



Is use of e-cigarettes an effective smoking cessation method?

Charlotta Pisinger

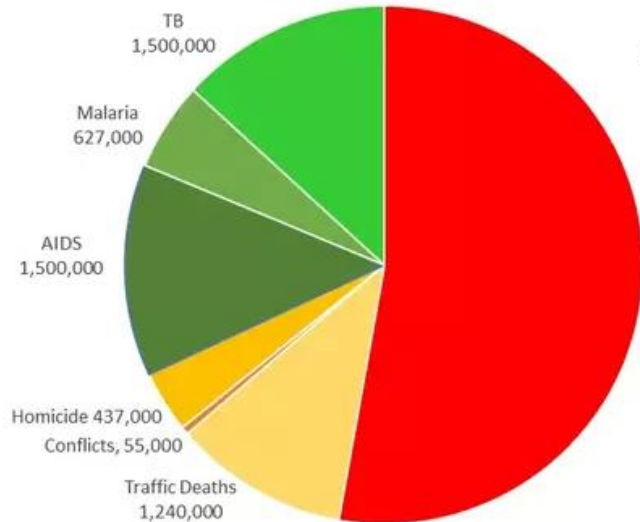
Professor in Tobacco Prevention
Center for Clinical Research and Prevention
The Capital Region of Denmark



I have nothing to declare



ANNUAL GLOBAL PREVENTABLE DEATHS



SMOKING:
6,000,000



Cancers

Oropharynx
Larynx
Esophagus

Trachea, bronchus, and lung

Acute myeloid leukemia

Stomach

Liver

Pancreas

Kidney and ureter

Cervix

Bladder

Colorectal

Chronic Diseases

Stroke

Blindness, cataracts, **age-related macular degeneration**

Congenital defects—maternal smoking: orofacial clefts

Periodontitis

Aortic aneurysm, early abdominal aortic atherosclerosis in young adults

Coronary heart disease

Pneumonia

Atherosclerotic peripheral vascular disease

Chronic obstructive pulmonary disease, **tuberculosis**, asthma, and other respiratory effects

Diabetes

Reproductive effects in women (including reduced fertility)

Hip fractures

Ectopic pregnancy

Male sexual function—erectile dysfunction

Rheumatoid arthritis

Immune function

Overall diminished health

How e-cigarettes changed my life

Demand for electronic cigarettes is booming, but experts are not convinced they help people to quit smoking. Whatever the case, I am still



▲ For Stephanie Rafanelli e-cigarettes were an electric lightbulb moment in the struggle to give up tobacco.
Photograph: Linda Nyland for the Guardian

It all started quite early on. My first words, uttered with a not-so-cherubic look on my face and a strange baby puffing sound, were: "Light! Light!" It was as if I had come out of the birth canal sucking not on my thumb, but a mini-Marlboro. Much excitement and hand-

"Quitting smoking was the easiest thing I've ever done, thanks to electronic cigarettes"

How the Electronic Cigarette Changed My Life

FOR TRAIL

the Electronic Cigarette Changed My Life

...oking when I
...l. Growing up
...orhood in
...everyone
...had its pluses
...ong lost
...d of mine
...d got me
...ttes. At first I
...e, but before I
...haling, and
...I would get to have my next smoke.
...h notice cigarettes taking over my entire life. It
...pretty soon I was making plans to sneak out to
...from my parents to get some more.



Growing up, you could smoke at work, in res pretty much wherever you wanted, and it seems smoked around me, too. But now, tons of people was banned everywhere, it was way too expensive to planning, scheming, and wondering when you your next smoke, using gum and something to h smell, and it was taking more and more time and I wanted to quit, but everything I tried didn't wor believe these stupid cigarettes were so impossible the health issues started, one after another. I w tails on the health issues, but I knew I had to fin quit, but still couldn't.

When the digital electronic cigarette first car given them a try, but they weren't very good, dic por, didn't taste anything like a real analog cigar before. But I found the idea.

LEADER REPORT

Vaping saved my life

Toni Brown - 11:00, Mar 30 2017





Randomized controlled trials
- clinical setting/research
centers/smoking cessation clinic



