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Oral cancer and dentists: Knowledge, attitudes, and practices in Italy

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Summary The purpose of the survey was to assess through a mailed questionnaire the knowledge, attitudes, and behaviors regarding oral cancer and their relationship with different indicators in a random sample of 1000 dentists in Italy. Respondents know the major risk factors and only half identify the diagnostic procedures. One-third indicated the most common form and the early lesions and this knowledge was more likely in those graduated from dental school and attended a course on oral cancer in the previous year. Approximately two-thirds (64.8%) believed that they were prepared to perform an oral cancer examination and to palpate lymph nodes in patients' necks. Multiple logistic regression revealed that this positive attitude was significantly higher for those who graduated from medical school and for those who have attended a course on oral cancer in the previous year. Half of the dentists routinely perform an oral cancer examination on all patients and it was more likely by those graduated from dental school, those who know that squamous cell is the most common form of oral cancer and that an early oral cancer lesion usually is a small, painless red area, those who believed that they are prepared to perform an oral cancer examination and to palpate lymph nodes in patients' necks, those who have attended a course on oral cancer in the previous year, and those who claim they need information. The importance of health care professionals as communicators of public health messages should be emphasized.

Introduction

It is well recognized that cancers of the oral cavity and pharynx are a public health problem and a result there are a great number of deaths and people suffering from illness or disabil-

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ity in many of the developed countries. In Italy, data from cancer registries reveals that cancer of the oral cavity represent approximately 3% of all cancers in men and 1% in female.[1]

Evidence is accumulating on the role of combined effects of several components in the prevention and treatment of these forms of cancer. Recognition of the problem demonstrates that close attention must be paid to addressing the problem and strengthening preventive interventions in health care globally as well as at the oral health level. Health care workers, health authorities, and managers must work with the best scientific evidence and recommendations in order to improve knowledge and practices of dental health care workers. It is vital to train such professionals in oral cancer risk, prevention and control measures, and detection procedures if we are to improve the level of knowledge and to achieve a high rate of guidelines adherence.

Assessment of the level of knowledge, attitudes, and behaviors of dental health care workers regarding oral cancer is important for several reasons. Because oral and pharyngeal cancers can be recognized at an earliest stage by visual and tactile examination, dentists are one of the most likely groups of health care practitioners who have a key role in counseling patients regarding early detection of oral cancer. Over the last decade, numerous published epidemiologic investigations conducted in several countries have examined primary care physicians' knowledge and practices[2–5] and oral cancer prevention and detection among dental health care workers.[6–13] Responses have differed by country, but those country-specific data are necessary for public health planning. Thus, because it is of great interest to provide further information on the issue, we report the findings of an investigation regarding the level of knowledge, attitudes, and behaviors about oral cancer in a population of dentists in Italy and their relationship with different indicators.

Material and methods

The cross-sectional survey was conducted between October 2004 and November 2005 among a random sample of 1.000 dentists attending 22 randomly selected dental association meetings throughout the Campania region, in the South of Italy.

The self-administered anonymous questionnaires used for this study were handed out, in sealed envelopes, to the dentists, with an information sheet which explained the purpose of the project, and an envelope to facilitate the return of the completed questionnaire. In addition, a letter assured dentists of the anonymity and confidentiality of all responses. Participants were asked to return the completed questionnaires anonymously via the envelope enclosed with each questionnaire inserting them in a closed box at the dental meeting. Participation was a voluntary basis and all potential respondents were clearly advised that participation was anonymous and they had the right to comply with or refuse participation. The dentists were encouraged to participate and confidentiality of the response was guaranteed. Response to the questionnaire constituted the participants' informed consent.

The questionnaire was a modification of survey instruments that have been previously used.[5,12] The instrument was arranged in five sections. Section 1 includes questions related to participant demographics and practice. These items related to dentist's gender, school and year of graduation, specialist degree, dental specialty, and type of practice setting. Section 2 focused on knowledge about the main risk factors and diagnostic procedures of oral cancer. This section elicited responses in a variety of formats, including ''yes'', ''no'', and ''do not know'' format for the risk factors and closed-end with categorical (yes or no) or multiple-choice questions with one correct answer for the diagnostic procedures. Section 3 asked the dentists regarding their attitude towards oral cancer, and for all items respondents had to choose a response using a five-point Likert scale in which the respondent indicates the level of agreement with each attitudinal statement, with options ranging from 1, strongly agree, to 5, strongly disagree. In the fourth set of questions, we assessed management practice regarding oral cancer by asking if the dentist perform an oral cancer examination, with yes or no response, and by asking to select, from a list of options with a yes or no response, which oral cancer risk factors the dentist assess in taking patient's medical history. Finally, in the fifth section respondents were asked the oral cancer information sources, with the possibility to indicate more than one source from a list of options, and whether they need additional information, with yes or no response.

