

Parental Dual Use of e-Cigarettes and Traditional Cigarettes



Emara Nabi-Burza, MS; Susan Regan, PhD; Bethany Hipple Walters, PhD; Jeremy E. Drehmer, MPH; Nancy A. Rigotti, MD; Deborah J. Ossip, PhD; Julie A. Gorzkowski, MSW; Douglas E. Levy, PhD; Jonathan P. Winickoff, MD, MPH

From the Division of General Academic Pediatrics (E Nabi-Burza, BH Walters, JE Drehmer, and JP Winickoff); Massachusetts General Hospital for Children; Tobacco Research and Treatment Center (E Nabi-Burza, S Regan, BH Walters, JE Drehmer, NA Rigotti, DE Levy, and JP Winickoff); Mongan Institute Health Policy Center (NA Rigotti and DE Levy), Massachusetts General Hospital; Harvard Medical School (NA Rigotti, DE Levy, and JP Winickoff) Boston; Department of Public Health Sciences, University of Rochester Medical Center, NY (DJ Ossip); and American Academy of Pediatrics, Julius B. Richmond Center of Excellence, Itasca, Ill (JA Gorzkowski and JP Winickoff) The authors have no conflicts of interest relevant to this article to disclose. Not related to this article, Dr. Rigotti receives royalties from UpToDate, Inc, is an unpaid consultant to Pfizer regarding smoking cessation, and is a paid consultant to Achieve LifeSciences regarding an investigational smoking cessation aid.

Clinical Trial Registration: (ClinicalTrials.gov, Identifier: [NCT01882348](https://clinicaltrials.gov/ct2/show/NCT01882348), <https://clinicaltrials.gov/ct2/show/NCT01882348>).

Address correspondence to Jonathan P. Winickoff, MD, MPH, Department of Pediatrics, Division of General Academic Pediatrics, Massachusetts General Hospital for Children, 125 Nashua Street, Suite 860, Boston, MA 02114 (e-mail: jwinickoff@mgh.harvard.edu).

Received for publication January 7, 2019; accepted April 6, 2019.

ABSTRACT

BACKGROUND: E-cigarettes are growing in popularity. Dual use of e-cigarettes and cigarettes is an increasingly common practice, but little is known about patterns of dual use in parents. We sought to describe smoking-related behaviors among dual-users.

METHODS: Parent exit surveys were conducted following their child's visit in 5 control pediatric practices in 5 states participating in the Clinical Effort Against Secondhand Smoke Exposure trial. We examined factors associated with dual use of e-cigarettes and cigarettes versus cigarette-only smokers, assessed by self-report.

RESULTS: Of 1382 smokers or recent quitters screened after their child's visit between April and October 2017, 943 (68%) completed the survey. Of these, 727 parents reported current use of cigarettes; of those, 81 (11.1%) also reported e-cigarette use, meeting the definition of dual use. Compared with cigarette-only smokers, dual users were more likely to have a child

younger than 1 year old, planned to quit in the next 6 months, and had tried to quit in the past (had a quit attempt in the past 3 months, called the quitline, or used medicine to quit in the past 2 years; $P < .05$ for each).

CONCLUSIONS: Parents who use both e-cigarettes and cigarettes may have greater rates of contemplating smoking cessation than parents who only smoke cigarettes. These parents may be using e-cigarettes for harm reduction or as a step toward cessation. Identification of these parents may provide an opportunity to deliver effective treatment, including nicotine-replacement therapies that do not expose infants and children to e-cigarette aerosol.

KEYWORDS: dual use; parental e-cigarette use; smoking cessation; tobacco control

ACADEMIC PEDIATRICS 2019;19:842–848

WHAT'S NEW

We identify factors associated with parental dual use of cigarettes and e-cigarettes and highlight the need for identification of dual-user parents in the pediatric setting. These findings may help protect children from exposure to both cigarette smoke and e-cigarette aerosol.