Observational studies
-real world

Counselling



Varenicline



Nicotine replacement therapy

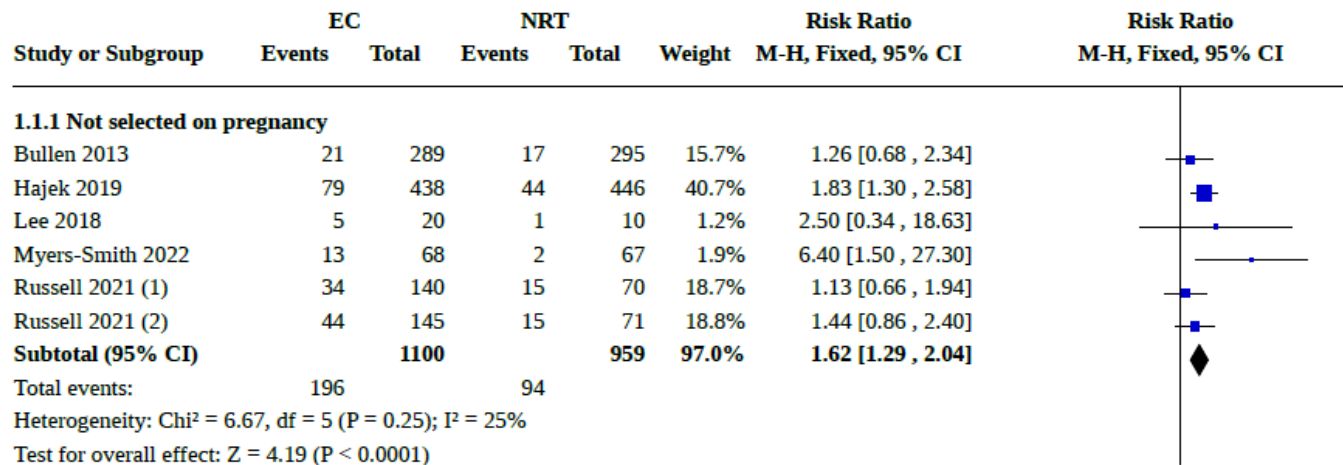


Bupropion



Clinical setting: comparing with nicotine replacement therapy

- 6 trials included
- 60% higher probability (significant) to quit with e-cigarettes than with NRT
- Evidence graded as HIGH



Clinical setting: comparing with nicotine replacement therapy



- 7 trials included
- E-cig. significantly better than NRT
 - OR 1.8 (95% CI: 1.4 - 2.3)
- Evidence graded as LOW

Hedman L et al. *Tob. Prev. Cessation* 2021;7(October):62

- 8 trials included
- No significant difference after 24 weeks
 - OR 1.2 (95%CI 0.7-1.9)
- Evidence graded as LOW

Quigley JM. *Tob. Prev. Cessation* 2021;7(November):69

- 6 trials included
- No significant difference
 - RR 1.42 (95% CI 0.97-2.1)
- Evidence was graded as LOW

Pound CM et al. *BMJ Open* 2021;11

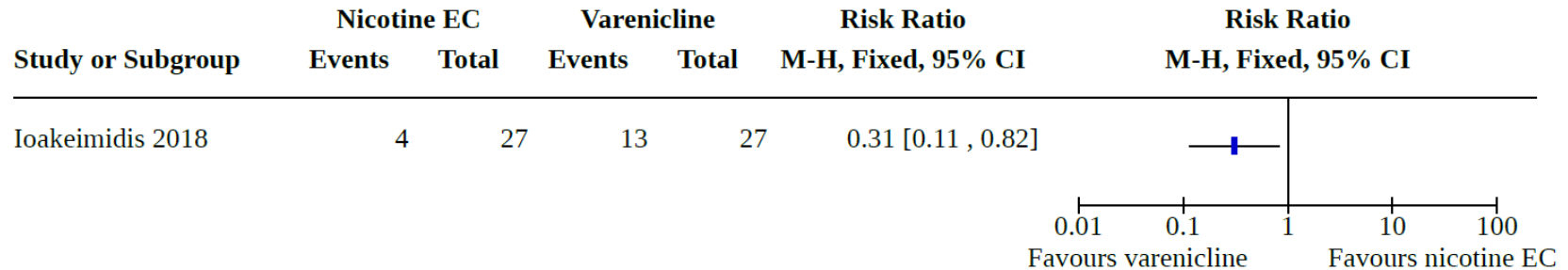
- 3 trials included
 - Biochemically verified + sustained smoking cessation (6 to 12 months), no conflict of interest
- No significant difference
 - OR 1.25 (95% CI: 0.7 - 2.1)
- Evidence graded as LIMITED

Banks E. et al. *Electronic cigarettes and health outcomes: systematic review of global evidence. Report for the Australian Department of Health.* 2022

