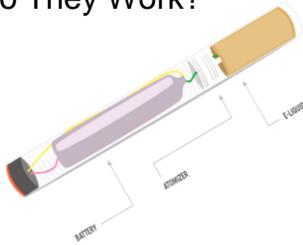
### What are e-Cigarettes?

- Formally: electronic nicotine delivery systems (ENDS)
- Battery powered, cigarette-shaped
- Vaporize nicotine liquid ("e-juice") so it can be inhaled
- Introduced in 2006-2007 as "cigalikes" ("slims")
- Initially available at convenience stores



### How do They Work?

- Three parts to all e-cigs:
  - Battery
  - Liquid nicotine
  - Vaporizer/atomizer
- Parts may be replaceable and/or rechargeable



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### Cigalikes

- Individual disposables for under \$10 (I paid \$7.50)
- In bulk on the web for \$5
- One disposable is equivalent to a pack or more of tobacco cigarettes



## “Vape pens” and Refillables

- e-Cigarette vaping systems, refillable and rechargeable vape pens (mods, eGos, PVs, etc)
- e-Juice comes in multiple flavors and concentrations



## Tanks, Mods, Box Mods

- Lots of names, shapes, sizes, but they all work the same way:
- Flavored liquid nicotine is vaporized and inhaled



## The e-Cigarette Family



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## Vape Shops

- Usually solo or local chain
- Sell a range of vaping eqpt
- e-Juice from different sources
- Kit with battery, juice, charger for \$35-\$110 ++
- Est. 10,000+ in the US



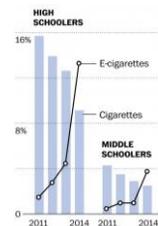
## Growth of e-Cigarettes

- \$500 million in US sales in 2012, 0.5% of tobacco products
- Growing fast: estimated to be \$2.5 billion in 2014. “Vaping” was OED’s 2014 word of the year!
- Big Tobacco joined the market, spiking sales
- Growth may have slowed, however, especially among cigalikes

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## Teen e-Cig Use Triples from 2013-14

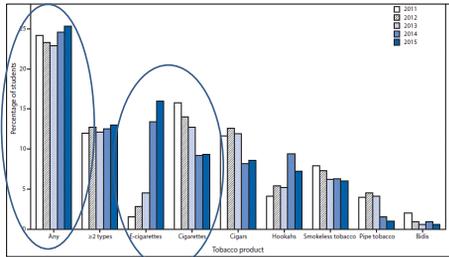
- Based on 2011-2014 National Youth Tobacco Surveys
- Significant *increase* in e-cigarette (and hookah) use
- Significant *decrease* in cigarette use
- **Overall, no change in tobacco use!**



Arrazola RA, et al. Tobacco use among middle and high school students. MMWR 2015;64:381-5.

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## Latest High School Survey Data



MMWR 2016.65:361-367

## Big Tobacco and e-Cigarettes

- NJOY was an early, independent cigalike
- Lorillard launched Blu in 2012; originally only a disposable, now multiple versions
- RJ Reynolds entered in 2013 with Vuse “digital vapor cigarettes”
- Finally, Altria bought Green Smoke and began introducing Mark Ten in 2014; distribution now increasing rapidly

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## 7-11 Field Trip!

- Visited my local 7-11
- Plenty of e-cigs available
- Literature also
- Integrated into the tobacco cigarette displays
- Sold “behind the counter” (in DC)



## 7-11 Field Trip, contd.

- Vuse (RJR) has multiple varieties and prices
- “Designed and assembled by the tobacco experts at RJR”
- “Perfect puff every time”



## Vuse

- I paid \$10
- Single e-cig, but is rechargeable *and* refillable
- Comes w USB charger
- Multiple flavors available



## 7-11 Field Trip, contd.

- Blu has varieties and refills and lots of space
- Disposables, tanks, and rechargeables
- “Take back your freedom”



## blu

- Very aggressive marketing:
  - “Slim. Charged. Ready to go”
- Distinctive blue “ash”



## blu



## 7-11 Field Trip #2

- Mark Ten, by Altria, is the most recent e-cig from Big T to hit the market.
- Starting to dominate the shelves, especially with their XL brand



