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Knowledge and Practice of Oral Cancer Screening in Teaching Faculty—Comparison of Specialty and Year of Clinical Experience

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Abstract
The purpose of this study was to assess the knowledge, practice, confidence, and perceived barriers to oral cancer screening among teaching faculty in Japan. Results were compared by specialist as well as years of clinical experience. A 25-question survey was used to assess the oral cancer screening practices of faculty dentists at Iwate Medical University, School of Dental Medicine, the only dental school located in the northeast (Tohoku) region of Japan. The study was approved by the Institutional Review Board of Iwate Medical University. The response rate was 83% ($n = 110$, 71.8% were male). This survey revealed that only 43.6% of the dentists performed oral cancer screening frequently (always or usually) at the initial appointment, and there was no significant differences between specialists and clinical experience. Visual inspection of the oral cavity was the primary screening method, but the frequency and content of the examination (TMJ and tonsil) was significantly different between specialties. A history of cancer and tobacco use motivated providers to perform an examination and was significantly different between various specialists and clinically experienced providers. In contrast, HPV and alcohol consumption were a weak motivator. The confidence level of providers on their examination knowledge/skills was poor, especially among junior faculty. More than 80% of junior faculty indicated a lack of knowledge/skills as a major barrier.

Keywords Oral cancer · Education · Cancer screening · Risk factor

Introduction

In 2012, an estimated 145,000 deaths occurred worldwide from oral cancer, with an estimated 300,400 new cases of oral cancer [1]. Similar to other cancers, the prognoses of oral cancers are affected by the stage of the disease at the time of diagnosis and the reduction of contributing and risk factors. Early diagnosis of oral cancer can be achieved by routine clinical examination, when the prognosis is favorable and the treatment is less invasive. Unfortunately, many cases are diagnosed at a late stage when the treatment is extensive and has significant morbidity and the prognosis is poor [2]. A clinical study performed in Cuba showed that the incidence of advanced stage III and IV oral cancer was reduced by 33% with oral cancer screening [3], indicating the importance of routine oral cancer screening. A previous study of the practices of Illinois dentists revealed that 44.8% of the participants performed oral cancer examination on asymptomatic patients less than annually [4]. It was also reported that there is a major disconnect between knowledge and actual practice of dental hygienists and dentists [5]. Both are generally knowledgeable regarding oral cancer but there is variability in the frequency of oral cancer examination [6]. There are several methods for early diagnosis of oral cancer, such as vital staining with toluidine blue, autofluorescence, cytologic testing, and tissue reflectance which have been introduced. However, it was concluded that there was a high rate of false-positive and there was no sufficient evidence to recommend inclusion or exclusion of these adjuncts [7, 8]. Comprehensive and careful visual examination remains an integral part of routine oral cancer screening.

Well-known major risk factors for oral cancer include smoking/tobacco use, alcohol consumption, age, a history of

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cancer, and more recently, HPV infection. It has been reported that in patients who are positive for HPV, there is a significant increase of oropharyngeal cancers among younger middle-aged men who lack significant risk factors such as tobacco use [9]. This finding increases the importance of the preventive roles of health care providers in screening for HPV-related oral cancer [10–12]. Screening must be done in spite of liability concerns and discomfort providers may have with sexual health discussions with patients regarding HPV-related oral cancer [11, 12].

In 2005, the Japanese government established national guidelines to promote routine cancer screenings [13]. For example, they recommended mammography to screen for breast cancer to be performed every 2 years for women over the age of 40. There are similar guidelines that have been established for stomach, cervical, lung, and colon cancer. With these guidelines, the mortality rate (age-adjusted death rate) by all cancers in Japan since 1995 has decreased from 157.8 per 100,000 persons to 121.3 in 2003 [14]. Unfortunately, there are no guidelines in place for routine oral cancer screening. Compared to other countries in South Asia, Japan has a lower incidence of oral cancer, but the mortality rate of oral cancer in Japan (age-adjusted death rate of oral cancer based on the age composition of Japanese population in 1985) has continued to increase, from 1.2 (1958) to 2.8 (2003). The incidence of oral cancer has also been on the rise since 1975 [14].