Evidence not
conclusive

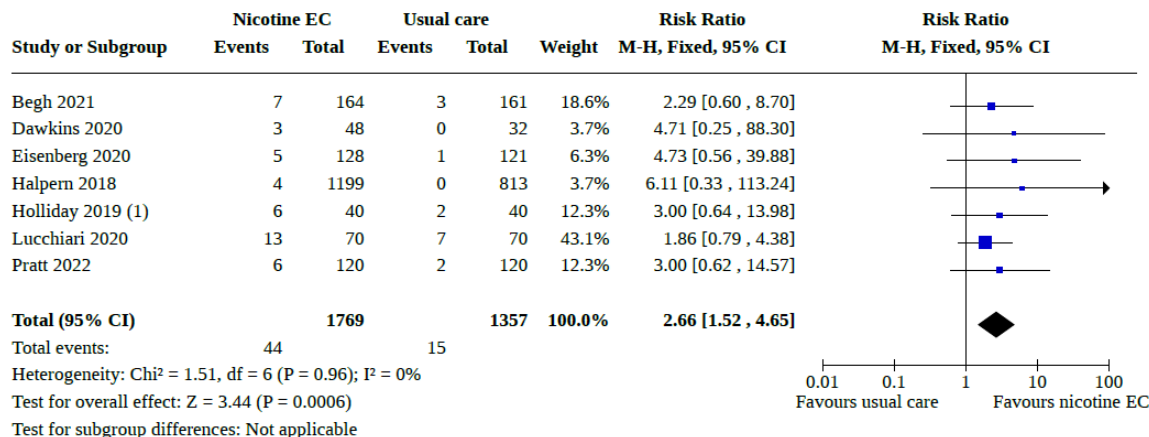
Clinical setting: comparing with varenicline

- 1 study included
- Varenicline significantly better
- Evidence graded as: very low



Clinical setting: comparing with behavioral support (counselling) or no support

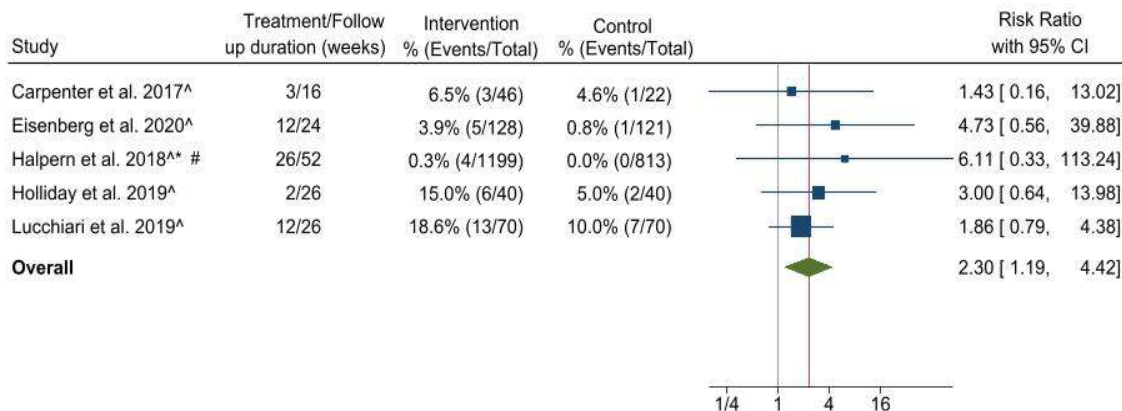
- 7 studies included
- Almost 2.7 times higher (significant) probability to quit with e-cigarettes
- Evidence graded as VERY LOW



Clinical setting: comparing with no assistance or "usual care"



- 5 trials included
- 2.3 times higher (significant) probability to quit with e-cigarettes
- Evidence graded as VERY LOW



Counselling/no support



E-cig maybe better

- *Very low evidence*

Nicotine replacement therapy



Diasagreement/E-cig maybe better

- *Low/limited/high evidence*

No support/as usual



E-cig maybe better

- *Very low evidence*



Varenicline



E-cig maybe less effective

- *Very low evidence*

Bupropion



?

- *No evidence*

... important things to consider

- Selected persons participate in clinical trials
 - More motivated to quit
 - Healthier
 - Younger



- E-cigarette users were also offered counseling

... important things to consider

- Generally: low quit rates
 - 9 out of 10 do not quit



- Many/most smokers allocated to e-cigarettes continue using them at end of trial

Real world studies

- 14 longitudinal studies
- Follow-up time: 6 months to 4 years
- No effect
 - OR 0.95 (95% CI 0.7 – 1.3)
- Evidence graded as **VERY LOW**

Hedman L et al. Tob. Prev. Cessation 2021;7(October):62

- 31 longitudinal studies
- No effect
 - OR 1.1 (95% CI 0.9 – 1.3)
 - But significant effect in daily users
- Evidence not graded

Wang RJ et al. Am J Public Health 2021 February; 111(2): 230–246.

