TITLE: Scoping review of guidance on cessation interventions for electronic cigarettes and dual electronic and combustible cigarettes use.

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ABSTRACT

Background: Despite having evidence-based smoking cessation guidelines in practice, the applicability of these guidelines for the cessation of electronic cigarettes and dual electronic and combustible cigarettes use has not been established yet. This review aims to identify current recommendations for cessation interventions for e-cigarette users and dual users tailored to adolescents, youth and adults.

Methods: We systematically searched MEDLINE, EMBASE, PsycINFO and grey literature databases including publications which provided guidance or recommendations on vaping cessation for e-cigarette users and complete cessation of cigarettes and e-cigarettes use for dual users. Papers focused on smoking cessation, harm reduction potential of e-cigarettes, cannabis vaping and management of e-cigarette or vaping use associated lung injury were excluded. Data was extracted on general characteristics and recommendations made by the papers.

Results: A total of 13 publications on vaping cessation interventions were included. No study was found on complete cessation of cigarettes and e-cigarettes for dual users. Most papers were youth-focused and behavioral counselling and nicotine replacement therapy were the most recommended interventions. 7 papers based their evidence on interventions applied for vaping cessation, while 6 papers adapted evidence from evaluation of smoking cessation.

Interpretation: There is lack of evidence in support of effective vaping cessation or dual use cessation interventions. Further vaping-specific research on the effectiveness of the suggested cessation interventions among different subpopulations and dual users is needed to facilitate formulation of evidence-based cessation guidelines.

Introduction

Over the past decade, vaping or e-cigarette use has increased dramatically, especially among adolescents and young adults.(1,2) E-cigarette or electronic nicotine delivery systems (ENDS) were first introduced in the market as a smoking cessation aid,(3) however, ENDS have become increasingly popular among young never-smokers,(4–6) mostly because of the availability of e-cigarettes in appealing flavours and the perception of e-cigarette as less harmful and less addictive than combustible cigarettes.(7,8) Between 2017 and 2018, e-cigarette use increased from 11.7% to 20.8% among high school students in the United States (US).(1) In addition, the top selling brands of e-cigarettes (i.e., Vuse/Vype, JUUL),(9,10) which use nicotine salt based technology to deliver high concentration of nicotine (>20 mg/ml),(11) are highly popular among young generation. The proportion of the US youth vapers mentioning JUUL as their usual brand of e-cigarette increased threefold between 2017 and 2018.(12)

The long-term health impacts of vaping are still not fully known and need to be investigated. [3,7] However, regular use of e-cigarettes can lead to nicotine dependence/addiction with associated vaping-related harms (i.e., increased respiratory symptoms, rise in heart rate and blood pressure, exposure to several toxic chemicals). Regular use is also associated with subsequent initiation of combustible cigarettes.(3–5) Among US adult e-cigarette users, 23.1% were never-smokers and 39.1% were dual users of cigarettes and e-cigarettes.(13) Dual use, which is common among both adults and younger people,(14–16) is associated with greater nicotine dependence,(17,18) poorer general health,(17) higher level of inflammatory and oxidative stress biomarkers,(19) and higher risk of cardiovascular disease and metabolic syndrome.(18)

Due to the potential harms from vaping, several organizations (i.e., American Lung Association, World Health Organization, Smokefree.gov, Truth Initiative) recommend quitting vaping and

advise against switching to ENDS from combustible cigarette.(20–23) In addition, Centers for Disease Control and Prevention and Health Canada recommend against the use of any types of vaping products by non-smokers, youth and young adults or to seek help for quitting from the health care providers.(24,25)

There is growing evidence that e-cigarette users and dual users are seeking help to quit e-cigarette use, due at least in part to concerns about the addictive potential of vaping, in addition to respiratory effects and long-term health harms, including increased risk of harm from COVID-19.(26–29) Moreover, dual users were found to report similar interest in quitting e-cigarette as exclusive vapers,(30) and more attempts to quit smoking compared to exclusive smokers.(31) However, our understanding of the process of vaping cessation is very limited and evidence-based guidelines for vaping cessation interventions are yet to be developed.(32) While well-established, evidence-based smoking cessation guidelines are currently used in practice,(33) the applicability of these guidelines for vaping cessation - especially for different age groups and for dual users- has not been established in the literature. To address this gap and find out the scope of future research, we conducted a scoping review of existing health care guidance or recommendations on cessation interventions for e-cigarette users and dual users of cigarettes and e-cigarettes among adolescents, youth and adult populations.