Regarding dental education, a perceived lack of knowledge and skills among graduating dental students has been reported [15, 16], and the need for improved education of medical students was also recommended [17]. Oral cancer screening is taught in the classroom as well as in the comprehensive teaching clinic in the predoctoral curriculum in Japan. However, it was reported that Japanese private practitioners indicated a significantly lower level of knowledge and confidence regarding oral cancer compared with dentists in Australia [18]. Globally, increasing incidence rates of oral cancer have been reported in South and Southeast Asia [19, 20], and an alarming lack of knowledge in public has also been identified. Therefore, education for oral health care providers is critical, and dental schools should include more training on this topic in their curricula. To date, no study has investigated the knowledge or practice of oral cancer screening by dental school faculty.

Japan is a developed country, but the gross prefectural product and prefectural income per capita vary widely among the prefectures [21]. Three prefectures (Akita, Aomori, and Iwate) in the northeastern region (Kita-Tohoku) of Japan have high cancer mortality rates. In particular, the mortality rate in Akita and Aomori is ranked top two among all 47 prefectures in Japan [14]. One contributing factor that has been identified for the high mortality rate in those prefectures is the high prevalence of smoking [14]. Higher tobacco consumption, along with limited access to health care and poor nutrition, is a major oral cancer determinant [22]. Additionally, these prefectures are in areas that are rural, seaside, and mountainous regions with limited access to advanced care hospitals. Even if patients are referred for further treatment by local dentists, they may not be able to easily access care. These limitations result in a delay in the definitive diagnosis of oral cancer. Iwate Medical University, School of Dental Medicine (IMU-SDM), was selected for this study. It is the only dental school hospital in the northeastern region of Japan. One of the missions of IMU-SDM is to increase the awareness of oral cancer through dental education and public education. Their goal is to improve knowledge and promote routine oral cancer screening to achieve early diagnosis and treatment.

The ultimate goal of this study is to establish *systematic guidelines for the education of health care providers* so that the public will have routine oral cancer screenings. The purpose of this study was to assess the knowledge, practice, confidence, and potential barriers for oral cancer screening *among teaching faculty*. The results were compared by specialty and years of clinical experience.

Materials and Methods

A 25-question survey was created using a previously published study as a reference [9, 10]. The survey was reviewed, revised, and validated by faculty at Iwate Medical University, IMU-SDM, and the Harvard School of Dental Medicine. The questionnaire includes 5 parts: career characteristics (3 questions), frequency of oral cancer screening (3 questions), examination contents (11 questions), effects of risk factors on promoting examination (4 questions), confidence and barriers (4 questions). The survey did not include any personal identifications and the study was approved by the Institutional Review Board of Iwate Medical University and informed consent was obtained from all participants. Oral surgeons and the faculty who validated the survey were excluded from the study.

The survey was sent to the 132 faculty dentists at IMU-SDM. Statistical analysis was performed using a chi-square test to evaluate potential associations regarding specialty and clinical experience.

Results

Background/Demographic Information

A total of 110 dentists responded, yielding a response rate of 83%. By gender, 71.8% of respondents were male, and 28.2% were female. Among 110 participants, 67 (60.9%) were the restorative dentists (operative, endodontics, periodontics, prosthodontics) and 43 (39.1%) were the non-restorative dentists (dental anesthesiology, dental public health, dental radiology, orthodontics, and pediatric dentistry). Seventeen

percent of participants had 1 year or less of clinical experience, 35.5% had 2–5 years of experience, 20.9% had 6–15 years of experience, and 26.4% had more than 16 years of clinical experience.

