E-cigarette Use and Effectiveness of Multimedia Cessation Tools in Adolescents

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BACKGROUND/ INTRODUCTION

Objectives: E-cigarettes (ECs) are battery operated devices created by Chinese chemist, Hong Lik, in 2003 and they have been sold commercially in the USA and Europe since 2007.[1] . They have been marketed as cigarette alternatives. Although e-cigarettes include less ingredients than regular cigarettes, they still contain harmful chemicals like acrolein, acetaldehyde, and formaldehyde.[2] Teenagers are the target audience for e-cigarette advertisements on billboards, social media and product packaging.[3,4,5] They cite flavor, discreteness, accessibility, experimentation, perceived safety, and targeted advertising as reasons for e-cigarette use.[4] E-cigarettes are readily available in vape shops and convenience stores and some are obtained from unaware parents or via coercion by peers.[5] **Purpose:** This pilot study is designed: to explore e-cigarette use, the social factors influencing use, the effects on systemic health associated with e-cigarette use, the role of healthcare providers (physicians and dentists) in addressing this issue, and strategies for cessation among adolescents and young adults ages 12-24 in the Nashville Metropolitan Statistical Area. **Research question:** Can dental providers be effective in discouraging the use of e-cigarettes in the adolescent and young adult populations? **Hypothesis:** Education can decrease the use of e-cigarettes in adolescents and young adults.

METHODS AND MATERIALS

Survey Design: Literature review was conducted from online medical databases PubMed, Journal of Student Research, and ResearchGate, using key words e-cigarette, vape, youth, tobacco, smoking, adolescent, EVALI. There were 64 academic articles and journals from 2009-2023 reviewed to aid in the development of pre- and post- questionnaires. The tablet- based self-administered questionnaires were designed to target adolescents, young adults, and healthcare providers (dentists and physicians) within multi-ethnic populations.
IRB: Approval was obtained at Meharry Medical College (Protocol #: 24-01-1432).
Patient Protocol: Informed consent/Assent was obtained. The survey included patient screener (**excluded: ASA III and >, Reside outside of Nashville Metropolitan Statistical Area**) and questions addressing the following: 1. Knowledge and awareness of e-cigarettes and their associated risks, 2. Attitudes and beliefs about e-cigarette use, 3. Utilization patterns and behavioral tendencies related to e-cigarettes, 4. Psychosocial determinants such as peer influence, family use, and media exposure and 5. Motivations for e-cigarette use, including flavor preferences and perceived safety.
Provider Protocol: Informed consent was obtained. The survey included a provider screener (**excluded: any provider without M.D., D.O., D.D.S. or D.M.D. credentials**) and questions that collectively address the healthcare provider's knowledge, practices, and beliefs regarding e-cigarette use, cessation, and its impact on health, particularly oral health. It also explores the provider's preparedness and willingness to discuss e-cigarette cessation with adolescent and young adult patients.
Educational Intervention: Education was provided to the patients via an e-cigarette video that demonstrates the harmful effects of e-cigarettes, both oral and systemic. Providers received their education by way of a fact sheet that detailed the risks associated with and the impacts of e-cigarettes on oral and systemic health and dispelled myths associated with e-cigarette use.
Follow-up: Both groups were administered a follow-up survey to determine effectiveness of education.
Data Analysis: The data was analyzed through a frequency-based approach, systematically quantifying the occurrence of each response selected in the survey to identify patterns and trends.

PATIENT RESULTS

Table 1. Survey Responses from Patients and Demographics

	Non-User Patients	User Patients
N (%)	86.6%	13.3% ***Frequency of Use*** • 1 user had not used an EC in >1 year • 2 users had not used in >6 months • 1 user smoked same day • 2 users also smoke marijuana ***Source of EC*** • Another person • Gas station or vape shop ***Reason for Use*** • "To relax" • "Smells better than cigarettes" • "Will help me quit using other tobacco products" • "Curiosity" • "To get high or a buzz from nicotine
Gender	57.6% female, 42.3% male	50% female; 50% male
Ethnicity	73% African American; 19.2% Hispanic; 3.8% Asian; 3.8% Other	50% Hispanic/Latino; 50% Caucasian
Beliefs	• 92.3% lack interest • 84.6% agree ECs have harmful chemicals	• 50% believe secondhand smoke is harmful but only 25% believe they will have physical health effects • 50% are concerned about affect of ECs on oral health and mental health

- **83.3% of respondents admit to their healthcare providers being trusted sources for receiving information about ECs**

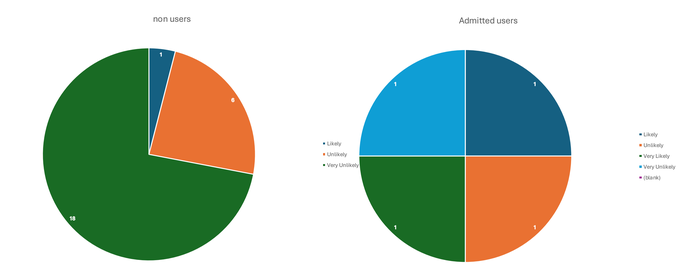

Figure 2. After reviewing the educational video, how likely are you to use an e-cigarette in the future?

