

Tobacco Use Assessment and Treatment in Cancer Patients: A Scoping Review of Oncology Care Clinician Adherence to Clinical Practice Guidelines in the U.S.

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Key Words. Tobacco • Cancer • Oncologists • Patients • Smoking cessation

ABSTRACT

Background. Smoking after a cancer diagnosis negatively impacts health outcomes; smoking cessation improves symptoms, side effects, and overall prognosis. The Public Health Service and major oncology organizations have established guidelines for tobacco use treatment among cancer patients, including clinician assessment of tobacco use at each visit. Oncology care clinicians (OCCs) play important roles in this process (noted as the 5As: Asking about tobacco use, Advising users to quit, Assessing willingness to quit, Assisting in quit attempts, and Arranging follow-up contact). However, OCCs may not be using the “teachable moments” related to cancer diagnosis, treatment, and survivorship to provide cessation interventions.

Materials and Methods. In this scoping literature review of articles from 2006 to 2017, we discuss (1) frequency and quality of OCCs’ tobacco use assessments with cancer patients and survivors; (2) barriers to providing tobacco

treatment for cancer patients; and (3) the efficacy and future of provider-level interventions to facilitate adherence to tobacco treatment guidelines.

Results. OCCs are not adequately addressing smoking cessation with their patients. The reviewed studies indicate that although >75% assess tobacco use during an intake visit and >60% typically advise patients to quit, a substantially lower percentage recommend or arrange smoking cessation treatment or follow-up after a quit attempt. Less than 30% of OCCs report adequate training in cessation interventions.

Conclusion. Intervention trials focused on provider- and system-level change are needed to promote integration of evidence-based tobacco treatment into the oncology setting. Attention should be given to the barriers faced by OCCs when targeting interventions for the oncologic context. *The Oncologist* 2019;24:229–238

Implications for Practice: This article reviews the existing literature on the gap between best and current practices for tobacco use assessment and treatment in the oncologic context. It also identifies clinician- and system-level barriers that should be addressed in order to lessen this gap and provides suggestions that could be applied across different oncology practice settings to connect patients with tobacco use treatments that may improve overall survival and quality of life.

INTRODUCTION

Smoking remains the most preventable cause of death worldwide. In the U.S. alone, tobacco use accounts for ~480,000 premature deaths every year [1]. Cancer patients and survivors face even greater risk from smoking than the general population. The 2014 Surgeon General’s report emphasized that continued smoking after a cancer diagnosis adversely influences health outcomes and overall survival, but quitting after diagnosis can improve cancer

prognosis, overall health, and quality of life [2]. The Clinical Practice Guidelines for Treating Tobacco Use and Dependence (TTUD) from the Public Health Service emphasize assessment and documentation of tobacco use in all clinical care encounters, along with referral to evidence-based treatments (including pharmacotherapy, nicotine replacement, and behavioral treatments, most of which are safe and efficacious in cancer patients; Table 1). Oncology

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Table 1. Smoking cessation therapy for cancer patients (adapted from National Comprehensive Cancer Network Guidelines Version 2.2017)

Treatment	Dosing and duration	Side effects, contraindications, and special considerations
Combination NRT ^a	<ul style="list-style-type: none"> Nicotine patch + short-acting NRT (lozenge, gum, nasal spray, inhaler) Begin with 21 mg nicotine patch. If it is not effective, consider adding an additional patch to increase dose to 35–42 mg Short-acting NRT can be taken every 1–2 hours as needed for cravings with a gradual dose reduction over 10 weeks Duration is 12 weeks (although treatment can be extended up to 6 months to 1 year to promote continued cessation)	<ul style="list-style-type: none"> Blood nicotine levels from combination NRT are significantly less than from smoking cigarettes Combination NRT is well tolerated and nicotine toxicity is rare and transient, even when used with continued smoking Patients commonly under-dose with combination NRT and nicotine overdose is rare, but possible and usually short-lived
Varenicline (Chantix) ^{a,b}	<ul style="list-style-type: none"> Initiate dosing 1–2 weeks prior to quitting Days 1–3: 0.5 mg orally once daily Days 4–7: 0.5 mg orally twice daily Weeks 2–12: 1 mg orally twice daily, if tolerated Duration is 12 weeks (although treatment can be extended up to 6 months to 1 year to promote continued cessation)	<ul style="list-style-type: none"> Nausea is a common side effect and may need to be managed for cancer patients, especially during chemotherapy Although rare, providers should monitor for the development or worsening of serious neuropsychiatric issues (i.e., depression and suicidal ideation/behavior) including in those without a previous history and discontinue if signs occur Review the Manufacturer Black Box Warning and weigh benefits of immediate smoking cessation and risks of increased hostility, depression, or suicidal behavior Contraindicated for patients with brain metastases because of seizure risk
Bupropion (sustained release) and NRT	<ul style="list-style-type: none"> Initiate dosing 1–2 weeks prior to quitting Adjust dose for hepatic insufficiency Day 1–3: 150 mg orally once daily Day 4–12 weeks: 150 mg orally twice daily, if tolerated Maximum dose is 300 mg/day Duration is 7–12 weeks (although treatment can be extended up to 6 months to 1 year to promote continued cessation)	<ul style="list-style-type: none"> Although rare, providers should monitor for the development or worsening of serious neuropsychiatric issues (i.e., depression and suicidal ideation/behavior) including in those without a previous history and discontinue if signs occur Review the Manufacturer Black Box Warning and weigh benefits of immediate smoking cessation and risks of increased hostility, depression, or suicidal behavior Bupropion is contraindicated for patients with seizure risks (i.e., stroke or brain metastases), those taking MAO inhibitors (increased risk of hypertensive reactions) or tamoxifen, or those with closed-angle glaucoma
Behavioral therapy/counseling ^a	<ul style="list-style-type: none"> 4+ sessions during each 12-week course of pharmacotherapy First session should occur within first 2–3 weeks Session duration of 10–30+ minutes Research suggests longer, more frequent sessions linked to higher success rates At minimum, brief advice should be delivered by an HCP Individual or group therapy, in-person and/or by phone, in coordination with a smoking cessation clinic is recommended if available If in active treatment, therapy can occur during scheduled oncology visits to avoid need for additional appointments Refer to smoking cessation quit line in addition to providing brief counseling from an HCP if face-to-face or group counseling is not available 	<ul style="list-style-type: none"> Should be performed by a tobacco treatment specialist or dedicated staff member (i.e., nurse or health educator) Should include skills training, support and motivational interviewing, plus print- or web-based patient education materials

