Preventive Health Care, 1999 Update: Prevention of Oral Cancer Mortality

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Abstract

Background

Approximately 3,000 new cases of oral cancer are diagnosed each year in Canada. Most of these cases occur among older adults with a history of tobacco use or excessive alcohol consumption. Preventive interventions for oral cancer include counselling of patients to modify risk factors and screening to identify precancerous and early-stage lesions. This report presents evidence-based guidelines on the prevention of oral cancer and precancer among asymptomatic patients.

Methods

Literature searches of the 1966-1999 MEDLINE and CANCERLIT databases were completed using the major MeSH heading "mouth neoplasms". References from articles and recommendations of organizations were also reviewed. The evidence-based methods of the Canadian Task Force on Preventive Health Care were used to assess evidence and to develop guidelines. Advice from experts and other recommendations were taken into consideration.

Results

In cohort and case-control studies, smoking cessation decreased the risk of oral cancer and precancer. Randomized controlled trials (RCTs) indicate counselling by trained health care professionals is effective in promoting smoking cessation. Although counselling has been effective for the reduction of excessive alcohol consumption in RCTs, no studies have examined whether alcohol reduction reduces the risk of oral cancer or precancer. The usefulness of general population screening is limited by the low prevalence and incidence of the disease, the potential for false-positive diagnoses and the poor compliance with screening and referral. There is no evidence that screening of the general population or high-risk groups leads to a reduction in mortality or morbidity from oral cancer.

Interpretation

There is good evidence to specifically consider smoking cessation counselling in a periodic health examination (grade A recommendation). For population screening, there is fair evidence to specifically exclude screening for oral cancer (grade D recommendation). For opportunistic screening during periodic examinations, there is insufficient evidence to recommend inclusion or exclusion of screening for oral cancer (grade C recommendation). For patients at high risk, annual examination by physician or dentist should be considered. Risk factors include tobacco use and excessive consumption of alcohol. These recommendations are similar to those made by the Canadian Task Force on the Periodic Health Examination in 1994 and by the U.S. Preventive Services Task Force in 1996.

MeSH Key Words: *counselling; mouth neoplasms; oral cancer, prevention; screening.*

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Oral cancer accounts for about 3% to 4% of all cancers and 2% to 3% of cancer-related deaths.[1] More than 90% of cases are squamous cell carcinomas, with the tongue and floor of mouth being the most common sites (75-85%). Despite low disease prevalences in developed countries, survival rates for patients with advanced stage lesions are generally 50% or less.[2] A preclinical phase is detectable as a white or red lesion, and treatment at an early stage may improve survival

rates to above 80%.[3] Unfortunately, most patients (67-77%) do not seek consultation until advanced cancer is present with symptoms of persistent pain.[4]

Preventive interventions for oral cancer include counselling of patients to modify risk factors (e.g., tobacco use and excessive alcohol consumption) and screening to identify precancerous and early-stage lesions. Previous guidelines have recommended that health care professionals deliver smoking cessation counselling to patients,[5,6] but uncertainty exists about the effectiveness of screening interventions. The use of a visual clinical examination to screen asymptomatic individuals for oral cancer and precancer has been advocated as an easy, non-invasive method to reduce disease-related morbidity and mortality,[2] and the disease appears to fulfil many of the criteria for suitability for screening interventions.[7] However, in North America, screening for oral cancer has been controversial because of the low prevalence and incidence of disease; the approximate number of new cases per year is 3,000 in Canada and 30,000 in the United States.[8,9] Consequently, large numbers of people must be screened to identify the few who will benefit, and the lives of those saved must be weighed against the financial costs of screening and of incorrect diagnoses.

Burden of Suffering

The estimated incidence of oral cancer in Canada was 3,090 in 1996, and the estimated number of deaths was 1,070 — 1.7% of all cancer deaths.[8] From 1987 to 1991, the actual number of new cases per year showed little variation, ranging from 2,837 to 3,017. The number of deaths during this period ranged from 960 to 1,026. The potential years of life lost due to oral cancer was 17,000 in 1993. Most new cases were found among men aged 50 and over (71% of all cases); for men, the probability of developing oral cancer was found to increase from age 50 to 90 from 0.2% to 1.7%.