ELECTRONIC CIGARETTES (E-CIGARETTES) include a diverse group of devices that allow users to inhale an aerosol, which typically contains nicotine, flavorings, and other additives.¹ These devices are referred to as “e-cigarettes,” “e-cigs,” “cigalikes,” “e-hookahs,” “mods,” “vape pens,” “vapes,” “tank systems,” and JUUL. For this paper, the term e-cigarettes is used to represent all such products in this diverse category. E-cigarettes vary widely in

design and appearance but generally operate in a similar manner and have similar components. They heat the liquid in the cartridge to create an aerosol that users inhale.² The concentration of nicotine can vary across cartridges and in “e-liquids” across different brands.^{2,3} A 2014 study showed that current e-cigarette users have systemic nicotine and/or cotinine concentrations similar to those seen in traditional cigarette users.³

E-cigarettes are easily available and growing in popularity in adults.^{4–6} When used as a replacement for cigarettes, e-cigarettes may serve as a potential smoking-cessation aid^{7,8} and are perceived by users as a less-harmful alternative to cigarette smoking.^{9,10} Although e-cigarettes could help with cigarette smoking cessation,¹¹ there is limited evidence regarding long-term adverse effects and their long-term impact on tobacco smoking reduction or cessation.^{12,13} Recommendations from the

US Preventive Services Task Force¹⁴ and an expert committee of the National Academies of Sciences, Engineering, and Medicine⁹ concluded that the current evidence is insufficient to recommend e-cigarettes for tobacco cessation and, as of 2019, the US Food and Drug Administration (FDA) has not approved e-cigarettes as a cessation aid.

Although data from the 2016 NHIS survey showed that current e-cigarette use declined among current smokers since 2014, it increased among former and never smokers.¹⁵ This trend is particularly worrisome, as it could indicate that e-cigarettes are renormalizing smoking behavior for former smokers¹⁶ and becoming gateways of nicotine use for never smokers.¹⁷ Long-term prospective data are needed to understand the patterns and trends of e-cigarette use in current, former, and never smokers.

Importantly, most adults who use e-cigarettes continue to smoke cigarettes (referred to as dual users). In 2015, National Health Interview Survey data showed that 58.8% of adult e-cigarette users also smoked cigarettes in the United States⁴ and the 2016 Behavioral Risk Factor Surveillance System reported similar findings, estimating that 54.6% of current e-cigarette users were also current smokers.⁶ A recent study showed that dual users exhibited greater concentrations of nearly all biomarkers of nicotine and toxicants compared with cigarette-only smokers.¹⁸

Parental use of traditional cigarettes is strongly associated with later use of cigarettes by their children,¹⁹ but it is not yet known whether this association holds true for parental e-cigarette use. E-cigarette use by parents may facilitate adolescent use of nicotine products through behavioral role modeling, direct effects of increased nicotine exposure on the developing brain, and increased access to the products themselves in the home.^{20,21} In addition, the concentrated nicotine present in e-liquid can be toxic if absorbed through the skin or ingested accidentally, posing a particular risk to children.²² Despite the increasing dual use of cigarettes and e-cigarettes in adults, and the implications for child health, there are limited data on dual use in parents.^{21,23} This is the first study to explore the readiness to quit smoking and use of FDA-approved tobacco treatments by parents who are dual users of cigarettes and e-cigarettes versus cigarette-only smokers.

DESIGN/METHODS

Data were collected between April and October 2017 from 5 practices in 5 states (Tennessee, Indiana, Virginia, North Carolina, and Ohio) randomized to the control arm of the Clinical Effort Against Secondhand Smoke Exposure (CEASE) study.²⁴ This trial tested the effectiveness and sustainability of an intervention to address parental tobacco use in the pediatric office setting. It was conducted in partnership with the American Academy of Pediatrics Julius Richmond Center of Excellence. The study protocol was approved by the institutional review boards of the American Academy of Pediatrics and

Massachusetts General Hospital, and by individual practice institutional review boards where required.