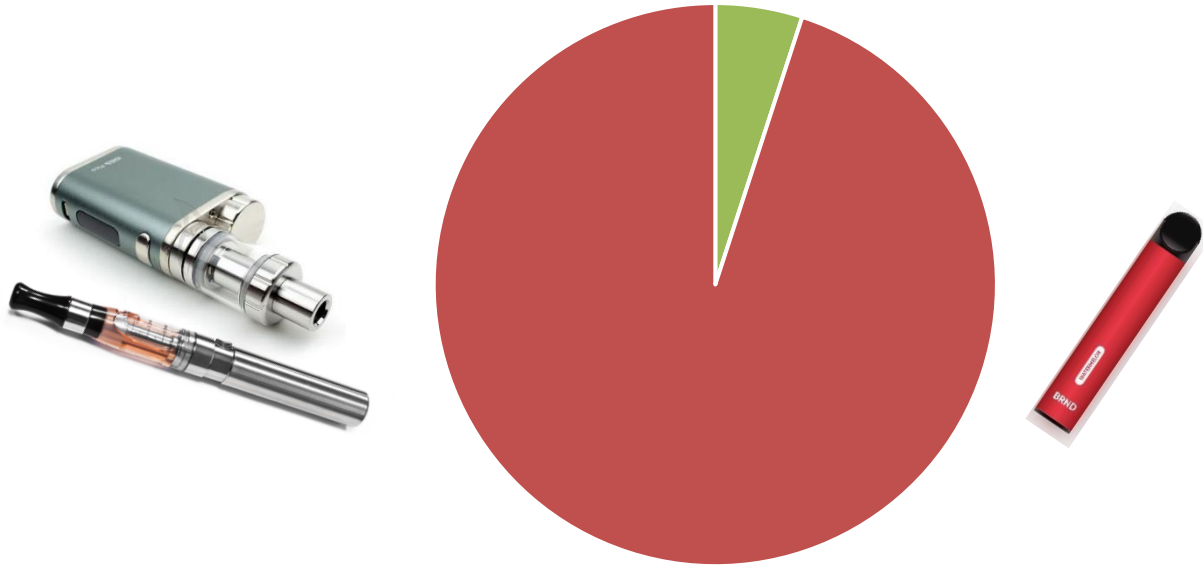




Use of e-cigarettes in a real world setting probably does not help smokers to quit

- Except when used daily?
 - But mostly used as consumer/lifestyle product
- Low evidence

Population perspective



- Receives assistance to quit in smoking cessation service/clinical setting (<5% of smokers)
- No assistance (>95% of smokers)

Switching or quitting?



Most participants continued using e-cigarettes at end of trial

- not rid of addiction
- not the health benefits of quitting
- best-case: reduction in health damage



Public Health
England

E-cigarettes

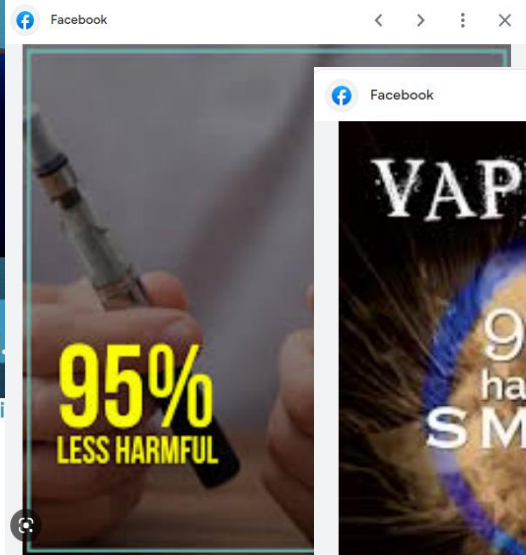
Current evidence

Are E-cigs safe?

E-cigarettes are significantly less harmful (95%) to health than smoking tobacco



Tobacco Harm Reduction is a human right
#WorldVapeDay #SayYesToTHR



Hale Vaping - Research by Public Health England shows that vaping is a staggering 95% less harmful than smoking.



E-cigarettes are 95% less harmful than... - Lebanon Vape Zone | Facebook



T-Juice on Twitter: "Did you know... Vaping is 95% less harmful than smoking! *publichealthengland..."

Besog

Background research paper for the PHE report



Research Report

European
Addiction
Research

Eur Addict Res 2014;20:218–225
DOI: [10.1159/000360220](https://doi.org/10.1159/000360220)

Received: December 23, 2013
Accepted: January 30, 2014
Published online: April 3, 2014

A limitation of this study is the lack of hard evidence for the harms of most products on most of the criteria.

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Some of the authors have a conflict of interest with the tobacco industry



Public Health
England

E-cigarettes

Current evidence

Are E-cigs safe?

Update from 2015 to 2022

“...we believe that the ‘at least 95% less harmful estimate’ remains broadly accurate **at least over short- and medium-term periods**” (<one year)



No studies with sufficiently long-term follow-up



- Most comprehensive reviews:
- NASEM report, US 2018

- Australian report, 2022
- +189 studies
- Health outcomes
- Human studies only

- *“The impact of e-cigarettes on important clinical health outcomes (...) is not known, as reliable evidence is lacking.”*

Banks E. et al. Electronic cigarettes and health outcomes: systematic review of global evidence. Report for the Australian Department of Health. 2022

