Preventive Medicine Reports 35 (2023) 102372

Contents lists available at ScienceDirect

Preventive Medicine Reports

journal homepage: www.elsevier.com/locate/pmedr

# Clinical guidance for e-cigarette (vaping) cessation: Results from a modified Delphi panel approach

Laurie Zawertailo [a,b,1], Erika Kouzoukas [a,1], Chantal Fougere [a], Rosa Dragonetti [a,c], Scott Veldhuizen [a], Peter Selby [a,c,*]

[a] Nicotine Dependence Service, Addictions Program, Centre for Addiction and Mental Health, Toronto, ON, Canada
[b] Department of Pharmacology and Toxicology, University of Toronto, Toronto, ON, Canada
[c] Department of Family and Community Medicine, University of Toronto, Toronto, ON, Canada

ARTICLE INFO

*Keywords:*
Vaping
E-cigarette
Vaping cessation
Dual use
Smoking
Combustible tobacco
Addiction medicine
Guidance
Delphi

ABSTRACT

Individuals seek help to stop their use of e-cigarettes from their healthcare practitioners. However, there is a paucity of published work addressing e-cigarette cessation methods empirically, and what evidence that is available is weak. Therefore, we developed an expert informed clinical resource to guide practitioners helping their clients quit using e-cigarettes. We conducted a modified Delphi process between September and December 2021 to reach consensus on clinical recommendations for e-cigarette cessation. Expert and Peer Panel members (n = 28) voted and provided feedback on the recommendations through three rounds of structured surveys, a discussion board, and one intermediate survey. The penultimate knowledge products underwent usability testing and were finalized based on user feedback. The Expert Panel maintained a 100% response rate for rounds 1 and 2 and 96% for round 3; the Peer Panel achieved a 100% response rate for all three rounds of the modified Delphi process. Consensus was reach on 24 recommendations and 2 statements spanning eight domains: severity and dependence; general approaches; treatment approaches; dual use; pharmacotherapy strategies; behavioural therapy strategies; harm reduction; and relapse prevention. Two additional 'no agreement' statements that did not reach consensus are included in the guidance resource. The recommendations were also contextualized for the following groups: adults; youth; people who are pregnant, breastfeeding and/or chestfeeding; and people with mental illness and/or substance use issues. The recommendations listed in the resource provide general clinical guidance on e-cigarette cessation to assist healthcare practitioners in the treatment planning process.

## 1. Introduction

The use of e-cigarettes has increased considerably over the past 10 years among both adults and youth. For example, in 2021, the prevalence of Canadians (ages 15+) who had used an e-cigarette in the past 30 days was 5.2%, an increase from 2% in 2013 (Statistics Canada, 2013; Statistics Canada, 2021). According to the Canadian Tobacco and Nicotine Survey, 13% of youth (ages 15 to 19), 17% of young adults (ages 20 to 24) and 4% of adults (ages 25+) reported e-cigarette use in the past 30 days and, of those, 84% used products that contained nicotine (Statistics Canada, 2021). Additionally, similar trends are also evident in England and the United States, as the prevalence of youth aged 16–19 who had used an e-cigarette in at least 20 of the past 30 days has risen to 6–8% in 2022, an increase from 2% in 2017 (Hammond et al., 2023).

As e-cigarettes have only been on the market since the early 2000s (Canadian Public Health Association, 2021; Heart and Stroke Foundation of Canada, 2018), their long-term health effects are largely unknown. Although e-cigarettes contain fewer harmful chemicals than tobacco cigarettes (NASEM, 2018), there is a lack of evidence to support the long-term safety of these products. The concurrent use of tobacco and e-cigarettes (referred to as dual use), and resultant exposure to chemicals from both products, is associated with greater exposure to toxicants (Goniewicz et al., 2018), greater difficulty breathing, greater nicotine dependence (Case et al., 2018), increased risk of cardiovascular disease (Kim et al., 2020), increased risk of cardiopulmonary symptoms (Wang et al., 2018) and worse overall health.

While treatment approaches for tobacco cessation are well

* Corresponding authors at: 1025 Queen Street West, Toronto, ON, M6J 1H1, Canada.
*E-mail address:* peter.selby@camh.ca (P. Selby).
[1] Co-first authors.

https://doi.org/10.1016/j.pmedr.2023.102372
Received 1 May 2023; Received in revised form 11 August 2023; Accepted 15 August 2023
Available online 19 August 2023

established, there are currently no evidence-based clinical guidelines available for e-cigarette or vaping cessation. We recently undertook a scoping review of current recommendations for e-cigarette and dual electronic and tobacco cigarette cessation in adults and youth, and found limited evidence-informed guidance on effective cessation interventions (Kundu et al., 2023). Given the increase of e-cigarette use and the lack of published clinical guidance for e-cigarette and dual use cessation, we developed an expert informed clinical guidance resource to help adults and youth (ages 15 to 24) quit using e-cigarettes. We used a modified Delphi process to integrate international clinical and research expertise, as well as perspectives of people with relevant lived experience. This resource is intended to guide healthcare practitioners whose clients use e-cigarettes containing nicotine and who are seeking treatment to quit.

## 2. Methods

### 2.1. Design

A modified Delphi process was used to develop evidence-informed clinical guidance for e-cigarette cessation. The Delphi process is a structured research process used to reach consensus on a particular research question(s) when there is a lack of evidence to inform the approach (Hohmann et al., 2018).

Due to ongoing COVID-19 restrictions, we modified the Delphi process as follows: three rounds of structured surveys disseminated through REDCap (an online data capture tool); one asynchronous discussion board hosted on Google Docs; and one intermediate survey (Fig. 1).

The discussion board and intermediate survey are not part of the established Delphi methodology (Dalkey and Helmer, 1963). The discussion board was a variation of the interactive Delphi Estimate-Talk-Estimate process used to promote the exchange of ideas and the justification of opinions (Gustafson et al., 1973).