PARTICIPANT ENROLLMENT

Exit surveys were conducted with parents following their child's visit to the pediatric office. The exit screener survey gathered the following information: parent's demographic information (age, sex, race and ethnicity, and level of education); parent's current and past smoking status; the age of the youngest child present at the visit; and how the visit was paid. Parents were eligible for inclusion in the study if they reported smoking at least 100 cigarettes in their lifetime and if they had smoked a cigarette, even a puff, in the last 7 days or had quit smoking within the past 2 years. Eligible parents were invited to complete a detailed survey. Exclusion criteria included: 1) parents <18 years; 2) parents whose child had a medical emergency; 3) non-English speakers; or 4) completion of the detailed survey during a previous visit. Eligible parents who agreed to do a detailed survey signed a consent form and received \$5 for completion. Screening continued until approximately 200 eligible parents completed the detailed survey at each practice. The detailed survey asked additional questions about their tobacco use and behavior, readiness to quit, quit attempts in the past 3 months, smoke-free and e-cigarette-free home and car rules, if someone had used cigarettes or e-cigarettes in their home or car in the last 3 months, use of other tobacco products including e-cigarettes, and if the child's health care provider asked them about their smoking status and discussed using medications or quitline enrollment to help them quit smoking.

Parents were considered to be dual users of cigarettes and e-cigarettes if they reported smoking a cigarette, even a puff, in the past 7 days and using e-cigarettes within the past 30 days. Bivariate analyses were conducted using Chi-square tests to explore the association between parent and child characteristics and dual use.

Variables that were significant ($P < .10$) in the bivariate analysis and those that had theoretical plausibility (infant seen at the visit, sex and education of the parent, number of cigarettes smoked per day) were added step-wise to a logistic regression model. We combined the people who reported making a quit attempt in the past 3 months, or reported using nicotine-replacement therapy (NRT) or calling the quitline to help them quit smoking in the past 2 years and created a variable "tried to quit in the past." Odds ratios and 95% confidence intervals were reported for each variable from the final model. All P values are 2-sided and were considered significant at $P < .05$. Analyses were conducted using Stata statistical software (Stata-Corp, 2017. Stata Statistical Software: Release 15; Stata Corporation, College Station, Tex).

RESULTS

Of 1382 eligible smokers and recent quitters screened after their child's office visit between April and October 2017, 943 (68%) completed the detailed survey. Of these,

Table 1. Characteristics of Parental Dual Users and Cigarette-Only Users Seen in Pediatric Practices (N = 727)

Characteristic	Dual Users n = 81 n (%)	Cigarette-Only Users n = 646 n (%)	P Value
Parent age, y			.581
18–24	16 (20)	99 (15)	
25–44	59 (73)	474 (73)	
≥45	6 (7)	73 (11)	
Relationship to the child			.855
Father	12 (15)	100 (15)	
Mother	62 (77)	501 (78)	
Other	45 (9)	45 (7)	
Race and ethnicity			.615
Hispanic	3 (4)	8 (1)	
Non-Hispanic black or African American	5 (6)	67 (10)	
Other or >1 race	3 (4)	29 (5)	
Non-Hispanic white	70 (86)	540 (84)	
Education			.338
Less than high school	14 (18)	85 (13)	
High school graduate	37 (46)	303 (47)	
Some college	24 (30)	176 (27)	
College graduate	5 (6)	79 (12)	
No. cigarettes/d			.754
1–10	38 (47)	315 (49)	
≥11	43 (53)	331 (51)	
Plan to quit			
Next 6 mo	65 (84)	411 (67)	.002
Next 30 d	44 (70)	233 (61)	.172
Quit attempt in the last 3 mo			<.001
Yes	56 (69)	303 (47)	
Daily smoker	66 (83)	528 (82)	.215
Youngest child seen age, y			.437
≤1	30 (37)	199 (31)	
2–4	16 (20)	114 (18)	
5–9	19 (23)	155 (24)	
≥10	16 (20)	178 (28)	
Home and car smoking policy			
Someone smoked in their home in past 3 mo	26 (32)	224 (35)	.625
Someone smoked in their car in past 3 mo	52 (72)	327 (56)	.009
Someone used e-cig in their home in past 3 mo	50 (62)	69 (11)	<.001
Someone used e-cig in their car in past 3 mo	45 (63)	49 (8)	<.001
Assistance used the last 2 y			
NRT	23 (28)	142 (22)	.199
Quitline	8 (10)	23 (4)	.008
Child's insurance coverage			.707
Medicaid	46 (57)	385 (60)	
Self-pay	2 (3)	26 (4)	
Private insurance/HMO	32 (40)	231 (36)	

NRT indicates nicotine-replacement therapy; HMO, health maintenance organization.

