E-cigarettes: a review

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Concerns: users

- Safety and efficacy
  - Product components
    - Nicotine
    - Propylene glycol
    - carcinogens and heavy metals
  - Quality control
    - No standards
    - Studies have noted differences in number and amount of components within the same brand in some instances
  - Smoking cessation and/or smoking reduction
    - No evidence to conclusively prove that they help people quit smoking or smoke less
      - Studies that do exist show a range of results (negative, positive and no effects) and often have small sample sizes
    - Number of studies are increasing constantly

Concerns: social

- Secondary exposure
  - Scarcity of studies to draw from
  - Indoors
    - Results show that non-smokers passively exposed to e-cigarettes absorb nicotine (Ballbé et al. 2014)
      - Chemical analysis of airborne nicotine at home and biomarkers (cotinine in saliva and urine)
  - Outdoors
    - Found that bystanders are exposed to nicotine (10x less than conventional cigarettes) (Czogala J et al. 2013)
    - Found no significant differences in outdoor air, human breath or e-cigarette vapor (Madden J 2014)
      - Meta-analysis that used outdoor air data from Los Angeles

Concerns: social

- Appeal to youth
  - Currently no age restriction in advertizing or sales
    - Kid friendly flavors (chocolate, gummy bear, bubble gum)
    - Sold online and in malls
  - CDC & Prevention's National Youth Tobacco Survey data
    - US high school student use increased from 4.7% in 2011 to 10% in 2012
    - 160,000 students tried e-cigarettes that had never tried conventional cigarettes
- Normalization of smoking
  - Set back current denormalization of smoking
  - Encourage use of a less dangerous product

FDA & E-cigarettes

- Currently the US Food and Drug Administration (FDA) does not regulate e-cigarettes
  - What does this mean?
    - e-cigarette manufacturing has no standards
    - e-cigarettes can be sold to anyone regardless of age
    - e-cigarette marketing is open to anyone
- Recently the FDA proposed a rule that would deem e-cigarettes as a tobacco product
  - What does this mean if it goes through?
    - Ban selling e-cigarettes to minors (under 18)
    - Internet sales will still be allowed
    - Marketing will likely be more limited
    - Manufacturing may be subject to certain standards
    - e-cigarettes may be inherently included in tobacco free policies

Policy trends in the US

- US Cities
  - Bans in workplaces including in NYC and LA
  - Full list can be found at http://www.nosmoke.org/pdf/ecigslaws.pdf)
- Universities
  - 1,178 smoke free, 793 tobacco free campuses
    - Include e-cigarettes in ban
      - University of Michigan Health Campus
      - Ohio State University
      - UT Austin
      - Texas A&M
      - All Georgia state universities
      - California system except Irvine
  - Complete list available at: http://www.insidehighered.com/news/2013/10/14/colleges-consider-whether-e-cigarettes-arecovered-bans-smoking

Policy trends in CA and EU

- Canada
  - Not much regulation: no minimum legal sale age
  - made it illegal to sell e-cigarettes preloaded with nicotine in stores
- Europe
  - European Parliament approved a ban on e-cigarette advertising starting in mid-2016 (likely to be approved by member states)

QUESTIONS?

- References for this presentation can be accessed in a Appendix A: Summary of References Updated

Appendix A: Resources used in e-cigarette presentation to University Senate on November 5, 2014

Abrams DB (2014) Promise and Peril of e-Cigarettes Can Disruptive Technology Make Cigarettes Obsolete? JAMA 311: 135-136

-nice brief summary of what we know and what we need to know to appropriately regulate and use e-cigarettes

Ballbé et al. (2014) Cigarettesvs.e-cigarettes:Passive exposure at home measured by means of air borne marker and biomarkers. Environmental Research 135: 76-80

- the study aimed to add to the very scant information about passive exposure to nicotine from e-cigarettes' vapour and conventional cigarettes' smoke

-observational study: 54 non-smoker volunteers in different home situations

-measured: airborne nicotine at home and biomarkers (cotinine in saliva and urine)

- our results show that non-smokers passively exposed to e-cigarettes absorb nicotine

Besaratinia and Tommasi (2014) Electronic cigarettes: The road ahead. Preventative Medicine 66: 65-67

-nice summary of what is known about e-cigs currently and what this means for their future regulation and use

Cahn Z & Siegel M (2010) Electronic cigarettes as a harm reduction strategy for tobacco control: a step forward or a repeat of past mistakes? Journal of Public Health Policy 32: 16-31.

-great summary of all research and legal happening with E-CIGs up to 2010 (even a table summarizing the 16 studies they found)

-basically only a couple of studies have found detrimental substances in the vapor, but in very small amounts

-point has been made that all these conclusions are preliminary as there is not enough evidence to tip the scales either way

-2nd hand exposure/ environmental effects not mentioned

Czogala J et al. (2013) Secondhand exposure to vapors from electronic cigarettes. Nicotine and Tobacco Research DOI: 10.1093/ntr/ntt203

-aim was to evaluate secondhand exposure to e-cig vapors

-findings were that they are a source of secondhand exposure to nicotine (albeit at 10x lower levels than cigarettes), but not combustion toxicants

-call for more research to evaluate consequences of secondhand exposure to nicotine, especially to vulnerable populations

Flouris AD and Oikonomou DN (2012) Electronic cigarettes: miracle or menace? BMJ 340.