### 2.2. Participants

We convened two panels, one Expert Panel formed with international experts in tobacco and e-cigarette cessation and one Peer Panel for people with experience using e-cigarettes, to provide input and rationale on the recommendations, as well as to capture end-user perspectives. Expert and Peer Panel members were selected based on eligibility criteria predetermined by the project team. Expert Panel members were identified based on their clinical and/or research expertise in the field of e-cigarette and/or smoking cessation, as well as on their professional and educational backgrounds. Peer Panel members were recruited through several existing peer engagement groups, and had to be aged 18 or older who either currently or formerly used e-cigarettes. All members had to declare real and perceived conflicts of interest. None had relevant commercial interests in e-cigarettes. None had received grant funding from and/or consulted with e-cigarette manufacturers. Conflicts of interest of panel members can be accessed by contacting the corresponding author. Since this was not a study (i.e. no data was collected from the participants) there was no need to seek institutional ethics approval for the project in order to protect the privacy and safety of human subjects.

### 2.3. Process

We first conducted a scoping review to identify evidence-based e-cigarette and dual use cessation interventions and guidance for youth, adolescents and adults published between 2010 and August 2021. We screened 508 records and included 12 papers in the final published review (Kundu et al., 2023).

We used evidence from this review and clinical and research expertise to develop the initial list of recommendations for Round 1 of the modified Delphi process. Given the limited evidence on e-cigarette cessation, we used open-ended questions to elicit unique perspectives and priorities of panel members. Recommendations that required clinical expertise were omitted from the Peer survey.

The recommendations were circulated to both panels via REDCap at the start of each round (Appendix A). Panel members were asked to vote whether they agreed or disagreed with the recommendation(s) and provide their rationale and/or suggest modifications to the recommendations, and were given two weeks to respond. For the Expert Panel, recommendations required 80% consensus to be included or excluded from the resource (Eubank et al., 2016), while for the Peer Panel, 75% consensus (i.e., 3 out of the 4 Peer members) was required. At the end of each round, results were collated and analyzed. Recommendations that did not reach consensus were modified based on panel member feedback and included in subsequent rounds. Revised recommendations that still did not reach consensus by Round 3 were included in the guidance resource as statements. At the end of Round 3, the accepted recommendations and statements from both the Expert and Peer Panels were combined into one resource.

A supplementary document with a summary of relevant panel member comments was distributed at the beginning of Rounds 2 and 3 and at the launch of the discussion board to provide context for the content included in these rounds. Comments from all three rounds were collated and used to inform the special considerations throughout the resource.

The discussion board was used to facilitate the 1-week discussion where Expert and Peer Panel members were invited to provide context on their responses, and share feedback on the recommendations that did not reach consensus in Round 2. Expert and Peer Panel members participated in separate discussion boards.

An intermediate survey was then circulated to Experts via Google Forms to determine if consensus could be reached on one question that had diverging feedback on the discussion board. The results were analyzed and a statement was included within Round 3. This survey was not circulated to Peers, as the question was clinical in nature.

### 2.4. Data analysis

Statistical analyses were conducted in Excel and Stata 16 (StataCorp, 2019). For ranking recommendations, raters first responded yes/no/do not know, and then ranked items for which they responded “yes”. “No” responses were treated as tied for last and “do not know” as ties ranking above “no” and below all “yes” responses. Missing rankings were imputed using the mean of other raters. In the case of ties or non-contiguous (e.g., “1, 3, 4”) rankings, ranks were rescaled to have the expected means and total.

In thematic analyses of open-ended responses, section comments and the discussion board, common themes were identified and used to create new recommendations, modify existing recommendations and inform the special considerations sections of the guidance resource.

## 3. Results

The Delphi process took place between September and December 2021. We invited 29 Experts and 10 Peers. Twenty-four Experts (83%) and 4 (40%) Peers agreed to participate. All panel members were asked to declare any conflicts of interest and were provided with honoraria for their participation. Demographic characteristics of the panels are reported in Tables S1 and S2.

The guidance resource was finalized in March 2022 and contains 24 recommendations, 2 statements that reached consensus, and 2 that did not reach consensus. Recommendations cover 8 domains: severity and dependence; general approaches; treatment approaches; dual use; pharmacotherapy strategies; behavioural approaches; harm reduction; and relapse prevention (Table 1). Several recommendations were separated by population (adults, youth, people who are pregnant, breastfeeding and/or chestfeeding and people with mental illness and/or substance use issues).

