Risks and benefits of vaporised nicotine products for tobacco harm reduction

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Topics covered

- Rationale
- Health risk and benefits
- Effectiveness

Smoking among people with substance use disorders

	General population	People on OST
Smoking prevalence	12.8%	71-95%
% ever smokers who quit	50-52%	12%
End of Treatment success with smoking cessation pharmacotherapy	19-33%	4-13%

References: Guydish, Passalacqua et al. 2016; Richter et al 2001; Miller and Sigmon 2015

Challenges

- Mental health
  - stress and trauma
- Low self-efficacy
- Multiple substance use
  - e.g. co-administration with cannabis
- Competing health issues - acute risks prioritised over longer-term risks

Smoking cessation and harm reduction

Pharmacotherapy – Varenicline, bupropion, nicotine replacement therapy

Behavioural support – F2F, Quitline

Harm reduction for those who can't quit or aren't ready to quit

Harm reduction strategies in D&A field

•Focus is on reducing harms without necessarily stopping substance use

•Examples
- •Methadone maintenance therapy
- •Clean need and syringe programs
- •Supervised injecting rooms
- •Prescribed heroin

Short, medium or long term nicotine substitutes

Widely accepted as safe

Widespread availability

Consumer acceptability

Faster nicotine delivery

Customisable

Controversy

- HR for illicit drugs usually controversial initially
- Accepted after evidence based developed
- THR initially accepted, then rejected due to TI fraud
  - filters, then lights and milds deception
- Low trust in TI, concerns about subversion
  - Fool me once…..

Health risk and benefits

Acute Risks – Overdose

- Most acute impacts are mild and self-limiting
  - Cough, sore throat, headache, nausea
- Overdose highly unlikely when used as intended
- Accidental poisonings (children)
- Intentional misuse
  - Injection
  - Suicide attempts

Acute Risks – Battery Explosions

- Relatively rare
- Lower risk of fire than from smoking
- Can be minimised by following safe practices and good maintenance

Evidence of long term safety

- Analyses of vapour constituents
- Analyses of biomarkers
- Self-reported health status
- Case reports/case series
- ~~Long-term epidemiological studies~~

Long term risks - Cardiovascular

- Emissions of concern for cardiovascular health include nicotine, oxidizing chemicals, aldehydes (especially acrolein), and particulates
- Levels are much lower than in smoke
- Nicotine might contribute to acute cardiovascular events, particularly in people with underlying cardiovascular disease
- **The cardiovascular risk of EC use is likely to be much less than that of cigarette smoking**

Benowitz & Fraiman. Cardiovascular effects of electronic cigarettes *Nature Reviews Cardiology* **14**, 447–456 (2017)

Long term risks-Respiratory

- All studies to date assess short-term exposures and acute changes in health effects or biomarkers of recent exposures
- Adolescents who took up vaping had more bronchitis
- Evidence of inflammatory response
- Reduction in lung carcinogens (NNAL) on switching
- **Smokers with COPD who switched to vaping had reduced symptoms and improved quality of life**

Shields et al. A Review of Pulmonary Toxicity of Electronic Cigarettes in the Context of Smoking: A Focus on Inflammation *Cancer Epidemiology Biomarkers and Prevention* DOI: 10.1158/1055-9965.EPI-17-0358 (2017)

Long term risks - Cancer

- Emissions of concern: carbonyls, volatile organic compounds (VOCs), nitrosamines and metals
- Levels much lower than in smoke

	Smoke	HNB	Vape	NRT
Mean lifetime cancer risk	$2.4x10^{-2}$	$5.7x10^{-4}$	$9.5x10^{-5}$	$8.9x10^{-6}$
Ratio to smoke	1.0	0.024	**0.004**	0.0004
Ratio to NRT	2697	64	10.7	1.0

<1% risk of smoking

Stephens. Comparing the cancer potencies of emissions from vapourised nicotine products including e-cigarettes with those of tobacco smoke *Tobacco Control* DOI: 10.1158/1055-9965.EPI-17-0358 (2017)

Summary- health impact

- Not using anything is safest option
- Non-smokers should not take up vaping
- Smokers who switch to vaping are likely to achieve substantial health gains
  - RCP estimates risks no greater than 5% the risks of smoking – but uncertainty remains
- Risk can probably be reduced further by:
  - Vaping unflavoured eliquid
  - Vaping higher nicotine strength (results in lower overall exposure)
  - Vape with lower power
  - Stopping vaping once confident won't relapse to smoking

Effectiveness

Observational studies: cross-sectional

- EC users had 60% greater odds of quitting smoking compared to standard nicotine replacement therapy or no aid (UK Smoking Toolkit Study)
- EC users had highest quit rate. Both quit attempts and quit success linearly related to the frequency of e-cigarette use (2014-15 US Current Population Survey-Tobacco Use Supplement)
- Daily vaping the factor most strongly associated with quitting (2014 and 2015 US National Health Interview Surveys)

Observational studies: longitudinal

- Long-term vapers (≥ 2 years) had four-fold higher odds of quitting smoking (Zhang et al, 2016)
- Daily vapers (≥ 1 month) had six-fold greater odds of quitting smoking (Biener and Hargreaves, 2015)
- Daily vaping with advanced devices (tank systems) associated with quit success (Hitchman et al, 2015)

Observational studies: A&D population

- Among people on OST - 73.0% had ever tried EC and 33.8% had used EC in the past month (Stein et al 2015, UK)
- 18% of PWID and 34% of regular psychostimulant users had used EC in past 6 months (Sutherland et al, 2016, Aus)
- Bonevski et al – see poster #9

Clinical trials – general populations

- Cochrane Review
  - Nicotine EC vs placebo EC RR 2.3 (1.1-5.0)
  - EC vs patch RR 1.3 (0.7-2.3)

Clinical trials- A&D populations

- 12 OST smokers used cigalikes for 6 weeks (Stein 2017)
  - adherence rates were high
  - significant reductions in smoking
  - 1 quit
- 50 veteran smokers with dual diagnosis used tank devices for 4 weeks (Stein 2017)
  - High acceptability
  - CO levels decreased
  - 3/30 who completed all follow-ups quit smoking

Effectiveness summary

- Dependent on
  - Frequency of use
  - Type of device
  - Nicotine content
  - Regulatory context

•Appears most effective when combined with other cessation support

Please visit my poster (#12) about the CARP trial to find out more about current research in this area