-animal and human studies on the effects of actively or passively smoking e-cigs lacking

- cannot draw any definitive conclusions about safety of e-cigarettes for human health and environment because the quality control for their manufacture is currently nonexistent

-what is need is more rigorous chemical analyses, animal studies, human clinical trials and until then healthcare professionals should inform people of the probable fallaciousness of manufacturer claims

Foulds J, Veldheer S, Berg A (2011) Electronic cigarettes (e-cigs): views of aficionados and clinical/public health perspectives. The International Journal of Clinical Practice 65: 1037-1042.

-update on Vansickel studies showing experienced e-cig users reach rapid increases in blood nicotine concentration similar order of magnitude and speed as a cigarette

-they study is a survey to assess e-cig use with 105 surveys completed showing that many completely replaced cigarettes with e-cigs and many use to quit smoking eventually because they perceive it as safer; users shop for e-cigs that meet certain characteristics not by most advertized

-suggest future studies looks at characteristics of the e-cig brands out there

-also points to lack of studies available to test efficacy and safety of e-cigs as smoking cessation aids

-FDA summary from 2009 concern (presence of low levels of nitrosamines and diethylene glycol) to 2011 post court hearing announcement to not regulate e-cigs as drugs/devices (unless manufacturers make health claims or seek this approval) but will seek to regulate as tobacco products

-point to other studies finding other impurities in e-cig liquid or vapor in small amounts

-public health concerns outlined (new tobacco users, allowed in banned spots, so helps continue addition maybe just dual users; unknown health issues (long term inhalation of propylene glycol; unproved for smoking cessation)

-calls for more research to address these concerns

- mentions environmental impacts in intro, but never really discusses

Goniewicz ML et al. (2013) Levels of selected carcinogens and toxicants in vapour from electronic cigarettes. Tobacco Control 0: 1-7.

-aim was to screen 12 brands of e-cigs and the medicinal nicotine inhaler (reference) for content of four groups of potentially toxic and carcinogenic compounds: carbonyls, volatile organic compounds (VOCs), nitrosamines, heavy metals

-findings indicate some toxic substances present at 9-450 times lower than cigarette smoke and comparable most of the time to trace amounts in the ref (inhaler); carbonyls (4 of 15 found, 3 found in inhaler, none in blanks), VOCs (2 of 11 found, none in inhaler, 1 found in similar levels in blanks), nitrosamines (2 of 2 found, none in inhaler or blanks); heavy metals (3 of 12 found but similar to inhaler & blanks in amount)

-conclude that se-cig vapor less injurious than cigarette smoke; substitution may substantially reduce exposure to tobacco specific toxicants, but needs more research as a harm reduction strategy with those unwilling to quit

-need studies confirming their results with people actually using the e-cigs because puff profile may differ

-quality control of e-cig brands almost nonexistent

-once again focus is on health effects to smoker, no mention of the harm to innocent bystanders except children drinking the e-cig liquid accidentally

Goniewicz ML et al. (2013) Nicotine levels in electronic cigarettes. Nicotine and Tobacco Research 15: 158:166.

-aim was to analyze nicotine levels in vapor generated from 16 popular e-cig brands

-findings were that vapor contains nicotine, but differs in efficacy and consistency by brand

Henningfield J. (2014) The tobacco endgame: It's all about behavior. Preventative Medicine (in press) (http://dx.doi.org/10.1016/j.ypmed.2014.09.003)

-discusses history of tobacco usage and efforts to curb its use by the public

-believes that understanding behavior will be key to future polices and efforts to eliminate tobacco usage in society

Hunt & Sweeting (2014) You have been QUALIFIED for a smokeless e-cig starter kit. doi: 10.1136/jech-2014- 203879

-commentary on how current advertizing schemes for e-cigarettes are very similar to the original schemes for conventional cigarettes; they call for increased scrutiny of this product before the advertizing does too much damage

Kennedy et al. (2014) Challenges and priorities for E-cigarette regulation at the local level – insights from an Ontario tobacco control community-of-practice

- minimal policy development in Canada to regulate when and where e-cigarettes can be used, and no policies to-date to set a minimum legal sale age to purchase e-cigarettes

-surveyed health units to assess how much of a priority e-cigarette regulation is

-responses indicated that many people in the public were coming to them asking questions about the safety of e-cigarettes, their efficacy to help with smoking cessation, and to complain about others using them indoors

Madden J (2014) A Comparison of Electronic Cigarette Emissions With Those of Human Breath, Outdoor Air, and Tobacco Smoke

-study aims to compare e-cigarette emissions with other air pollutant sources using a meta-analysis

- they find that passive vaping is not more dangerous than outdoor air or human breath emissions that occur naturally in public spaces

-however they caution that indoor spaces need to be tested independently

- I think it should be noted that their outdoor air quality information came from Los Angeles, so I don't know how "natural" we can really consider that and even if there is air pollution, do we really want to add more contaminants to it?