The original version of the survey instrument was piloted among a convenient group of dentists to ensure practicability, validity, and interpretation of answers. On the basis of the comments obtained, the questionnaire was revised according to item, wording, and format before distribution to the study sample.

Statistical analysis

Multiple logistic regression analysis was performed. In the models developed, we included variables that we considered likely to be associated with the following outcomes of interest: knowledge that squamous cell is the most common form of oral cancer and erythroplakia and leukoplakia are the two lesions most likely associated with oral cancer (Model 1); belief that they are adequately prepared to perform an oral cancer examination and to palpate lymph nodes in patients' necks (Model 2); routinely perform an oral cancer examination (Model 3). For the purposes of analysis, the outcome variables originally consisting of multiple categories were collapsed into two levels. In Model 1, dentists were divided into those who knew that squamous cell is the most common form of oral cancer and erythroplakia and leukoplakia are the two lesions most likely associated with oral cancer versus all others; in Model 2, those who believe that they are adequately prepared to perform an oral cancer examination and to palpate lymph nodes in patients' necks versus all others; in Model 3, they were grouped according to whether they routinely perform an oral cancer examination versus all others. The following explanatory variables were included in all models: school of graduation (medical = 0, dental = 1), dental specialty (oral surgery or oral pathology = 1, other = 0), type of practice setting (non-solo = 0, solo = 1), attended an educational course on oral cancer in the previous 12 months (no = 0, yes = 1), sci-

entific materials as source of information on oral cancer (no = 0, yes = 1), and the need of additional information about oral cancer (no = 0, yes = 1). The following variables were also included: in Models 1 and 3, number of years since graduation (continuous); in the Models 2 and 3, knowledge that squamous cell is the most common form of oral cancer and that an early oral cancer lesion usually is a small, painless red area (no = 0, yes = 1); in Model 3, believe that they are adequately prepared to perform an oral cancer examination and to palpate lymph nodes in patients' necks (no = 0, yes = 1). Before testing multivariable logistic regression models assessing predictors of the outcomes of interest, we examined correlations to assess collinearity among the independent variables and bivariate relations between the independent variables and the dependent variable. The criterion to be met before any independent variable was considered for entry into an initial multivariable logistic regression model was a *p*-value of less than 0.5 obtained for each outcome variable in the univariate analysis and non-collinear with other predictors. Furthermore, the significance level for variables entering the logistic regression models was set at 0.2 and for removing from the model at 0.4. The odds ratios (ORs) and 95% confidence intervals (CIs) were calculated. A two-tailed statistical significance level was set at *p*-value of 0.05. All statistical analyses were conducted using the Stata software program, version 8.1.[14]

Table 1 Demographic and practice characteristics of respondents

Characteristic	*N*	%	Mean ± SD
Gender			
Male	377	82.5	
Female	80	17.5	
Number of years since graduation			17.8 ± 8.2
⩽15	186	40.7	
16—20	99	21.7	
21—25	80	17.5	
26—30	67	14.7	
>30	25	5.4	
School of graduation			
Medical	232	50.8	
Dental	225	49.2	
Post degree course			
Surgery	41	9	
Non-surgery	416	91	
Specialty			
General dentistry	242	53	
Oral surgery	82	17.9	
Restorative dentistry/endodontics	45	9.9	
Orthodontics	34	7.4	
Periodontics	27	5.9	
Oral pathology	16	3.5	
Prosthetics	11	2.4	
Type of practice setting			
Solo	155	33.9	
Non-solo	302	66.1	

SD = Standard Deviation.

Results

Of the 1000 dentists approached, a total of 750 questionnaires were returned, but 293 uncompleted were excluded from analysis for a final response rate of 45.7%. The responses about demographic and practice characteristics are listed in Table 1. The vast majority was males, more than half were in general practice, the mean number of years since graduation was 18, and only one-third was in a solo practice.