## MarkTen

- Altria purchased Green Smoke
- “FourDraw technology”
- Rechargeable, 2 sizes
- Available in classic, menthol, fusion, mint



## 7-11 Field Trip, contd.

- NJOY has been squeezed down a bit
- “Proudly independent of Big Tobacco”
- Now makes refillable vape pens as well



## NJOY

- One of the original cigalikes, still the smallest and most cigarette-like
- “Not a tobacco company”
- Going up against Big T



## Vape Shop Field Trip!

- Large selection
- Snide about disposables
- Ex-smoker
- Down-played dangers of e-juice



## Vape Shops vs. Convenience Stores

- No one knows how many vape shops there are (est. 10,000+) or how much they sell
- Mom and Pop or small chains
- Convenience stores are the province of Big Tobacco: 300,000 stores is the goal
- Altria and RJR spent more than \$150 million in 2014 alone to roll out products

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## Marketing with the Stars: No Restrictions

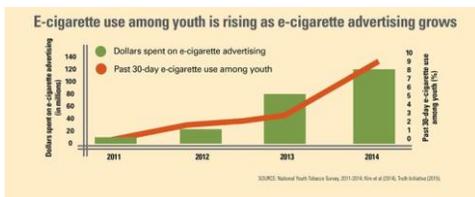


## Free Promotion from the Stars



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## Marketing and Use by Kids



## Benefits and Harms

- Harms
  - What's in them?
  - How are they being used?
- Benefits
  - Better than tobacco cigarettes?
  - NRT for smoking cessation
  - Harm reduction?

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## What's in Them?

- MarkTen pretty standard: "tobacco-derived nicotine, propylene glycol, glycerol, water and additional flavors"
- Vape shop e-liquid: WHO KNOWS?



## What Comes Out of Them?

- Ctr. for Environmental Health commissioned outside labs to test 97 e-cig products with smoking machines (9/15)
- Found that most produced "high levels" of formaldehyde and acetaldehyde
- Q: at what temps?



## Are They as Dangerous as Cigarettes?

- If you smoke them: no, they are *likely* safer than tobacco products if the ingredients are as stated:
  - Far fewer carcinogenic particles
  - Less inflammation
  - Better indoor air quality

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## How Much Nicotine is in Them?

- Impossible to say
  - Different measures (percent or weight)
  - Different smoking styles
  - Different batches of e-juice
  - Different strengths available, both in vape shops and even in cigalikes
- Summary: variable

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## How About e-Juice?

- Nasty stuff: serious poison, esp. in large quantities: attractive small bottles
- Up to 36mg/mL of nicotine, easily absorbed orally or even cutaneously
- Poison center calls up from **1 to 215/mo** from 2010 to 2014: kids *and* adults
- First death has now been reported: IV nicotine suicide



Chatham-Stephens, K, et al. Calls to poison centers for exposures to electronic cigarettes. *MMWR* 2014;63:292-3.



## RCP Report: "Huge Potential"

- E-Cigs more popular than NRT
- ≤5% of the harm of cigarettes
- Gateway evidence is weak
- "Appear to be effective" in smoking cessation
- Endorsed, but regulations needed



## US Authorities' Recommendations

- USPSTF: Insufficient evidence to recommend for smoking cessation
- CDC: Potential for harm and benefit
- AAFP: Ban marketing, do more research
- FDA: Adults only, not approved for smoking cessation



## How are e-Cigs being Used?

- Kids
  - Bad: experimentation
  - Bad: smoking initiation
- Adults
  - Good: smoking cessation
  - Good/Bad?: harm reduction
  - Bad: smoking maintenance, initiation

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## Bad: Kids Experimentation

- Anecdotes: e-cigs cool
- 79K to 263K ↑ in 3 yrs
- Twice as many who used e-cigs intend to smoke
- Easy to use and put in your pocket
- Nicotine much more addictive in kids



## Bad: Kids Smoking Initiation

- Evidence starting to emerge that kids are starting smoking w e-cigarettes and then moving to combustibles
- Most is correlational at this point, some bi-directional, but this is a big concern

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## Good: Smoking Cessation

- A few retrospective studies and small trials
  - Historical: as good as NRT
  - Trial: as good as NRT, better than placebo
  - Vs. nicotine inhaler: preferred
- Cochrane review judged evidence positive but low quality
- All brands explicitly deny use as smoking cessation tool; none FDA approved

McRobbie H, et al. Electronic cigarettes for smoking cessation and reduction. Cochrane Library 2014. DOI:10.1002/14651858.CD010216.pub2

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## Harm Reduction: Good or Bad?