Methods

We systematically searched the published academic and grey literature databases for publications which provided guidance or recommendations for cessation interventions for e-cigarette users and dual users of cigarettes and e-cigarettes tailored to adolescents, youth, and adults. A scoping review methodology was followed as it allows for the review of potentially heterogeneous studies and

provides an overall account of existing evidence and future research scope.(34,35) We followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guideline for Scoping Reviews (PRISMA-ScR) for this study (see PRISMA-ScR reporting checklist),(36) and registered our protocol (doi:10.17605/OSF.IO/79DXP) in the Open Science Framework.(37)

Search strategy

We initially searched the databases for publications addressing guidance on vaping cessation interventions. MEDLINE (Ovid), EMBASE (Ovid) and PsycINFO (Ovid) were searched on May 27th, 2021 using various combinations of subject headings, including Medical Subject Headings or MeSH terms, when applicable, and keywords (i.e., 'vaping', 'electronic cigarette', 'electronic nicotine delivery systems' 'ENDS', 'e-cig', 'cessation', 'quit', 'stop', 'intervention', 'management', 'treatment', 'adolescent', 'teen', 'youth', 'young adult', 'adult', 'guideline', 'guidance', 'clinical', 'practice', 'care'). The search results were further limited to English language papers published within the year 2010 and May, 2021, as e-cigarettes first emerged in the American market in 2007.(32) One reviewer (AK) conducted the database search and imported all citations to the Covidence workflow platform where duplicate papers were removed.

We conducted targeted grey literature searches of key databases including Canadian Institute for Health Informatics, Canadian Agency for Drugs and Technologies in Health, Canadian Medical Association Infobase, National Institute for Heath and Care Excellence Guidance, National Guideline Clearinghouse and customized Google searches, between May 28th and May 31st, 2021. Customized Google searches included searching for government and organizational reports on vaping cessation interventions or guidelines, of which, the first 100 results of each search were

considered for title and abstract screening. We also searched the reference lists of identified relevant papers and consulted with subject matter experts.

We decided to modify our search strategy to add publications addressing cessation interventions for dual users of cigarettes and e-cigarettes. To identify any specific recommendations for dual users, we conducted an additional search between 2010 to August 2021 with the following key words added (i.e., 'dual use', 'concurrent use', 'co-use', 'e-cigarette', 'cigarette', 'tobacco cessation'). This updated strategy is presented in Appendix 1.

Eligibility

We included papers that provided guidance or recommendations tailored to adolescents, youth or adults addressing vaping cessation among e-cigarette users and complete cessation of cigarettes and e-cigarettes among dual users The following types of papers were included:

- Experimental studies including randomized controlled trials, case reports and case series
- Systematic reviews and meta-analyses
- Brief reports, commentaries and letters

Papers focused on smoking cessation, the harm reduction potential of e-cigarette, cannabis vaping and the management of e-cigarette or vaping use associated lung injury were excluded. We also excluded animal studies, non-English articles, articles not published in last 11 years, study protocols, full-texts not available, and publication duplicates.

Study Selection

Two reviewers (AK and EK) independently screened each title and abstract based on compliance with the inclusion criteria. Full–text review was undertaken by two reviewers (AK and EK) and

any disagreements on final inclusion were resolved through discussions and guidance with other reviewers (RS, RD and LZ). The detailed selection process of the papers is presented in the PRISMA flow diagram (Figure 1).(38)

Data extraction and data analysis

Custom-made data extraction forms were developed which included general characteristics of included studies (author, year, study design, sample size, target population, objective, methods, and primary outcome results), authors' conclusions or recommendations and limitations or special features (Appendix 2). We considered World Health Organization and Statistics Canada's standard age limits for defining target population such as adolescents (10-19 years), youth (15-24 years) and adults (25-64 years) age groups.(39,40) We presented descriptive statistics of the extracted datasets by calculating the total number of all papers in each category (Table 1).

Ethics approval

As we performed a scoping review of literature, the study was exempted from institutional ethics approval.

Results

The search of academic electronic databases yielded 546 publications. An additional 22 publications were added through grey literature search and hand searching of citation lists and professional networks. After removing duplicates, the title and abstract of 509 papers were reviewed. Of the 34 papers that were eligible for full-text screening, 21 were excluded for various reasons (Figure 1). This resulted in 13 papers included in the final review.(41–53) We did not find

any publications addressing complete cessation of cigarettes and e-cigarettes for dual users. Hence, the final 13 papers reflected guidance or current practice recommendations on cessation interventions for exclusive e-cigarette use only (Table 1, Appendix 2).(41–53)

Of the 13 papers included,(41–53) 11 were conducted in the US, 2 papers were from Canada,(47,53) and all were published within last 6 years (Table 1). The general characteristics of the papers are presented in Appendix 2. Among the papers (N=13), 7 were guidance or recommendation documents,(43–49) 1 was a randomized controlled trial (RCT),(42) 1 was a pretest-posttest experimental study,(41) 2 were case reports,(51,52) 1 was a case series,(50) and 1 was a qualitative study.(53) Among the target population categories, youth were the most commonly studied population (n=11),(41–43,45–47,49–53) followed by adolescents (n=4),(41,44,45,47) and adults (n=2).(48,50)

Of the vaping cessation interventions discussed, behavioural interventions (i.e., 5'A' approach, motivational interviewing, individual or group counselling, cognitive behavioural therapy, mindfulness approach, 'This is Quitting' text messaging program, 'SmokeSCREEN' videogame, and smartphone apps) was recommended by 10 papers,(41–43,46,47,49–53) nicotine replacement therapy (NRT) (i.e., nicotine patch, gum, lozenge, and spray) by 6 papers,(45–48,50,52) combined behavioural counselling and NRT by 4 papers,(46,47,50,52) non-NRT medications (i.e., bupropion and varenicline) for those ≥ 17 years old by 3 papers,(46–48) and tapering of e-cigarette use by 2 papers (51,53) (Table 1, Appendix 2). One of the included guidance documents included e-cigarette as a tobacco product and concluded that there was insufficient evidence (54) to assess the net benefit of behavioural counselling and medications as cessation interventions among adolescents.(44) They recommended primary care providers to balance the benefits and harms of interventions while providing cessation services on a case-by-case basis.(44) 'This is Quitting'

text messaging program which has been tested by a pre-test post-test experimental study (41) and a RCT,(42) was recommended by two other guidance documents.(43,49)