Health outcome	Meta-analyses	Randomised controlled trial	Cohort study	Non-randomised intervention study	Case-control study	Surveillance report	Cross-sectional survey	Case series	Case report
Dependence and abuse liability		13 7/6	1 0/1	17 9/8			20 11/9		
Cardiovascular health outcomes	1 0/1	11 3/8	1 0/1	6 5/1			8 1/7		1 0/1
Cancer			1 1/0				2 1/1		3 2/1
Respiratory health outcomes*		9 5/4	5 2/3	5 1/4		18 0/18	21 4/17	11 0/11	26 0/26
Oral health			2 1/1	2 2/0			19 1/18		1 0/1
Developmental and reproductive effects			2 0/2				1 0/1		
Burns and injuries						7 1/6		24 14/10	16 5/11
Poisoning						25 13/12		4 2/2	23 14/9
Mental health effects			1 0/1				8 0/8		
Environmental hazards with health implications**				17 9/8		2 0/2		5 0/5	
Neurological outcomes						3 0/3		2 0/2	7 1/6
Sleep outcomes							4 0/4		
Less serious adverse events		11 3/8	3 1/2	2 2/0		1 0/1	3 0/3		
Optical health				1 0/1			1 0/1		
Wound healing									2 0/2
Olfactory outcomes							1 0/1		
Endocrine outcomes							2 0/2		
Allergic diseases							2 0/2	1 0/1	3 2/1
Haematological outcomes									2 0/2

Numbers in green relate to evidence most relevant to the assessment of causation

Conclusive evidence

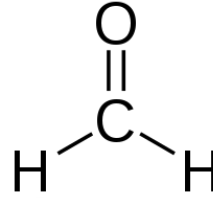
Negative immediate and short-term health effects

- **addiction**
- throat irritation, nausea
- poisoning, injuries, burns
- seizures
- increased heart rate and blood pressure
- increased arterial stiffness
- **EVALI**
 - (acute lung injury, (cannabis oil/vitamin E related in 8 of 10 cases))



Banks E. et al. Electronic cigarettes and health outcomes: systematic review of global evidence. Report for the Australian Department of Health. 2022

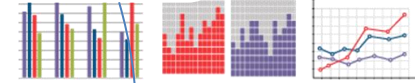
Studies investigating composition of fluid/vapor



In vitro studies



Epidemiological studies



Human eksperimental studies



Animal studies



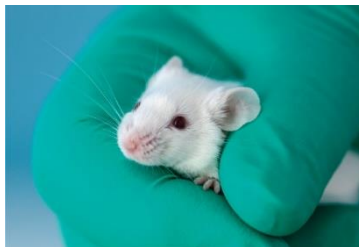
Case reports



Health outcomes in other studies

- **Animal studies**

- higher mortality when exposed to infections
- DNA damage in lungs, heart, and bladder
- lung cancer
- impaired kidney development
- cardiac arrhythmia
- arterial dysfunction
- cerebrovascular dysfunction
- lung dysfunction
- airway inflammation
- asthma
- ...