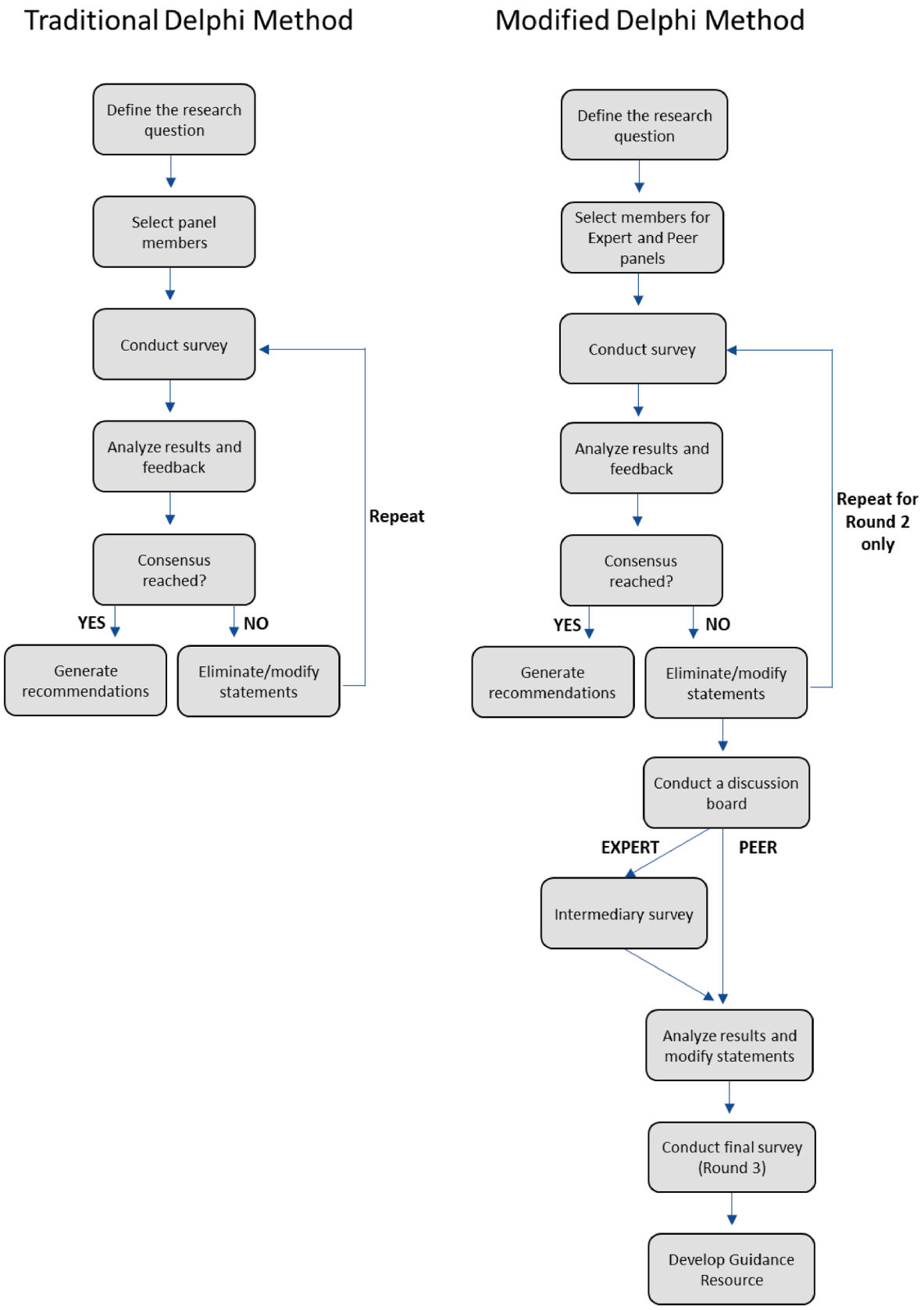


**Fig. 1.** Flowcharts comparing the traditional and modified Delphi Methodology.

**Table 1**
Clinical recommendations resulting from the modified Delphi panel.

| | |
|---|---|
| **1. Severity and Dependence** | |
| 1A | All clients should be asked if they vape. |
| 1B | All clients who formerly smoked and are advised to quit vaping should be monitored for relapse to smoking cigarettes. |
| 1C | Vaping assessments can include questions on dual use, physical and mental health, and social and environmental factors (e.g., partner vaping, vaping use policies, etc.) |
| 1D | Healthcare providers can use standardized tools to assess vaping dependence, to inform treatment plans and/or facilitate discussion with clients. |
| 1E | While there is currently no recommendation on which of the following validated tools should be used to assess vaping dependence, healthcare providers can use the one that best suits the needs of their client.[a]<br>Adults: E-FTND, EDS, PS-ECDI<br>Youth: HONC, EDS[b] |
| 1F | There is currently no consensus among experts on the use of the language around nicotine use disorder or nicotine dependence when referring to people who vape and want to quit. |
| **2. General Approaches** | |
| 2A | Adults, youth, people who are pregnant, breastfeeding and/or chestfeeding and people with mental illness and/or substance use issues who quit smoking and have continued vaping, should be advised to quit vaping. |
| 2B | Adults, youth, people who are pregnant, breastfeeding and/or chestfeeding and people with mental illness and/or substance use issues who vape but have never smoked, should be advised to quit vaping. |
| 2C | There is currently no agreement on a recommended general approach for the treatment of people who are both smoking and vaping and are seeking help to quit. Healthcare providers are advised to take a person-centred approach and discuss all approaches so that clients can make an informed decision about the treatment options available. |
| **3. Treatment Approaches** | |
| 3A | Duration of treatment should be based on the needs of each person. The suggested treatment duration is a minimum of 8–12 weeks. |
| 3B | Adults, youth and people with mental illness and/or substance use issues who vape exclusively can be offered a combination of behavioural therapy strategies (tapering, CBT, etc.) with or without pharmacotherapy to help quit. |
| 3C | People who are pregnant, breastfeeding and/or chestfeeding who vape exclusively (and want to quit) can be offered behavioural therapies as a first line treatment. Nicotine replacement therapy (NRT) may be considered as a second line treatment. |
| **4. Dual Use (people who use both tobacco and electronic cigarettes)** | |
| 4A | Health care providers should advise people who are both smoking and vaping to switch completely from smoking to vaping only. |
| 4B | For people who have quit smoking but are currently vaping, healthcare providers can encourage them to quit vaping. |
| **5. Pharmacotherapy Strategies** | |
| 5A | Adults, youth and people with mental illness and/or substance use issues who want to quit vaping and are willing to use pharmacotherapy can be offered one of the four pharmacotherapy options for smoking cessation (NRT, varenicline, cytisine and bupropion), if available. |
| 5B | There is currently no agreement on a recommended pharmacotherapy strategy for people who are pregnant, breastfeeding and/or chestfeeding and want to quit vaping. Healthcare providers are advised to take a person-centred approach and discuss all treatment options so that people can make an informed decision about the pharmaceutical options available. |
| **6. Behavioural Therapy Strategies** | |
| 6 | Adults and youth who want to quit vaping or quit vaping and smoking can be encouraged to use one or more of the following strategies: see a health care provider for one-on-one counselling, use an app, web-based program or text messaging program and call a helpline for cessation support. |
| **7. Harm Reduction (related to vaping device)** | |
| 7A | People should not modify their products (THC, vitamin E acetate, other oils, etc.) or modify their vaping device. |
| 7B | People should not purchase illicit/black market e-liquids, pods or devices. |
| 7C | People should avoid certain flavours shown to cause harm (e.g., cinnamon, (Wavreil and Heggland (2019);Clapp et al., 2019), cherry (Kosmider et al., 2016), menthol (Chandra et al., 2023) and products containing diacetyl (Langel et al., 2022; White et al., 2021)).[c] |
| 7D | People should follow the instructions for use specific to their vaping device. |
| **8. Relapse Prevention** | |
| 8A | Healthcare providers should offer support to people that have relapsed to vaping and still want to quit. |
| 8B | Relapse prevention strategies can include extending pharmacotherapy even after a person has quit. |
| 8C | For dual users and people who formerly smoked who relapse to smoking, healthcare providers should reinitiate treatment. |
| 8D | For people who relapse into smoking, healthcare provider should encourage clients to quit using approved smoking cessation interventions. |
| 8E | If people who vape exclusively are unsuccessful in their vaping quit attempts, they should be advised to use harm reduction strategies to minimize their risk. |
| 8F | For adults and youth who have quit smoking and/or vaping, health care providers should regularly screen for relapse to support treatment goals.[d] |
| 8G | If adults, youth and people with mental illness and/or substance use issues who formerly smoked are at risk of relapsing to smoking, healthcare providers can consider supporting continued vaping.[e] |

[a] A brief explanation of each tool as well as access to the questionnaires can be found in the supplementary appendix List of Assessment Tools.