Frequency of Intra-/Extra-oral Examination and Risk Factors

The percentage of respondents reporting a high frequency (always or usually) doing intra-/extra-oral examination at a new patient's initial appointment was 43.6 and 32.7% at a recall appointment. The percentage of respondents reporting a low frequency (rarely or never) on performing intra-/extra-oral examination at initial appointments was 35.5 and 43.7% at the recall appointment. There was no significant difference in the frequency of initial and recall appointment between restorative dentists and non-restorative dentists. There is a trend of more dentists performing oral examinations with more years of clinical experience, but there was no statistically significant difference in both intra- and extra-examinations among four experienced groups (Table 1). For those who performed an examination at recall appointments, 38.6% answered performing an examination at 4- to 6-month intervals, and 3.0% answered "12-months intervals."

Detail Components of the Examination

During an examination, 77.3% of dentists perform an overall visual inspection of the oral cavity with high frequency (always ~ usually). However, less than 50% of dentists perform a specific detailed examination with a high frequency (Fig. 1). A lower frequency was observed for the palpation components of an examination such as the floor of the oral cavity and head/neck lymph nodes. There was a significant difference observed in the frequency of examination between restorative dentist and non-restorative dentists on visual inspection of the oral cavity ($p < 0.05$), palpation of the temporomandibular joint (TMJ) ($p < 0.01$), and palpation of the tonsil ($p < 0.05$, Table 2). Restorative dentists perform more visual inspection examinations of the oral cavity and TMJ, and non-restorative dentists do more tonsil examinations. There was no statistical difference observed with years of clinical experience.

Motivational Effects of Risk Factors on Performing Intra-/Extra-oral Examination

The most common risk factors that promoted intra-/extra-oral examinations at an initial appointment were as follows: a history of cancer (52.7%), tobacco use (41.8%), advancing age (21.8%), a history of HPV (18.2%), alcohol consumption (13.6%), and poor diet (10.1%). The same order of risk factors was observed by a restorative dentist group and a non-restorative dentist group. There was significant difference between the restorative and non-restorative dentist groups on the motivational factors of "tobacco ($p < 0.01$)," "bad diet/habit ($p < 0.05$)," and "history of cancer ($p < 0.05$)" (Fig. 2). Among years of clinical experience, dentists with 1 or less years of experience were most strongly motivated by a history of tobacco use (73.7%) and history of cancer (68.4%), and there was a significant difference shown for the history of cancer among years of clinical experience ($p < 0.00030$, Fig. 3). Over 90% of respondents considered patients over 50 years old to be at a higher risk. For tobacco use and alcohol consumption, more than 50% respondents asked about the current history, past history, and level of consumption.

Perceived Knowledge/Skill and Barriers

Only 3.6% dentists rated their knowledge/skills on oral cancer examination, and screening as "good" and majority (89%) answered as "poor" or "very poor" (Fig. 4). The most perceived barriers to perform routine intra-/extra-oral examination for oral cancer were "lack of knowledge and skills" (73%) and followed by "lack of time" (22%, Fig.

Table 1 Frequency of oral cancer screening examination. (*chi-square test)

	Frequency at initial appointment				Frequency at recall appointment			
Specialty	High	Moderate	Low	*p* value	High	Moderate	Low	*p* value
Restorative	39% (26)	22% (15)	39% (26)	0.4407	25% (17)	27% (18)	47% (32)	0.1448
Non-restorative	51% (22)	19% (8)	31% (13)		44% (19)	19% (8)	37% (16)	
	Initial appointment				Recall appointment			
Year in practice	High	Moderate	Low	p value	High	Moderate	Low	p value
< 1	38.1% (8)	19.1% (4)	42.9% (9)	0.4165	10.5%(2)	36.8% (7)	52.6% (10)	0.1428
2~5	43.6% (17)	20.5% (8)	35.9% (14)		41.0% (16)	20.5%(8)	38.5% (15)	
6~15	47.8% (11)	8.7% (2)	43.5% (10)		39.1% (9)	8.7% (2)	52.2% (12)	
> 16	48.3% (14)	31.0% (9)	20.7% (6)		31.0% (9)	31.0% (9)	37.9% (11)	