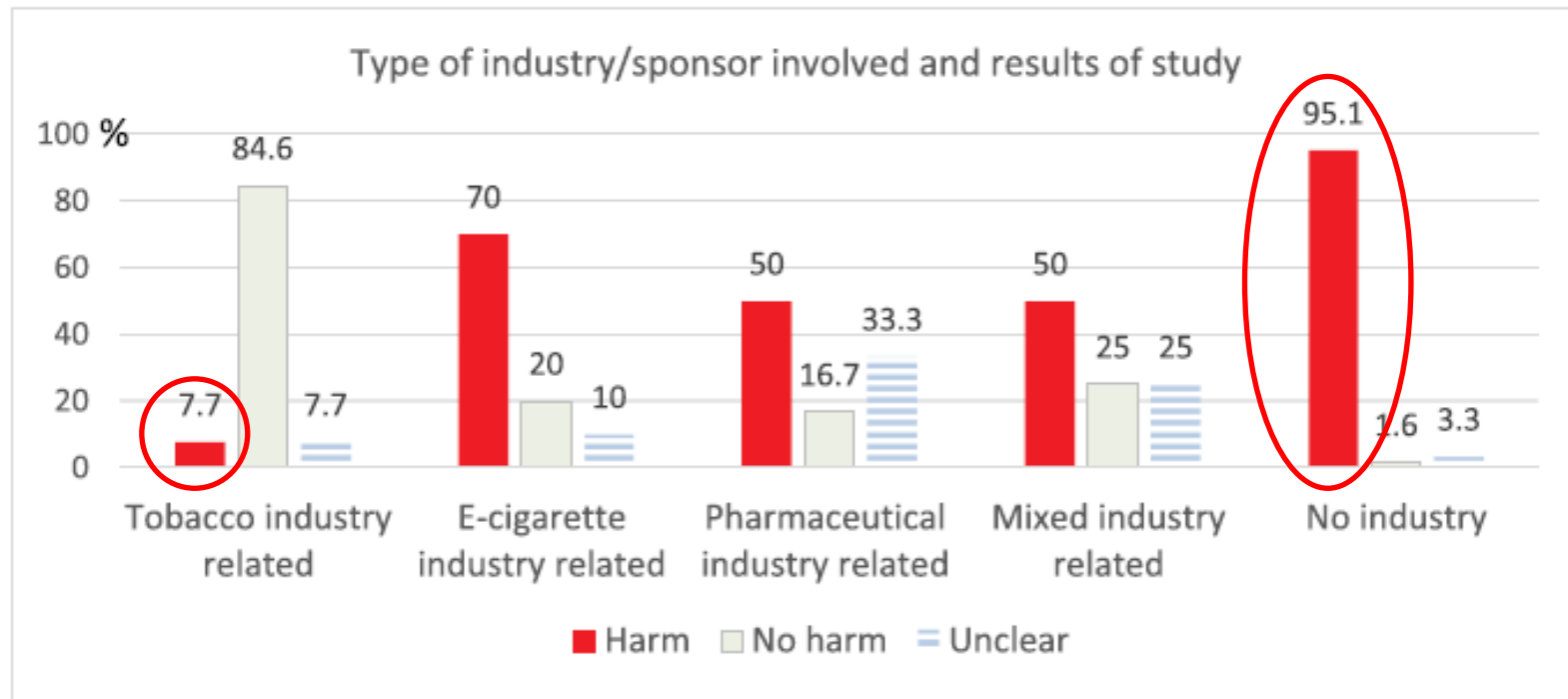


- **Other studies**

- Content of fluid/vapor: many toxic and carcinogenic compounds
- Cell studies: inflammation, cytotoxicity/cell death, oxidative stress
- ...

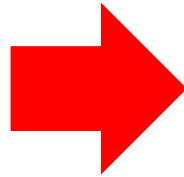


Tobacco industry related papers almost never find harm of vaping



Pisinger C. et al. A conflict of interest is strongly associated with tobacco industry-favourable results, indicating no harm of e-cigarettes. *Prev Med.* 2019 Feb;119:124-131.

Switching



Short term eksperimental studies

- Short term studies show potential health benefits of switching
- Example:
- 186 participants
- **6 weeks** randomized controlled trial
 - Intervention: e-cigarette with flavors, 5% nicotine + brief education
 - Control: continue smoking
- Results:
 - E-cigarette group: significantly greater reductions in NNAL(carcinogen), CO and respiratory symptoms



Real world use

The switching study with the longest follow-up time

- 228 e-cig users (all ex-smokers) followed for **6 years**
- Interviews + hospital discharge data
- No significant difference (smokers vs. e-cigarette users):
 - Smoking related disease
 - Self-rated health



Outcomes	Adjusted OR (95% CI)	p ^a
<i>Possibly smoking-related disease</i>		
A2. Analyses by baseline status, including only the participants with 6-year follow-up data		
– Tobacco smokers (ref. cat.)	1 (–)	–
– E-cig. users	1.17 (0.64-2.13)	0.6
– Dual users	1.48 (0.81-2.70)	0.2
A3. Analyses restricted to non switchers only, with all data at 72 months		
– Tobacco smokers (ref. cat.)	1 (–)	–
– E-cig. users	0.88 (0.40-1.93)	0.7
– Dual users	1.28 (0.38-4.31)	0.7
Self-rated health score		
Difference baseline-6 years	Adj. coefficient (95% CI)	p^a
A2. Analyses by baseline status, including only the participants with 6-year follow-up data		
– Tobacco smokers (ref. cat.)	0 (–)	–
– E-cig. users	-0.19 (-0.42; 0.05)	0.12
– Dual users	0.16 (-0.08; 0.39)	0.19
A3. Analyses restricted to non switchers only, with all data at 72 months		
– Tobacco smokers (ref. cat.)	0 (–)	–
– E-cig. users	-0.24 (-0.62; 0.14)	0.2
– Dual users	0.43 (-0.33; 1.19)	0.3

Flacco ME et al. *European Review for Medical and Pharmacological Sciences*. 2020; 24: 3923-3934

Do smokers switch?

**WHY QUIT?
SWITCH TO BLU**

It's the next phase for smokers seeking a change. Take back your freedom to smoke when and where you want without any smell. Blu is everything you enjoy about smoking and nothing less. Nicotinely blue is better, so make the switch today.

Visit blucigs.com

blu

100 mg "tar," 0.9 mg nicotine av. per cigarette by FTC method.

PREMIUM ELECTRONIC CIGARETTES

18+ only. | CALIFORNIA PROPOSITION 65: Warning: No product contains known or potential carcinogens. For more information, visit www.p65.ca.gov.