*Missing data not included. Car items limited to parents who reported they have a car.

727 parents reported current use of cigarettes and of these, 81 (11.1%) also reported e-cigarette use, meeting the definition of dual use. In our sample of 216 parents who quit smoking in the past 2 years, 34 (15.7%) reported current e-cigarette use.

Of the 81 dual users, 73% were in the age group 25 to 44 years, 46% were high school graduates, 36% had some college education or had graduated college, 83% smoked every day, and 84% and 70% intended to quit smoking in the next 6 months and 30 days, respectively. As well, 56 (69%) of dual users had made an unsuccessful quit attempt in the previous 3 months, 23 (28%) had tried FDA-approved medications to help them quit smoking,

and 8 (10%) had called a quitline in the previous 2 years (Table 1).

Of the 81 dual-user parents, 32% and 72% reported that someone had smoked in their homes or cars, respectively, in the past 3 months. Of the 646 cigarette-only smokers, 35% and 56% reported that someone had smoked in their home or car, respectively, in the past 3 months. Of the dual users, 62% and 63% reported that someone had used an e-cigarette in their home or car, respectively, in the past 3 months. Of the cigarette-only smokers, 11% and 8% reported that someone had used an e-cigarette in their home or car, respectively, in the past 3 months.

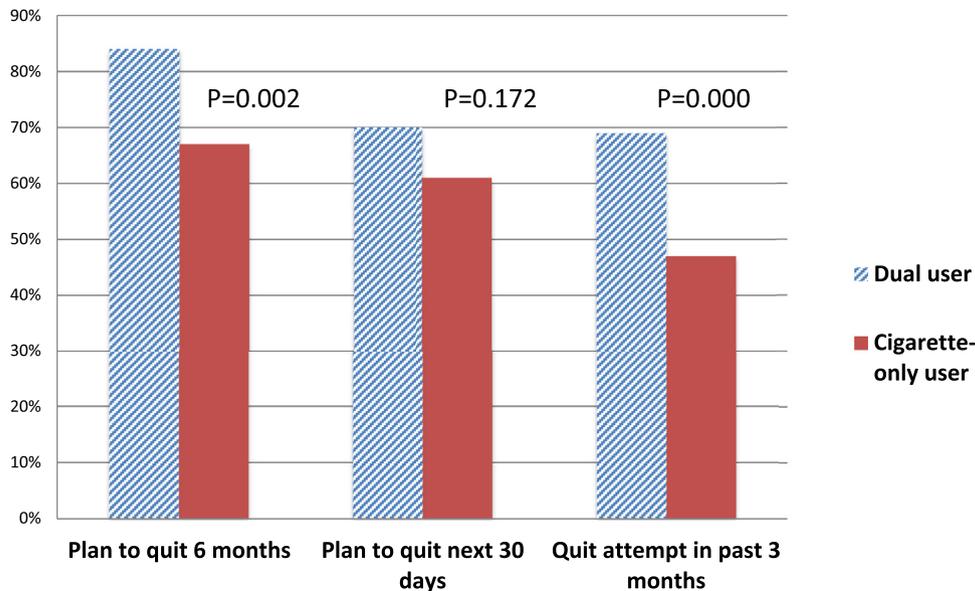


Figure. Readiness to quit and use of assistance to quit among parental dual users and parental cigarette-only users (N = 727).

The Figure shows that 84% of dual users planned to quit smoking in the next 6 months, compared with 67% of cigarette-only smokers; and 70% of dual users planned to quit smoking in the next 30 days, compared with 61% of cigarette-only smokers. Of the dual users, 69% had already attempted to quit in the last 3 months, compared with 47% of cigarette-only smokers.

Of the 81 dual users, 28 (34.5%) reported either calling the quitline or using NRT in the last 2 years to help them quit smoking, whereas of the 646 cigarette-only smokers, 157 (24.3%) reported calling the quitline or using NRT in the last 2 years to help them quit smoking ($P < .05$). Of those parents who reported calling the quitline or using NRT in the past 2 years, 82.1% dual users and 59.9% cigarette-only smokers reported making a quit attempt in the past 3 months ($P = .02$).

