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## Does utilization of electronic cigarettes facilitate smoking cessation compared to other interventions?

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### Abstract

**Clinical Question:** Does utilization of electronic cigarettes facilitate smoking cessation compared to other interventions?

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**Answer:** Debatable. With conflicting data and some evidence of e-cigarettes leading to on-going nicotine use, there is not a clear benefit to utilizing e-cigarettes for smoking cessation.

**Level of Evidence for the answer:** B

**Search Terms:** smoking cessation, electronic cigarettes, e-cigarettes

**Date Search was Concluded:** 24 April 2019 **Inclusion and Exclusion Criteria:**

**Inclusion criteria:** Studies directly comparing smoking cessation with utilization of electronic cigarettes compared to control group.

**Exclusion criteria:** Studies that were systematic reviews, published since 2015, and studies comparing smoking cessation with anything other than electronic cigarettes.

### SUMMARY OF THE ISSUES

The use of electronic cigarettes, abbreviated as e-cigarettes, has become increasingly popular. E-cigarettes are devices that contain a reservoir to hold a liquid, an element or atomizer to aerosolize the liquid using heat, a mouthpiece to inhale the resulting mixture, and a battery as an energy source. The liquid component is generally referred to as e-liquid. It contains propylene glycol or glycerin which dissolves nicotine and flavoring. According to the Centers for Disease Control and Prevention (CDC), in 2016, 3.2% of all adults were using e-cigarettes while 15.4% of adults had tried them before.<sup>1</sup> In 2015, the United States Preventive Services Task Force found insufficient evidence to recommend either for or against use of electronic delivery systems for the purpose of smoking cessation.<sup>2</sup> Patient and physician surveys were indicative that e-cigarettes may be beneficial in smoking cessation, prompting the investigation by the USPSTF. However, only two RCTs were available at the

time of the recommendation and results were mixed leading to an “I” recommendation for insufficient evidence to recommend for or against the use of e-cigarette for smoking cessation.

## SUMMARY OF THE EVIDENCE

The number of studies specifically addressing smoking cessation with use of e-cigarettes is still somewhat limited and results remain conflicting. There have been few relevant publications since 2015. There have been two meta-analyses published since 2015 with each of them yielding opposing conclusions and one cohort study that addressed our specific question. Finally, there is a Cochrane review and a recent randomized-controlled trial (RCT) published this year in the NEJM.

The first meta-analysis, published in March 2015, included six studies. Studies for this meta-analysis were chosen after evaluation of the PRISMA guidelines (Preferred Reporting Items for Systematic Reviews and Meta-analyses) using e-cigarettes as the exposure variable and smoking cessation at the outcome variable. The meta-analyses were completed with the Metan Stata statistical program. The final meta-analysis included two RCTs, two cross-sectional studies, and two prospective cohort studies. There was considerable heterogeneity of the studies given the various study designs. The two RCTs showed e-cigarettes with nicotine were more effective for smoking cessation than those without nicotine (pooled Risk Ratio 2.29, 95% CI, 1.05–4.97). Only e-cigarettes with nicotine were used for the remainder of analyses. The pooled Effect Size of 0.20 (95% CI, 0.11 to 0.28) represents the positive association between the use of nicotine-filled e-cigarettes and smoking cessation. Authors concluded from this study that e-cigarettes *may have a role* for smoking cessation.<sup>3</sup>

A second meta-analysis compiled 20 studies including 15 co-hort studies, three cross-sectional studies, and two clinical trials. They used the Holm-Sidak method to acquire adjusted p values.

A funnel plot and Egger’s tests did not identify a publication bias. However, for the observational studies, patients chose to use e-cigarettes rather than be assigned to them. They found the odds of quitting cigarette smoking were 28% lower when using e-cigarettes compared to those who didn’t (OR 0.72, 95% CI 0.57–0.91). The authors concluded e-cigarettes likely *do not have a role* in smoking cessation.<sup>4</sup>

The next study was a prospective cohort study by Pasquereau et al comparing dual smoking with e-cigarettes and exclusive tobacco cigarettes smokers. While they found that people who were dual users were more likely to attempt smoking cessation, they found no significant difference in smoking cessation at six months.<sup>5</sup>

The Cochrane Database of Systematic Reviews<sup>6</sup> in a 2016 meta-analysis identified 1700 studies of which 3 Randomized-controlled trials (RCTs) and 21 cohort studies were suitable for review. They found two trials that showed electronic cigarettes to help patients stop smoking for six months or longer, compared with placebo electronic cigarettes. Patients were given up to four 7.4 mg nicotine cartridges per day. Confirmation of non-smoking status included exhaled carbon monoxide testing. The pooled results included a total of 662

participants and showed that use of a nicotine-containing electronic cigarette was associated with higher abstinence rates than placebo electronic cigarettes at one year with a relative risk of 2.29% CI 1.05 to 4.96. The confidence was rated “low” by Grading of Recommendations, Assessment, Development and Evaluations (GRADE)<sup>7</sup> standards.