Maron DF (2014) Are e-cigarettes safe? Scientific American

-great examination of the policy conundrum that is e-cigarettes in a very relatable way to anyone

McQueen A et al. (2011) Interviews With "Vapers": Implications for Future Research With Electronic Cigarettes. Nicotine and Tobacco Research. doi: 10.1093/ntr/ntr088

-interviewed e-cigarette users to understand their experience more clearly

-notes a strong culture with its own language and social interactions has formed; perceived benefits of e-cigarettes over conventional cigarettes (e.g., cigarette enjoyment, improved sense of taste/smell, improved breathing, strong interest in policy and research of e-cigarettes)

-call for more research as well that crosses disciplinary boundaries (medical/social sciences/policy)

Polosa et al. (2014) Effect of Smoking Abstinence and Reduction in Asthmatic Smokers Switching to Electronic Cigarettes: Evidence for Harm Reversal. Int. J. Environ. Res. Public Health 11: 4965-4977; doi:10.3390/ijerph110504965

- study looks at the effects of e-cigs on smokers with asthma and how it impacts those who quit or reduced their tobacco consumption by switching to these products

- their results suggest that regular use of e-cigs to substitute smoking has both objective and subjective benefits for asthmatics that cannot quit smoking by other means

Polosa et al. (2011) Effect of an electronic nicotine delivery device (e-Cigarette) on smoking reduction and cessation: a prospective 6-month pilot study. BMC Public Health 2011, 11:786

-monitored possible modifications in smoking habits of 40 regular smokers
- e-cigarette use substantially decreased cigarette consumption and also did not cause significant side effects in smokers not intending to quit

Saitta D et al. (2014) Achieving appropriate regulations for electronic cigarettes. Therapeutic Advances in Chronic Disease 5: 50-61.

-nice overview of studies on e-cigs to date; albeit they downplay some of the results due to limited data so far (there is a discussion on the precautionary principle though)

-great suggestions for regulations that are reasonable though (although their argument about public place bans is a little lacking, since they rely on there being no evidence to support claims that it might undermine no smoking laws, but then again there is no evidence that it won't either)

-they also call for more research

Trtchounian A, Williams M, Tolbot P (2010) Conventional and electronic cigarettes (e-cigarettes) have different smoking characteristics. Nicotine and Tobacco Research 12: 905-912.

-examined vacuum required to produce smoke/aerosol and density of smoke/aerosol over time in 8 brands of e-cigs

-findings are that the vacuum required varied with brand, while conventional cigarettes were uniform

Vansickel AR et al. (2010) A clinical laboratory model for evaluating the acute effects of electronic 'cigarettes': nicotine delivery profile and cardiovascular and subjective effects. Cancer Epidemiology, Biomarkers & Prevention 19:1945-1953.

-small sample study (naive e-cig users) looked at acute effects of two brands of E-CIGS and regular as well as unlit ones and measured plasma nicotine and CO concentration, heart rate and subjective effects

-found that they didn't raise measurable levels of nicotine or CO, but suppressed nicotine/tobacco abstinence symptoms ratings (specifically craving a cig and urge to smoke but not most of others compared to actual cigs making it unlikely for this to be more than a supplement)-more research is needed

-environmental effects not mentioned

Wagner TL et al. (2012) Electronic cigarettes: achieving a balanced perspective. Addiction 107: 1545-1548.

-strong supporters, but FDA is one of the opposition that would like to see them regulated

-looks at opinion pieces and how balanced they are

-no evidence for cessation benefit

-possible impacts don't warrant taking off the market

-argue that no production of smoke means no second hand smoke exposure (SHEs) in environment

-calls for more research before we draw any final conclusions

Zhu et al. (2014) Four hundred and sixty brands of e-cigarettes and counting: implications for product regulation. Tobacco Control 23: iii3-iii9 (doi: 10.1136/tobaccocontrol-2014-051670)

- study examines how the online market for e-cigarettes has changed over time: in product design and in marketing messages appearing on websites

- as of January 2014: 466 brands (each with its own website) and 7764 unique flavors

-In the 17 months between the searches, there was a net increase of 10.5 brands and 242 new flavors per month

-Older brands highlight advantages over conventional cigarettes; newer brands emphasize consumer choice (e.g., multiple flavors and product versatility)

- a lot of great information on current marketing strategies and implications for policy making in the future

There isn't a list of universities that have also banned e-cigs, but these two stories outline a number of them that have and the reasons behind choosing to or not to.

http://www.insidehighered.com/news/2013/10/14/colleges-consider-whether-e-cigarettes-are-covered-bans-smoking

http://www.huffingtonpost.com/2014/01/14/campus-smoking-bans-e-cigarrettes_n_4595101.html

http://www.dailytexanonline.com/news/2014/03/20/campus-tobacco-ban-includes-electronic-cigarettes