Reported five-year survival rates for patients are often 50% or lower. These rates have not improved substantially since the 1960s, because diagnosis usually occurs when nodal involvement and metastases have occurred (stages III or IV).[9] In the advanced stages of the disease, morbidity and mortality are both high, and treatment at later stages may lead to impaired function, pain and disfigurement.[10,11] Speech, appearance and chewing ability may all be adversely affected by the disease or its therapy. In a one-year follow-up study of patients who had received cancer therapy, side effects were found to affect eating in 23 of 25 patients.[12] Financial costs of the disease are also high, since rehabilitation and prosthetic replacements are often necessary following treatment.

Methods

Extraction of Evidence

Between January and March 1999, literature searches of the 1966-1999 MEDLINE and CANCERLIT databases were completed. The following MeSH headings and text words were used: mouth neoplasms, oral cancer, precancer, screening, population surveillance, therapy, smoking cessation, alcohol reduction and evaluation studies. Articles were also identified by manual searches of relevant journals and by reviewing references from appropriate studies. Only articles in English-language journals were reviewed.

Inclusion and exclusion criteria were used to select appropriate studies. Case reports, expert opinions, review articles and abstracts were excluded. Studies of precancer and cancer therapies were included only if lesions were of the oral cavity or oropharynx: sites 140 to 149 of the International Classification of Diseases (ICD-9).[13] Articles about cancer therapy had to include patients with early-stage disease. Specific outcome results for stage I or stage II had to be reported. (Stage I refers to the TNM classification T1N0M0 and stage II to T2N0M0; in both of these stages no nodal involvement or metastases are present.)

Critical Appraisal and Consensus Development

This evidence was systematically reviewed using the methodology of the Canadian Task Force on Preventive Health Care. This Task Force of expert clinicians and methodologists from a variety of medical specialities used a standardized, evidence-based method for evaluating the effectiveness of this intervention. The lead author prepared a manuscript providing critical appraisal of the evidence. This included identification and critical appraisal of key studies and ratings of the quality of this evidence using the Task Force's established methodological hierarchy (Appendix 1), resulting in a summary of proposed conclusions and recommendations for consideration by the Task Force. This manuscript was precirculated to the members in April 1998, and evidence for this topic was presented by the lead author and deliberated upon in a Task Force meeting in May 1998.

At the meeting, the expert panellists addressed critical issues, clarified ambiguous concepts and analysed the synthesis of the evidence. At the end of this process, the specific clinical recommendations proposed by the lead author were discussed, as were issues related to clarification of the recommendations for clinical application and any gaps in evidence. The results of this process are reflected in the description of the decision criteria presented with the specific recommendations. The final decisions on recommendations were arrived at unanimously by the group and the lead author.

Procedures to achieve adequate documentation, consistency, comprehensiveness, objectivity and adherence to the Task Force methodology were maintained at all stages during review development, the consensus process and beyond. These procedures were managed by the Task Force Office under supervision of the Chairman and ensured uniformity and impartiality throughout the review process. The full methodology is described in Woolf and others.[14]

Results

Risk Factors

It has been estimated that approximately 75% of all oral malignancies in the United States are attributable to tobacco or alcohol intake or both.[15] Evidence from both case-control and cohort studies indicates a causal relationship between these two risk factors and oral cancer.[15-21] Case-control studies in the United States and Canada have documented a fourfold or higher increase in deaths from oral cancer among smokers and alcohol abusers as compared to the general population.[15,17,18] Both factors are associated with oral cancer in a dose-response fashion and have a synergistic effect when combined. In one study, the odds ratio (OR) associated with men who were heavy smokers but non-drinkers was 7.4; the OR for non-smoking heavy drinkers was 5.8; for men who were heavy smokers and heavy drinkers the OR was 37.7.[15]

Although an interaction has been shown, the independent effects of tobacco and alcohol have been difficult to determine, and studies have found conflicting results. Both tobacco[22,23] and alcohol[18,24,25] have been described as the more important risk factor, while other researchers have found comparable results for the two factors or sex differences.[15,16,26] In addition, two studies have found differences by anatomic location, alcohol being the stronger risk factor for oral and pharyngeal cancer and smoking the stronger factor for laryngeal cancer.[18,20] A major difficulty in the study of tobacco and alcohol as risk factors is that most oral cancer patients have used both products. Further research is necessary to determine the relationship between oral cancer, alcohol use and tobacco use.