(%)

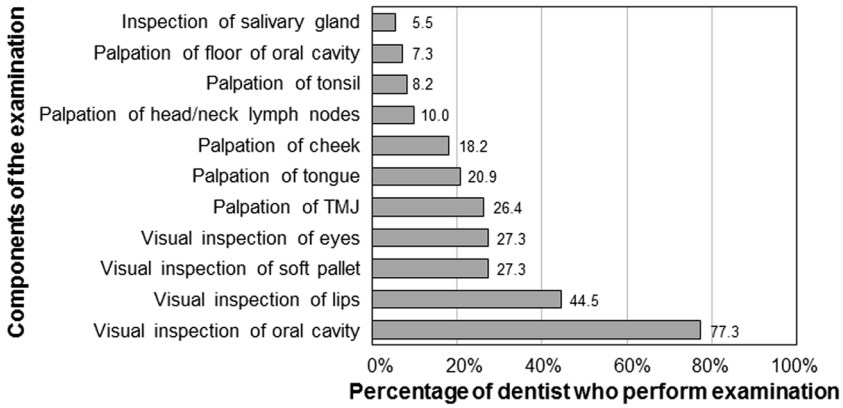

Fig. 1 Percentage of dentists who perform examination with a high frequency in each content of examination

4). Among restorative dentists, 67.2% ranked themselves "Very Poor" on their knowledge and skills compared to 34.9% of non-restorative dentists who ranked themselves "Very Poor" (Fig. 5). There was a trend observed that experienced dentists had more confidence in their skills than less-experienced dentists. However, more than 60% of dentists with experience over 16 years still ranked themselves as "Poor" on their knowledge and skills (Fig.5). The "lack of knowledge and skills" was the biggest barrier for the restorative dentists (77.6%), and 58.3% for non-restorative dentists (Fig. 6). The percentage of the dentist who consider a lack of knowledge/skills as the greatest barrier decreased along with clinical experience. In contrast, experienced dentist groups claimed that a lack of time was their greatest barrier. In the group with over 16 years of experience claimed that their "concern about patient compliance" was the barrier (Fig.6). The majority of dentists (78.2%) had never attended a course on oral cancer screening, and 86.4% of dentists reported interest in attending a continuing education course in the future.

Discussion

Early detection is important for most diseases and experts believe that identifying abnormal tissue and appropriate treatment is critical in oral cancer [23]. The aims of this report are to present the current knowledge, practice, confidence, and potential barriers for oral cancer screening in dental faculty in Japan, with the ultimate goal of establishing systematic guidelines to reduce the incidence and mortality of oral cancer.

Overall, there is a low prevalence of routine oral cancer screenings. It was previously reported in a different study that only 34.1% of Japanese dentists in private practice, performed oral cancer screenings for their patients. This is a much lower percentage when compared to Australian dentists (90%) [18]. In this study, 43.6% of the faculty dentists routinely performed oral cancer screening (always: 19.1%, usually: 24.5%), which is higher than those for private practitioners [24], but still lower than those found in studies done in other developed countries [2, 4, 24, 25].

Table 2 Comparison of frequency of oral examination in each content between restorative dentist and non-restorative dentists (*chi-square test)