To test their knowledge about oral cancer, participating dentists were asked about risk factors and diagnostic procedures, and the distribution of those who correctly answered each of the different items is presented in Table 2. Respondents were aware of the major risk factors most likely asso-

Table 2 Knowledge about oral cancer of the study population

	Yes		No		Do not know	
	N	%	*N*	%	*N*	%
Risk factors						
Use of tobacco	430	94.1	6	1.3	21	4.6
Prior oral cancer lesion	409	89.5	18	3.9	30	6.6
Use of alcohol	362	79.2	41	9	54	11.8
Older age	219	47.9	131	28.7	107	23.4
Low consumption of fruit and vegetable	118	25.8	173	37.9	166	36.3
Diagnostic procedures						
Prior oral cancer lesion usually is small, painless red area	272	59.5	185	40.5		
Erythroplakia and leukoplakia are the two lesions most likely to be precancerous	246	53.8	211	46.2		
Squamous-cell carcinoma is the most common form of oral cancer	231	50.5	226	49.5		
Oral cancer is diagnosticated more frequently at 40—59 years	229	50.1	228	49.9		
Tongue and floor of mouth are the two most common sites for oral cancer	146	32	311	68		

ciated with oral cancer, since the largest number of them identified tobacco (94.1%) and alcohol usage (79.2%) and prior oral cancer lesions (89.5%), and lower numbers reported older age (47.9%) and low consumption of fruit and vegetable (25.8%). As for questions about the knowledge of oral cancer diagnostic procedures, only half were able to provide the correct answer. Indeed, 32—59.5% knew that the tongue and floor of the mouth were the two most common sites of oral cancer and that ulceration was the most common sign of oral cancer. Overall, only 32% were able to identify the most common form of oral cancer and of the early oral cancer lesions. Table 3 presents the distribution of this knowledge according to various explanatory variables and showed that such knowledge was significantly higher for those who graduated from dental school ($\chi^2 = 21.52$, $p < 0.0001$), for those graduated from longer period of time ($t = 4.19$, $p < 0.0001$), for those who are in oral surgery/pathology ($\chi^2 = 4.51$, $p = 0.034$), and for those who have attended an educational course on oral cancer in the previous 12 months ($\chi^2 = 7.41$, $p = 0.006$). Results of the multiple logistic regression analysis revealed that respondents from dental school (OR = 2.68; 95% CI 1.77—4.07) and those who attended a course in the previous 12 months (OR = 1.94; 95% CI 1.19—3.16) were more likely to identify the most common form of oral cancer and of the early oral cancer lesions (Model 1 in Table 4).

Respondents' attitudes about oral cancer are presented in Table 5. More than three-quarters thought that they were

Table 3 Distribution of knowledge, attitude and behavior regarding oral cancer according to several explanatory variables