[b] **E-FTND:** E-cigarette Fagerström Test of Cigarette Dependence; **EDS**: E-cigarette Dependence Scale; **PS-ECDI**: The Penn State Electronic Cigarette Dependence Index; **HONC**: Hooked on Nicotine Checklist

[c] For individuals who currently smoke, healthcare providers should discuss both the risks and benefits of using flavoured e-liquids to facilitate switching completely from smoking to vaping only (Gades et al.,2022).

[d] Healthcare providers should regularly screen people who have quit smoking and/or vaping for relapse, including people who are pregnant, breastfeeding and/or chestfeeding, and people with mental illness and/or substance use issues.

[e] Currently, it is not advised that healthcare providers consider supporting continued vaping in patients who are pregnant, breastfeeding and/or chestfeeding who formerly smoked and are at risk of relapsing to smoking.

### *3.1. Expert Panel*

Results of the Delphi process for the Expert Panel are shown in Fig. 2. In Round 1, Experts provided feedback on 17 open-ended questions and voted on 49 recommendations. In Round 2, the 37 recommendations that did not reach consensus in Round 1 were modified and condensed based on participant feedback. Thirty-two recommendations were circulated, along with a summary of panel comments. All Experts

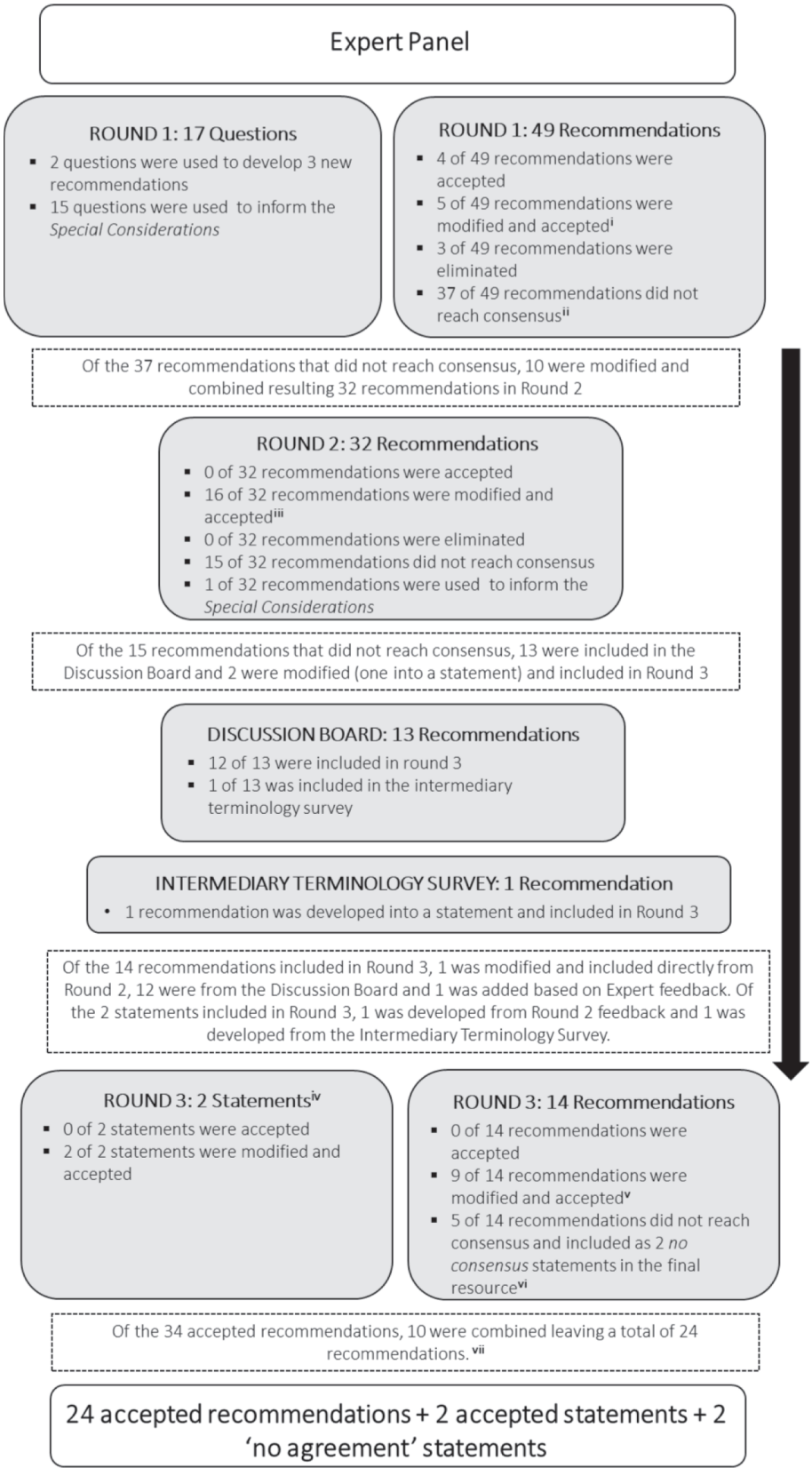


**Fig. 2.** A flowchart illustrating the results of the modified Delphi Expert Panel. [i] All 5 recommendations that were modified and accepted had minor wording modifications made. [ii] Of the 37 recommendations that did not reach consensus, 1 was split due to different topics, 5 were combined by term (pregnant and breastfeeding) , 2 were combined by population and 2 were combined by vaping/smoking status. [iii] Of the 16 recommendations that were modified and accepted, 2 were combined due to similar topics and 14 had minor wording modifications made. [iv] These statements were developed based on the results from the intermediate terminology survey and Expert feedback from Round 2. [v] All 9 recommendations that were modified and accepted had minor wording modifications made. [vi] The wording of these 2 statements included in the final resource was not voted on. [vii] Of the 34 recommendations voted on, 1 was combined due to similar topics and 9 were combined by population leaving a combined total of 24 recommendations in the final resource.