Frequency	Restorative			Non-restorative			*p* value
	High	Moderate	Low	High	Moderate	Low	
Visual inspection of the oral cavity	52 (78)	12 (18)	3 (4)	33 (77)	3 (7)	7 (16)	0.043
Visual inspection of the lips	28 (42)	19 (28)	20 (30)	21 (49)	10 (23)	12 (28)	NS
Visual inspection of the soft pallet	15 (22)	15 (22)	37 (56)	15 (35)	5 (12)	23 (53)	NS
Visual inspection of the eyes	9 (25)	14 (21)	36 (54)	13 (30)	11 (26)	19 (44)	NS
Palpation of the TMJ	14 (21)	33 (49)	20 (30)	15 (35)	7 (16)	21 (49)	0.002
Palpation of the tongue	17 (25)	17 (25)	33 (50)	6 (14)	11 (26)	26 (60)	NS
Palpation of the cheek	13 (19)	7 (29)	13 (52)	7 (16)	10 (23)	26 (61)	NS
Palpation of the head/neck lymph nodes	6 (9)	15 (22)	46 (69)	5 (12)	5 (12)	33 (76)	NS
Palpation of the tonsil	2 (3)	3 (4)	62 (93)	7 (16)	3 (7)	33 (77)	0.035
Palpation of the floor of the oral cavity	5 (8)	13 (19)	49 (73)	3 (7)	4 (9)	36 (84)	NS
Inspection of the salivary gland	4 (6)	11 (16)	52 (78)	2 (5)	3 (7)	38 (88)	NS

(%)

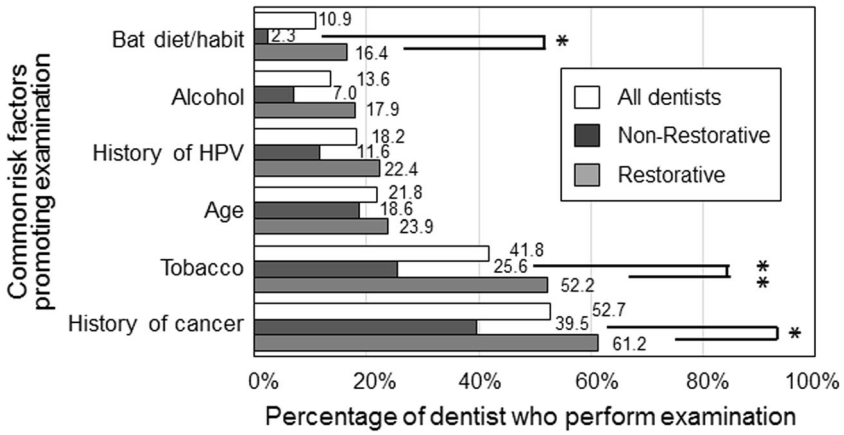

Fig. 2 The motivational effects of the major risk factors on performing oral cancer screening examination (percentage of dentists who answered "Yes" to the question "Do you perform oral cancer examination for the patient who has following risk factors?"). Answers were compared between restorative dentists and non-restorative dentists (chi-square test, $*p < 0.05$, $**p < 0.01$)

One possible reason for the low frequency of oral cancer screenings in Japan might be related to Japan's universal health care system. The system provides everyone dental care with same co-payment rate. Patients can have Type III (major services) dental care at a relatively low cost/co-payment (approximately 1/10 fees of USA), while patients have to pay the same co-payment rate for Type I (examination and preventive services care). This culture creates a low rate of office visits for routine dental examinations and cleanings for prevention [26, 27], resulting in higher numbers of "chief-compliant"-related examinations rather than comprehensive oral examinations.

Looking into the detailed examination components of an oral cancer screening, the majority of dentists only perform the overall visual inspection of the oral cavity. However, less than 50% perform an examination of specific areas, and the palpitation examination is not performed (less than 30%). Although the most common site of oral cancer varies with country, and tongue is the most common site in Japan [28], only 20% of dentists who perform an oral cancer screening palpate the tongue. Interestingly, significantly more restorative dentists perform the visual inspection of TMJ than non-restorative dentists; in contrast, more non-restorative dentists perform palpation of the tonsils. These trends could be explained by the focus of the specialty area. For instance, restorative dentists are concerned with occlusion and the TMJ, and dental anesthesiologists may focus on oropharyngeal tissues like tonsils. Although faculty with various clinical experience were involved in this study, there was no significant difference observed on frequency among those groups. Thus, our findings indicated that the oral cancer examination performed was not an in depth one, and faculty may need to review updated oral cancer examination protocols and guidelines.