Bivariate analyses (Table 1) demonstrated an association between being a dual user and intention to quit in the next 6 months, having made a quit attempt in the past 3 months, having called a quitline in the past 2 years, smoking cigarettes in the car in the past 3 months, and smoking e-cigarettes in the home and the car in the past 3 months. We did not find any association between parent's age, race and ethnicity, education, intention to quit smoking in the next 30 days, or smoking cigarettes inside the home, with parental dual use.

The final multivariable logistic regression model (Table 2), adjusting for parent sex and education, showed that dual users, compared with cigarette smokers only, had 1.7 times greater odds of having a child <1 year old (infant) at the visit, 1.99 times greater odds of having the intention to quit smoking in the next 6 months, and 1.85 times greater odds of having tried to quit in the past (called the quitline or used medicine in the past 2 years to help them quit or made a quit attempt in the past 3 months) compared with cigarette-only users. Parent sex, education or numbers of cigarettes smoked per day were not associated with dual use.

In our sample of cigarette smokers, we found that 114 (17.6%) cigarette-only users and 21 (25.9%) dual users were asked about their smoking status; however, medication to help them quit smoking was discussed with 16 (2.4%) cigarette-only users and 0 (0%) dual users. Similarly, 13 (2.0%) cigarette-only users and 2 (2.5%) dual users were advised enrollment in the quitline.

DISCUSSION

In our sample of current cigarette smoking parents, we found that almost 11% were dual users of cigarettes and e-cigarettes. Dual users are more likely to have a child <1 year old at home, have the intention to quit smoking in the next 6 months, and tried to quit in the past (called the quitline or used medicine in the past 2 years to help them quit smoking or made a quit attempt in the past 3 months) relative to cigarette-only users.

Having a child <1 year old was associated with dual use of cigarettes and e-cigarettes. Data show that two fifths of US adults believe that children's exposure to e-cigarette aerosol causes some or little harm, whereas one third do not know whether it causes harm.²⁵ Such

Table 2. Characteristics Associated With e-Cigarette Use Among Current Cigarette-Smoking Parents (N = 727)*

Characteristic	OR	95% CI	P Value
Infant at home (<1 y old)	1.68	1.01–2.79	.044
Male	1.01	0.55–1.86	.953
Attended college	0.94	0.57–1.54	.813
Smokes >10 cigarettes per day	1.42	0.85–2.37	.172
Plan to quit in next 6 mo	1.99	1.08–3.67	.027
Tried to quit [†]	1.85	1.05–3.25	.031

OR indicates odds ratio; CI, confidence interval.

*Results from multiple logistic regression analysis.

[†]Parent is classified as "tried to quit" if they reported making a quit attempt in the past 3 months, using medication for quitting, or calling the quitline in the past 2 years for assistance.

beliefs also may be the reason that dual users had relatively high rates of smoking e-cigarettes in their home and car.^{21,23} A recent paper from the CEASE trial examined parents' strict rules about prohibiting e-cigarette and regular tobacco use in homes and cars, concluding that dual users were less likely than cigarette only smokers to report a variety of child-protective measures for the home and car.²³ The particles and toxicants released in e-cigarette aerosols, although in much lower concentrations than in combusted cigarettes,²⁶ may still pose health risks to users and bystanders.^{12,13,27} Another report entitled the Public Health Consequences of E-Cigarettes, an expert committee of the National Academies of Sciences, Engineering, and Medicine⁹ reported that there is conclusive evidence that e-cigarette use increases airborne concentrations of particulate matter and nicotine in indoor environments compared with background levels. The report also concluded that in addition to nicotine, most e-cigarette products contain and emit numerous potentially toxic substances. In addition, just like combusted tobacco smoke, the nicotine from e-cigarette aerosol can remain on indoor surfaces for weeks to months, causing third-hand exposure to toxicants.²⁸ Nicotine exposure is particularly harmful to the developing brains of children and adolescents.^{29,30} Considering recent evidence highlighting the harms of e-cigarette aerosols,⁹ there is a need for clinicians to deliver appropriate education and advice to e-cigarette users and dual user parents.