Pharmacotherapy is most effective when combined with behavior therapy [4, 9].

^aIndicates preferred treatment method.

^bChantix; Pfizer, New York City, NY.

Abbreviations: HCP, healthcare provider; MAO, monoamine oxidase; NRT, nicotine replacement therapy.

professional organizations, including the National Comprehensive Cancer Network and the American Society of Clinical Oncology, have issued guidelines to emphasize the

importance of smoking cessation and establish evidence-based standards of tobacco use treatment (TUT) for cancer patients [3, 4].

Despite the guidelines and availability of evidence-based cessation approaches, smoking rates remain high among individuals diagnosed with cancer [5], and cancer centers have been slow to establish tobacco treatment services. In their survey of 58 National Cancer Institute (NCI)-designated cancer centers, Goldstein and colleagues found that only 58.6% reported TUT within their center (20.7% reported external TUT services and 20.7% had no TUT services) [6]. Only 38% of centers assessed tobacco as a vital sign and 48% had designated TUT personnel. Centers suboptimally implemented recommended clinician-oriented TUT practices: only 35% noted adequate training of clinicians and 9% provided regular feedback to clinicians about their cessation referral rates. Based on these findings, the authors recommended that cancer centers should institutionally fund internal TUT programs and implement quality improvement efforts and that NCI should take a more active role in TUT provision [6]. The NCI has issued a call to action for all cancer centers to address smoking cessation for cancer patients and survivors [7] and recently offered supplemental funds from the Cancer Moonshot Initiative to facilitate implementation of evidence-based TUT programs at NCI-designated cancer centers [8].

The TTUD clinical practice guidelines note that all health care professionals, including oncology care clinicians (OCCs), should provide at least brief intervention to every tobacco user. Data from general health care settings show that advice from a clinician is influential; even 3 minutes of advice and smoking cessation counseling may increase the odds of abstinence by 30%–50%, and meta-analyses show that advice from clinicians to stop smoking significantly increases quit rates [9, 10]. The ability to facilitate appropriate referrals and coordinate hand-offs is also important; direct introduction to a TUT professional (so-called “warm handoffs”) have been shown to increase enrollment in tobacco treatment programs over electronic referrals [11]. At each visit, clinicians should follow the 5As model of brief cessation intervention: (1) *Ask* all patients about their tobacco use; (2) *Advise* smokers to quit; (3) *Assess* smokers’ willingness to quit; (4) *Assist* smokers with cessation; and (5) *Arrange* follow-up contact to prevent relapse [9]. The 5As were formulated to be easily implemented across diverse clinical settings and patient populations and were designed with the understanding of busy clinic schedules [9]. For providers less comfortable with TUT delivery or with substantial time constraints, the 5As can be abbreviated to AAR: Ask, Advise, and Refer [9].

For patients receiving cancer care, an important step in successful TUT hinges on oncology care clinicians’ consistent and effective use of the 5As or AAR. OCCs are trusted sources of information and guidance for cancer patients [12]. The combination of patients’ advice-seeking and increased motivation to quit make the oncologic context a powerful opportunity to engage in conversations about smoking cessation [13, 14]. A cancer diagnosis may serve as a “teachable moment” in which motivation for and interest in tobacco cessation increase [15]. The entire period from diagnosis through survivorship has been described as a “window of opportunity” through which clinicians can intervene and assist cancer patients in the

tobacco cessation process [16]. Patients who continue to smoke after a cancer diagnosis often do not ask their OCCs for assistance because of stigma and guilt [17]. Therefore, clinicians play a critical role in initiating conversations about the risks of continued smoking after a cancer diagnosis, advising patients to quit, prescribing treatment, or providing referrals. Because relapse is common in this population, clinicians also play important roles in assisting patients in maintaining abstinence and preventing relapse [13].

