Assessing Electronic Nicotine Delivery Systems Use at NCI-Designated Cancer Centers in the Cancer Moonshot-funded Cancer Center Cessation Initiative

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Running title: ENDS use assessment at cancer centers

Declarations of Interest

The authors have no conflicts of interest to disclose.

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Prevention Relevance: This study identifies a gap in the systematic assessment of ENDS use among patients seen at 42 NCI-Designated cancer centers. Requiring the systematic assessment of both ENDS use and use of other tobacco products can inform evidence-based treatment of tobacco dependence and lead to improved cancer treatment outcomes.
Abstract
Assessing tobacco product use and delivering tobacco dependence treatment is an essential part of cancer care; however, little is known about electronic nicotine delivery systems (ENDS) or e-cigarette use assessment in cancer treatment settings. Given the importance of tailoring tobacco treatment, it is critical to understand how ENDS use is assessed in the electronic health record (EHR) in cancer care settings. Two questionnaires were completed by tobacco treatment program leads at 42 NCI-Designated Cancer Centers in the Cancer Center Cessation Initiative (January 1 to June 30 and July 1 to December 31, 2019). Items assessed how often smoking status and ENDS use were recorded in the EHR. An open-ended item recorded the text and response categories of each center’s ENDS assessment question. All 42 centers assessed smoking status at both time periods. Twenty-five centers (59.5%) assessed ENDS use in the first half of 2019, increasing to 30 (71.4%) in the last half of 2019. By the end of 2019, 17 centers assessed smoking status at every patient visit while six assessed ENDS use at every visit. A checkbox/drop-down menu rather than scripted text was used at 30 centers (73.2%) for assessing smoking status and at 18 centers (42.9%) for assessing ENDS use. Our findings underscore the gap in systematic ENDS use screening in cancer treatment settings. Requiring ENDS use measures in the EHR as part of quality measures and providing scripted text scripts to providers may increase rates of ENDS use assessment at more cancer centers.
Introduction
Tobacco use by cancer patients can impact their prognosis and response to cancer therapy.[1] About 18% of adult cancer survivors report current (conventional) cigarette smoking,[2] and 3% to 4% report current use of electronic nicotine delivery systems (ENDS), such as electronic cigarettes (e-cigarettes).[2-5] However, about 11.8% of young adult cancer survivors (age 18-34) reported current e-cigarette use in a national survey.[4] Further, national studies of cancer survivors have found that about 15% to 22% of current smokers report dual use of cigarettes and ENDS.[3,4] The health harms from cigarette smoking are numerous and well known. Evidence regarding the toxicity and health effects of ENDS use is still emerging, but research to date demonstrates ENDS use exposes users to toxicants including carcinogens[6] and to health risks including cardiopulmonary harm.[7] While some harmful health effects have already been documented, ENDS have only been widely available on the retail market for about 10 years, therefore the health effects of long-term use are yet to be determined. Research to understand the risks of ENDS use for cancer survivors (that is, patients at or after diagnosis) is needed.[8] In order to ensure that each cancer survivor receives effective and appropriate evidence-based cessation treatment, it is necessary to identify all tobacco use behaviors, including the use of ENDS. Incorporating screening for both smoking status and for ENDS use into the electronic health record (EHR) is a step toward sustainable, systematic cessation treatment that is relevant to each patient’s tobacco use behaviors.

Progress has been made with respect to assessing cigarette smoking in cancer treatment settings,[9] and the American Association for Cancer Research (AACR) and the American Society of Clinical Oncology have identified the need for a better understanding of ENDS use among cancer patients.[8] However, little is known about the assessment of ENDS use among patients treated in National Cancer Institute (NCI)-designated cancer centers (NDCCs). Assessment of ENDS use in general (noncancer) clinical settings has been low,[10] and most ENDS use documentation has been found in health care providers’ notes and comments in the EHR, rather than in discrete required EHR fields.[11] For those seeking to conduct research related to ENDS use and cancer-related behaviors and outcomes, or to develop cessation programs for cancer patients, it is important to know whether and how ENDS use is being assessed by providers in clinical cancer care settings.
The NCI Cancer Center Cessation Initiative (C3I) was designed to promote the consistent documentation of tobacco use and delivery of tobacco cessation treatment services for cancer patients.[12] In 2017 and 2018, 42 NDCCs across the United States (of 64 clinical NDCCs) were provided two years of funding to develop sustainable tobacco use screening and treatment services for the population of cancer patients they serve. One of the goals of C3I is to foster the dissemination of best practices to all NDCCs and to community oncology settings, to promote the consistent assessment and treatment of tobacco dependence among cancer patients nationwide. Sharing information about approaches to assess tobacco product use in the evolving tobacco control landscape is in service of this goal. This report describes the status of cigarette smoking and ENDS use assessment in the EHR at the 42 NDCCs that received C3I funding in 2017 and 2018.