Other risk factors for oral cancer include previous upper aerodigestive tract malignancy or oral malignancy,[27,28] an age of 60 or older,[29] human papillomavirus[30] and exposure to ultraviolet light (lip cancer).[31] There is no known association between oral cancer and denture wearing or denture biomaterials.[32-34] Betel-quid chewing has been shown to be associated with oral cancer in epidemiological studies.[35,36] It is questionable, however, whether betel juice alone enhances the risk of oral cancer or if the effect is due to the tobacco added to the chewing mixture.[36-38]

Manoeuvres

Counselling to modify risk factors. Primary prevention of oral cancer may involve counselling on the cessation of tobacco use or counselling on the reduction of alcohol consumption. Figure 1 shows the causal pathway for the counselling manoeuvre.

Evidence from randomized controlled trials documents the effectiveness of smoking cessation counselling directed toward adults.[39,40] Counselling by health care providers has been shown to increase smoking cessation rates over 6 to 12 months relative to interventions where there is no provider.[39-42] Health care providers in these studies include physicians, dentists, nurses and dental hygienists. However, a lack of training or interest in smoking cessation exists among many health care

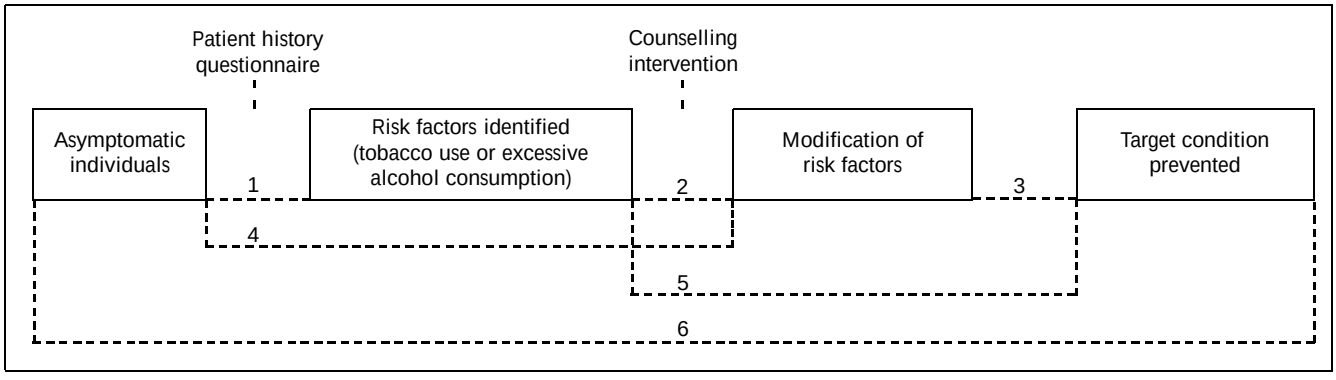

Figure 1: *Causal pathway for smoking cessation and alcohol reduction counselling.*