REVIEW OBJECTIVES

This scoping review covers oncology care clinicians’ assessment and treatment of tobacco use among cancer patients and survivors through the framework of the 5As. We included papers that report data from multiple sources, including OCC self-report, cancer patient/survivor report, clinic or health system representative report, and objective data sources such as electronic medical records or billing codes. For the purpose of this review, we defined OCC as any clinician who provides cancer treatment, follow-up, or supportive care in the cancer trajectory. Based on more recent understanding of tobacco and cessation in the context of oncology and the release of the 2008 update to the “Treating Tobacco Use and Dependence” Clinical Practice Guideline, which established an expectation of standard tobacco treatment practices, we focused primarily on the last 10 years of research, addressing patient-, clinician-, and system-level barriers to providing tobacco cessation advice and treatment to cancer patients, as well as interventions to increase clinician adherence to practice guidelines.

MATERIALS AND METHODS

We conducted a scoping review in accordance with the methodological framework for scoping reviews published by Arksey and O’Malley [18] and advanced notably by Levac et al. [19], which includes guidance on identifying the research question, searching for and selecting relevant studies, charting the data, and summarizing the results.

Search Strategy

PubMed and PsycINFO electronic databases were initially searched in December 2016, with an updated search conducted on August 1, 2017, for potentially eligible studies published up to July 2017. The following key search words were used in different combinations: “teachable moment,” “providers,” “smoking cessation,” “oncology,” “tobacco,” “cancer,” and “5As” (e.g., [oncology OR cancer] and [smoking OR tobacco] and [provider OR clinician]). References were crosschecked, and all available abstracts were reviewed to obtain articles of interest. Articles were limited to human subjects, those written in English and published between 2006 and 2017.

Eligibility Criteria

To be included, studies were required to be empirical research focused on OCCs and to include data on at least one of following: (1) quality and/or frequency of conversations about tobacco use or cessation with adult cancer

patients or survivors, (2) barriers in discussing tobacco use with cancer patients and survivors, and (3) interventions to increase the quality and/or frequency of tobacco treatment for cancer patients or survivors. Empirical studies of clinical practice guideline adherence included surveys and/or qualitative interviews completed by cancer patients, survivors, OCCs, cancer center administrators, and/or reviews of medical records. Letters, conference abstracts, editorials, opinion papers, and reviews that did not report on unique data were excluded. Based on U.S.-specific guidelines, we only included papers reporting on data in the U.S. In the initial exploratory searches, we noted a limited number of studies explicitly assessing OCC adherence to all of the 5A components. To broaden the scope of the review, studies that assessed individual aspects or subsets of the 5As (e. g., tobacco use documentation, assessment, and counseling) and/or were not specifically described within the 5A or AAR frameworks were included (in the latter case, authors classified outcomes within the appropriate framework components). All authors were experienced in narrative, scoping, and systematic review methods. The first author (S.P.) conducted the literature search with support from the full team (J.S. and H.H.). Abstracts of identified articles were reviewed against inclusion criteria (S.P.), and studies were excluded if eligibility criteria were not clearly met. If a paper could not be excluded based on the abstract, the full article was reviewed. A spreadsheet was designed and used by S.P. to aid in data extraction and charting. Coauthors (J.S. and H.H.) then reviewed the results of the article selection and data extraction process, and results were discussed as a team to describe emergent themes in the literature and to resolve any disagreements. Data collected from each article included authors and author affiliations, title, journal, year of publication, study setting, eligibility criteria, participants (patient/OCCs/administrators), sample size, reference to OCC assessment and treatment of tobacco use among cancer patients in routine practice settings, barriers to tobacco assessment and treatment, and any outcomes from interventions designed to improve OCC provision of TUT.

RESULTS

Literature Search Results

The initial search yielded 922 articles, based on review of abstracts; 42 full-text articles were then accessed for eligibility, yielding 12 eligible articles. Three additional papers that were all eligible were identified after hand-searching the reference sections of relevant papers (Fig. 1). In total, 15 papers were included in this scoping review, but 2 papers (by Warren and colleagues, 2013 and 2015) reported on the same survey data, resulting in 14 unique studies (Table 2). Although the 5As or AAR were mentioned in the majority of the studies reviewed, only one (by Simmons and colleagues) explicitly labeled each A. Therefore, the remaining studies required some amount of translation into the 5A/AAR framework (e.g., deciding that prescribing tobacco cessation medication falls under “Assist,” despite the fact that the authors of the original studies did not describe it that way explicitly). Of the

14 unique studies, 3 focused on all 5As, 7 focused on a subset of the 5As, and 4 addressed only a single A or discussed adherence to clinical practice guidelines broadly, with terms such as “providers discussed tobacco cessation” or “patients were counseled on smoking cessation.”