Many/most e-cigarette users continue smoking = dual use



Population-based studies: dual use

- 91% USA, nationally representative sample, adults, *Harlow 2019*
- >80% UK, nationally representative sample *English Smoking Toolkit Aug 2015*
- >80% Korea. Youth. *Lee 2014*
- 78% Canada, nationally representative sample *Reid 2015*
- 77% Georgia. Youth. *King 2014.*
- 74 % Poland. Youth. *Goniewicz 2015*
- 74% Malaysia. Adults. *Rahman 2019*
- 64% New Zealand , nationally representative sample 15+ years *Oakly 2019*
- 36% USA, Adults. *Hitschick 2019*
- 35% UK. Adults. *ASH data 2022*

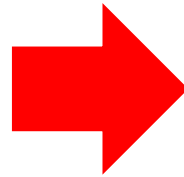
Prof Robert West, BBC "Inside Health" Feb 2016
<http://www.bbc.co.uk/programmes/b070dq8h>



Cutting down "not much"

- 10m40s: "We know that most people who use ecigarettes are continuing to smoke and when you ask them they tell you that they are mostly doing that to cut down the amount they smoke. But we also know they are smoking, it's not really that much different from what they would have done since they started using ecigarettes."

The reality



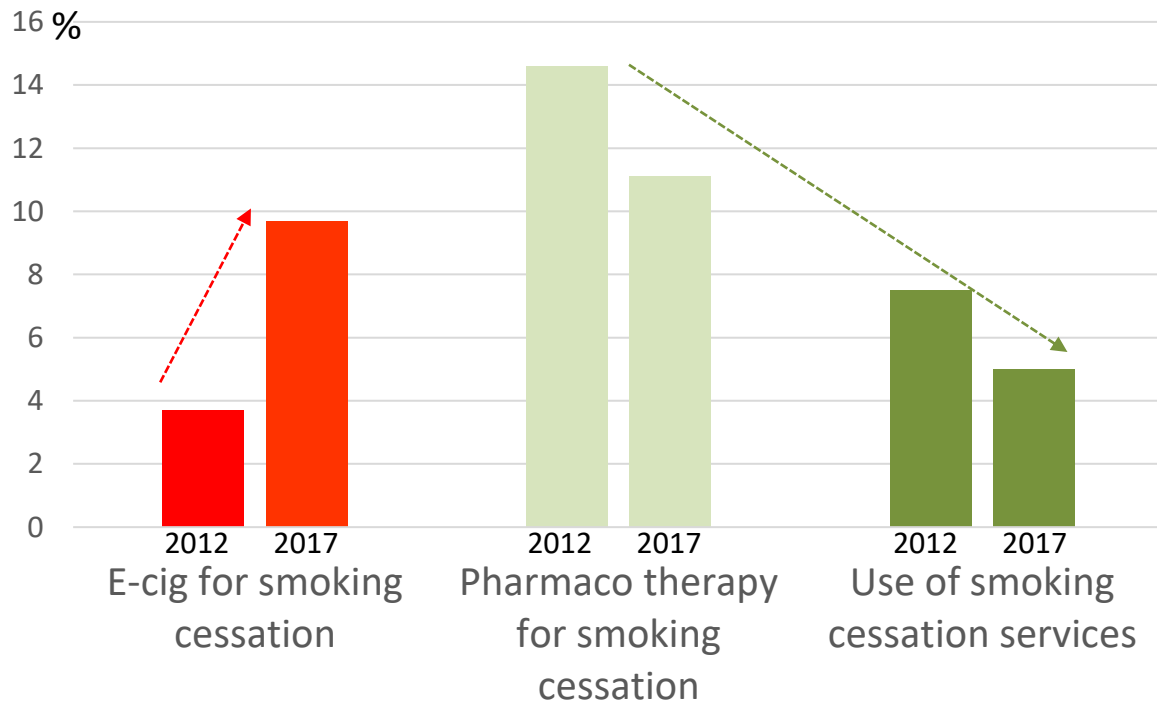
Dual use: more harmful than smoking only?



Since our search: many new studies support our finding

- Systematic review
- 49 studies - only 10 prospective
- Many different outcomes
- *“Existing studies indicate that dual use is at least as, or probably even more, harmful than cigarettes”*
- Evidence: low certainty

Great concern: e-cigarettes seem to displace pharmacotherapy and use of smoking cessation services in Europe