7 out of the 13 papers based their evidence from interventions applied with the intention of vaping cessation,(41–43,49–52) while 5 papers applied evidence from existing smoking cessation interventions,(44–48) and 1 paper (53) reported self-reported preference of suggested vaping cessation interventions made by the e-cigarette users (Table 1, Appendix 2).

Interpretation

We found that the current evidence on vaping cessation interventions is limited. Although we did find one RCT evaluating the effectiveness of 'This is Quitting' text messaging program,(42) the application of other cessation interventions particularly NRT and non-NRT for the purpose of vaping cessation has not been thoroughly investigated yet. There are some important differences between smoking and vaping. E-cigarettes are available in a number of flavours and may deliver higher nicotine concentrations than conventional cigarettes by some popular brands like JUUL.(4,55) Moreover, Users get the ability to adjust the amount of nicotine delivery by adjusting device power, can use them discreetly, and vaping is highly prevalent among young population.(4,11,55) Understanding these differences is important to modify the guidance for vaping cessation interventions.

We found several vaping cessation recommendations/guidance documents published by reputable organizations such as Substance Abuse and Mental Health Services Administration (SAMHSA),(43) US Preventive Services Task Force (USPSTF),(44) American Academy of pediatrics,(45) Canadian Paediatric Society,(47) and Health Canada.(53) However, none of them except the SAMHSA publication based their evidence on interventions targeting vaping cessation.

The USPSTF final recommendation statement was based on 12 RCTs included in a meta-analysis, but all of these studies examined smoking cessation as an outcome.(44) In this respect, despite their conclusion of insufficient evidence in support of behavioural counselling and medications for tobacco product cessation, the applicability of this recommendation for vaping cessation is questionable (Table 1, Appendix 2). However, currently, two RCTs are recruiting participants for evaluation of the effectiveness of behavioural interventions (i.e., 'Goal2QuitVaping' smartphone app, phone counselling, text messaging program) and NRT for vaping cessation among the youth population.(56,57) The findings from these studies would improve our understandings and provide the evidence base for the application of established smoking cessation interventions for vaping cessation.

We did not find any studies meeting our inclusion criteria of targeting complete cessation of both electronic and combustible cigarettes. Although one recent RCT was conducted to evaluate behavioural interventions among dual users,(58) the primary target of the interventions was smoking cessation and the researchers allowed ongoing use of e-cigarettes somewhat to facilitate smoking cessation in their study. Their results showed that the targeted intervention resulted in significant smoking abstinence throughout the 18 months treatment compared to control group. Although vaping decreased over the same time period, there was not significant difference between the groups. However, as expected, vaping was associated with higher probability of smoking abstinence.(58)

The only intervention, that has been rigorously tested for vaping cessation was 'This is Quitting', a text-messaging based behavioural intervention program by the Truth Initiative. The program has shown promising results in engaging the participants on a 3 months follow-up, with 60.8% of respondents self-reporting reduced e-cigarette use or vaping cessation 14 days after their quit

date.(41) When evaluated by a RCT, the participants receiving the intervention showed 1.39 times (95% CI 1.15, 1.68, p<0.001) more likelihood of remaining abstinent at 7 months follow-up compared to the controls.(42) In addition to being proven effective, the program has been recommended by two other guidance documents (Appendix 2).(43,49)

Some important features emerged from the qualitative study by Health Canada,(53) such as preference by the e-cigarette users for a customizable quit plan, the option of tapering use then quitting vaping, and the importance of support groups or friends to help quit vaping, which should be taken into account when formulating e-cigarette cessation guidelines. In addition, the availability of validated tools is crucial to assess vaping dependence among e-cigarette users. While several papers have recommended or used modified version of smoking cessation tools including Hooked on Nicotine Checklist, Fagerstrom Test for Nicotine Dependence, Modified Version of the Fagerstrom Tolerance Questionnaire, Screening to Brief Intervention, Brief Screener for Tobacco, Alcohol, and other Drugs, Car-Relax-Alone-Forget-Friends-Trouble,(45–47,51,52) none of them have been validated to assess for vaping dependence.

Most of the papers included youth as their target population (Table 1). However, two case reports presented cessation interventions for past-smokers who used e-cigarettes as a tool for smoking cessation and further sought help to quit vaping (Appendix 2).(51,52) This subgroup of adult who vape should also be taken into consideration when formulating age-appropriate and population-specific clinical guidelines for vaping cessation. The case reports also reflect that switching dual users to exclusive e-cigarette use first and then providing support for vaping cessation might be an effective strategy for dual users who wants to quit.(51,52)

Limitations

The findings of our review need to be interpreted with the consideration of a few key limitations. Our intention to find guidance on complete cessation of cigarette and e-cigarette use among dual users was not met. Due to the highly heterogeneous characteristics of the included publications and a limited amount of evidence, we could not perform critical appraisal of the papers and therefore, could not comment on the quality of the papers. However, we identified current research gaps which would provide future research directions to improve the evidence base for interventions targeted for vaping and dual use cessation.