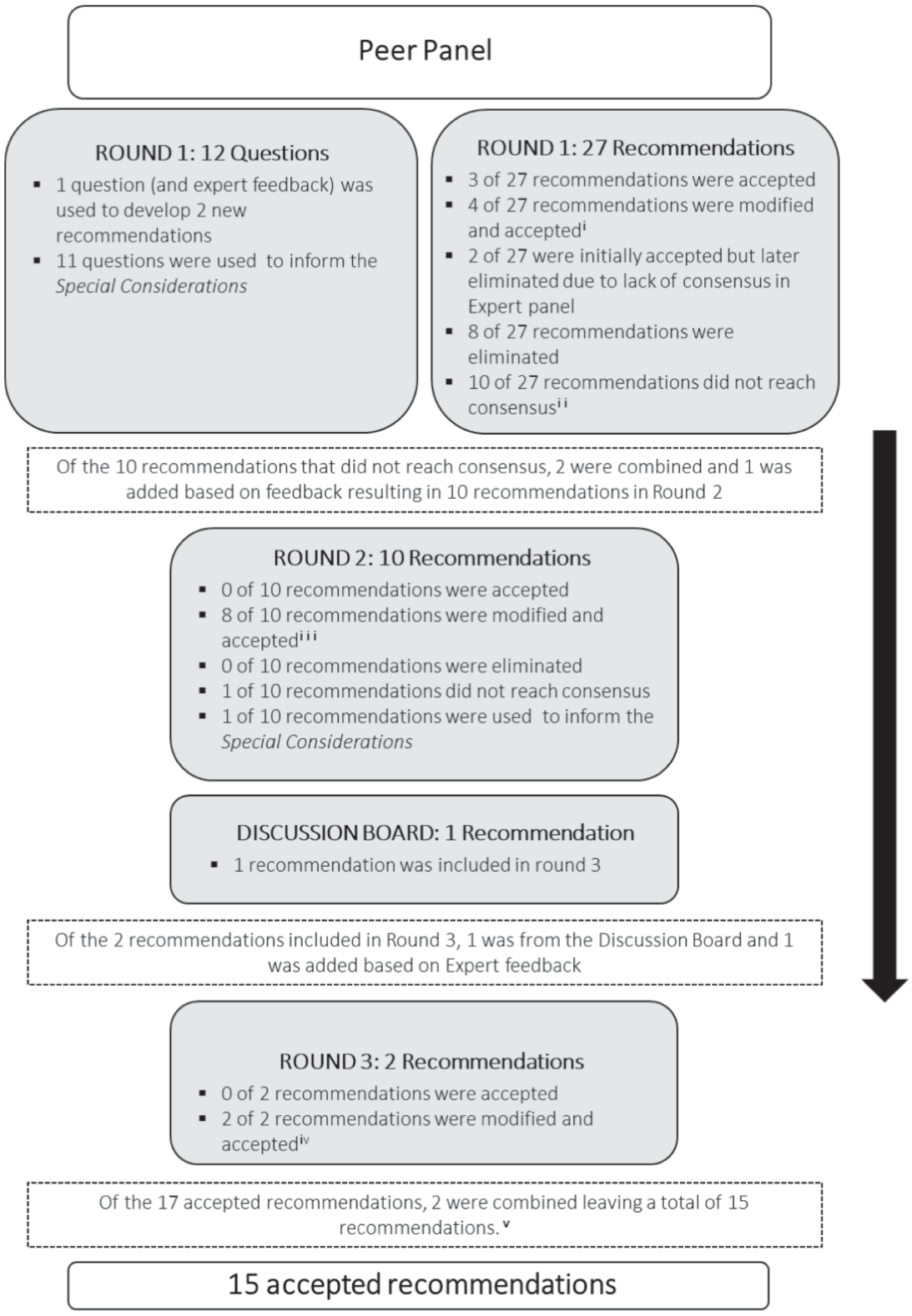


**Fig. 3.** A flowchart illustrating the results of the modified Delphi Peer Panel. [i] All 4 recommendations that were modified and accepted had minor wording modifications made. [ii] Of the 10 recommendations that did not reach consensus, 1 recommendation was combined based on population and 1 was combined based on formatting. [iii] Of the 8 recommendations that were modified and accepted, 6 minor wording modifications made and 2 were combined by population. [iv] Both recommendations that were modified and accepted had minor wording modifications made. [v] Of the 17 recommendations voted on, 2 were combined based on population leaving a total of 15 recommendations. At the end of Round 3, the accepted recommendations in both the Expert and Peer Panels were combined into one resource.

responded in both rounds.

Fifteen recommendations did not reach consensus in Round 2. Two recommendations were modified and directly included in Round 3 voting, as one was close to reaching consensus in Round 2 and the second was developed into a statement based on panel feedback. The 13 other recommendations were included in a discussion board and Experts were asked to expand on their opinions (Appendix B). Feedback on one recommendation in the discussion board regarding the classification of people who want to quit using e-cigarettes containing nicotine was divided. Experts were asked to vote, via the intermediate survey, on the question: "*For patients who seek help to stop vaping nicotine, which term do you think best describes their condition?*". Twenty-one Experts (88%) responded, however the group did not reach consensus, with ~71% voting for "*nicotine use disorder*" and ~29% for "*nicotine* dependence". Therefore, a new statement was developed for inclusion in Round 3 voting.

Round 3 included 14 recommendations that did not reach consensus in Round 2 and two statements plus a summary of discussion board comments. Survey response rate was 96%.

### 3.2. Peer Panel

Fig. 3 outlines the results of the modified Delphi process for the Peer Panel. In Round 1, Peers provided feedback on 12 open-ended questions and voted on 27 recommendations.

Ten recommendations did not reach consensus and were modified and condensed, and an additional recommendation added, based on panel feedback. These recommendations were circulated in Round 2, along with a summary of panel comments.

One recommendation regarding a treatment approach for youth who use e-cigarettes did not reach consensus in Round 2, and Peers were asked to discuss it in the Peer discussion board (Appendix B). Participant feedback was used to modify the recommendation and circulated in Round 3, along with a summary of discussion board comments. All Peers responded to all rounds.

