

ORIGINAL ARTICLE

PERIODONTAL STATUS AND PROVISION OF PERIODONTAL SERVICES IN MALAYSIA: TRENDS AND WAY FORWARD

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ABSTRACT

The paucity of published literature on periodontal treatment needs and services in developing countries has undermined the significance of periodontal disease burden on healthcare systems. This study analyses periodontal status and population treatment needs of Malaysians, and patterns of periodontal services provided at public sector dental clinics. A retrospective approach to secondary data analysis was employed. Data for population treatment needs were extracted from three decennial national oral health surveys for adults (1990, 2000 and 2010). Annual reports from the dental subsystem of the government Health Information Management System (HIMS) provided information on oral health care delivery for years 2006-2010. They were based on summaries of aggregated data; analyses were limited to reporting absolute numbers and frequency distributions. Periodontal disease prevalence declined between 1990 (92.8%) to 2000 (87.2%) but a sharp rise was observed in the 2010 survey (94.0%). The proportion of participants demonstrating periodontal pockets of 6 mm and more increased in 2010 survey after showing improvements in 2000. Individuals not requiring periodontal treatment (TNO) increased in proportion from 1990 to 2000, only to drop in 2010. An increase in utilisation was observed alongside a growing uptake of periodontal procedures (62.2% in 2006 to 73.6% in 2010). Only about 10% of treatment was surgeries. While the clinical burden of periodontal disease is observed to be substantial, the types of treatment provided did not reflect the increasing needs for complex periodontal treatment. Emphasis on downstream and multi-collaborative efforts of oral health care is deemed fit to contain the burden of periodontal disease.

Keywords: periodontitis, disease trend, dental utilisation, periodontal treatment, oral health care delivery

INTRODUCTION

The periodontium is made up of specialized tissues in the oral cavity that both surround and support the teeth, maintaining them in the maxillary and mandibular bones; they include the alveolar bone, gingival (gums), the root cementum and periodontal ligaments. Once infected by pathogenic bacteria, the integrity of these tissues is impaired hence resulting in inflammatory condition causing symptoms such as gum pain, swelling, bleeding, abscesses, mobility of teeth within its socket, mal-alignment of teeth and ultimately tooth loss. Periodontal disease refers to all diseases that affect one or more tissues of the periodontium and they are generally recognised as either gingivitis or periodontitis. Gingivitis, the mildest form of periodontal disease, affects only the soft tissues surrounding the teeth and does not extend into the alveolar bone, periodontal ligament or cementum¹. In contrast, periodontitis results in the formation of soft tissue pockets or deepened crevices between gingiva and the root of the

tooth - these are often referred to as periodontal pockets. Periodontitis may be described as an irreversible, cumulative condition, initiated by bacteria but propagated by host factors².

Periodontal disease is recognised as a major global oral health burden - alongside dental caries - and inequalities in periodontal health exists in underprivileged sub-populations in both developed and developing countries³⁻⁵. Several explanations for these inequalities have been proposed, some of which include: access to oral health services, patient compliance, awareness of and attitude toward importance of oral health and periodontal health⁵. In Malaysia, oral healthcare is provided both by a public and smaller private sector. The public sector delivery of healthcare is well-structured and financed by general taxation; however, the need for a national healthcare financing mechanism has long been debated⁶. Currently the Ministry of Health (MOH) shoulders the bulk of care in the public

sector at three levels - primary, secondary and tertiary. Basic oral healthcare at these public sector facilities are made available free of charge for preschool and school children, expectant mothers and civil servants. Periodontal care in public sector facilities is provided by general dentists at primary care level, who will, if required, refer patients to periodontists for specialist care. Periodontal services are also provided by general dentists or periodontists in the private sector, as well as universities. There is limited data available on the oral health of many low-to-middle income countries, such as Malaysia, and this gap detracts from our understanding of global disease trends^{3,7}. Moreover there is a dearth of shared knowledge in relation to the clinical burden of periodontal disease in developing countries⁷. The aim of this study was to estimate the clinical burden of periodontal disease in Malaysia by analysing the population periodontal status, treatment needs and service provision at the public sector specialist periodontal clinics in the country.

Methods

The data frameset for this study was provided by the Oral Health Division, Ministry of Health (MOH). To estimate the clinical burden of periodontal disease and periodontitis at the population level, we accessed weighted data for prevalence and severity of periodontal conditions and periodontal treatment needs for the populations. These data were extracted from the decennial National Oral Health Survey for Adults reports for surveys done in 1990, 2000 and 2010. To access information on oral health care delivery including periodontal services, we utilised annual reports from the dental subsystem of the MOH Health Information Management System⁸. Prior to this, permission to access the data frameset was granted by the Oral Health Division, MOH.