Seven papers discussed barriers to 5A adherence. The papers used different approaches to examine clinician adherence to clinical practice guidelines, with seven studies using clinician report, five patient report, four Electronic Health Record (EHR) or billing codes, and two using report from clinic representatives or administrators. Eight of the fourteen studies collected data at academic medical centers, one study collected data from a community medical center, and five collected national/regional data from a variety of urban and rural practice settings, including private practice, academic institutions, managed care, and multispecialty groups. The majority of included studies (eight) focused specifically on OCCs treating tobacco-related cancers such as lung, head and neck, and genitourinary, whereas the rest studied the behavior of OCCs treating patients with a variety of tumor types, including those related and unrelated to tobacco use.

Frequency of the 5As in Oncology Settings

Ask All Patients About Their Tobacco Use

Oncology Care Clinicians were most likely to adhere to the first A, “ask all patients about tobacco use.” Across the seven relevant studies, 77%–100% of OCCs routinely asked about tobacco use at a patient’s initial visit [13, 20]. However, in the three studies that addressed follow-up, tobacco assessment rates dropped at subsequent visits [13, 21–23]. For example, Weaver and colleagues found that OCC-reported rates of smoking assessment dropped from 82.4% to 60.8% (for current smokers) and 42.5% (for recent quitters) at follow-up visits [22]. EHR review confirmed provider report in this study, with smoking status documentation rates ranging from 60% to 95% at patients’ initial visit and dropping to 5%–80% at subsequent visits [22]. Low rates of tobacco assessment and documentation may be due in part to lack of system-level infrastructure. For example, in their survey of 15 Wisconsin cancer clinics, Adsit and colleagues found that only 10 clinics collect smoking status and 8 assess for all tobacco use at every visit [25].

Advise Smokers to Quit

Among 10 reviewed studies that focused on this aspect, results indicated that 62%–100% of OCCs sometimes or always encourage current smokers to quit [20, 28]. Delivery of this advice was variable and not always detailed or evidence-based [9]. For example, in a survey of cancer patients smoking at diagnosis, 62% were advised to quit by an OCC, but only 44% reported being informed of the specific dangers of continued smoking during treatment [26]. Semistructured interviews noted that although providers feel confident in delivering their message to quit smoking, patients do not perceive their clinicians’ messages as particularly strong or helpful. When asked about the effectiveness of clinician messaging, patients reported that they would prefer a more balanced approach that emphasized

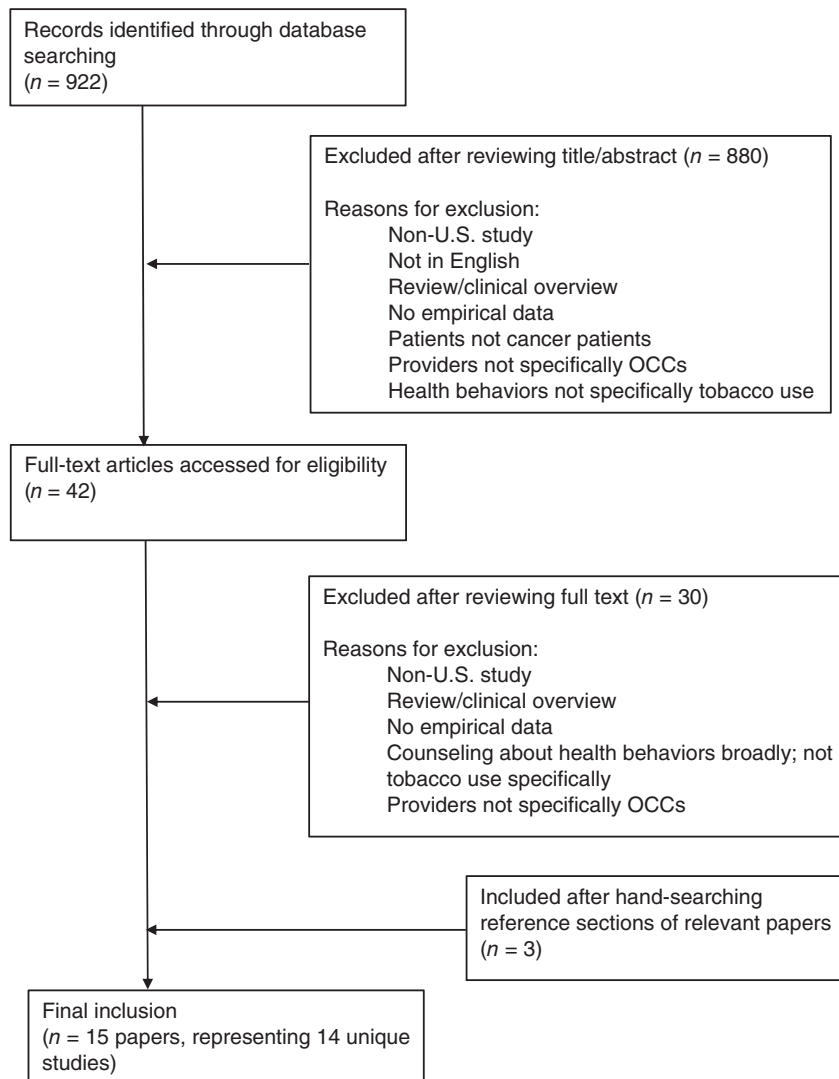


Figure 1. Search process.
Abbreviation: OCCs, oncology care clinicians.

the benefits of cessation in addition to the harms of continued smoking [13].