Conclusions

There is currently very little evidence in support of effective vaping cessation interventions and no evidence on dual use cessation. Future research activities should focus on randomized controlled trials to evaluate the effectiveness of different evidence-based smoking cessation interventions for vaping cessation among different subgroups and dual users who switch to exclusive vaping. The ethical dilemma of advising complete nicotine cessation for adult smokers who have switched completely to vaping still needs study as well.

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Figure 1: PRISMA flow diagram showing study selection.

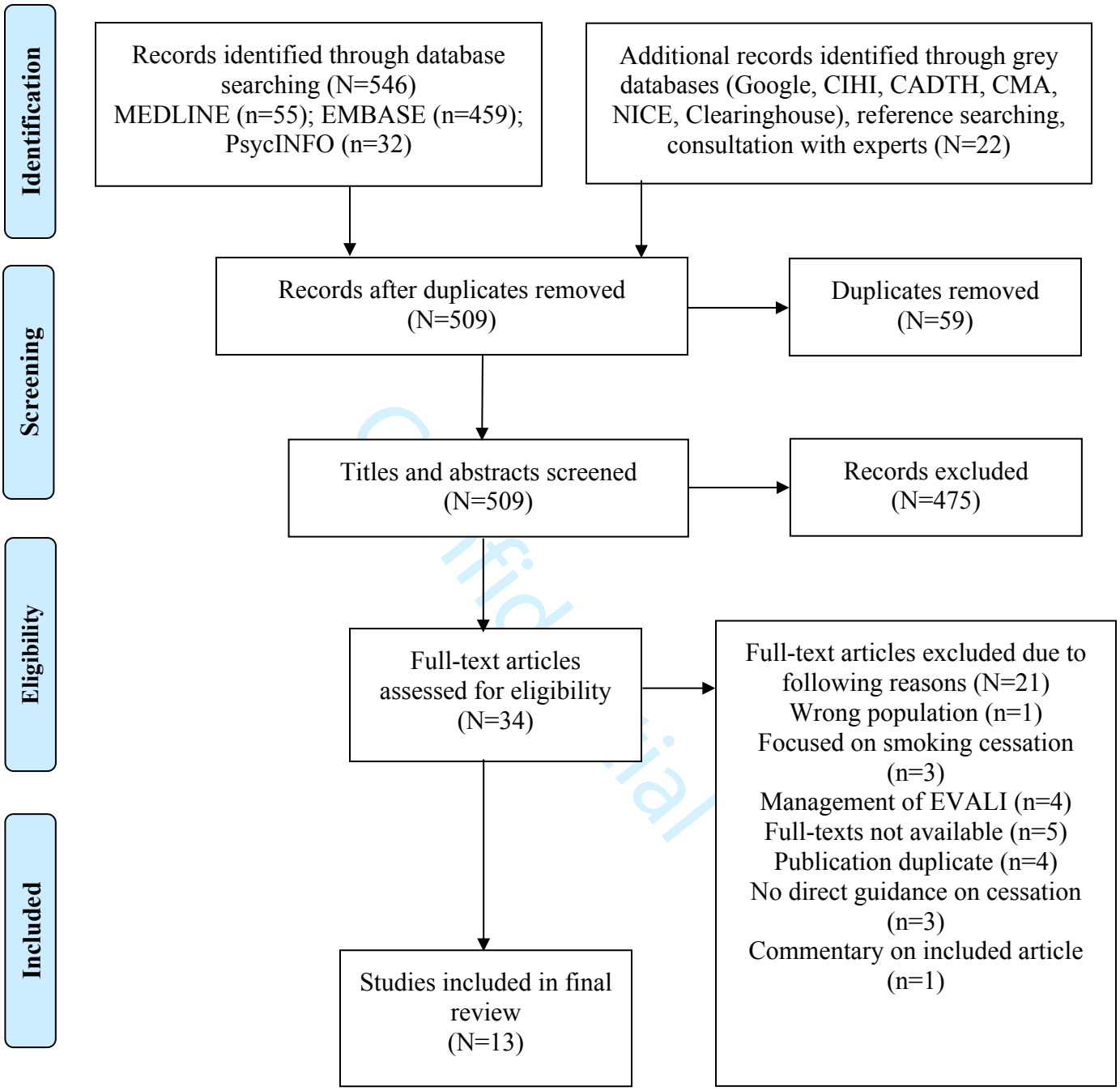

Table 1. Summary statistics of included papers.