Figure 1. *Why youth vape*. Centers for Disease Control and Prevention.

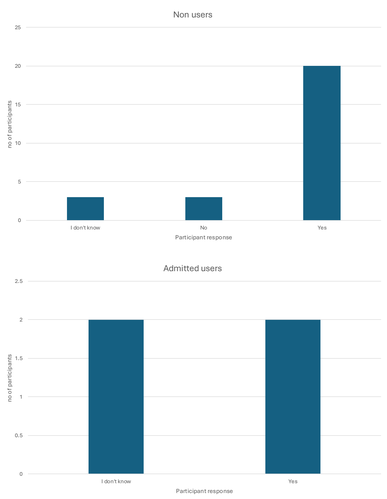

Figure 3. Can exposure to secondhand smoke from an e-cigarette cause health problems?

PROVIDER RESULTS

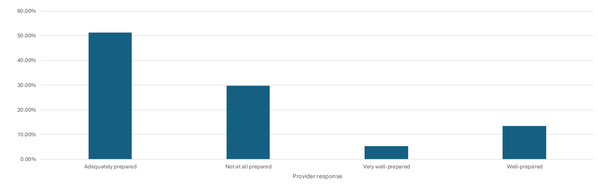

Figure 4. Preparedness to offer EC cessation counseling before reviewing the fact sheet. (n = 74)

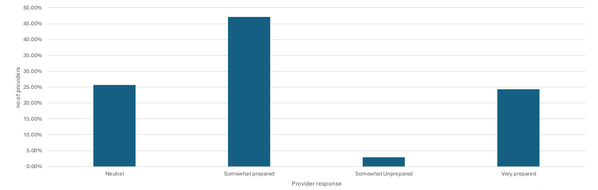

Figure 5. Preparedness to offer EC cessation counseling after reviewing the fact sheet. (n = 70)

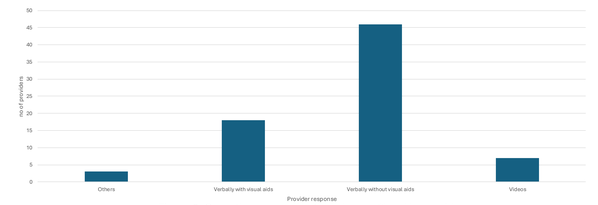

Figure 6. Cessation counseling techniques offered by providers.

Table 2. Demographics of Providers

DEMOGRAPHICS OF PROVIDERS	
n	74 initial surveys; 70 follow-up surveys
Gender	45.9% female; 54% male
Ethnicity	77% African American, 15.3% Caucasian, 4% Asian, 5.4% Other
Age	Range: • 25-65+ years • 25% 35-44 years
Credentials	70 Dentists (D.D.S. or D.M.D.) 4 physicians (M.D.)

- **Initial survey and Post-educational survey analyses demonstrated:**
  - **Beliefs and Preparedness:**
    - 98.6% of providers believed that EC use was harmful
    - 95% believed that it was important to discuss EC cessation options with adolescent and young adult patients.
  - **Training:**
    - 72.9% of the providers had not received any prior training or education on ECs or cessation options
    - 89.1% were interested in obtaining education about the impacts of ECs on oral health.
    - The majority of providers preferred receiving e-cigarette training via virtual learning or in person learning
  - **Patient Tracking/ Counseling:**
    - 43.2% of providers use one-on-one teaching for cessation
      - Only 12.1% track EC use during visits
    - 32.4% offer no cessation options
    - 85% believe repeated counseling is necessary for cessation
    - 59.5% stated that their personal beliefs impacted their recommendations to patients.

LIMITATIONS/ FUTURE RESEARCH OPPORTUNITIES

Due to our small sample size of 30 patients and 74 healthcare providers, **several limitations exist**:
- **Reduced statistical power** reduced ability to generalize findings to a larger population.
- **Sampling bias** – use of four Meharry Medical college clinics traditionally servicing individuals from a lower socioeconomic status.
- **Outliers** may disproportionately affect results.

Future research opportunities
- Expanding the sample size to include broader demographics
- Assess the impact of combined educational strategies (i.e. social media- based campaigns, apps and in-person interventions)
- Evaluate the behavioral and psychological predictors of e-cigarette use (personality traits, mental health status, risk behaviors, etc.)

Figure 7. *What are E-Cigarettes, Vapes, and Other Electronic Nicotine Delivery System (ENDS) Products*. Food and Drug Administration.

SUMMARY/CONCLUSION

1. Non-EC users are less likely to be convinced to use and more aware of the dangers of use than EC users, even after educational intervention. Cessation counseling must be ongoing.
2. Healthcare providers are viewed as trusted sources by patients but have insufficient education about EC risks and cessation methods. Providers should (1) counsel all patients on ECs and their consequences and (2) receive continuing education about ECs, cessation methods, and risks of use.
3. Further research is needed to expand sample size and explore implementation of policies aimed at reducing e-cigarette usage.

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