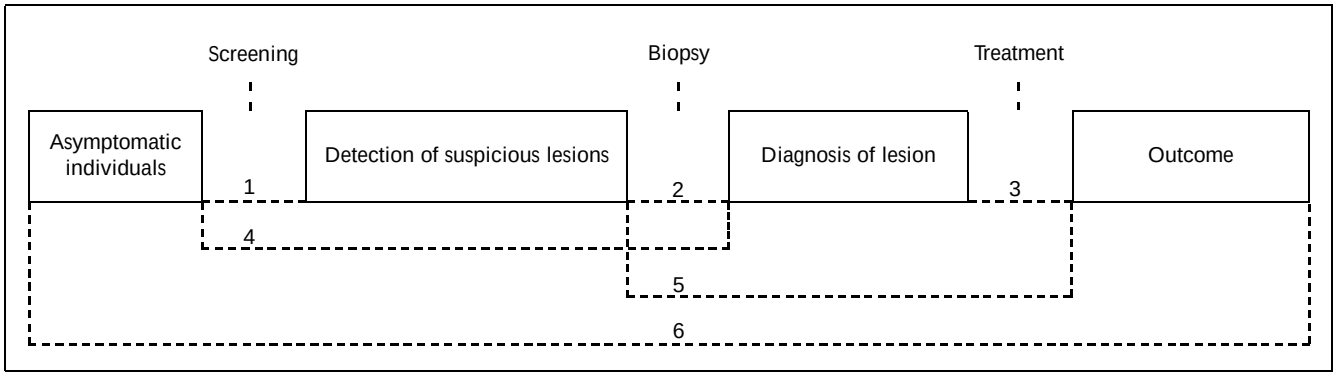

Figure 2: *Causal pathway for screening for oral cancer and precancer.*

professionals, especially dentists. Physicians are more likely than dentists to report that they routinely advise smoking patients to quit; 30% to 40% of dentists and 70% to 80% of physicians report doing smoking cessation counselling.[43] Results from a population-based survey of dental patients also suggest that dentists under-utilize tobacco cessation advice.[44]

In randomized controlled trials, counselling for the reduction of excessive alcohol consumption, defined as 15 or more drinks per week,[15] has been found to significantly reduce alcohol consumption among problem drinkers and to reduce the frequency of binge drinking and excessive drinking.[45-48] A limitation of these studies is the use of self-report data, although several studies also conducted family-member interviews to corroborate subject self-report. Counselling for alcohol reduction has been assessed only among medical professionals. Dentists should refer patients with alcohol problems to a trained medical professional.

Screening for oral cancer and precancer. Figure 2 shows the causal pathway for the screening manoeuvre. The assessment of screening interventions examines (a) the ability of examiners to identify suspicious lesions and (b) the accuracy of diagnostic procedures.

(a) Population-based studies of screening programs to identify suspicious lesions by oral physical examination have generally found high specificity (98-99%), but sensitivity has varied greatly (56-94%) (Table 1).[49-53] Positive predictive values have also varied (15-91%) depending on the prevalence of oral cancer. Consequently, due to the low prevalence of oral cancer in developed countries, two significant issues for screening programs are a low yield in the general population and a high proportion of false-positive referrals.

In eight reports of population-based screening efforts, the yield of suspicious lesions was less than 6% overall and was under 2% in five studies (Table 2).[49-52,54-57] The yield of cancerous lesions, confirmed by biopsy, was much lower (not greater than 0.05%), and three studies failed to detect any cancerous lesions. Screening programs that focus on high-risk groups may substantially increase the yield for both suspicious and confirmed lesions. A screening program in northern Italy

Table 1 Results from studies of screening for oral cancer by clinical examination

Study	N	Examiners	Gold Standard	Sensitivity	Specificity	Type of Program
Mehta and others[49]	33,331	35 trained health workers	2 dentists	56%	98%	Regional screening program in India
Ikeda and others[50]	3,131	4 general dentists	1 oral pathologist	73%	73%	Screening program for factory and office workers in Japan
Downer and others[51]	553	2 general dentists	1 specialist in oral medicine	71%	99%	Company screening program in London (UK)
Jullien and others[52]	985	2 general dentists	1 specialist in oral medicine	74%	99%	Screening in UK dental hospital and medical practice
Mathew and others[53]	2,069	42 trained health workers	3 physicians	94%	99%	Regional screening program in India

Table 2 Yield of suspicious and cancerous lesions from studies of screening for oral cancer by clinical examination

Study	N	Site	Yield of Suspicious Lesions (%)	Yield of Confirmed Cancerous Lesions (%)	Number of Confirmed Cancerous Lesions
Bouquot and Gorlin[54]	23,616	USA	3.4	0.01	2
Mehta and others[49]	33,331	India	1.3	0.05	20
Banoczy and others[55]	7,820	Hungary	1.3	0.05	1
Ikeda and others[50]	3,131	Japan	5.3	0.0	0
Talamini and others[58]	212	Italy - high risk group	9.5	2.4	5
Downer and others[51]	553	UK	5.5	0.0	0
Fernandez and others[56]	13 million	Cuba	0.2	0.005	705
Field and others[57]	1,949	UK	0.2	0.05	1
Jullien and others[52]	985	UK	1.2	0.0	0

for older male alcoholics reported that 5 of 212 subjects had oral cancer, a yield of 2.4%.[58]