Nationwide oral health survey of adults

Oral health surveys of adults aged 15 years and above in Malaysia are conducted once every ten years. These surveys utilised two-stage sampling technique; each time the probability sampling was based on national census data of enumeration blocks (EB) from the Department of Statistics, Malaysia.

Clinical examiners were selected from among government dentists with postgraduate qualifications in dental public health and underwent comprehensive standardisation and calibration sessions. To date, there have been four such large-scale surveys in 1974⁹, 1990¹⁰, 2000¹¹ and 2010¹². Of these, periodontal assessments for only three years - 1990, 2000 and 2010 - were comparable as they utilised the Community Periodontal Index (CPI) to assess the periodontal status and treatment needs of adults¹³. We reviewed secondary data from these three surveys for analysis of periodontal disease prevalence, severity and the corresponding treatment needs. Based on the CPI, prevalence of periodontal disease by severity was reported whereby: Score 0 = healthy periodontal conditions, Score 1 = gingival bleeding, Score 2 = gingival bleeding and calculus, Score 3 = shallow periodontal pockets (4-5 mm), Score 4 = deep periodontal pockets (≥ 6 mm), Score 9 = excluded, and Score X = not recorded or not visible. For estimation of periodontal treatment needs, the following scores were given: Score 0 = no treatment, Score 1 = need oral hygiene instruction (OHI), Score 2 = need OHI and dental scaling (prophylaxis), and Score 3 = need complex treatment.

Review of annual reports

We completed a retrospective analysis of dental procedures received by patients attending MOH periodontal specialist clinics in Malaysia from January 2006 - December 2010. Data were tabulated and calculations made using Microsoft Excel 2010 (Microsoft, Redmont WA USA). The procedures were categorised as examination and diagnosis, counselling (chair-side patient education), periodontal or periodontics treatment whether nonsurgical or surgical, and periodontal-related procedures such as restorative dentistry, extractions and prosthodontics based on national agreed standardised codification of treatment¹⁴. Most of the treatment was conducted by the periodontists while specially-trained dental nurses assisted in performing nonsurgical therapy. These nurses are referred to as post-basic dental nurses.

Results

Periodontal status

For all three surveys, the proportion of participants who had healthy periodontium (CPI 0) was generally low (Table 1). We observed a slight decline of periodontal disease (both gingivitis and periodontitis) prevalence between 1990 (92.8%) and 2000 (87.2%) but a rise in 2010 survey (94.0%). There was a marked increase of individuals with periodontitis (CPI 3 and CPI 4) in all age groups, especially for the 15-19 year-olds. For CPI 4 (severe periodontitis), highest increase was observed in the 35-44 and 65-

74 age groups. Excluded sextants referred to sextants that have less than two teeth present and may be indicated as representing tooth loss. Some reduction in the mean number of excluded sextants was apparent throughout the thirty years. Highest proportions of participants remained to be those with calculus (CPI 2). We also noted an increase in severity of periodontal disease for all age groups. This was shown by the increase in the mean number of sextants with CPI 1, 2 and 3 for all age groups, with greatest increase in the 35-44 age group (Figure 1).