Dual users in our study were more likely to have tried to quit smoking than cigarette-only smokers. Almost 7 in 10 dual users had made a quit attempt in the past 3 months compared with fewer than 5 in 10 cigarette-only smoking parents. This finding is consistent with studies that have shown that dual users are significantly more likely than exclusive cigarette smokers to have made a quit attempt.^{31,32} This finding could suggest that these parents may have started using e-cigarettes as a method of harm reduction or a path to smoking cessation but since our data are cross-sectional, we cannot derive that inference. However, these data are consistent with existing evidence that current smokers report using these products to help reduce the number of cigarettes smoked or to quit smoking,¹³ despite insufficient evidence to recommend e-cigarettes for tobacco cessation.⁹

Significantly greater percentages of dual users in our study reported calling the quitline or using NRT in the past 2 years to help them quit smoking compared with cigarette-only smokers. These findings reinforce the opportunity for pediatric clinicians to promote the use of evidence-based treatment for nicotine dependence in the growing population of dual user parents.³³

Parents who use both e-cigarettes and cigarettes appear to have greater rates of contemplating quitting.³⁴ This finding is consistent with studies that have shown that greater proportions of dual users have high intention to quit compared with cigarette smokers,³⁵ further suggesting that this group may be more likely to accept effective cessation assistance treatments offered by their child's pediatrician.

In our sample, the majority of e-cigarette users (70%) also smoked cigarettes and almost 1 in 6 recent quitters of combusted tobacco were vaping e-cigarettes. Even though a comparison between the harmful substances released by cigarettes and e-cigarettes suggest that e-cigarettes are likely safer than cigarettes,³⁶ their overall effect on population health depends on how e-cigarettes are used.³⁷ Recent research suggests that even though vaping may reduce or partially replace cigarette use, e-cigarette dependence may increase over time without further reductions in smoking among those who maintain dual use.³⁸

Our data show that although some pediatric offices may have systems to prompt clinicians to screen for parental tobacco product use, few routinely deliver evidence-based tobacco control treatments to help parents quit. Pediatricians are in a unique position to help parents who use e-cigarettes and cigarettes^{39,40} in the following ways:

- **Screening:** Pediatric clinical settings could use systems like the CEASE intervention to routinely screen all families for combusted and non-combusted tobacco use.
- **Motivational messaging:** Pediatric settings have an opportunity to deliver evidence-based messages to parents about the harmful effects of nicotine and other toxins in both e-cigarette aerosol and combusted tobacco smoke.
- **Advising strict smoke-free and vape-free environments:** Considering the recent research about harms from e-cigarette aerosol,^{1,9,30} parents should be advised to protect their children from second- and third-hand tobacco smoke and e-cigarette aerosol by having strict smoke-free and e-cigarette aerosol-free homes and cars.
- **Treating with medications:** Pediatricians should prescribe evidence-based,³³ nonaerosolized, FDA-approved NRT in the form of patch, lozenge, and gum to help parents completely replace combusted tobacco and e-cigarettes.
- **Enrolling:** Pediatric offices should enroll tobacco product users in free resources like tobacco quitlines, cessation support Web sites, and texting services like smokefreeTXT.⁴⁰

LIMITATIONS

The results presented in this paper were generated from a secondary analysis of the data collected for the CEASE trial²⁴ and therefore the statistical tests were not specifically powered for the research questions posed in this paper. The sample size of dual users is small, so the results should be interpreted cautiously. Although surveys were administered in-person and directly following the pediatric office visit, the results are based on parental self-report and thus, are subject to recall and response bias. In addition, the results are based on cross-sectional exit-survey data and no causal inferences should be made for the observed associations. Despite these limitations, the statistically significant results add to the limited knowledge base about dual use of cigarettes and e-cigarettes in the parent population.

CONCLUSIONS

In this study, 11% of parents who smoked cigarettes were dual users of cigarettes and e-cigarettes, and the majority had made a quit attempt in the past 3 months. This study suggests that parents who smoke may view e-cigarettes as a cessation tool or as a harm-reduction aide despite insufficient evidence to support the efficacy or safety of e-cigarettes as a tobacco dependence treatment product. The fact that 70% of e-cigarette users were still smoking combusted cigarettes highlights the need for providing specific messaging and evidence-based tobacco dependence treatment to parents in this prevalent dual user group. Early identification of dual user parents could be helpful in identifying smokers who have recently tried quitting and may be particularly motivated to accept referral for effective treatment and prescription of safe forms of nicotine replacement therapy that do not expose infants and children to e-cigarette aerosols. Finally, this research study highlights the need for pediatric clinicians to provide a new message to parents about keeping homes and cars completely smoke-free and vape free.

