Can electronic cigarettes (EC) help people stop smoking, and are they safe to use for this purpose?

Findings from the most recent Cochrane review

December 2020

This briefing document brings you the most up to date information on the effect and safety of using electronic cigarettes (ECs) to help people who smoke achieve long-term smoking abstinence.

Key findings

- Findings across the main comparisons consistently favoured EC for smoking cessation at 6 months or longer. Quit rates were higher with nicotine EC compared to: non-nicotine EC; to nicotine replacement therapy (NRT) and to behavioural support only or no support.
- Confidence intervals were wide for data on adverse events and other safety markers. We did not detect any clear evidence of harm from EC; however, longest follow-up was two years and the overall number of studies was small.
- The unwanted effects reported most often with nicotine e-cigarettes were throat or mouth irritation, headache, cough and feeling sick. These effects reduced over time as people continued using nicotine e-cigarettes.

This Cochrane systematic review and meta-analysis included 50 studies, representing 12,430 participants. The 2020 update has gathered 35 new studies since the Cochrane review in 2016. In order to keep the information as up to date as possible we are searching monthly for new evidence, a living systematic review

NEW SEARCH UPDATE... Searches are run and screened monthly. Our February search identified one paper linked to a study already included in the review (Lucchiari 2020). We have preliminary results from a study listed as ongoing (Begh 2019).This is in addition to the 7 new, 9 linked and 13 ongoing studies identified up to January 2021. We will be incorporating these into an update of our review over the next few months.

Implications for policy and practice

Our review for the first time presents moderate certainty evidence on the effectiveness of EC compared to NRT – a frontline smoking cessation treatment, and also presents low certainty evidence comparing EC to no treatment. Both signal a clinically important benefit of nicotine EC, filling an important gap with implications for policymakers, clinicians, and people who smoke.

Unanswered questions and future research

More randomized controlled trials are needed with long-term follow up, testing recent EC devices. As data on EC continue to emerge, we will continue to update our analyses to ensure decision makers have the best available evidence to hand when considering the role of EC in supporting smoking cessation.

For all references and the most up to date 2020 Cochrane Review follow this link
For further information please visit our webpage.

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About Cochrane reviews

Cochrane reviews bring together the best available evidence from research and systematically review this information to determine the benefits and risks of treatments. Cochrane Reviews are internationally recognized as the highest standard in evidence-based health care.

The Process

Databases were searched for randomized trials and uncontrolled intervention studies testing EC for smoking cessation. The main outcomes were smoking cessation at 6 months or more and adverse or serious adverse events at one week or longer. Only randomized trials were included in meta-analyses. Our current review contains evidence up to January 2020. Summary of findings tables were made for main comparisons and outcomes. GRADE ratings were used to evaluate certainty in the evidence, and can be interpreted as follows.

Grade Working Group grades of evidence

High certainty: We are very confident that the true effect lies close to that of the estimate of the effect
Moderate certainty: We are moderately confident in the effect estimate: The true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different
Low certainty: Our confidence in the effect estimate is limited: The true effect may be substantially different from the estimate of the effect
Very low certainty: We have very little confidence in the effect estimate: The true effect is likely to be substantially different from the estimate of effect

Summary of Findings: Nicotine EC compared to NRT for smoking cessation

Nicotine EC compared to NRT for smoking cessation

Patient or population: People who smoke
Setting: New Zealand, UK, USA
Intervention: Nicotine EC
Comparison: NRT

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	№ of participants (studies)	Certainty of the evidence (GRADE)
	Risk with NRT	Risk with Nicotine EC			
Smoking cessation at 6 months to 1 year Assessed with biochemical validation	Study population 6 per 100	10 per 100 (8 to 14)	RR 1.69 (1.25 to 2.27)	1498 (3 RCTs)	⨁⨁⨁⨀ MODERATE[a]
Adverse events at 4 weeks to 6 months Assessed by self-report	Study population 45 per 100	44 per 100 (36 to 53)	RR 0.98 (0.80 to 1.19)	485 (2 RCTs)	⨁⨁⨀⨀ LOW[b]
Serious adverse events at 4 weeks to 1 year Assessed via self-report and medical records	Study population 5 per 100	7 per 100 (4 to 13)	RR 1.37 (0.77 to 2.41)	727 (2 RCTs)	⨁⨁⨀⨀ LOW[b]