Characteristics	Number of papers (N=13)	Author and year
Country		
US	11	Graham et al, 2020;[41] Graham et al., 2021;[42] Substance Abuse and Mental Health Services Administration, 2020;[43] Owens et al., 2020;[44] American Academy of Pediatrics, 2019; [45] Hadland & Chadi, 2020;[46] Gonzalvo et al., 2016;[48] Berg et al, 2021;[49] Sikka et al., 2021;[50] Sahr et al, 2020;[51] Silver et al, 2016[52]
Canada	2	Chadi et al., 2021;[47] Health Canada,2020[53]
Target population		
Adolescent	4	Graham et al, 2020;[41] Owens et al., 2020;[44] American Academy of Pediatrics, 2019; [45] Chadi et al., 2021[49]
Youth	11	Graham et al, 2020;[41] Graham et al., 2021;[42] Substance Abuse and Mental Health Services Administration, 2020;[43] American Academy of Pediatrics, 2019; [45] Hadland & Chadi, 2020;[46] Chadi et al., 2021;[47] Berg et al, 2021;[49] Sikka et al., 2021;[50] Sahr et al, 2020;[51] Silver et al, 2016 ;[52] Health Canada,2020[53]
Adult	2	Gonzalvo et al., 2016;[48] Sikka et al., 2021[50]
Study design		
RCT	1	Graham et al., 2021;[42]
Pre-test post-test experimental study	1	Graham et al, 2020;[41]
Guidance/recommendation	7	Substance Abuse and Mental Health Services Administration, 2020;[43] Owens et al., 2020;[44] American Academy of Pediatrics, 2019; [45] Hadland & Chadi, 2020; [46] Chadi et al., 2021;[47] Gonzalvo et al., 2016;[48] Berg et al, 2021;[49]
Case report/case series	3	Sikka et al., 2021;[50] Sahr et al, 2020;[51] Silver et al, 2016[52]
Qualitative study	1	Health Canada,2020[53]
Type of intervention recommended		
Behavioural	10	Graham et al, 2020;[41] Graham et al., 2021;[42] Substance Abuse and Mental Health Services Administration, 2020;[43] Hadland & Chadi, 2020; [46] Chadi et al., 2021;[47] Berg et al, 2021;[49] Sikka et al., 2021;[50] Sahr et al, 2020;[51] Silver et al, 2016 ;[52] Health Canada,2020[53]
NRT	6	American Academy of Pediatrics, 2019; [45] Hadland & Chadi, 2020; [46] Chadi et al., 2021;[47] Gonzalvo et al., 2016;[48] Sikka et al., 2021;[50] Silver et al, 2016[52]
Non-NRT	3	Hadland & Chadi, 2020; [46] Chadi et al., 2021;[47] Gonzalvo et al., 2016[48]

Based evidence on vaping cessation		
Yes	7	Graham et al, 2020;[41] Graham et al., 2021;[42] Substance Abuse and Mental Health Services Administration, 2020;[43] Berg et al, 2021;[49] Sikka et al., 2021;[50] Sahr et al, 2020;[51] Silver et al, 2016[52]
No	6	Owens et al., 2020;[44] American Academy of Pediatrics, 2019; [45] Hadland & Chadi, 2020; [46] Chadi et al., 2021;[47] Gonzalvo et al., 2016;[48] Health Canada,2020[53]

Abbreviation: US, United States; RCT, Randomized controlled trial; NRT, nicotine replacement therapy

Scoping review of guidance on cessation interventions for electronic cigarettes and dual electronic and combustible cigarettes use.

Appendix 1: Search Strategy

Research question: What are the current guidance or recommendations for cessation interventions for e-cigarette users and dual combustible and e-cigarette users tailored to adolescents, youth and adults?

Inclusion criteria:

1. Clinical practice guidance or recommendations of vaping cessation for e-cigarette users and complete cessation of cigarettes and e-cigarettes for dual users targeting adolescents or youth or adults
2. Experimental studies including randomized controlled trials, case reports or case series on vaping or dual use cessation
3. Systematic review or meta-analysis on vaping or dual use cessation interventions
4. Brief reports, commentaries or letters on vaping or dual use cessation interventions

Exclusion criteria:

1. Not in English, animal studies, not published in last 11 years
2. Study protocols
3. Focused on smoking cessation
4. Articles on harm reduction potential of e-cigarette
5. Articles on cannabis vaping
6. Management of EVALI

MEDLINE:

Date: 03.08.2021

Search type	Search terms	Results
MeSH	1. exp Vaping/ or exp Electronic Nicotine Delivery Systems/	5487
Title, abstract and keyword	2. ((e-cig* or electronic cigarette or nicotine or vaping or vape or vaporizer* or device* or product* or e-liquid* or ENDS) adj3 (cessation or quit* or stop* or intervention or management or treatment)).tw,kf.	25510
Title, abstract and keyword	3. ((e-cigarette* or electronic cigarette or e-cig* or ENDS or cigarette* or smok*) adj3 (dual use* or concurrent use* or co-use*)).tw,kf.	596
MeSH	4. exp Adult/	7540735
MeSH	5. exp Young Adult/ or exp Adolescent/	2542624
Title, abstract and keyword	6. (adult* or adolescen* or teen* or youth* or young adult*).tw,kf.	1662137
MeSH	7. exp Guideline/ or exp Practice Guideline/	36011
Title, abstract and keyword	8. ((clinical or practice or practitioner* or health or care) adj3 (guideline* or guidance)).tw,kf.	77205
	9. 1 or 2 or 3	30668
	10. 4 or 5 or 6	8887356
	11. 7 or 8	106473
	12. 9 and 10 and 11	90
	13. limit 12 to (english language and humans)	78
	14. limit 13 to yr="2010 -Current"	55

Scoping review of guidance on cessation interventions for electronic cigarettes and dual electronic and combustible cigarettes use.