Assess Smokers' Willingness to Quit

Among the reviewed studies, only four documented adherence to “assessing” willingness to quit. In these studies, OCCs' rates of routinely assessing willingness to quit ranged from 46% to 80% [20, 21, 23, 25].

Assist Smokers with Cessation

Across nine of the reviewed studies, 20%–62% of OCCs routinely assist patients with tobacco cessation (e.g., discussing tobacco cessation or suggesting at least one treatment) [20–25, 27–29]. Rates of actively treating (prescribing medication or referring to appropriate treatment) are consistently low (generally <40%) based on patient and provider report, billing codes, and EHR documentation [20–24, 30, 31]. For example, in an analysis of billing claims from over 34 million enrollees with newly diagnosed genitourinary cancers and noted tobacco use disorder, only 5.3% had claims for smoking cessation interventions [30]. When treatment was discussed, varenicline or bupropion and nicotine replacement therapy

were recommended more frequently than psychological treatments in all but two reviewed studies [20, 22, 25, 27, 28, 30].

Arrange Follow-Up Contact to Prevent Relapse

Six studies examined OCC follow-up contact to prevent relapse, with rates ranging widely across reports (3.6%–72%) [20–24]. Studies examining whether OCCs arranged a follow-up call or visit specifically to assess quitting progress showed lower rates compared with studies that simply documented whether OCCs ask about smoking at subsequent appointments (3.6%–11.7% vs. 55%–71%) [20–24]. Oncology care clinicians were more likely to ask smokers if they have quit at a follow-up appointment than to ask a previously abstinent smoker if they have relapsed (70%–72% vs. 55%–62.7%) [21, 23].

Barriers to Providing Tobacco Assessment and Treatment

Clinician-Level Factors

Despite generally favorable attitudes toward TUT for cancer patients, more than half of OCCs in four different

Table 2. Provider documentation, assessment, and treatment of tobacco use in cancer patients

Study	Source of data	Type of data	Ask	Advise	Assess	Assist	Arrange	Notes and comments
Simmons et al., 2009	Patients and providers	Individual, semistructured in-depth interviews with 20 lung and head and neck cancer patients and 11 health care providers (oncology nurses, head/neck thoracic surgeons, nurse practitioners, physician assistants)	All 11 providers ask about current smoking status at initial visit; most providers did not discuss tobacco again at follow-up appointments unless they have reason to suspect that patient still smoking	All 11 providers advise patients to quit; majority of providers emphasized risk of recurrence; many patients reported not being asked to quit or that advice was not strong or helpful; most patients preferred a benefits-focused message and more balanced style	N/A	Providers reported referring patients to primary care for prescriptions and additional assistance; the majority of providers offer general quitting tips such as avoiding other smokers and using distraction techniques; several patients reported not receiving any cessation assistance from providers	Patients and providers reported that providers don't offer much advice for relapse prevention	Qualitative data; purposive sampling strategy used to gather sample balanced by tumor type and smoking status (abstinent vs. relapsed). Patients do not typically initiate smoking conversations, and some relapsed patients were uncomfortable discussing smoking with their providers because of stigma and guilt
Burke et al., 2009	Patients	Survey data from 34 patients who were active smokers when diagnosed with cancer	N/A	62% of patients who were smokers at diagnosis report being told to quit by their doctors; only 44% were explained the dangers of smoking for cancer patients	N/A	N/A	N/A	Surveys had a relatively low (19%) response rate; 58% of patients in the sample thought about quitting or tried to quit after diagnosis
Bjurlin et al., 2010	Providers	Anonymous survey data from 601 urologists treating bladder cancer patients	N/A	43% always, 49% sometimes, 8% never recommend quitting	N/A	20% always, 25% sometimes, 56% never discuss smoking cessation; 6% always, 56% sometimes, 38% never recommend nonprescription medications; 1% always, 27% sometimes, 73% never recommend bupropion or varenicline; 9% always, 23% sometimes, 68% never recommend support programs	N/A	Surveys had a 33% response rate; Only 5.7% of urologists received formal education on smoking cessation assistance, and of those, the majority (67.5%) were trained in nonmedical community classes; unclear whether practice patterns differ by practice type/setting
Cooley et al., 2011	Patients	Survey data from 160 lung and head and neck cancer patients within 120 days of diagnosis (includes both smokers and recent quitters)	N/A	79% of patients reported that a provider advised them to quit smoking	N/A	53% of patients reported that a provider recommended a specific smoking cessation treatment to assist in their quit attempt; most common types of assistance offered were pharmacotherapy alone (57.5%) and combined pharmacotherapy and behavioral treatments (27.2%)	N/A	Data collected as part of a larger prospective clinical study of smoking abstinence rates among lung and head and neck cancer patients
Gosselin et al., 2011	Patients	Survey data from 60 tobacco-using patients receiving usual care at dental/maxillofacial or head and neck clinics	76.6% reported being asked about tobacco product use	72.3% received advice to quit; 65% were informed of the benefits of cessation	N/A	20% provided information (such as written materials) about smoking cessation; 3.3% prescribed smoking cessation medication; 6.7% set a quit date	11.7% arranged follow-up/received a support call	Study investigated the impact of a brief staff training session on tobacco cessation methods using quasi-experimental design to compare usual care (pre-training) and enhanced cessation (post-training). Although enhanced group was more likely to be asked, advised, and offered medication, quit attempts and smoking abstinence were similar between conditions at 1-month follow-up
Simmons et al., 2012	Patients	Survey data from 167 lung and head and neck cancer patients who had quit smoking but were at risk for relapse or were planning to quit	93% of patients were asked by physicians or other staff if they smoked	76.1% were advised to quit	46.1% were assessed for interest in quitting	40.2% reported that a provider suggested at least one treatment; 11% received a prescription from an OCP	3.6% arranged a follow-up visit or phone call to monitor progress in quitting	Survey conducted as part of a larger study; patient-reported 5A receipt did not differ by patient sex, age, marital status, race, ethnicity, education, income, or nicotine dependence level
Weaver et al., 2012	Providers and EHRs	Survey of 74 outpatient oncology providers (hematology/medical oncology, surgical oncology/surgery, radiation oncology, other specialties, physicians, fellows, residents, physician assistants, nurse practitioners) and 120 medical records of breast, lung, head and neck, colon, prostate, and acute leukemia patients	82.4% of providers frequently or always assess smoking in new patients; dropped to 60.8% for current smokers and 42.5% for recent quitters at subsequent visits	86.5% frequently or always advise patients to quit smoking	N/A	<30% frequently or always provided intervention, including referrals, NRT or other medications, self-help materials, preparation for withdrawal, or advice to set a specific quit date; 48.7% of providers unaware of free state tobacco quit line; only 28.4% of providers had referred a patient to the free state tobacco quit line; smoking cessation interventions were documented in charts of <20% of identified smokers at the initial visit	<30% frequently or always follow up to assess progress with quitting	Neither clinician specialty nor cancer types treated (smoking-related vs. unrelated) significantly predicted whether clinicians offered quit assistance or assessed quitting progress