In this study, the relationship of major known risk factors and motivational effects on actual performance of an oral cancer screening was assessed. Tobacco consumption and history of cancer lead a dentist to perform an oral cancer screening; however increasing age, alcohol, and history of HPV were not strong motivational components. Increasing age is a strong risk factor for oral cancer, with an increased risk for those over

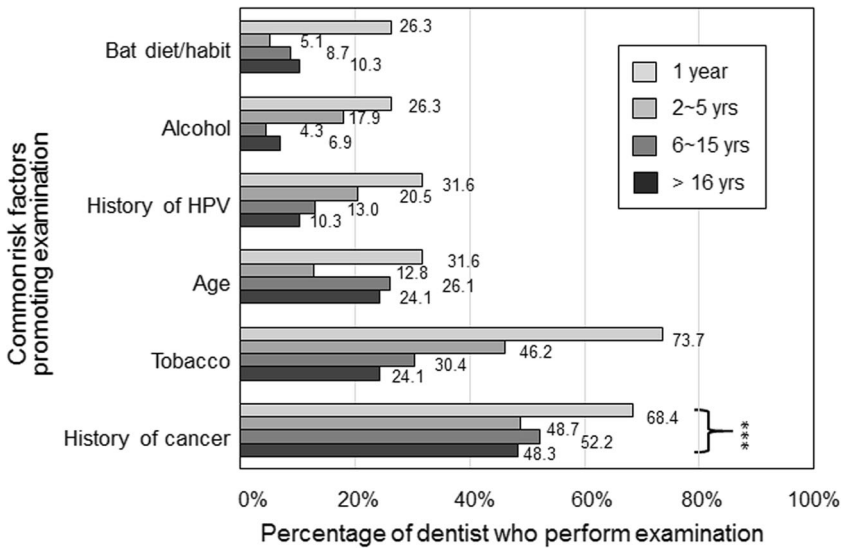

Fig. 3 Comparison of the motivational effects of the major risk factors on performing oral cancer screening examination among different levels of clinical experience (chi-square test, $***p < 0.001$)

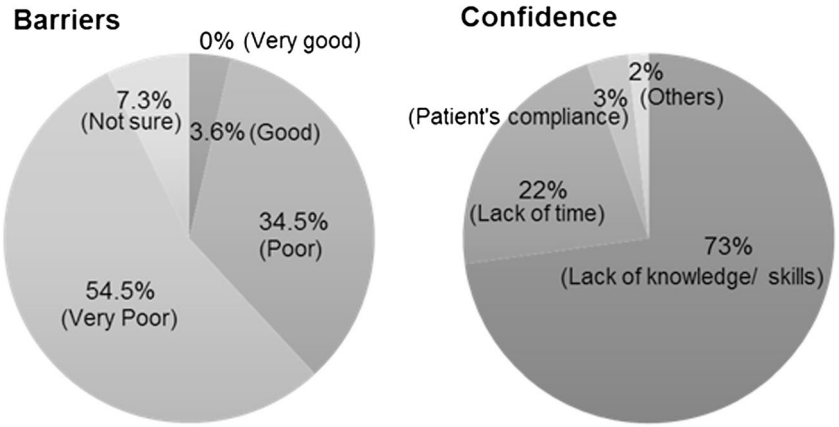

Fig. 4 Percentage of confidence of knowledge/skills and perceived barriers for oral cancer screening examination