The above studies must be interpreted with caution because of the use of specialists as the gold standard for evaluation and the use of different types of health workers as examiners. Other variations between studies include the protocol for training examiners, the criteria used for diagnosing lesions, the location where examinations were performed and the equipment and light source used. Not surprisingly, the highest diagnostic values (94% and 99%) were obtained in the study that used the most extensive training program.[53] In this study, examiners underwent a 6-week program of lectures and clinical education in epidemiology, diagnosis and the management and prevention of oral precancer and cancer; the examiners were then tested (written and practical). Based on the test results, the best health workers were selected as examiners. In other studies, training programs were not as extensive and were either of 2 to 5 days[49] or of an unspecified duration.[50-52]

The three studies employing dentists as examiners had similar results for sensitivity (71-74%).[50-52] These values were low compared to a sensitivity of 94% obtained in a study using other health care workers.[53] A possible explanation may be that dentists in these studies were not formally trained in standardization, and were only advised of the diagnostic criteria for identifying positive and negative cases. The low sensitivity results may reflect general dentists' lack of training in the detection of oral cancer and precancer and a failure to seek continuing education to maintain their training. Studies to determine the sensitivity and specificity of oral cancer examinations conducted by physicians have not yet been done.

Vital staining of suspected lesions with toluidine blue (tolonium chloride) might serve as an adjunct to visual examination. Sensitivity and specificity are high (average 97% and 91%) when staining is done by experienced clinicians in specialized institutions, but the test characteristics are unknown for less experienced clinicians in general practice settings.[59,60] For screening purposes, results from a meta-analysis suggest that vital staining is of limited usefulness due to the low prevalence of oral cancer.[59] The yield of suspicious lesions would be increased, but this increase would not be substantial.

Regardless of their response to toluidine blue staining, all suspicious lesions should undergo tissue biopsy. Staining is not a substitute for biopsy nor is it a replacement for detailed visual and digital head and neck examination. However, tissue stains may assist clinicians in determining the extent of lesions, in selecting sites for biopsy and in following up patients after cancer treatment.[61] Therefore, the use of vital staining as a screening measure in the general population is not supported, but this procedure may be useful in the assessment of high-risk patients and suspicious lesions.

(b) Screening by clinical examination is not intended to be diagnostic. Biopsy is currently recognized as the definitive method of diagnosing oral cancer. However, recent studies of observer agreement have led researchers to question the ability of oral pathologists to diagnose cases based on histologic examination. Three studies (one in Denmark and two in the United States) have assessed inter-rater agreement between oral pathologists in the diagnosis of oral epithelial dysplasia (one of the criteria for malignant diagnosis).[62-64] All studies involved the examination of histologic specimens by pathologists followed by a comparison with either other pathologists or the sign-out diagnosis. The total number of slides examined by each observer ranged from 100 to 120; slides represented a spectrum of dysplasia, which varied, in the authors' opinions, from no dysplasia to severe dysplasia, or carcinoma-*in-situ*. Observers classified dysplasia according to the following grades: none, mild, moderate and severe. Kappa values for exact agreement of diagnosis did not exceed moderate agreement and ranged from 0.15 to 0.45.[62,63] The addition of clinical information did not improve agreement; it actually decreased agreement (0.10-0.23).[64] For agreement within one diagnostic grade, agreement was much higher, ranging from 0.70 to 0.88.[63] Disagreements of two or more grades occurred in 6% to 20% of cases.

Most classification differences were of one grade; in those cases, it is likely that treatment planning decisions would not have been substantially different. However, no studies have examined the influence of biopsy assessment on treatment planning, and other factors must also be considered (e.g., patient history). Thus, the clinical significance of inter-examiner differences can only be speculative. Nevertheless, these results indicate that classification of dysplasia is an inexact science. Further advances in molecular biology may provide more objectivity and consistency in the assessment of lesions and their prognosis.[65]

Effectiveness of Counselling and Screening

Effectiveness of counselling. Case-control studies indicate that smoking cessation decreases the risk of developing oral cancer.[15,23,66] Odds ratios for ex-smokers become equal to ratios for non-smokers after 10 years of cessation. Furthermore, a 10-year follow-up study in India found that an anti-tobacco education program resulted in a decrease in the incidence of precancerous lesions among the intervention cohort compared to a control group.[67] However, school-based programs have had mixed results,[68-70] and smokeless tobacco cessation programs have been assessed only in small case series.[71]

Studies have failed to show that alcohol reduction leads to a decrease in the risk of oral cancer or precancer. Further research is necessary to establish the link between alcohol reduction and end-state outcomes (i.e., causal links 3, 5 or 6).