EMBASE:

Date: 03.08.2021

Search type	Search terms	Results
Subject headings/Emtree	1. exp electronic cigarette/ or exp vaping/	9769
Title, abstract and keyword	2. ((e-cig* or electronic cigarette or nicotine or vaping or vape or vaporizer* or device* or product* or e-liquid* or ENDS) adj3 (cessation or quit* or stop* or intervention or management or treatment)).tw,kw.	36112
Title, abstract and keyword	3. ((e-cigarette* or electronic cigarette or e-cig* or ENDS or cigarette* or smok*) adj3 (dual use* or concurrent use* or co-use*)).tw,kw.	654
Subject headings/Emtree	4. exp adult/ or exp young adult/	9661217
Subject headings/Emtree	5. exp adolescent/	1745200
Title, abstract and keyword	6. (adult* or adolescen* or teen* or youth* or young adult*).tw,kw.	2245139
Subject headings/Emtree	7. exp practice guideline/	605388
Title, abstract and keyword	8. ((clinical or practice or practitioner* or health or care) adj3 (guideline* or guidance)).tw,kw.	113128
	9. 1 or 2 or 3	45064
	10. 4 or 5 or 6	11009529
	11. 7 or 8	655078
	12. 9 and 10 and 11	550
	13. limit 12 to (human and english language)	525
	14. limit 13 to yr="2010 -Current"	459

Scoping review of guidance on cessation interventions for electronic cigarettes and dual electronic and combustible cigarettes use.

PsycINFO:

Date: 03.08.2021

Search type	Search terms	Results
Subject headings	1. exp Electronic Cigarettes/	1884
Title, abstract and keyword	2. ((e-cig* or electronic cigarette or nicotine or vaping or vape or vaporizer* or device* or product* or e-liquid* or ENDS) adj3 (cessation or quit* or stop* or intervention or management or treatment)).mp.	4832
Title, abstract and keyword	3. ((e-cigarette* or electronic cigarette or e-cig* or ENDS or cigarette* or smok*) adj3 (dual use* or concurrent use* or co-use*)).mp.	351
Subject headings	4. exp Human Males/	45199
Subject headings	5. exp Human Females/	150226
Subject headings	6. exp Adolescent Behavior/	2535
Subject headings	7. exp Emerging Adulthood/	4144
Title, abstract and keyword	8. (adult* or adolescen* or teen* or youth* or young adult*).mp.	1285184
Subject headings	9. exp Treatment Guidelines/ or exp Evidence Based Practice/	25864
Subject headings	10. exp clinical practice/	21775
Title, abstract and keyword	11. ((clinical or practice or practitioner* or health or care) adj3 (guideline* or guidance)).mp.	15888
	12. 1 or 2 or 3	6575
	13. 4 or 5 or 6 or 7 or 8	1401467
	14. 9 or 10 or 11	58025
	15. 12 and 13 and 14	43
	16. limit 15 to (human and english language)	41
	17. limit 16 to yr="2010 -Current"	32

Scoping review of guidance on cessation interventions for electronic cigarettes and dual electronic and combustible cigarettes use.

Grey literature search:

Google advanced search:

Date	Search terms	Results
31.05.2021	1. allintext: vaping cessation guidelines site:.gov filetype:pdf (filter: Jan 1, 2010- May 31, 2021)	838
31.05.2021	2. allintext: vaping cessation guidelines site:.org filetype:pdf (filter: Jan 1, 2010- May 31, 2021)	2330
31.05.2021	3. allintext: vaping cessation guidelines site:.edu filetype:pdf (filter: Jan 1, 2010- May 31, 2021)	770
31.05.2021	4. allintext: How to help quit vaping site:.gov filetype:pdf (filter: Jan 1, 2010- May 31, 2021)	1410
31.05.2021	5. allintext: How to help quit vaping site:.org filetype:pdf (filter: Jan 1, 2010- May 31, 2021)	3020
31.05.2021	6. allintext: How to help quit vaping site:.edu filetype:pdf (filter: Jan 1, 2010- May 31, 2021)	926
03.08.21	7. allintext: tobacco cessation for dual users of e-cigarette and cigarette site:.gov filetype:pdf (filter: Jan 1, 2010- July 28, 2021)	418
03.08.21	8. allintext: tobacco cessation for dual users of e-cigarette and cigarette site:.org filetype:pdf (filter: Jan 1, 2010- July 28, 2021)	1620
03.08.21	9. allintext: tobacco cessation for dual users of e-cigarette and cigarette site:.edu filetype:pdf (filter: Jan 1, 2010- July 28, 2021)	434

Grey databases:

Date: 28.05.2021
Keywords: vaping, e-cigarette, electronic cigarette

Database	Results	Post-screening
Canadian Institute for Health Information (CIHI)	4	0
Canadian Agency for Drugs and Technologies in Health (CADTH)	10	3
Canadian Medical Association (CMA) Infobase	0	0
National Institute for Heath and Care Excellence (NICE) Guidance	7	0
National Guideline Clearinghouse	1	0