At the end of this process, and in advance of usability testing, minor wording edits were made to the 38 combined recommendations and statements. To improve ease of use and reduce redundancy, 11 recommendations were combined in the final Vaping Cessation Guidance Resource.

### 3.3. Usability testing

We sent the penultimate knowledge products, including the guidance resource and a list of validated e-cigarette dependence assessment tools, to four healthcare practitioners and four peers for usability testing. Participants responded to nine open-ended questions and were asked to provide overall impressions and feedback on design features of the resource. Suggested improvements were reviewed by the project team and implemented in the final version of the guidance resource. The complete Vaping Cessation Guidance Resource (also translated in French) is available for download on the Nicotine Dependence Service website (https://www.nicotinedependenceclinic.com/en/Pages/electronic-nicotine-delivery-systems-(ends).aspx).

## 4. Discussion

Through a modified Delphi process, we developed an evidence-informed clinical guidance resource to help adults and youth quit using e-cigarettes. In addition, we tailored recommendations for specific populations.

Although there are currently no evidence-based clinical guidelines on cessation of e-cigarette use or dual use (Kundu et al., 2023), a recent position statement from the Canadian Paediatric Society provides preliminary clinical guidance on e-cigarette cessation for youth. Consistent with our recommendations, this guidance suggests behavioural therapy and pharmacotherapy (either alone or in combination) to support youth quitting e-cigarettes. (Chadi et al., 2021) However, some of the tools recommended by the Canadian Paediatric Society and elsewhere (Chadi et al., 2021; Hadland and Chadi, 2020; American Association of Pediatrics, 2019; Sahr et al., 2020; Morean et al., 2019; Morean et al., 2018) are not validated for e-cigarette use specifically, whereas we only recommend the use of validated tools in our guidance resource. Additionally, an RCT conducted by the Truth Initiative found that tailored mobile interventions are an effective tool to support vaping cessation among young. (Graham et al., 2021) This finding supports our clinical recommendation that practitioners should encourage patients to use behavioural strategies, including text messaging programs, to support quit attempts (see Table 1: recommendation 6).

There is mixed evidence regarding e-cigarette use and cessation for individuals who previously smoked cigarettes. A Cochrane review reported with high certainty that e-cigarettes help individuals quit smoking cigarettes and are more effective than nicotine replacement therapy (Hartmann-Boyce et al., 2022) However, findings from a meta-analysis reported that these individuals were at a greater risk of smoking relapse compared to those who did not use e-cigarettes (Barufaldi et al., 2021). This is in line with our recommendations suggesting that healthcare practitioners should advise these individuals to quit using e-cigarettes altogether, and to regularly screen for relapse to smoking.

Full consensus among experts could not be reached with respect to: 1) selecting assessment tools; 2) whether to use the term *nicotine use disorder*, which aligns with DSM 5 terminology (American Psychiatric Association, 2013), or *nicotine dependence*, which some felt was less stigmatizing and did not imply harm; 3) whether people who use both cigarettes and e-cigarettes concurrently should quit both products simultaneously or quit cigarettes first; and 4) recommended pharmacotherapy for people who are pregnant, breastfeeding, and/or chestfeeding and want to quit using e-cigarettes. Given the importance of these clinical issues, we included 'statements' in the guidance document (see Table 1: recommendations 1E, 1F, 2C, 5B) indicating that because there was no agreement among the experts, practitioners need to use a patient-centered approach.

As international regulations and policies for e-cigarette products vary between countries (Institue for Global Tobacco Control, 2021) and empirical evidence assessing e-cigarette cessation interventions is weak, the Vaping Cessation Guidance Resource as well as the modified Delphi process described here provide timely clinical guidance that adds value to the current knowledge on e-cigarette cessation methods. While the guidance resource is meant to provide support to practitioners within Canada, the recommendations generated reflect the best international evidence to date on clinical approaches to e-cigarette cessation. The high level of consensus achieved enhances the reliability of the findings and suggests that the resource can be applied broadly to international landscapes.

### 4.1. Strengths and limitations

A major strength of our project was the inclusion of the Peer Panel, which provided perspectives of adults and youth with experience of e-cigarette use, as their reflections may improve the real-world applicability and relevance of the resource. Other strengths were the anonymous voting process (a key feature of the Delphi process designed to limit potential biases) and the high response rates achieved in all three rounds of both panels. In addition, the pandemic restrictions and low budget permitted the use of the internet to efficiently engage international experts in the process. Finally, the guidance resource provides recommendations for a range of populations, to better support healthcare practitioners with their diverse client populations.

As the evidence in the field of e-cigarette cessation is weak, most recommendations from the Expert Panel have drawn on research and clinical expertise in tobacco cessation. Another limitation was the asynchronous format of the discussion board. As panel members were

situated internationally and there were travel restrictions due to the COVID-19 pandemic, hosting a live, in-person discussion was not possible. Despite active participation, this format may have limited participant interaction and the free exchange of ideas and information. Finally, the Peer Panel included only four members, and its views may therefore not be fully representative of people who use e-cigarettes.

There is a need for further research in all areas of e-cigarette use, and especially on effectiveness of cessation interventions, supports, and services. The assumption that interventions and medications for tobacco cessation will be equally effective for e-cigarette dependence requires testing, as do treatments for people who use cigarettes and e-cigarettes concurrently and other specific populations. Further work could also include collaborations with specific vulnerable populations to adapt recommendations and ensure acceptability.

## 5. Conclusion

Our modified Delphi process produced a guidance resource to provide evidence-informed treatment recommendations to support healthcare practitioners with clients who want to quit using e-cigarettes. While there is currently limited clinical evidence on effective approaches to e-cigarette cessation, the recommendations made are consistent with current knowledge in the field. This resource constitutes the first step to informing the treatment planning process for e-cigarette cessation. However, rigorous clinical trials that assess treatment efficacy are needed.

## CRediT authorship contribution statement

**Laurie Zawertailo:** Conceptualization, Funding acquisition, Methodology, Project administration, Resources, Supervision, Writing – original draft, Visualization, Writing – review & editing. **Erika Kouzoukas:** Formal analysis, Investigation, Methodology, Project administration, Resources, Software, Writing – original draft, Visualization, Writing – review & editing. **Chantal Fougere:** Funding acquisition, Methodology, Supervision, Project administration, Writing – review & editing. **Rosa Dragonetti:** Funding acquisition, Conceptualization, Methodology, Project administration, Supervision, Writing – review & editing. **Scott Veldhuizen:** Formal analysis, Writing – review & editing. **Peter Selby:** Conceptualization, Funding acquisition, Methodology, Supervision, Project administration, Writing – review & editing.