Methods
All C3I cancer centers (N=42) completed a biannual questionnaire that provides program evaluation data to the C3I Coordinating Center at the University of Wisconsin; the questionnaire was determined to be exempt from Institutional Review Board approval. Data presented in this study are from two questionnaires fielded in 2019 (January 1-June 30 and July 1-December 31). The questionnaire, which is completed by either the Project Lead or the Program Manager/Director for the cancer center’s tobacco treatment program, included items regarding how often smoking status and ENDS use were initially recorded or updated in the EHR: “Is patient use of electronic cigarettes/electronic nicotine delivery system (ENDS; including any type of “vaping” device such as JUUL) assessed in the EHR?” Respondents reporting “Yes” to this item were then asked “How often is use of electronic cigarettes/electronic nicotine delivery systems (ENDS; including any type of “vaping” device such as JUUL) updated/recorded in the EHR?” with response categories: at new patient visits only; more frequently than new patient visits, but not at every visit; every patient visit; other. Two additional items were included in the January 1, 2019, through June 30, 2019 questionnaire for sites that reported collecting data on ENDS use in the EHR: 1) an open-ended item for respondents to enter the text of the question and the response categories used to assess ENDS use in the EHR, and 2) whether the assessment was required (“hard stop”) in the EHR. Smoking status is a required EHR field for hospitals to receive incentives through the Centers for Medicare and Medicaid Services Promoting Interoperability Programs;[13] therefore, the frequency of smoking status assessment and the text of the question/field in the EHR was captured for cigarettes.
Results
As expected, all 42 C3I cancer centers assessed smoking status in the EHR at both time periods (Table). In the first half of 2019, 25 centers (59.5%) also assessed ENDS use in the EHR; this increased to 30 centers (71.4%) in the last half of 2019. Although all centers are required to assess smoking status, the frequency of assessment varied. In the second half of 2019, smoking status was assessed at every visit at 17 centers (40.5%), up from 12 centers (28.6%) in the previous six months. The assessment of ENDS use at every visit was also implemented at more centers in the last half of 2019, increasing from three to six centers over the year. In both time periods, eleven centers (26.2%) reported inconsistent assessment or were uncertain of the frequency of ENDS assessment. Only two centers (5%) reported that the ENDS assessment was required to be entered into the EHR before proceeding with the rest of the visit (aka “hard stop” assessment).

A checkbox or drop-down menu within the EHR was used at 30 centers (73.2%) for assessing smoking status and at 18 centers (42.9%) for assessing ENDS use. Fewer centers used a specific question text or script for providers/clinicians to read to patients before selecting a response via a checkbox or drop-down menu. The text and degree of detail in the assessment varied across centers. Typically, centers captured ENDS use as a single response option to a question about tobacco types used. Some centers’ assessment of tobacco use was more general, asking whether patients had, in the last 30 days, used any type of tobacco including “cigarettes, cigars, vaping, e-cigarettes,” without distinguishing among these types. Terms to reference ENDS varied, and included “e-cigarettes,” “vapes,” “vaping,” “vaporizer,” “vape pens,” “other vaping devices,” or “personal vaporizer”; “electronic cigarettes,” “electronic nicotine products,” or “electronic nicotine delivery products”; or “mods,” “e-cigars,” “e-pipes,” “e-hookahs,” and “hookah pens.” One center reported that ENDS were categorized as an “other” tobacco product. Other centers collected a more detailed and specific assessment of ENDS use, capturing the frequency of use per week, or whether the respondent used ENDS currently every day, currently some days, formerly, or never; the cartridges used per day; and the start and end dates (duration of use). One center also assessed whether the ENDS contained nicotine.

Discussion
ENDS use is increasingly being assessed via the EHR at NDCCs participating in C3I. By the end of 2019, 71% of C3I centers included ENDS use in the EHR. Our findings that all C3I
centers capture cigarette smoking status, but not all capture ENDS use, may reflect that while smoking status assessment is required as a meaningful use measure in the EHR,[13] the assessment of other tobacco products is currently not required. Similarly, recent studies examining ENDS assessment in EHR systems outside the cancer center context[10,11] demonstrate informal, nonsystematic documentation, while systematic or required assessment is less common. One study in a large health care system found that it was feasible to modify the EHR to include documentation of ENDS use (separate from tobacco product use), but that ENDS use was assessed and documented at only 6% of patient visits in a 30-week post-implementation period.[14] Assessment can trigger important conversations between providers and patients about reasons for ENDS use, which may include help with quitting smoking, thereby facilitating a clinical conversation about evidence-based smoking cessation treatment options like pharmaceutical medications and behavioral counseling.[15,16]