Date: 03.08.21
Keywords: dual use, dual use of e-cigarette and cigarette, tobacco cessation for dual users of e-cigarette and cigarette

Database	Results	Post-screening
Canadian Institute for Health Information (CIHI)	2	0
Canadian Agency for Drugs and Technologies in Health (CADTH)	1	0
Canadian Medical Association (CMA) Infobase	0	0
National Institute for Heath and Care Excellence (NICE) Guidance	5	0
National Guideline Clearinghouse	2	0

Appendix 2. General characteristics and recommendations of included studies

Author and year	Study Design	Target population	Sample size	Objective	Methods	Primary Outcome Results	Conclusions/recommendations	Limitations/special features
Graham et al, 2020[41]	Pretest-post test experimental study	Adolescents and youth	27,000	To evaluate 'This is Quitting' text-message program delivering motivational and skill training exercises for vaping cessation	-One message per day was sent to all users -Self-reported e-cigarette use and abstinence were assessed at 14 and 90 days post-enrollment	-At 14 days, 60.8% respondents indicated they reduced or stopped vaping -At 90 days, point prevalence of last vaping within 7 days was 24.7% and more than 30 days ago was 15.5%.	Concluded that youth engagement and acceptance of the program was high among those who wanted to quit vaping.	-Did not conduct bio-chemical verification of abstinence. -Further evaluation was conducted through a RCT.
Graham et al., 2021[42]	RCT	Youth	2588	To determine effectiveness of 'This is Quitting' text message program delivering cognitive and behavioural skills training for vaping cessation	All participants in the intervention and the control arms were followed up at 1 month and 7 months post-randomization	Self-reported 30-day abstinence rate at 7 months was 24.1% among intervention participants and 18.6% among controls with an odd ratio of 1.39 (95% CI 1.15,1.68, p<0.001)	The 'This is Quitting' text message program was an effective vaping cessation intervention among youth.	Did not conduct bio-chemical verification of abstinence.
Substance Abuse and Mental Health Services Administration, 2020[43]	Guidance	Youth	NA	Review evidence and recommend on reduction and cessation of e-cigarette use among youth	Environmental scans for public health evidence of vaping reduction ot cessation interventions	-*SmokeSCREEN (videogame):* Improved belief and knowledge about vaping (no evaluation of vaping reduction yet)	Recommended multifaceted approach at different levels, -*Individual:* 'smokeSCREEN', 'This is Quitting'	-Most individual and community measures should be tested further

Scoping review of guidance on cessation interventions for electronic cigarettes and dual electronic and combustible cigarettes use.

						-*This is Quitting (text message):* Effective in vaping cessation -*CATCH My Breath (School-based):* Effective in reducing vaping	-*Community:* 'CATCH My Breath', media campaigns -*Population level interventions:* Price policies, licensing and zoning policies	
Owens et al., 2020[44]	Clinical guidance	Adolescents	3304	To update recommendation on the primary care interventions for tobacco use (including e-cigarette) prevention and cessation	Systematic review and meta-analysis of 12 RCTs evaluating effectiveness of behavioural counselling, NRT and non-NRT for smoking cessation	-Inadequate evidence on benefits of behavioural counselling and medications for tobacco cessation -No reported harms from behavioural counselling -Inadequate evidence on harms from medications	-Insufficient evidence to recommend for or against tobacco cessation interventions- Recommend clinical judgement to make decisions	Included studies were on smoking cessation rather than vaping cessation interventions, however, final recommendations included e-cigarettes as a tobacco product
American Academy of Pediatrics, 2019[45]	Clinical guidance	Adolescents and youth	NA	Provide dosage, indications and contraindications for pediatricians to use NRT for patients who want to quit vaping	-Literature review and clinical decision making based on safety of NRT among adolescents	NA	-Recommended using of off-label NRT (combination of long-acting patch and short acting gum or lozenge) for youth who are moderately to severely nicotine dependent. -NRT were suggested for <18 years old with prescriptions and for >18 years old as OTC medications.	-Provided NRT dosing guideline and screening tools for nicotine dependence (HONC tool, e-cigarette dependence scale, mFTQ). Note: mFTQ was not tailored for vaping -Did not provide any evidence of the effectiveness

								of NRT for vaping cessation or reduction
Hadland & Chadi, 2020[46]	Clinical guidance	Youth	NA	To provide clinical guidance on vaping cessation with a specific focus on screening, assessment, counseling, and pharmacotherapy	Narrative literature review in support of evidence for recommended interventions	NA	Recommended clinicians to follow: -*Screening tool:* S2BI and BSTAD -*Nicotine dependence assessment tool:* HONC, key questionnaire tailored for vaping -*Counselling:* '5A' approach, individual or group counselling, motivational interviewing, CBT and mindfulness approach, phone and text quit lines -*Medication:* NRT (combination of long-acting and short-acting agents); non-NRT (for ≥17 years)	-Provided NRT and non-NRT dosing guidelines -Recommendations for vaping cessation interventions were based on smoking cessation intervention among youth.
Chadi et al., 2021[47]	Clinical recommendation	Adolescents and youth	NA	To offer vaping cessation strategies for pediatric heath care providers	Narrative literature review in support of evidence for recommended interventions	NA	Recommended pediatricians to follow: -*Assessment tool:* S2BI and CRAFFT modified for vaping; tailored vaping assessment	-Provided NRT dosing guidelines -Recommendations are based on the evidence available from smoking

							questions; '5A' approach, HONC -*Behavioural therapy*: individual or group counselling; motivational interviewing; mobile or online resources; reminders; reinforcements -*NRT (in combination with behavioural therapy):* offer for youth experiencing withdrawal symptoms -*Non-NRT (in combination with NRT and behavioural therapy):* Seek guidance from specialist before prescribing	cessation interventions among youth

Scoping review of guidance on cessation interventions for electronic cigarettes and dual electronic and combustible cigarettes use.