- First tenet of harm reduction: alternative is less harmful than the established harm. *Probably true.*
- Second tenet: use of alternative leads to decreased use of the established harm. *May be true.*
- Is it better to substitute e-cigarettes for conventional cigarettes, even without the intention of quitting?

Drummond MP. Electronic cigarettes: Perhaps the devil unknown is better than the devil known. *Ann Intern Med* 2015;163:81-2.

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## Bad: Smoking Maintenance

- Major public health cessation strategy: make it hard to smoke
- e-Cigarettes make this easier, allow maintenance of smoking
- True extent of this threat unknown; one recent study found smokers using e-cigs may be at *increased risk* for not being able to quit smoking

Al DeLamby WK et al. E-cigarette use in the past and quitting behavior in the future. *AJPH* 2015;105:1213-19.

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## FDA Regulations, Effective 8/8/16

- Announced May 2016, after a 2-year wait
- Restricting sales to age 18+, no giveaways
- Safety bottles for e-juice
- Registering manufacturers (incl some vape shops)
- Requiring premarket review of all products (since 2007)
- Requiring health warnings on all packages and ads
- Prohibiting “modified risk” products unless authorized

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## Problems with FDA Rule

- S-L-O-W: took two years til final rule
- Most provisions don't take effect for two years
- May be delayed by legal maneuvers
- No flavor restrictions
- No effect on marketing/advertising (not FDA's job—FTC is “looking at it”)

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## The Post-FDA Rule World

- Vape shops are scared: “vapocalypse” if they have to register their products, submit to inspections, etc
- Big tobacco presumably loves it, because they've got the resources to respond to regulations
- What will the landscape look like in 5-10 years?
  - Vape shops out of business except for a few large chains?
  - e-Cigarettes only at convenience stores?
  - Cigarettes out of business?

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## Cool (or Crazy?) Idea: Disruptive Technology

- Ultimate in harm reduction
- Regulate e-cig nicotine content, humectants, additives
- Regulate tobacco cigarette nicotine content *down* to send people fleeing to e-cigs
- Increase taxes on tobacco cigarettes
- Result: millions of lives saved, cigarettes out of business

Cobb NK and Abrams DB. The FDA, e-cigarettes, and the demise of combusted tobacco. *NEJM* 2014;371:1469-71

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## What Should Family Doctors Do? Kids

- Clearly e-cigarettes are a disaster for kids
- Ask all kids about “vaping” and/or “e-cigarette use”
- Make sure parents know about the growth of e-cigarette use in kids and how easy it is to conceal
- Alert all vapers about e-juice safety issues, esp. for young children
- Push for local restrictions on flavors, marketing

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## What Should Family Doctors Do? Adults

- Recommend e-cigarettes:
  - Not at all (unproven)
  - For cessation? (as NRT)
  - Partial substitution? (harm reduction)
  - Total substitution? (harm reduction)
- Which e-cigarettes? Vape shops?
- Safety issues, esp with e-juice

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## Practice Recommendations

- Revise your “smoking” questions to specifically include “vaping” and e-cigarettes: and ask all kids!
- Warn your patients who vape about the safety issues and likely harms
- Consider whether there MAY be a class of patients for whom you *recommend* e-cigarettes

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## Suggested Readings

- Abrams DB. Promise and peril of e-cigarettes. *JAMA* 2014;311:135-6.
- Gostin LG and Glasner AY. e-Cigarettes, vaping, and youth. *JAMA* 2014;312:595-6.
- Barter T. Electronic cigarettes: Aggregate harm. *Ann Intern Med* 2015;163:60-1.
- Drummond BM. Electronic cigarettes: Perhaps the devil unknown is better than the devil known. *Ann Intern Med* 2015;163:61-2.

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## Discussion



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## Thanks!

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