Effectiveness of screening. At present, only one study has reported data applicable to "causal link 6", which represents the most direct line of evidence. In a non-controlled study of an oral cancer screening program in Cuba, approximately 13 million examinations were performed in government-sponsored dental offices over a six-year period (1984-1990).[56] Although the proportion of early stage cancers detected by examiners increased from 24% to 49%, there was no change in Cuba's oral cancer incidence and mortality over the study period. The program identified only 16% of the new oral

cancer cases reported by the cancer registry during this period. However, the usefulness of these results is limited due to problems in study design: no control group was used, and the time period may have been too brief to detect improvements. It is doubtful that the screening program was implemented as intended, because less than 30% of subjects with suspected lesions complied with referral and less than one-quarter of the target population was screened annually.

No randomized controlled studies have yet evaluated the effectiveness of screening for oral cancer. In 1995, a randomized controlled screening intervention study was begun in India, but results will not be available for at least 7 to 10 years.[53] When available, these results should be interpreted with caution, because of their lack of generalizability to Canada. The oral cavity is the leading site of cancer in India, and the use of population-based screening programs is more feasible. The results may, however, be applicable to certain high-risk subgroups within Canada (e.g., people from Southeast Asia).

Effectiveness of Treatment

Oral precancerous lesions. Oral precancer refers to lesions considered to have malignant potential because they may exhibit dysplasia. Oral epithelial dysplasia may present clinically as leukoplakia, erythroplakia or leukoerythoplakia. Prevalence of these lesions is quite low (1-4%),[54,55,72,73] and malignant transformation rates vary from 0.1% to 6% in general population studies[74-76] to 7% to 36% among high-risk patients.[77-80] Erythroplakia is considered to be an early sign of oral cancer, because lesions that are erythroplastic or leukoerythroplastic have a higher risk of malignant transformation compared to leukoplastic lesions[79] and because the majority of invasive cancers are red or predominantly red (64-86%).[81,82] Another type of premalignant lesion, lichen planus, also has low prevalence (0.1-2%)[54,55,83] and low transformation rates (0.4-3%).[84-87] At present, it is not possible to predict which precancerous lesions will ultimately undergo malignant transformation.

For localized lesions, surgical removal is the standard therapy, but its effectiveness has not been evaluated in randomized controlled studies. Observational studies have found that, after therapy, the recurrence rate of premalignant lesions is approximately 20% and the risk of developing malignant lesions is not eliminated (5%).[88-90] The number of lesions prevented from malignant development by surgical excision cannot be determined from these studies. Another mode of therapy, laser removal, has yet to be assessed in well-designed clinical trials.[91]

For certain lesions, surgical excision may be difficult, because of the location or extent of the lesion. Three therapies have been assessed in clinical trials for such lesions: 13-cis-retinoic acid (13cRA),[92,93] beta-carotene (a retinol precursor)[94] and bleomycin.[95] In a randomized controlled trial, high doses of 13cRA were more effective than a placebo in reversing and stabilizing oral leukoplakia; however, side effects and relapse after discontinuation were significant problems.[92] A recent comparison study of low-dose regimens of 13cRA indicated that 13cRA was more effective than beta-carotene; only 8% of cases progressed to malignancy, compared to 55% in the beta-carotene group.[93] Side effects were more common for the 13cRA group, but only mild complications were reported. A third agent, topical bleomycin, was more effective than a placebo in decreasing lesion size in a randomized trial of patients with oral leukoplakia.[95] No studies have reported a comparison of 13cRA and bleomycin therapy.

Early stage malignant lesions. Malignant lesions identified through screening examinations are usually at an early stage (I or II), the tongue and floor of the mouth being the most common sites. No controlled studies have yet evaluated either surgery or radiotherapy. Since 1980, nine studies have reported data from retrospective reviews of patient charts (Table 3).[96-104] The only measure provided in all studies was the five-year survival rate; for stage I, five-year survival ranged from 57% to 90%, and for stage II, from 41% to 72%. A problem with the statistical analysis of these data is that the influence of lead-time bias was not considered.