ACKNOWLEDGMENTS

We especially appreciate the efforts of the American Academy of Pediatrics practices and practitioners.

Financial disclosure: This study was supported by the National Institutes of Health NCI grant R01-CA127127 (to J.P.W.). The funder had no role in the design or conduct of the study; collection, management, analysis, and interpretation of the data; or preparation, review, and approval of the manuscript.

REFERENCES

- United States Department of Health and Human Services. E-Cigarette Use Among Youth and Young Adults: A Report of the Surgeon General. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health. Published 2016. Available at: https://e-cigarettes.surgeongeneral.gov/documents/2016_sgr_full_report_non-508.pdf. Accessed April 10, 2019.
- Trehy ML, Ye W, Hadwiger ME, et al. Analysis of electronic cigarette cartridges, refill solutions, and smoke for nicotine and nicotine related impurities. *J Liq Chromatogr Relat Technol*. 2011;34:1442–1458.
- Schroeder MJ, Hoffman AC. Electronic cigarettes and nicotine clinical pharmacology. *Tob Control*. 2014;23(suppl. 2):ii30–ii35.
- QuickStats: Cigarette Smoking Status* Among Current Adult E-cigarette Users,† by Age Group—National Health Interview Survey,§ United States, 2015. *MMWR Morb Mortal Wkly Rep*. 2016;65:1177.
- McMillen RC, Gottlieb MA, Whitmore Shaefer RM, et al. Trends in electronic cigarette use among U.S. adults: use is increasing in both smokers and nonsmokers. *Nicotine Tob Res*. 2015;17:1195–1202.
- Mirbolouk M, Charkhchi P, Kianoush S, et al. Prevalence and distribution of e-cigarette use among U.S. adults: behavioral risk factor surveillance system, 2016. *Ann Intern Med*. 2018;169:429–438.
- Ghosh S, Bradley Drummond M. Electronic cigarettes as smoking cessation tool: are we there? *Curr Opin Pulm Med*. 2017;23:111–116.
- Hartmann-Boyce J, McRobbie H, Bullen C, et al. Electronic cigarettes for smoking cessation. *Cochrane Database Syst Rev*. 2016;2016:CD010216.
- Helen GS, Eaton DL. Public health consequences of e-cigarette use. *JAMA Intern Med*. 2018;178:984–986.
- Grana RA, Ling PM. “Smoking revolution”: a content analysis of electronic cigarette retail websites. *Am J Prev Med*. 2014;46:395–403.
- Hajek P, Phillips-Waller A, Przulj D, et al. A randomized trial of e-cigarettes versus nicotine-replacement therapy. *N Engl J Med*. 2019;380:629–637.
- El Dib R, Suzumura EA, Akl EA, et al. Electronic nicotine delivery systems and/or electronic non-nicotine delivery systems for tobacco smoking cessation or reduction: a systematic review and meta-analysis. *BMJ Open*. 2017;7(2).
- Kalkhoran S, Glantz SA. E-cigarettes and smoking cessation in real-world and clinical settings: a systematic review and meta-analysis. *Lancet Respir Med*. 2016;4:116–128.
- Siu AL. Behavioral and pharmacotherapy interventions for tobacco smoking cessation in adults, including pregnant women: U.S. Preventive Services Task Force Recommendation Statement. *Ann Intern Med*. 2015;163:622–634.
- Bao W, Xu G, Lu J, Snetelaar LG, et al. Changes in electronic cigarette use among adults in the United States, 2014–2016. *JAMA*. 2018;319:2039–2041.
- Cataldo JK, Petersen AB, Hunter M, et al. E-cigarette marketing and older smokers: road to renormalization. *Am J Health Behav*. 2015;39:361–371.
- Glasser A, Abudayyeh H, Cantrell J, et al. Patterns of e-cigarette use among youth and young adults: review of the impact of e-cigarettes on cigarette smoking. *Nicotine Tob Res*. doi: 10.1093/ntr/nty103.
- Goniewicz ML, Smith DM, Edwards KC, et al. Comparison of nicotine and toxicant exposure in users of electronic cigarettes and combustible cigarettes. *JAMA Netw Open*. 2018;1:e185937–e185937.
- Vuolo M, Staff J. Parent and child cigarette use: a longitudinal, multigenerational study. *Pediatrics*. 2013;132:e568–e577.
- Collaco JM, Drummond MB, McGrath-Morrow SA. Electronic cigarette use and exposure in the pediatric population. *JAMA Pediatr*. 2015;169:177–182.
- Garbutt JM, Miller W, Dodd S, et al. Parental use of electronic cigarettes. *Acad Pediatr*. 2015;15:599–604.
- Barrington-Trimis JL, Samet JM, McConnell R. Flavorings in electronic cigarettes: an unrecognized respiratory health hazard? *JAMA*. 2014;312:2493–2494.
- Drehmer JE, Nabi-Burza E, Hipple Walters B, et al. Parental smoking and E-cigarette use in homes and cars. *Pediatrics*. 2019;143:e20183249.
- Clinicaltrials.gov. Clinical Effort Against Secondhand Smoke (CEASE) Program or Standard Care in Helping Parents Stop Smoking. 2008. Available at: <https://clinicaltrials.gov/ct2/show/NCT00664261>. Accessed November 1, 2018.
- Nguyen KH, Tong VT, Marynak K, et al. Perceptions of harm to children exposed to secondhand aerosol from electronic vapor products, styles survey, 2015. *Prev Chronic Dis*. 2017;14:160567.
- Bush D, Goniewicz ML. A pilot study on nicotine residues in houses of electronic cigarette users, tobacco smokers, and non-users of nicotine-containing products. *Int J Drug Policy*. 2015;26:609–611.
- Grana R, Benowitz N, Glantz SA. E-Cigarettes. *Circulation*. 2014;129:1972–1986.
- Goniewicz ML, Lee L. Electronic cigarettes are a source of third-hand exposure to nicotine. *Nicotine Tob Res*. 2015;17:256–258.
- United States Public Health Service. Office of the Surgeon General. Preventing Tobacco Use Among Youth and Young Adults: A Report of the Surgeon General. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2012.
- England LJ, Bunnell RE, Pechacek TF, et al. Nicotine and the developing human. *Am J Prev Med*. 2015;49:286–293.
- Messer K, Vijayaraghavan M, White MM, et al. Cigarette smoking cessation attempts among current US smokers who also use smokeless tobacco. *Addict Behav*. 2015;51:113–119.
- Pasquereau A, Guignard R, Andler R, et al. Electronic cigarettes, quit attempts and smoking cessation: a 6-month follow-up. *Addiction*. 2017;112:1620–1628.