Gonzalvo et al., 2016[48]	Clinical recommendation	Adults with diabetes	NA	Recommend a standardized dosage of NRT and non-NRT therapies for users who want to quit vaping	Clinical judgement by taking the recommended dosage of NRT and non-NRT for smoking cessation into consideration while recommending for vaping cessation	-*Patch:* 21 mg for vaping 12-18 mg/ml nicotine at 5 ml/day -*Gum or lozenge:* 4mg if vape within 30 mins of waking, 2mg if >30 mins after waking -*Bupropion SR:* 150 mg po daily × 3 days followed by 150 mg po BID × 12 weeks -*Varenicline:* 0.5 mg po daily × 3 days followed by 0.5 mg po BID for days 4-7 then 1 mg po BID × 11 weeks	Recommended NRT and non-NRT therapies on reasonable basis	Did not provide any supportive trial data or case reports on the recommended doses of NRT and non-NRT for vaping cessation.
Berg et al, 2021[49]	Guidance	Youth	NA	To review evidence on effectiveness of vaping cessation interventions	Narrative literature review of evidence in support of behavioural interventions for vaping cessation	'This is Quitting', a text messaging program, was found effective for vaping cessation	Recommended combinations of technology-based (text-messaging system, smartphone apps) and individualized (one-on-one counseling) behavioural interventions	Evidence provided in support of interventions were mostly on smoking cessation
Sikka et al., 2021[50]	Case series	Youth and adults	6	To evaluate the combination of NRT and counselling for	-Regular follow-up up to 12 months -Used tapering doses of patch	3 out of 6 patients achieved 7-days abstinence by 6 months, and a	Concluded that vaping cessation is possible by utilizing combination of NRTs and	-Did not use any vaping dependence scale to measure e-cigarette use

				vaping cessation	or fixed dose of gum, lozenge or spray with counselling	fourth patient by 8 months	motivational interviewing	-Frequency of e-cigarette use following reported 7-days abstinence was not clear
Sahr et al, 2020[51]	Case report	Youth	1	To evaluate an alternative approach (vaping taper with behavioural support) for vaping cessation	-Regular clinical follow-ups by a pharmacist up to 6 months -Used alternate weekly taper of nicotine concentration and frequency of vaping with behavioural support	Modified FTND score turned to 0 from 8 within 8 weeks	Combination of ENDS taper with motivational interviewing was effective	Participant was initially a smoker, who switched to vaping for smoking cessation and later sought help for vaping cessation
Silver et al, 2016[52]	Case report	Youth	1	To evaluate combination of NRT and behavioural counselling for vaping cessation	-Regular clinical follow-ups up to 1 year -Used both patch and lozenge first, after one week discontinued patch and continued lozenge, added cinnamon flavoured nicotine gum from 6 weeks and continued counselling	Quit e-cigarette use (measured by FTND score) within 12 weeks, quit NRT within next 6 months	Combination of NRT and behavioural therapy was successful in quitting vaping	Participant was initially a smoker, who switched to vaping for smoking cessation and later sought help for vaping cessation-Nicotine dependence on FTND scale at baseline was measured as per initial smoking frequency.

					throughout the treatment period			
Health Canada,2020 [53]	Qualitative study	Youth	137	To elicit ideas and opinions regarding vaping cessation plan or aids from young vapers	Online focus group discussion	Most preferred self-reported approaches were cut back first, then quit vaping; quit with friends' help; text messaging related to vaping cessation; using mobile apps for tracking vaping behaviour	Concluded that all of the proposed vaping cessation approaches and materials were credible, although preferences varied.	-Reported personal preferences rather than effectiveness data on proposed vaping cessation approaches -Small sample size, study results cannot be reliably generalized

Abbreviations: AAP, American Academy of Pediatrics; BSTAD, Brief Screener for Tobacco, Alcohol, and other Drugs; CBT, cognitive behavioural therapy; CPS, Canadian Pediatric Society; CRAFFT, Car-Relax-Alone-Forget-Friends-Trouble; ENDS, electronic nicotine delivery systems; FTND, Fagerstrom Test for Nicotine Dependence; HONC, Hooked on Nicotine Checklist; mFTQ, Modified Version of the Fagerstrom Tolerance Questionnaire; NA, not applicable; NRT, Nicotine replacement therapy; OTC, over the counter; RCT, Randomized controlled trial; S2BI, Screening to Brief Intervention; TIQ, This is Quitting; US, the United States.