age 40 [29, 30]. Age as a risk factor for oral cancer needs to be reinforced especially in Japan, with its aging society. It has been reported that HPV-16 positively increased the risk for oropharyngeal cancer which is much higher in the western world. Japan has the highest incidence of oropharyngeal cancer in Asia [31, 32]. Risk factors for HPV infection include first intercourse at a young age and having multiple sexual partner [33]. Oral health professionals need to be aware of the increased incidence of HPV infection with changing sexual practices in the Japanese society. Interestingly, in this study, alcohol consumption was not a strong motivational factor for performing an oral cancer examination even though alcohol is strongly associated with oral cancers. It is possible that because culturally, consuming alcohol is a frequent social habit of Japanese men and there is a high level of acceptance for drinking alcohol in Japan [23], this might account for this response. Since cultural lifestyle varies in each country or each region of the country [34], risk factors for oral cancer may need to be modified to fit geographic/regional variation. Iwate Medical University, School of Dental Medicine, is located in the northeastern region of Japan, where the consumption rate of both alcohol and tobacco is in the top one and two among all Japanese prefectures. Therefore, it is urgent that IMU-SDM improve the education for health care providers and advances the public's understanding that alcohol consumption is a risk factor strongly associated with oral cancer.

In this study, 73% of respondents indicated a lack of knowledge and/or skills to provide oral examinations as the biggest barrier to performing oral cancer screenings. Likewise, 89% of dentists assessed that the quality of their skills/knowledge is poor/very poor. Looking at different specialties and years of clinical experience, 77.6% of restorative dentists indicated a lack of knowledge/skill as a barrier which is greater than non-restorative dentists, and dentists with more

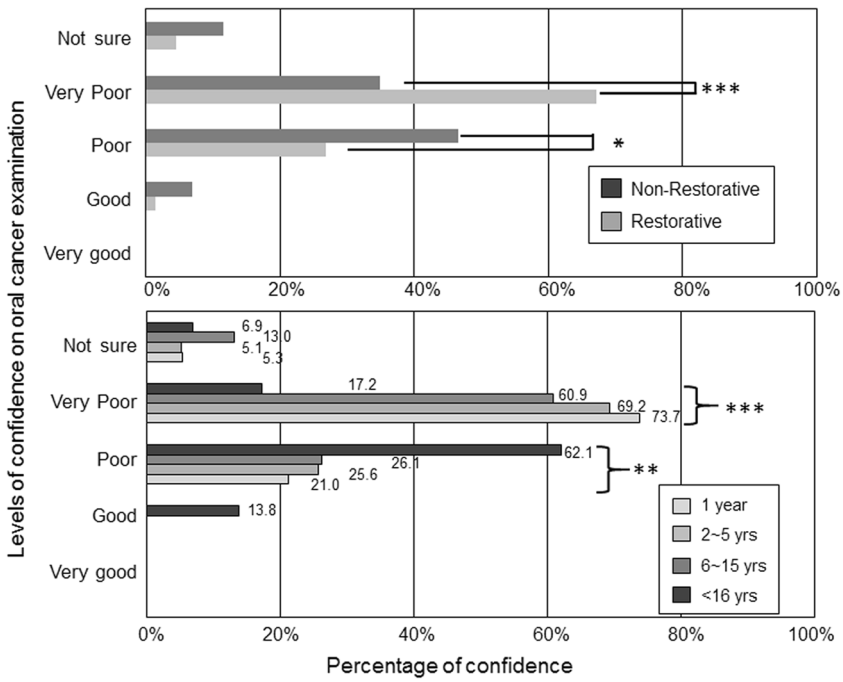

Fig. 5 Percentage of confidence of knowledge/skills. Comparison between restorative and non-restorative dentists, and among different levels of clinical experience