Variable	Knowledge that squamous cell is the most common form of oral cancer and erythroplakia and leukoplakia are the two lesions most likely associated with oral cancer		Belief that they are adequately prepared to perform an oral cancer examination and to palpate lymph nodes in patients' necks		Routinely perform an oral cancer examination	
	N	%	*N*	%	*N*	%
Number of years since graduation						
Mean ± SD	18.9 ± 7.6 (Do not know) 15.5 ± 8.9 (Know) $t = 4.19$, 455 df, $p < 0.0001$				18.5 ± 8.1 (Do not perform) 17.3 ± 8.3 (Perform) $t = 1.53$, 455 df, $p = 0.13$	
School of graduation						
Medical	51	22	163	70.3	116	50
Dental	95	42.2	133	59.1	130	57.8
	$\chi^2 = 21.52$, 1 df, $p < 0.0001$		$\chi^2 = 6.22$, 1 df, $p = 0.013$		$\chi^2 = 2.78$, 1 df, $p = 0.095$	
Dental specialty						
Oral surgery/ Oral pathology	40	40	73	74.5	62	51.3
Other	106	40.8	223	73	184	63.5
	$\chi^2 = 4.51$, 1 df, $p = 0.034$		$\chi^2 = 5.16$, 1 df, $p = 0.023$		$\chi^2 = 4.47$, 1 df, $p = 0.035$	
Type of practice setting						
Solo	92	30.5	187	61.9	152	50.3
Non-solo	54	34.8	109	70.3	94	60.6
	$\chi^2 = 0.9$, 1 df, $p = 0.34$		$\chi^2 = 3.17$, 1 df, $p = 0.08$		$\chi^2 = 4.38$, 1 df, $p = 0.036$	
Educational course in the previous 12 months						
No	105	28.9	215	59	174	70.7
Yes	41	43.6	81	86.2	72	29.3
	$\chi^2 = 7.41$, 1 df, $p = 0.006$		$\chi^2 = 23.75$, 1 df, $p < 0.0001$		$\chi^2 = 24.68$, 1 df, $p < 0.0001$	
Scientific materials as source of information						
No	92	30.1	194	63.4	162	52.9
Yes	54	35.8	102	67.6	84	55.6
	$\chi^2 = 1.5$, 1 df, $p = 0.22$		$\chi^2 = 0.76$, 1 df, $p = 0.38$		$\chi^2 = 0.29$, 1 df, $p = 0.59$	
Need of additional information						
No	5	27.8	12	66.7	5	27.8
Yes	141	32.1	284	64.7	241	54.9
	$\chi^2 = 0.15$, 1 df, $p = 0.7$		$\chi^2 = 0.03$, 1 df, $p = 0.86$		$\chi^2 = 5.12$, 1 df, $p = 0.024$	
Knowledge that squamous cell is the most common form of oral cancer and that an early oral cancer lesion usually is a small, painless red area						
No			258	64	205	50.1
Yes			38	70.4	41	75.9
			$\chi^2 = 0.84$, 1 df, $p = 0.36$		$\chi^2 = 12.03$, 1 df, $p = 0.0001$	
Belief that they are adequately prepared to perform an oral cancer examination and to palpate lymph nodes in patients' necks						
No					59	36.7
Yes					187	63.2
					$\chi^2 = 29.53$, 1 df, $p < 0.0001$	

SD = Standard Deviation; df = degrees of freedom.

adequately trained to provide tobacco (80.9%) and alcohol (76.5%) cessation education. When dentists were asked whether they were adequately trained, 53.8% and 66.8%, respectively, believed that they were comfortable performing an oral cancer examination and palpating lymph nodes in patients' necks. Overall, 64.8% believed that they were adequately prepared to perform an oral cancer examination and to palpate lymph nodes in patients' necks. Results on determinants of this positive attitude explored at the univariate analysis were almost confirmed at the multivariate logistic adjustments (Table 3). Indeed, this belief was significantly higher for those who graduated from medical school (OR = 0.57; 95% CI 0.38—0.85) and for those who have attended an educational course on oral cancer in the previous 12 months (OR = 3.94; 95% CI 2.09—7.41) (Model 2 in Table 4).

Several health history assessments were probed and the results are summarized in Table 6. It was found that 89.3% and 74.4% of respondents, respectively asked patients about current and previous use of tobacco, but only 55.6% asked about the type and amounts of tobacco products used; similar values were observed concerning the present and past use of alcohol with results of 81% and 62.8%, respectively; only half of them (59.9%) knew the type and amounts of alcohol use. More than three-quarters (78.6%) and less than half (47.9%) asked their patients about personal and family history of cancer, respectively. Approximately two-thirds of respondents stated that they sent the patient to a specialist when suspicious oral cancerous and precancerous lesions were detected. Of the respondents, 52.3% carried out a systematic oral cancer screening at the initial appointment for every patient 40 years of age or older. Overall, half of the dentists (53.8%) indicated that they routinely perform an oral cancer examination on all patients. Results on determinants of routinely perform an oral cancer examination explored at the univariate analysis showed the significant role of several variables (Table 3). These results almost resembled, with the exception of the dental specialty and the type of practice setting, those from the logistic regression model that showed that such examination was more likely to be performed by those graduated from dental school (OR = 1.55; 95% CI 1.03—2.32), those who know that squamous cell is the most common form oral cancer and that an early oral cancer lesion usually is a small, painless red area (OR = 2.62; 95% CI 1.31—5.26), those who believed that they are adequately prepared to perform an oral cancer examination and to palpate lymph nodes in patients' necks (OR = 2.69; 95% CI 1.76—4.13), those who attended an educational course on oral cancer in the previous 12 months (OR = 2.67; 95% CI 1.55—4.61), and those who