*__The risk in the intervention group__ (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI). For cessation, the assumed risk in the control group is based on assumed quit rates for NRT assuming receipt of limited behavioural stop-smoking support (as per Hartmann-Boyce 2018a). The assumed risk for adverse events and serious adverse events is a weighted mean average of quit rates across control groups in contributing studies.
CI: Confidence interval; **RCT:** randomised controlled trial; **RR:** Risk ratio

Summary of Findings: Nicotine EC compared to non-nicotine EC for smoking cessation

Nicotine EC compared to non-nicotine EC for smoking cessation

Patient or population: People who smoke cigarettes
Setting: Canada, Italy, New Zealand, UK, USA
Intervention: Nicotine EC
Comparison: Non-nicotine EC

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	№ of participants (studies)	Certainty of the evidence (GRADE)
	Risk with non-nicotine EC	Risk with Nicotine EC			
Smoking cessation at 6-12 months Assessed with biochemical validation	Study population 6 per 100	10 per 100 (6 to 18)	RR 1.71 (1.00 to 2.92)	802 (3 RCTs)	⨁⨁⨁⨀ MODERATE[a,b]
Adverse events at 1 week to 6 months Assessed via self-report	Study population 35 per 100	35 per 100 (25 to 47)	RR 1.00 (0.73 to 1.36)	346 (2 RCTs)	⨁⨁⨀⨀ LOW[c]
Serious adverse events at 1 week to 1 year Assessed via self-report and medical records	Study population 2 per 100	0 per 100 (0 to 4)	RR 0.25 (0.03 to 2.19)	494 (4 RCTs)	⨁⨁⨀⨀ LOW[c]

*__The risk in the intervention group__ (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI). For cessation, the assumed risk in the control group is based on receipt of moderate-intensity behavioural stop-smoking support. The assumed risk for adverse events and serious adverse events is a weighted mean average of quit rates across control groups in contributing studies.
CI: Confidence interval; **RCT:** randomised controlled trial; **RR:** Risk ratio

Summary of Findings: Nicotine EC compared to behavioural support for smoking cessation

Nicotine EC compared to behavioural support only/no support for smoking cessation

Patient or population: People who smoke
Setting: Canada, Italy, UK, USA
Intervention: Nicotine EC
Comparison: Behavioural support only/no support

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	№ of participants (studies)	Certainty of the evidence (GRADE)
	Risk with behavioural support only/no support	Risk with Nicotine EC			
Smoking cessation at 6 to 12 months Assessed using biochemical validation	Study population		RR 2.50 (1.24 to 5.04)	2312 (4 RCTs)	⨁⊖⊖⊖ VERY LOW[a,b]
	4 per 100	10 per 100 (5 to 20)			
Adverse events at 12 weeks to 6 months Assessed via self-report	Study population		RR 1.17 (1.04 to 1.31)	516 (3 RCTs)	⨁⊖⊖⊖ VERY LOW[a,c]
	60 per 100	70 per 100 (62 to 78)			
Serious adverse events at 4 weeks to 6 months Assessed via self-report and medical records	Study population		RR 1.33 (0.25 to 6.96)	842 (5 RCTs)	⨁⊖⊖⊖ VERY LOW[d,e]
	1 per 100	1 per 100 (0 to 5)			

*__The risk in the intervention group__ (and its 95% confidence interval) is based on the assumed risk in the comparison group and the __relative effect__ of the intervention (and its 95% CI). For cessation, the assumed risk in the control group is based on receipt of limited stop-smoking support. The assumed risk for adverse events and serious adverse events is a weighted mean average of quit rates across control groups in contributing studies.

CI: Confidence interval; **RCT:** randomised controlled trial; **RR:** Risk ratio