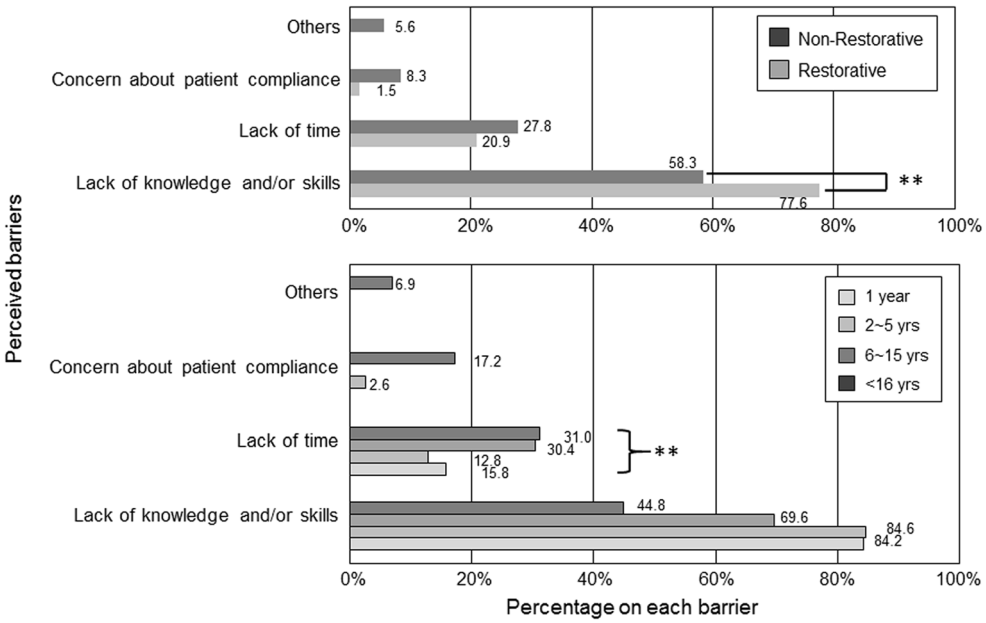

Fig. 6 Percentage of perceived barriers. Comparison between restorative and non-restorative dentists, and among different levels of clinical experience

years of clinical experience. The average years of clinical experience for restorative dentists (6.7 years) was shorter than those for non-restorative dentists (11.7 years) which influences this finding. Similarly, the experienced group with over 16 years' experience indicated a higher confidence level; in contrast, over 80% of junior faculty (1~5 years' experience) indicated a lack of knowledge/skills. Studies have shown a lack of knowledge and skills in oral cancer examinations in US dental schools [15] and a low passing rate (42%) on oral cancer diagnosis test by senior dental students in Spain [35]. It is clear that a strong emphasis on oral cancer education and screening during dental education is necessary to improve the knowledge, skills, and confidence of dental students which will lead to a subsequent increase in the frequency of oral cancer screening. Another reason for such a low screening rate could be a lack of time. A lack of time was identified as the second greatest barrier to screening in this study, and time constraints have been identified as a barrier in other studies as well. However, oral cancer screening only takes a few minutes and can be incorporated into a regular examination reducing time constraints. Therefore, it can explain that a misconception of the time necessary to perform an oral cancer screening may be another reason for the low frequency of screening. The implementation of protocols and guidelines for oral cancer screening is critical to early detection and treatment. Interestingly, approximately 20% of experienced dentists (over 16 years) claimed "patient's compliance" as a barrier. With the increased prevalence of HPV-related oral cancer, it is essential to facilitate increased communication and interaction between providers across fields, both dental and medical, and to increase public awareness [11].

The primary limitations of this study is the generalization of study population. A future study should expand to include other dental and medical schools in other areas of Japan, as well as other oral health care providers in private practice including dental hygienists for a comprehensive sample. Furthermore, awareness and knowledge of oral cancer in public population also need to be investigated.

In conclusion, there are several approaches that will be necessary to promote oral cancer screening in Japan. In dental education, more training and exposure to oral cancer screening is urgently needed, and currently licensed practitioners should have mandatory continuing education courses on oral cancer. This could be an important approach to achieving the goals of detection and early treatment. Furthermore, preventive behaviors such as reduction in exposure to know risks as well as routine checkups and prophylaxis should have more emphasis. Increasing the frequency of dental visits for preventive care could be achieved through insurance reform. One approach could be to reduce or eliminate the co-payment for preventive visits that include oral cancer screening.

Compliance with Ethical Standards The study was approved by the Institutional Review Board of Iwate Medical University and informed consent was obtained from all participants.

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