33. Fiore MC, Jaén CR, Baker TB, et al. Treating Tobacco Use and Dependence: 2008 Update. Clinical Practice Guideline. Rockville, MD: US Department of Health and Human Services. Public Health Service; 2008.
34. Prochaska JO, Velicer WF. The transtheoretical change model of health behavior. *Am J Health Promot.* 1997;12:38–48.
35. Nayak P, Pechacek TF, Weaver SR, et al. Electronic nicotine delivery system dual use and intention to quit smoking: will the socioeconomic gap in smoking get greater? *Addict Behav.* 2016;61:112–116.
36. Rigotti NA. Balancing the benefits and harms of E-cigarettes: a National Academies of Science, Engineering, and Medicine report. *Ann Intern Med.* 2018;168:666–667.
37. McRobbie H. Modelling the population health effects of e-cigarettes use: current data can help guide future policy decisions. *Nicotine Tob Res.* 2017;19:131–132.
38. Brandon T, Martinez U, Simmons V, et al. Dual use of combustible and electronic cigarettes: patterns and associations between products. *Tob Induc Dis.* 2018;16(1).
39. Jenssen BP, Wilson KM. Tobacco control and treatment for the pediatric clinician: practice, policy, and research updates. *Acad Pediatr.* 2017;17:233–242.
40. Winickoff JP, Nabi-Burza E, Chang Y, et al. Implementation of a parental tobacco control intervention in pediatric practice. *Pediatrics.* 2013;132:109–117.