## Declaration of Competing Interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: PS declares being a Member, Youth Vaping Cessation Advisory Group, University of Toronto, and reports funding received for e-cigarette research from Canadian Institutes of Health Research and the Ontario Ministry of Health. LZ declares providing an expert report on vaping to Cambridge LLP and reports receiving funding for e-cigarette research from the Ontario Ministry of Health and CAMH womenmind. EK, CF, RD and SV declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## Data availability

No data was used for the research described in the article.

## Acknowledgements

The authors would like to thank Elise Tanzini for sharing her REDCap expertise during survey development and deployment. The authors would also like to thank the Expert panel members, Alexandra Andric, Dr. Osnat Melamed, Dr. Amit Rotem, Dr. Theo Moraes, Dr. Patricia Smith, Dr. Trisha Tulloch, Rosa Dragonetti, Dr. Laurie Zawertailo, Dr. Peter Selby, Dr. Andrew Pipe, Dr. Milan Khara, Dr. Brent Friesen, Dr. Leslie Phillips, Dr. Mark Eisenberg, Dr. Nicholas Chadi, Dr. Lorraine Greaves, Dr. Amanda Graham, Dr. Suchitra Krishnan-Sarin, Dr. Scott Hadland, Dr. Lion Shahab, Dr. Chris Bullen, Dr. Natalie Walker, Dr. Hayden McRobbie, and Dr. Colin Mendelsohn, for providing their clinical and research expertise in the development of the guidance resource. The authors are grateful to the Peer panel members, Clayton H., Charlene L., Malcolm P. and Russell L., for providing their feedback and lived experience perspectives to inform the development of the guidance resource. This work was supported by the Ontario Ministry of Health (funding no. 72–2021-250). The funding source had no involvement in the project design; the collection, analysis and interpretation of data; in the writing of the report; and the decision to submit an article for publication.

## Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.pmedr.2023.102372.

## References

American Association of Pediatrics. Nicotine Replacement Therapy and Adolescent Patients: Information for Pediatricians [Internet]. 2019 [2022 Oct 12]. Available from: https://downloads.aap.org/RCE/NRT_and_Adolescents_Pediatrician_Guidance_factsheet.pdf.

American Psychiatric Association. Diagnostic and statistical manual of mental disorders [Internet]. 5th ed. Washington (DC); 2013 [2022 Oct 12]. Available from: 10.1176/appi.books.9780890425596.

Barufaldi, L., Guerra, R., de Albuquerque, R.d.C., Nascimento, A., Chança, R., de Souza, M., de Almeida, L., 2021. Risk of smoking relapse with the use of electronic cigarettes: A systematic review with meta-analysis of longitudinal studies. Tob. Prev. Cessat. 7 (April), 1–10.

Canadian Public Health Association. Tobacco and Vaping Use in Canada [Internet]. Ottawa (ON): Canada Public Health Association; 2021 [2022 Sept 9]. Available from: https://www.cpha.ca/tobacco-and-vaping-use-canada-moving-forward.

Case, K.R., Mantey, D.S., Creamer, M.R., Harrell, M.B., Kelder, S.H., Perry, C.L., 2018. E-cigarette- specific symptoms of nicotine dependence among Texas adolescents. Addict. Behav. 84, 57–61. https://doi.org/10.1016/j.addbeh.2018.03.032.

Chadi, N., Vyver, E., Bélanger, R.E., 2021. Protecting children and adolescents against the risks of vaping. Paediatr. Child Health 26 (6), 358–365. https://doi.org/10.1093/pch/pxab037.

Chandra, D., Bogdanoff, R.F., Bowler, R.P., Benam, K.H., 2023. Electronic cigarette menthol flavoring is associated with increased inhaled micro and sub-micron particles and worse lung function in combustion cigarette smokers. Respir. Res. 24 (1), 108.

Clapp, P.W., Lavrich, K.S., van Heusden, C.A., Lazarowski, E.R., Carson, J.L., Jaspers, I., 2019. Cinnamaldehyde in flavored e-cigarette liquids temporarily suppresses bronchial epithelial cell ciliary motility by dysregulation of mitochondrial function. Am. J. Physiol. Lung Cell. Mol. Physiol. 316 (3), L470–L486.

Dalkey, N., Helmer, O., 1963. An Experimental Application of the Delphi Method to the Use of Experts. Manag. Sci. 9 (3), 458–467.

Eubank, B.H., Mohtadi, N.G., Lafave, M.R., Wiley, J.P., Bois, A.J., Boorman, R.S., et al., 2016. Using the modified Delphi method to establish clinical consensus for the diagnosis and treatment of patients with rotator cuff pathology. BMC Med. Res. Method. 16, 56. https://doi.org/10.1186/s12874-016-0165-8. 15.

Gades MS, Alcheva A, Riegelman AL, Hatsukami DK. The Role of Nicotine and Flavor in the Abuse Potential and Appeal of Electronic Cigarettes for Adult Current and Former Cigarette and Electronic Cigarette Users: A Systematic Review. Nicotine Tob Res. 2022;24(9):1332-43.

Goniewicz, M.L., Smith, D.M., Edwards, K.C., Blount, B.C., Caldwell, K.L., Feng, J., Wang, L., Christensen, C., Ambrose, B., Borek, N., van Bemmel, D., Konkel, K., Erives, G., Stanton, C.A., Lambert, E., Kimmel, H.L., Hatsukami, D., Hecht, S.S., Niaura, R.S., Travers, M., Lawrence, C., Hyland, A.J., 2018. Comparison of Nicotine and Toxicant Exposure in Users of Electronic Cigarettes and Combustible Cigarettes. JAMA Netw. Open 1 (8), e185937.

Graham, A.L., Amato, M.S., Cha, S., Jacobs, M.A., Bottcher, M.M., Papandonatos, G.D., 2021. Effectiveness of a Vaping Cessation Text Message Program Among Young Adult e-Cigarette Users: A Randomized Clinical Trial. JAMA Intern. Med. 181 (7), 923–930.