(continued)

Table 2. (continued)

Study	Source of data	Type of data	Ask	Advise	Assess	Assist	Arrange	Notes and comments
Warren et al., 2013	Providers	Survey data from 1,101 American Society of Clinical Oncology members in medical oncology, surgical oncology, radiation oncology, and other specialties, mostly physicians	At initial visit 90% routinely (always or most of the time) ask patients about tobacco use, but assessment rates decreases to 70% at follow-up visits	82.4% routinely advise patients to stop using tobacco; drops to 71.5% reinforcing importance of stopping tobacco use at subsequent visits	80% routinely ask patients if they will quit tobacco use	44% routinely discuss medication options; 39% provide cessation support (actively treat or refer patients for smoking/tobacco use cessation intervention)	69.7% ask patients if they have quit; 54.9% ask patients if they have relapsed	6.5% survey response rate
Goldstein et al., 2013	Oncology providers and cancer center program directors	Survey data from key staff of 58 National Cancer Institute-designated cancer centers (43 responses from program directors or director designees, 15 responses from oncology treatment providers)	53% of cancer centers report effective identification of outpatient tobacco use; 38% collect tobacco use as a vital sign	N/A	N/A	62% of centers reported routinely providing tobacco education materials to patients	N/A	Authors used data from only one respondent per center. Only 48% of survey respondents reported substantive knowledge about the tobacco use treatment clinical practice guidelines
Hildebrand, Sastry, 2013	EHRs	Medical records of 438 bronchogenic carcinoma patients who smoked at time of diagnosis (tobacco cessation counseling identified through billing codes, physician notes, and orders surrounding time of diagnosis)	N/A	N/A	N/A	36.1% received documented counseling on smoking cessation from one or more sources. On average, each patient encountered three different physicians in both the inpatient and outpatient settings, but there was no correlation between number of encounters and likelihood of being counseled, suggesting this may be provider-specific behavior	N/A	A patient was categorized as counseled if a clinician documented counseling in a note, referred the patient for counseling, billed for counseling, or ordered nicotine replacement therapy. There was no difference between those counseled and not counseled in terms of age, race, or sex, but patients with more advanced cancer were less likely to be counseled
Warren et al., 2013 and 2015	Providers	A survey of 1,507 members of the International Association for the Study of Lung Cancer, representing specialties in medical oncology, pulmonary medicine, radiation oncology, and surgery including doctors, nurses, and others	At initial visit, 90.2% of physicians routinely (always or most of the time) ask about tobacco use always or most of the time; 73.5% ask at follow-up visits	80.6% advise patients to stop tobacco use at initial visit; 70.8% reinforce the importance of cessation at follow-up visits	78.9% ask patients if they will quit	Only 40.2% discuss medication options; 38.8% actively treat or refer patients for tobacco use cessation intervention	71.6% ask if patient has quit at follow-up appointment; 62.7% ask if patient has relapsed after a quit attempt	40% survey response rate; compared with others (Canada, Australia, Africa, Asia, Europe), the U.S. is generally associated with equivalent or superior tobacco assessment and cessation practices
Macleod et al., 2015	Billing codes from the MarketScan database, 2007–2011	Inpatient and outpatient insurance claims of 5,777 smokers with tobacco-related GU malignancy aged 18–65	N/A	N/A	N/A	Provider-driven cessation claims are rare (5.3%). Among intervention recipients, 92% had claims for either counseling or medications; only 8% had both. Most claims-based interventions (61%) were within 3 months after GU cancer diagnosis, and patients who were diagnosed toward the end of the study period were 30% more likely to have a smoking cessation intervention claim	N/A	Primary outcome of interest was evidence of claims-based intervention for tobacco use within 12 months of diagnosis. Nicotine replacement was rarely billed because it can be acquired over the counter. Women, individuals with bladder cancer, and those with any comorbidity, and those treated in an inpatient setting were more likely to receive smoking cessation intervention