Table 4 Logistic regression models results

Variable	OR	SE[a]	95% CI	*p*
Model 1. Knowledge that squamous cell is the most common form of oral cancer and erythroplakia and leukoplakia are the two lesions most likely associated with oral cancer				
Log likelihood = −270.07, χ^2 = 32.45 (3 df), $p < 0.0001$				
School of graduation	2.68	0.57	1.77—4.07	<0.0001
Educational course in the previous 12 months	1.94	0.48	1.19—3.16	0.008
Dental specialty	1.44	0.36	0.89—2.34	0.139
Model 2. Belief that they are adequately prepared to perform an oral cancer examination and to palpate patients' lymph nodes				
Log likelihood = −276.94, χ^2 = 39.17 (5 df), $p < 0.0001$				
Educational course in the previous 12 months	3.94	1.27	2.09—7.41	<0.0001
School of graduation	0.57	0.12	0.38—0.85	0.007
Type of practice setting	0.69	0.15	0.45—1.06	0.093
Dental specialty	1.48	0.4	0.87—2.52	0.146
Scientific materials as source of information	1.3	0.29	0.84—2.02	0.234
Model 3. Routinely perform an oral cancer examination				
Log likelihood = −281.39, χ^2 = 68.08 (6 df), $p < 0.0001$				
Educational course in the previous 12 months	2.67	0.74	1.55—4.61	<0.0001
I am adequately prepared to trained to perform an oral cancer examination and to palpate patients' lymph nodes	2.69	0.59	1.76—4.13	<0.0001
Knowledge that squamous cell is the most common form of oral cancer and that an early oral cancer lesion usually is a small, painless red area	2.62	0.93	1.31—5.26	0.007
Need of additional information	3.37	1.9	1.11—10.18	0.032
School of graduation	1.55	0.32	1.03—2.32	0.035
Type of practice setting	0.69	0.15	0.45—1.05	0.087

[a] Standard error.

Table 5 Attitudes towards oral cancer of the study population

	Agree, %	Uncertain, %	Disagree, %
I advise my patients with suspicious oral lesions	63.1	7.2	1.7
My patients are sufficiently informed on risk factors for oral cancer	41.6	19	39.4
My patients sufficiently know signs and symptoms of oral cancer	18.8	21.9	59.3
I am adequately trained to provide tobacco cessation education	80.9	10.3	8.8
I am adequately trained to provide alcohol cessation education	76.5	11.2	12.3
I am adequately trained to perform an oral cancer examination	53.8	18.8	27.3
I am adequately trained to perform patient's lymph nodes palpation	66.8	13.4	19.9

need additional information about oral cancer (OR = 3.37; 95% CI 1.11—10.18) (Model 3 in Table 4).

Almost all respondents recalled receiving some information about oral cancer (96.1%) while 20.6% attended an educational course on oral cancer in the previous 12 months. The main sources of information were educational courses (72.4%) and scientific journals (22.8%); almost all (96.1%) reported an interest in receiving further information.

Discussion

This investigation reports the overall knowledge, attitudes, and self-reported behavior patterns regarding oral cancer among a population of Italian dentists and the combination of quantitative and qualitative data provides a comprehensive picture of the current status of ability and behavior among Italian dentists.

The results of this study must be interpreted in the context of potential methodological limitations. First, since this is an observational study, it provides only circumstantial evidence for the causal nature of the relationships we have observed. Second, typical of any survey using self-reported data to measure, for example, adherence for preventive precautions, there exists the possibility that the reported behaviors may not match actual clinical practice. The tendency of respondents to provide socially acceptable answers would usually bias against variability in reported practices, possibly resulting in an underestimation of nonadherence. However, the anonymous nature of the questionnaire has minimized this type of information error. Finally, in our survey we have chosen a quasi-convenience cohort, although randomly selected, of dentists attending continuing education courses, and results may not generalize to all dentists nationwide because those sampled might be more knowledgeable. However, since education courses are mandatory in our country for all health care workers, we are confident that our study's findings may be generalized to all dentists nationwide.