Gustafson, D.H., Shukla, R.K., Delbecq, A., Walster, G.W., 1973. A comparative study of differences in subjective likelihood estimates made by individuals, interacting groups, Delphi groups, and nominal groups. Organ. Behav. Hum. Perform. 9 (2), 280–291.

Hadland, S.E., Chadi, N., 2020. Through the Haze: What Clinicians Can Do to Address Youth Vaping. J. Adolesc. Health 66 (1), 10–14. https://doi.org/10.1016/j.jadohealth.2019.10.009.

Hammond D, Reid JL, Burkhalter R, Hong D. Trends In Smoking And Vaping Among Young People: Findings From The ITC Youth Survey. University of Waterloo; 2023 [2023 Jul 17].

Hartmann-Boyce, J., McRobbie, H., Butler, A.R., Lindson, N., Bullen, C., Begh, R., Theodoulou, A., Notley, C., Rigotti, N.A., Turner, T., Fanshawe, T.R., Hajek, P., 2022. Electronic cigarettes for smoking cessation. Cochrane Database of Syst Rev. 11 (10) https://doi.org/10.1002/14651858.CD010216.pub7.

Heart and Stroke Foundation of Canada. E-cigarettes in Canada [Internet]. 2018 [2022 Sept 9]. Available from: www.heartandstroke.ca/-/media/pdf-files/position-statements/ecigarettesincanada.ashx.

Hohmann, E., Cote, M.P., Brand, J.C., 2018. Research Pearls: Expert Consensus Based Evidence Using the Delphi Method. Arthroscopy 34 (12), 3278–3282. https://doi.org/10.1016/j.arthro.2018.10.004.

Institue for Global Tobacco Control. Global E-cigarette Policy Scan. Johns Hopkins Bloomberg School of Public Health; 2021 [2023 Jul 17] Available from: https://globaltobaccocontrol.org/en/policy-scan/e-cigarettes.

Kim, C.-Y., Paek, Y.-J., Seo, H.G., Cheong, Y.S., Lee, C.M., Park, S.M., Park, D.W., Lee, K., 2020. Dual use of electronic and conventional cigarettes is associated with higher cardiovascular risk factors in Korean men. Sci. Rep. 10 (1) https://doi.org/10.1038/s41598-020-62545-3.

Kosmider, L., Sobczak, A., Prokopowicz, A., Kurek, J., Zaciera, M., Knysak, J., Smith, D., Goniewicz, M.L., 2016. Cherry-flavoured electronic cigarettes expose users to the inhalation irritant, benzaldehyde. Thorax 71 (4), 376–377.

Kundu, A., Kouzoukas, E., Zawertailo, L., Fougere, C., Dragonetti, R., Selby, P., Schwartz, R., 2023. Scoping review of guidance on cessation interventions for electronic cigarettes and dual electronic and combustible cigarettes use. CMAJ Open 11 (2), E336–E344.

Langel, S.N., Kelly, F.L., Brass, D.M., Nagler, A.E., Carmack, D., Tu, J.J., Travieso, T., Goswami, R., Permar, S.R., Blasi, M., Palmer, S.M., 2022. E-cigarette and food flavoring diacetyl alters airway cell morphology, inflammatory and antiviral response, and susceptibility to SARS-CoV-2. Cell Death Discov. 8 (1).

Morean, M.E., Krishnan-Sarin, S., O'Malley, S.S., 2018. Assessing nicotine dependence in adolescent E-cigarette users: The 4-item Patient-Reported Outcomes Measurement Information System (PROMIS) Nicotine Dependence Item Bank for electronic cigarettes. Drug Alcohol Depend. 188, 60–63. https://doi.org/10.1016/j.drugalcdep.2018.03.029.

Morean, M.E., Krishnan-Sarin, S., Sussman, S., Foulds, J., Fishbein, H., Grana, R., et al., 2019. Psychometric Evaluation of the E-cigarette Dependence Scale. Nicotine Tob. Res. 21 (11), 1556–1564. https://doi.org/10.1093/ntr/ntx271.

National Academies of Sciences, Engineering, and Medicine. Health and Medicine Division; Board on Population Health and Public Health Practice; Committee on the Review of the Health Effects of Electronic Nicotine Delivery Systems; Eaton DL, Kwan LY, Stratton K, editors. Public Health Consequences of E-Cigarettes [Internet]. Washington (DC): National Academies Press; 2018 Jan 23 [2022 Oct 5]. Available from: https://www.ncbi.nlm.nih.gov/books/NBK507191/.

Sahr, M., Kelsh, S.E., Blower, N., 2020. Pharmacist assisted vape taper and behavioral support for cessation of electronic nicotine delivery system use. Clin Case Rep. 8 (1), 100–103. https://doi.org/10.1002/ccr3.2599.

StataCorp, 2019. Stata Statistical Software: Release 16. StataCorp LLC, College Station (TX).

Statistics Canada. Canadian Tobacco Alcohol and Drugs (CTADS): 2013 summary [Internet]. Ottawa (ON): Health Canada; 2013 [2022 Sept 9]. Available from: https://www.canada.ca/en/health-canada/services/canadian-tobacco-alcohol-drugs-survey/2013-summary.html.

Statistics Canada. Canadian Tobacco and Nicotine Survey (CTNS), 2021 [Internet]. Ottawa (ON): Health Canada; 2022 [2022 Sept 9]. Available from: https://www150.statcan.gc.ca/n1/daily-quotidien/220505/dq220505c-eng.htm.

Wang JB, Olgin JE, Nah G, Vittinghoff E, Cataldo JK, Pletcher MJ, et al. Cigarette and e-cigarette dual use and risk of cardiopulmonary symptoms in the Health eHeart Study. PLoS One. 2018;13(7):e0198681. 10.1371/journal.pone.0198681.

Wavreil, F.D.M., Heggland, S.J., 2019. Cinnamon-flavored electronic cigarette liquids and aerosols induce oxidative stress in human osteoblast-like MG-63 cells. Toxicol. Rep. 7, 23–29. https://doi.org/10.1016/j.toxrep.2019.11.019.

White, A.V., Wambui, D.W., Pokhrel, L.R., 2021. Risk assessment of inhaled diacetyl from electronic cigarette use among teens and adults. Sci. Total Environ. 772, 145486.