Hajek, P et al<sup>8</sup> randomly assigned 886 participants in England to either nicotine replacement products of their choice (including combinations) or e-cigarettes with nicotine e-liquid (18 mg/mL). All participants received weekly behavioral support per the UK stop-smoking service practice for at least four weeks.

The rate of sustained 1-year abstinence was 18% in the e-cigarette group and 9.9% in the nicotine replacement group (relative risk 1.83 CI 1.30 to 2.58). Eighty percent of participants in the e-cigarette group continued use of the e-cigarettes at the end of one year.

In the accompanying editorial Borrelli and O’Connor<sup>7</sup> highlight that ‘societal consideration (of the) ...effect of adult e-cigarette use on children and young adults’ should be looked at closely, as it not only affects them by second hand, but also ‘models addictive behavior’.

Regarding this last study, Thomas Houston, MD, past chair of the AAFPs Commission on Health of the Public and Science<sup>8</sup> highlighted that “...the counseling that accompanied the e-cigarettes...is not a part of real-world quit attempts with e-cigarettes” additionally, it is concerning that continuation of e-cigarettes means “nicotine addiction was perpetuated.”

## CONCLUSION

Since the USPSTF released an “I” recommendation regarding the use of e-cigarettes for smoking cessation in 2015, few further studies have been published. The newest data is still conflicting with a possible trend towards e-cigarettes facilitating smoking cessation. There have been few quality randomized controlled trials directly comparing the use of e-cigarettes to other standard smoking cessation methods such as medications and nicotine supplements since the USPSTF released their recommendation. The low-strength data supporting a role for e-cigarettes in smoking cessation points towards the e-cigarettes promoting *abstinence* by *replacing* conventional tobacco smoking with e-cigarettes rather than yielding true cessation of nicotine use. Unquestionably, long-term use of nicotine remains deleterious. The goal of smoking cessation is to replace cigarette smoking with no smoking at all. The number of chemicals released by combustible conventional cigarettes is higher than that of e-cigarettes; nevertheless, we can’t assume that the chemicals created by burning the e-cigarettes’ liquid is safe in any way and the longterm effects of this aspect of e-cigarettes use is thence, unknown.

More research is needed to definitively determine if e-cigarettes can facilitate smoking cessation. Currently, there is *no clear evidence* to recommend e-cigarettes in facilitating smoking cessation.

## ACKNOWLEDGEMENT

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## REFERENCES

1. “Morbidity and Mortality Weekly Report (MMWR).” Centers for Disease Control and Prevention, Centers for Disease Control and Prevention, 24 8 2017, [www.cdc.gov/mmwr/volumes/66/wr/mm6633a6.htm](http://www.cdc.gov/mmwr/volumes/66/wr/mm6633a6.htm).
2. “Final Recommendation Statement.” Tobacco Smoking Cessation in Adults, Including Pregnant Women: Behavioral and Pharmacotherapy Interventions - US Preventive Services Task Force, 9 2015, [www.uspreventiveservicestaskforce.org/Page/Document/RecommendationStatementFinal/tobacco-use-in-adults-and-pregnant-women-counseling-and-interventions1](http://www.uspreventiveservicestaskforce.org/Page/Document/RecommendationStatementFinal/tobacco-use-in-adults-and-pregnant-women-counseling-and-interventions1).
3. Rahman Muhammad Aziz, et al. “E-Cigarettes and Smoking Cessation: Evidence from a Systematic Review and Meta-Analysis.” Plos One, vol. 10, no. 3, 30 3 2015, doi:10.1371/journal.pone.0122544
4. Kalkhoran Sarah, et al. “E-cigarettes and smoking cessation in real-world and clinical settings: a systematic review and meta-analysis” The Lancet, vol. 4, 2 2016, pp. 116–124., doi:10.1016/S2213-2600(15)00521-4. [PubMed: 26776875]
5. Pasquereau Anne, et al. “Electronic Cigarettes, Quit Attempts and Smoking Cessation: a 6-Month Follow-Up.” Addiction, vol. 112, no. 9, 26 9 2017, pp. 1620–1628., doi:10.1111/add.13869. [PubMed: 28504457]
6. Hartmann-Boyce J et al. “Electronic cigarettes for smoking cessation” Cochrane Database Syst Rev 2016;9
7. <https://bestpractice.bmj.com/info/us/toolkit/learn-ebm/whatis-grade/>
8. Hajek P et al. “A Randomized Trial of E-Cigarettes versus Nicotine-Replacement Therapy” N Engl J Med 2019; 380:629–637 [PubMed: 30699054]
9. Borrelli B; O’Connor GT. “E-Cigarettes to Assist with Smoking Cessation” Engl J Med 2019; 380:678–679
10. <https://www.aafp.org/news/health-of-the-public/20190213NEJMe-cigstudy.html>