Adsit et al., 2016	Clinic representatives	A survey of 15 cancer clinics	Only 10/15 clinics assess smoking at every clinic visit; 8/15 assess for all tobacco use at every visit	38% always, 62% sometimes advise smoking cessation	46% always, 54% sometimes assess patient's willingness to quit	39% always, 46% sometimes, 15% infrequently provide cessation medication to interested patients; 31% always, 62% sometimes, 8% infrequently provide cessation counseling to interested patients; 15% always, 62% sometimes, 8% infrequently refer interested patients to internal services; 8% always, 54% sometimes, 15% infrequently refer patients to local/community cessation resources; 23% always, 31% sometimes, 23% infrequently refer interested patients to the Wisconsin tobacco quit line	N/A	Only four clinics reported having the capacity to create a list of patients who use tobacco, and only two of those clinics use this list to reach out to patients for tobacco cessation assistance. Most oncology clinic staff are open to receiving training and technical assistance to improve provision of TUT
Ma et al., 2016	Providers and EHRs	6-month retrospective review of clinic visit notes for 54 newly diagnosed head and neck cancer patients who were active tobacco users and a survey of head and neck oncology providers	N/A	N/A	N/A	Tobacco cessation discussions were documented in 28% of patients' medical records	N/A	Data collected as part of a quality improvement initiative

Abbreviations: EHRs, Electronic Health Records; GU, genitourinary; N/A, not applicable; OCC, oncology care clinician; TUT, tobacco use treatment.

studies reported lacking training and confidence to provide cessation assistance [21–23, 27, 32]. Experience was a predictor of practice patterns: Urologists with smoking cessation training and those who treated higher numbers of cancer patients were more likely to consistently provide assistance [27]. Smoking-related discussions were also considered lower priority, with assumptions that primary care clinicians had addressed it or that smoking cessation was not a specialist's responsibility [13, 22, 27]. Intent and experience were not sufficient in all domains; barriers to 5A adherence (especially Assist and Arrange) existed even among motivated practitioners who strongly agreed that smoking cessation was important to health outcomes [21]. Across a range of studies, the most frequently identified reasons for not providing assistance included the perception that patients lacked motivation or interest in quitting, that patients were already overwhelmed, or that patients were unwilling to stop [21–23, 31, 32]. Some providers were also concerned about patient resistance to treatment or feared that speaking about smoking would damage rapport [21–23, 32].

System-Level Factors

Across five separate studies, one third to one half of OCCs cited system-level factors, including lack of time and resources, as barriers to providing TUT [21–23, 27, 31, 32]. Some OCCs were also unsure where to refer patients or were unaware of community resources such as free quitlines [22, 23, 25]. In their quality improvement initiative, Ma and colleagues discovered only 13% of OCCs were aware of tobacco cessation resources prior to intervention [31]. Warren and colleagues also found that practice setting predicted provision of tobacco treatment. Compared with academic/university settings, clinicians practicing in nonacademic/hospital-based environments were significantly less likely to ask patients about tobacco use or advise them to quit [32].

In a survey of NCI-designated cancer centers, those with an “in-house” TUT program had better communication between providers, and point-persons emerged at these centers who made TUT a major part of their professional role [6]. Cancer center representatives surveyed about factors that would improve TUT most commonly endorsed stable funding, tobacco treatment specialists, space, training for staff, technical assistance for system enhancements, support from physicians, links to resources, and support from administration [6].