A valid comparison of surgery and radiotherapy is difficult because of the poor quality of the studies and the inability to adjust for patient differences between studies. Since definitive conclusions can be drawn only from randomized controlled trials, survival rates at present can only be described as comparable for surgery and radiotherapy. Another problem in attempting to evaluate cancer therapy is that recurrence rates for specific cancer stages are not reported in most studies. Only two studies have documented recurrence rates at five years for stage I (12-14%) and stage II (18-22%).[96,104]

Finally, few studies provide information on the relative impact of therapy on quality of life and oral function. Length of survival alone is an unsatisfactory measure of the success of treatment; the quality of survival needs to be evaluated as well as the quantity. At present, subjective measures of outcome have been used mainly in studies of advanced cancer therapy.[10-12] No studies have compared the health states achieved through therapy to the health states of people who refused treatment.

Interpretation

Canadian Task Force Recommendations

Table 4 summarizes the recommendations developed from this review. There is good evidence to support the recommendation that counselling for smoking cessation should be specifically considered in a periodic health examination (A-level recommendation). No specific recommendation was made for alcohol reduction counselling for the prevention of oral cancer; however, counselling of problem drinkers may be recommended for other reasons. The Task Force gave counselling a B recommendation in 1994.[105]

Recommendations for screening are divided into two components: population screening and opportunistic screening (i.e., screening during periodic examinations). For population screening, a D recommendation was made based on the low prevalence and incidence of oral cancer in Canada, the low yields obtained in screening studies and the potential for high

Table 3 Results from studies* of therapy for early stage oral cancer (stages I and II)

Study	N	Intervention	Site	Outcome (5-year survival rate)
Decroix and Ghossein[96]	382	Radiotherapy or combination	Tongue	Stage I - 57% Stage II - 41%
Callery and others[97]	546	Surgical	Tongue	Stage I - 65% Stage II - 58%
Mendenhall and others[98]	132	Radiotherapy	Tongue	Stage II - 54%
Nason and others[99]	209	Surgical	Floor of mouth	Stage I - 69% Stage II - 64%
Wildt and others[100]	267	Surgery (40%) Radiotherapy (40%) Combined (22%)	Various sites: primarily mandibular	Stage I - 65% Stage II - 42%
Soderholm[101]	162	Surgery (20%) Radiotherapy (18%) Combined (62%)	Mandibular region	Stage I - 80% Stage II - 58%
Franceschi and others[102]	297	Surgical	Tongue	Stage I - 90% Stage II - 72%
Kraus and others[103]	100	Surgical	Tongue	Stage I/II - 77%
Lefebvre and others[104]	429	Radiotherapy	Various sites: primarily, tongue and floor of mouth	Stage I - 61% Stage II - 50%

**All studies were case series.*

proportions of false positive diagnoses. False positives are not an insignificant problem, because they may lead to the personal and financial costs of anxiety, unnecessary biopsies and inappropriate therapy.

For opportunistic screening of asymptomatic patients, a C recommendation is made, similar to the recommendation made by the Task Force in 1994.[5] For patients at high risk, an annual examination by a physician or dentist should be considered. Tobacco use and excessive alcohol consumption, alone or in combination, are the most important factors linked to the development of oral cancer.

Recommendations of Others

The recommendation for smoking cessation counselling agrees with the guidelines developed by the U.S. Department of Health and Human Services (1996).[6] The screening recommendations in this report are consistent with recommendations from the U.S. Preventive Services Task Force and the U.K. Working Group on Oral Cancer.[106-108] Both have indicated screening only for high-risk groups. Conversely, routine screening for asymptomatic persons over 20 years of age was advocated by the American Cancer Society.[109] Dental organizations have also supported the concept of oral cancer screening, but no official statements have been made.[110,111]

Quality of evidence continues to be a major concern in the evaluation of oral cancer screening. No controlled prospective trials have yet linked screening to lives saved from oral cancer. As with screening for other forms of cancer, "the problem ... is not evidence of a lack of effect, but lack of evidence".[112]