Another important gap identified was the type of EHR field used to document both cigarette smoking status and ENDS use. Most centers employed a simple checkbox or drop-down menu without an accompanying text-based script for a provider to read to the patient. Without this script, the quality of patient-provider communication regarding tobacco use screening and treatment will likely depend on providers’ motivations and prior experience with delivering tobacco dependence treatment.[17] Insufficient training in tobacco dependence treatment and interventions has been identified by clinicians, including oncologists, as a barrier for assessing tobacco use and providing treatment.[18,19] Similarly, because of stigma and guilt surrounding tobacco use, cancer patients are often reluctant to proactively share their tobacco use behaviors with providers.[20] Providing a standardized script and EHR fields for the assessment of all tobacco products may help both patients and providers bridge the communication gap regarding smoking, ENDS use, and accessing cessation services. Examples of a standard EHR field and a script for providers to read is presented in research from the Mayo Clinic Cancer Center.[14, 21]

Our findings underscore the gap in systematic ENDS use screening in cancer treatment settings. Strengths of this study include a large sample of NDCCs and a longitudinal survey to assess changes in EHR assessment over a one-year period. While responses were self-reported, program leaders worked closely with clinical and IT staff to ensure that the reports were accurate, and documentation of the question text served as a form of validation. The cancer centers in the C3I were selected based on applications that indicated a commitment to
tobacco use assessment, however some centers were starting new programs while other programs were well established. All C3I centers received funding to expand tobacco use assessment and treatment, therefore the findings in this study may not be representative of other NCI-designated cancer centers, community oncology practices or other treatment settings with fewer resources available to make substantial changes to the EHR.

Requiring ENDS use measures in the EHR as part of quality measures[13] may encourage ENDS use assessment at more cancer treatment settings. Provider training and lack of time to conduct assessments during visits[14] and provider uncertainty regarding how to advise patients about ENDS use as an alternative to smoking,[22,23] are common barriers to assessing ENDS. To overcome these barriers, ENDS use assessment could be standardized within the EHR to occur at the initial visit or at key junctures in cancer therapy (e.g., each cycle of chemotherapy) and 6 to 12 months after therapy is completed, following NCI-AACR Cancer Patient Tobacco Use Assessment Task Force recommendations.[9] Further, there are models of tobacco dependence treatment in cancer center settings that reduce burden on oncologists by shifting the assessment to medical assistants[24] and electronically referring patients to treatment[21] by trained tobacco use treatment specialists who may be more equipped to handle questions about ENDS use specifically. Assessing tobacco use among cancer patients in both the context of exclusive ENDS use and concurrent use with other tobacco products can inform evidence-based treatment of tobacco dependence and lead to improved cancer treatment outcomes.

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**References**


Table 1. Current Smoking Status and E-Cigarette/ENDS Use Assessment in the Electronic Health Record (EHR) Among C3I-Funded NCI-designated Cancer Centers (N=42).

<table>
<thead>
<tr>
<th></th>
<th>January to June 2019</th>
<th>July to December 2019</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Smoking status</td>
<td>E-cigarette/ENDS Use</td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Any tobacco product use&lt;sup&gt;a&lt;/sup&gt; assessment</td>
<td>42</td>
<td>100.0</td>
</tr>
<tr>
<td>Frequency of tobacco product use assessment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Every visit</td>
<td>12</td>
<td>28.6</td>
</tr>
<tr>
<td>More frequently than new patient visits, but not every visit</td>
<td>25</td>
<td>59.5</td>
</tr>
<tr>
<td>New patient visits only</td>
<td>4</td>
<td>9.5</td>
</tr>
<tr>
<td>Don't know/inconsistently asked</td>
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<td>2.4</td>
</tr>
<tr>
<td>Tobacco product use not assessed</td>
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<td>0.0</td>
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<tr>
<td>Type of EHR field used for tobacco product use assessment&lt;sup&gt;b&lt;/sup&gt;</td>
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<td></td>
</tr>
<tr>
<td>Checkbox/drop down menu only</td>
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<td>73.2</td>
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<tr>
<td>Question text/script plus checkbox/drop down menu</td>
<td>11</td>
<td>26.8</td>
</tr>
<tr>
<td>Tobacco product use not assessed</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

<sup>a</sup>Tobacco product use refers to smoking status or e-cigarette/ENDS use as indicated by column headers.

<sup>b</sup>Center did not report on the type of EHR field used for assessing smoking status.

<sup>c</sup>Not applicable, items not present in the July to December 2019 questionnaire.
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