Table 6 Patient's health history assessment by the study population

	N	%
Patient's current use of tobacco	408	89.3
Patient's current use of alcohol	370	81
Patient's history of cancer	359	78.6
Patient's previous use of tobacco	340	74.4
Patient's previous use of alcohol	287	62.8
Patient's type and amounts of alcohol use	274	59.9
Patient's type and amounts of tobacco use	254	55.6
Family history of cancer	219	47.9

The results greatly concern us, namely that many of the dentists themselves showed significant gaps in knowledge with respect to the diagnostic procedures, with only one-third correctly identifying the most common form of oral cancer and early oral cancer lesions. This lower-than expected percentage surprises us because we have found supporting evidence that educational interventions positively impact all outcomes measured. Dentists who attended an educational course in the preceding year on oral cancer were more likely to have a higher level of knowledge of oral cancer itself, an apparent positive attitude that they were adequately prepared about oral cancer, and the tendency to routinely perform an oral cancer examination on all patients. In the medical literature, similar findings have been found in previous studies among dentists practicing in the United States.[7,8,11] So supplementary educational efforts are necessary simply because specific risk and benefit communication is a skill that can be taught. This inference is supported by the observation that nearly all respondents indicated that additional materials would be useful in their current profession. Furthermore, the impact of education on the level of knowledge accords with the results of a previous research conducted in our country that reported that primary care physicians who learned about oral cancer from scientific journals were more likely to identify tobacco use as a risk factor for oral cancer.[5]

Comparisons with other studies conducted in various countries at different times are interesting but require caution while interpreting the results. Indeed, since many factors may influence knowledge, attitudes, and behavior patterns regarding oral cancer, important differences should be taken into account, such as the practice characteristics of the study population surveyed, different modalities of determining and of measuring the outcomes, and different procedures used to collect information. The present results indicate that performing an oral cancer screening is not usual procedure for dentists in this area of Italy, with only 52.3% responding that such an examination would be conducted at the initial appointment for every patient

40 years of age or older. We compared this result to that of other countries and discovered that our value was considerably lower than those observed in recent surveys. Such routine examination was conducted by 91.3%[7] and 81%[8] of general dentists in two studies carried out in the United States and by 92% of specialists in oral surgery, oral medicine, surgical dentistry and general dental practitioners in the UK.[13] Moreover, 84% of dentists in the UK said that they performed a systematic examination of the oral mucosa irrespective of the patient's complaint.[6] Regarding health history assessments, our results differ again from other studies: the prevalence of respondents who asked patients about their current and previous use of tobacco (89.3% and 74.4%) and alcohol (81% and 62.8%) compare favorably with only 19% that questioned on both smoking and alcohol use in the UK.[6] Moreover, our findings regarding the patient's (78.6%) and family (47.9%) history of cancer were lower than the 92.1% and 69.2% reported in the United States,[7] whereas values of 70% and 21% were observed in the UK.[13]

In this study, lack of knowledge about the main risk factors and diagnostic procedures was diffuse. Only 32% were able to identify the most common form of oral cancer and of the early oral cancer lesions, with values ranging from 47.9% to 94.1% for the different risk factors. These finding were markedly lower than the values observed in the already mentioned surveys.[9,13] More troubling is the lack of knowledge that dentists assume about the protective effect of both fruit and vegetable consumption, since only 25% of them knew the risk related with a low consumption and a meta-analysis has recently provided evidence for the observation that dietary intake plays an important role as a protective factor against the development of oral cancer.[15]

Our analysis reveals certain insight into dentists' attitudes and practices. Classified by type of practice, surveyed dentists who worked in a group practice fell, although not significantly, adequately prepared to perform an oral cancer examination and to palpate lymph nodes in patients' necks and to routinely perform an oral cancer screening examination than those who are in a solo practice. This finding may be explained by the fact that the dentists in group practice are generally involved in different specialties and, therefore, may be able to share their collective knowledge and clinical experience about oral cancer.

In summary, in view of the findings of this study, improving the level of knowledge and the application of preventive measures by the population of dentists becomes a very important public health and preventive strategy for the reduction of the burden of the disease. Because such improvement can be gradually achieved, increased awareness on the importance of the role of health care professionals as communicators of public health messages should be emphasized so that appropriate and systematic educational strategies can be implemented quickly.

Conflict of Interest Statement

None declared.

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