Research Agenda

1. In Canada, a national screening program is unlikely to be a practical means of screening. However, the prospective evaluation of screening programs for high-risk groups is warranted, as risk factors are known and identifiable. High-risk individuals may be selected in a two-stage screening process consisting of a self-administered questionnaire to identify patients with risk factors and a subsequent oral cancer examination for those individuals classified as high-risk. The screening only of high-risk groups would likely increase the yield of screening programs and may be more cost-effective.[113,114] However, one study that screened older male alcoholics suggests that it is expensive to identify high-risk individuals and that compliance with referral is poor (34%).[58] Therefore, cost-effective ways of identifying these individuals and effective follow-up programs are necessary.
2. Another issue needing further consideration is which health care professionals should perform screening examinations and counselling interventions. In a study of case referrals, physicians identified a higher proportion of cancers located in the pharynx, larynx and tonsil, whereas dentists identified a higher percentage of cases in the gingiva and floor of the mouth.[115] Dentists were also more likely to identify cases in the earlier, asymptomatic stages of cancer and precancer, while symptomatic patients generally reported to a physician for examination.

Both general dentists and physicians are able to detect cancerous or precancerous lesions in their practices, but it is unknown whether one profession is more suitable. Although dentists conduct oral examinations more often and may be

Table 4 Summary table of recommendations for prevention of oral cancer mortality

Manoeuvre	Effectiveness	Level of Evidence	Recommendation
Smoking cessation counselling	Multiple interventions and reinforcement strategies have increased 6-month and 1-year cessation rates.	Randomized controlled trials[39,40] (I)	Good evidence to specifically consider smoking cessation counselling in a PHE **(A)**
	Smoking cessation has been shown to reduce the risk of oral cancer. Intervention programs have reduced the incidence of precancerous lesions.	Case-control and cohort studies[15,23,66,67] (II-2)	Counselling should be done by trained health professionals.
Screening by clinical examination	The usefulness of screening is limited by: the low prevalence and incidence of disease, the potential for false positive diagnoses and the poor compliance with screening and referral.	Case-control studies[49-58] (II-2)	**Population screening:** Fair evidence to exclude screening the general population for oral cancer by clinical examination **(D)**
	No studies have shown that screening intervention programs reduce mortality or morbidity due to oral cancer.		**Opportunistic screening:** Insufficient evidence to recommend inclusion or exclusion of screening for oral cancer by clinical examination in a PHE of asymptomatic patients **(C)**
			For high risk patients, annual examination by physician or dentist should be considered. Major risk factors include a history of tobacco use and excessive alcohol consumption.

expected to be more familiar with the differences between pathology and variations of the normal, studies using general dentists as screening examiners have found sensitivity values to range from 71% to 74%,[50-52] indicating a high rate of false negatives. Primary care practitioners have also been found to have difficulties identifying oral lesions.[116] The lack of training and awareness among practitioners in medicine and dentistry has been noted.[117-119]

It has been suggested that a variety of health professions should play a role in counselling and screening and that emphasis should be placed on level of training and interest rather than on membership in a specific professional discipline.[6] From a cost-effectiveness viewpoint, the use of nurses, nurse practitioners and dental hygienists would be substantially less expensive.

3. Further studies are necessary to establish a causal link between alcohol reduction and reduced risk of oral cancer and precancer. A case-control study would be the most feasible means of examining this risk factor, but a sufficient number of subjects are needed to control for the effects of tobacco use.

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Appendix 1 Canadian Task Force on Preventive Health Care: Levels of Evidence and Grades of Recommendations

Quality of Published Evidence	
I	Evidence from at least 1 properly randomized controlled trial (RCT).
II-1	Evidence from well-designed controlled trials without randomization.
II-2	Evidence from well-designed cohort or case-control analytic studies, preferably from more than 1 centre or research group.
II-3	Evidence from comparisons between times or places with or without the intervention.
III	Opinions of respected authorities based on clinical experience, descriptive studies or reports of expert committees.

Grades of Recommendations	
A	Good evidence to support the recommendation that the condition be specifically considered in a periodic health examination (PHE).
B	Fair evidence to support the recommendation that the condition be specifically considered in a PHE.
C	Insufficient evidence regarding inclusion or exclusion of the condition in a PHE, but recommendations may be made on other grounds.
D	Fair evidence to support the recommendation that the condition be specifically excluded in a PHE.
E	Good evidence to support the recommendation that the condition be specifically excluded in a PHE.

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