Interventions to Improve Adherence to 5As in Oncology Settings

Although delivery of the 5As in the oncologic context is a clearly identified concern, only two included studies examined interventions for OCCs to improve adherence to clinical practice guidelines. A recent project demonstrated the effectiveness of a brief educational intervention, which included a 10-minute TUT presentation for providers, distribution of a tobacco cessation “teaching sheet” with cancer-specific reasons to quit smoking and a list of available community resources, placement of reminder signs in clinic rooms to alert OCCs to counsel patients about smoking cessation, and the introduction of an EHR template to

facilitate tobacco use documentation and discussion at every visit [31]. Prior to the intervention, tobacco use status was recorded only during initial visits, but the process was modified so that it was assessed during vital sign collection at every visit. Five months after intervention, tobacco use discussion documentation increased from 28% to 56%, all head and neck OCCs could name at least one TUT resource in the community, and 88% of OCCs noted that the intervention prompted them to discuss tobacco cessation with their patients [31]. Gosselin and colleagues also tested the effect of a 1-hour education session for OCCs treating head and neck cancer patients and found that the intervention significantly increased the number of patients who were asked about their smoking status, prescribed cessation medications, and received cessation support calls [24].

LIMITATIONS

The results of this review must be considered in the context of its potential limitations. These include the use of one initial rater instead of multiple data extractors and lack of consultation with a medical librarian [18]. Although all study authors were experienced in conducting rigorous reviews and were actively involved in the search process, these potential limitations should be considered in the context of emerging guidelines on conduct of scoping reviews [33].

DISCUSSION

This review addresses the persistence of suboptimal tobacco assessment, referral, and treatment patterns in the oncology setting. It also highlights the need to address barriers, clarify roles within multidisciplinary cancer care teams, and develop scalable interventions to improve and sustain adherence to clinical practice guidelines, including the 5As/AAR.

The reviewed studies indicate that OCCs routinely implement the first two As (ask and advise) at patients' initial visit, but that the last three As (assess, assist, arrange) are delivered at much lower rates (<50%). Lack of training was identified as a primary barrier to referring and offering evidence-based tobacco treatments. Although tobacco use intervention has been increasingly integrated into medical school curriculums, practicing OCCs may also require additional instruction [20]. It is important to note that stigma and nihilism may play an insidious role in the quality and frequency of TUT delivery [34]. Therefore, efforts to train OCCs should emphasize compassionate, evidence-based 5A delivery, including Motivational Interviewing principles [35, 36]. The AAR model may be a better alternative to the 5As for OCCs who do not have training in direct cessation interventions. Educational efforts should extend beyond physician training alone; guidelines recommend that *all* clinicians who have contact with patients implement the 5A model, extending the clinical responsibility for TUT to the entire team of individuals providing cancer care. Being advised to quit by more than one type of health professional increases cessation attempts and readiness to quit [37]. Because nicotine dependence is by nature a relapsing,

chronic disease requiring repeated intervention, persistence is critical and a coordinated effort is necessary [9].

System-level changes are also needed, and any system-level efforts will require active participation by clinicians, insurers, and institutions. One important area of focus includes comparing different models for delivering TUT in oncology settings to elucidate preferred roles and opportunities for engagement (e.g., comparing in-house with external referrals or warm handoffs with automatic referrals). More research is also needed to better understand and address differences in adherence to TUT guidelines based on practice setting. Although promising strategies (e.g., dedicating a specialist or “champion” to provide TUT, standardizing systems to identify tobacco users) have been employed at several model cancer centers, the literature has not yet identified one program format that is superior, and different models may be necessary for various cancer care settings. Future research should compare or combine lessons learned from these implementation efforts and include evaluation measures such as cessation outcomes, service uptake, and cost-per-patient [9, 38]. Although NCI’s Cancer Moonshot-driven effort to facilitate integration of tobacco treatment into oncology settings at NCI-designated cancer centers is primarily a service implementation initiative, this effort may generate program evaluation data that could provide a broader roadmap for service integration.

CONCLUSION

Recent interventions have reduced burden on the provider in delivering TUT, including the use of prompts within EHRs and automated referrals and follow-up [39–41]. For example, one site integrated standardized tobacco assessment questions into the EHR to ensure patients were asked at each visit and automatic referrals to a dedicated tobacco cessation program were generated for current users and recent quitters [41]. Physicians had a minimal role in this process but were notified if patients required a prescription for a tobacco cessation medication. Automated support services such as interactive voice response telephone

calls provide additional assessment and follow-up points at a low cost and can generate opportunities for referral beyond the confines of the clinic visit.

Clinical reminders and decision support systems within the EHR can also reduce clinician burden in providing TUT. These systems have been implemented in a variety of settings to improve adherence to TUT guidelines and are cost-effective, sustainable, feasible, and acceptable [42–46]. Computerized clinical reminders increase the likelihood of documentation, engagement in counseling, and medication prescriptions, and they require minimal training to implement [47]. However, these electronic interventions have limitations, such as clinician pop-up fatigue, and they may need to include embedded strategies to increase clinicians’ motivation for use, such as generation of feedback reports [48]. Mobile health technology and targeting of household members and social support systems may also extend the impact of traditional behavioral support and pharmacotherapy cessation strategies. Although these strategies can reduce clinician burden, providers are a trusted source of advice and support during treatment and their role in TUT will remain important.

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DISCLOSURES

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