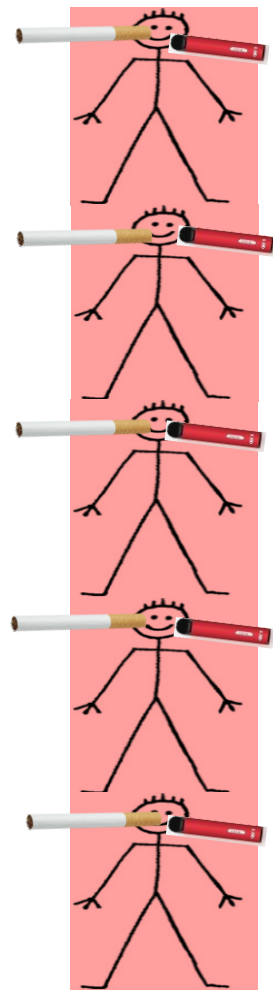
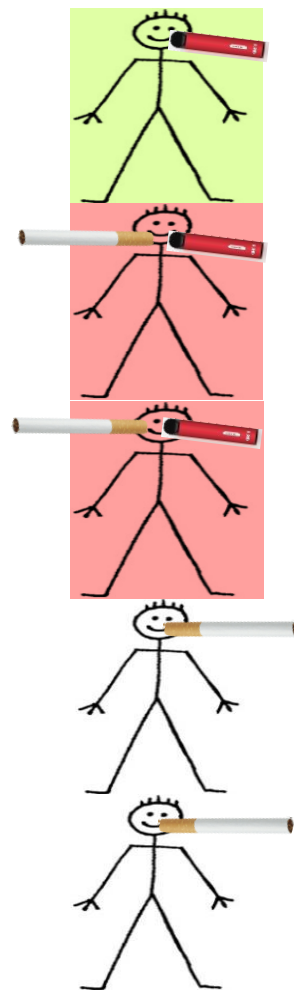
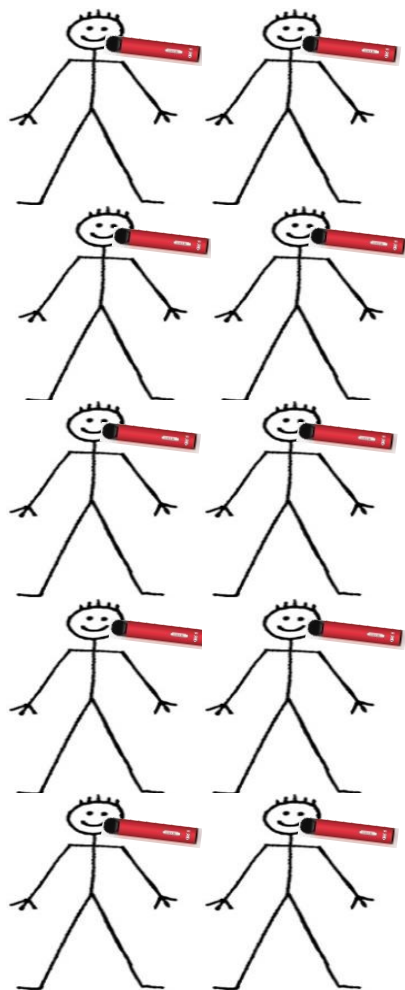
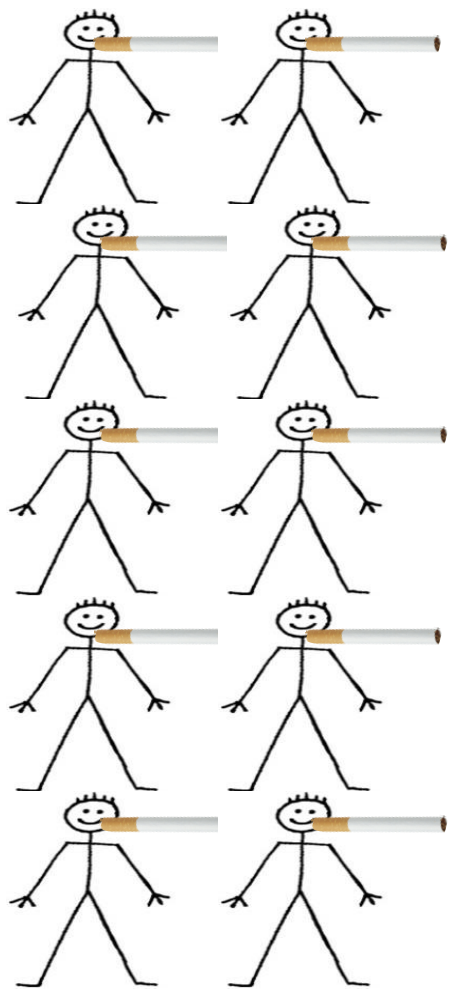
Filippidis FT et al. Tobacco Control 2018


How do we help the reluctant (old) heavy smokers?



Hospital setting

- Short-term experiments show health benefits when smokers switch
- Some researchers find evidence of effect
- A good choice for the reluctant heavy smoker?





I have tried
EVERYTHING to quit

I have tried to quit
> 100 times

I have tried nicotine
gum, hypnosis,
acupuncture

We know what works

Evidence based

High long-term quit rates can be achieved

- Repeated (5-6(8)) smoking cessation counseling sessions
- +
- Varenicline or combined nicotine replacement therapy



*Thank you for
your attention*

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DEAR SMOKING BAN,



blu ELECTRONIC CIGARETTE

Take back your freedom to smoke anywhere with blu electronic cigarettes. blu produces no smoke and no ash, only vapor, making it the smarter alternative to regular cigarettes. It's the most satisfying way to tell the smoking bans to kiss off. Okay, maybe the second-most satisfying way.



New blu Smart Pack

blucigs.com

18+ only. CALIFORNIA PROPOSITION 65 Warning: This product contains nicotine, a chemical known to the state of California to cause birth defects or other reproductive harm.