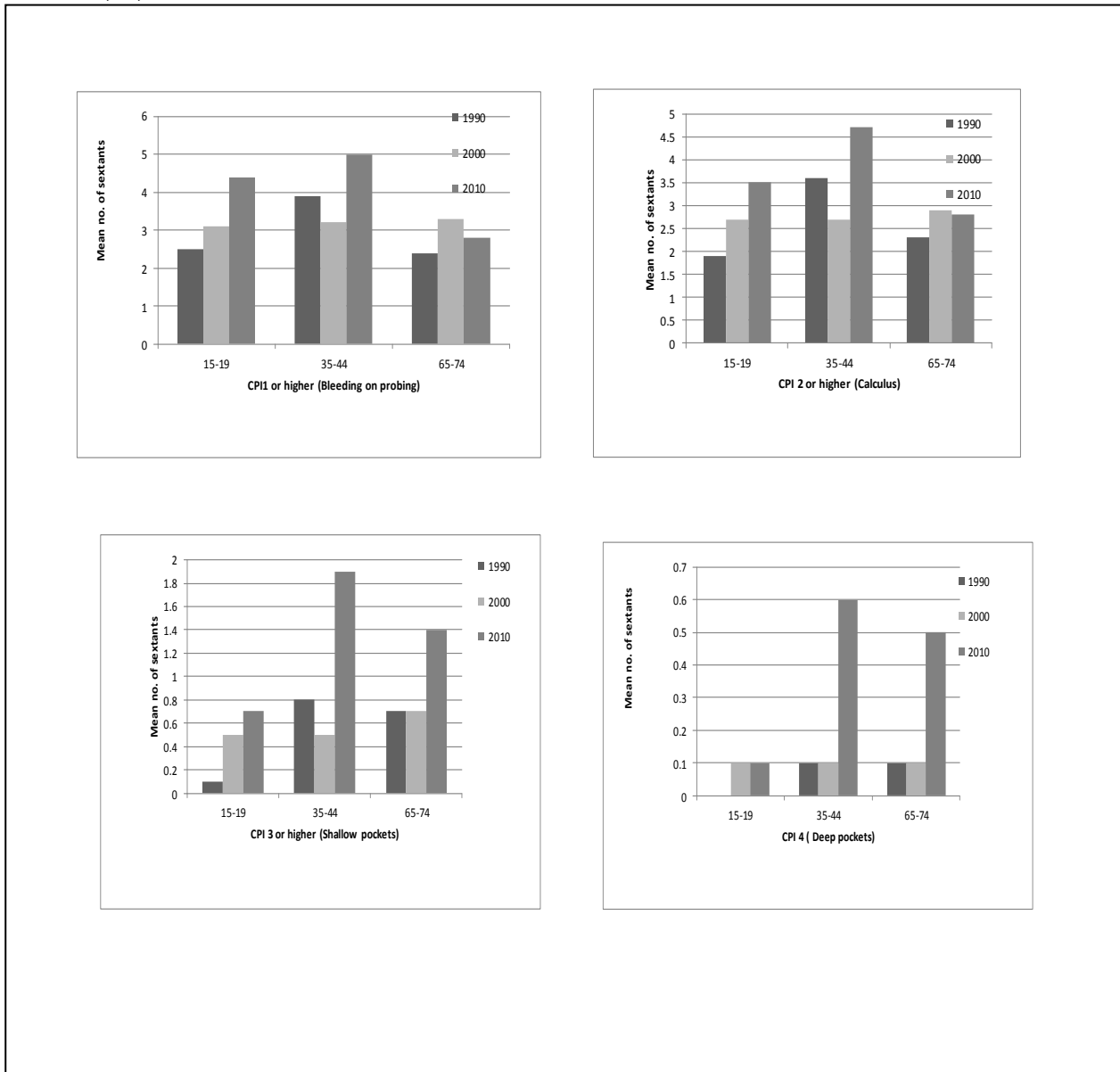
Table 1

Highest periodontal score in dentate adults in 1990, 2000 and 2010, by age groups

Age group	Year	Participants examined (dentate)	Periodontal status (%)					
			Healthy (CPI 0)	Bleeding (CPI 1)	Calculus (CPI 2)	Shallow pockets (CPI 3)	Deep pockets (CPI 4)	Excluded sextant (X)
15-19	*1990	1,928	16.9	10.4	68.5	3.9	0.3	-
	2000	1,639	25.8	11.2	60.0	2.9	0.1	0.0
	2010	1,235	9.6	14.1	56.5	16.8	3.0	0.0
35-44	*1990	2,452	4.6	2.6	60.6	23.4	8.5	-
	2000	2,258	5.0	2.8	54.9	28.5	7.2	1.7
	2010	1,629	1.8	1.7	36.1	34.2	25.3	0.9
65-74	*1990	354	4.2	0.6	54.5	24.3	16.4	-
	2000	392	2.6	1.5	40.7	27.1	9.2	19.0
	2010	363	2.0	1.4	26.7	28.1	26.7	15.1
ALL	*1990	12,305	7.2	4.6	65.1	17	6	-
	2000	9,932	9.8	4.5	57.5	20	5.2	3.0
	2010	8,332	3.2	4.1	41.4	30.3	18.2	2.7

*unweighted data; age group of 65+ was examined in 1990 instead of 65-74 age group

Figure 1
 Severity of periodontal disease (Mean no. of sextants affected) in Key Index Age Groups for CPI 1, 2, 3 and 4



Periodontal treatment needs

Percentage of participants not requiring periodontal treatment (TNO) increased from 1990 to 2000, only to decline in 2010 (Table 2). A similar high-proportioned need requiring oral hygiene instructions was observed for the three surveys respectively. There was a steady increase in need for prophylaxis, while the greatest change was observed for the proportion requiring complex periodontal care - an increase from 5.2% in 1990 to 18.2% in 2010.

Table 2

Periodontal treatment need for adults in 1990, 2000 and 2010 by age group

Age group	Year	Participants examined (dentate)	Periodontal treatment needs (%)			
			No treatment	Need OHI	Need OHI + prophylaxis	Need complex treatment
15-19	*1990	1,928	16.9	83.1	72.7	0.3
	2000	1,639	25.8	74.2	62.9	0.1
	2010	1,235	9.6	90.4	76.3	3.0
35-44	*1990	2,452	4.6	95.4	92.5	8.5
	2000	2,258	5.0	95.0	90.4	7.2
	2010	1,629	1.8	97.3	95.6	25.3
65-74	*1990	354	4.2	95.8	95.2	16.4
	2000	392	2.6	97.4	76.4	9.2
	2010	363	2.0	82.8	81.4	26.7
ALL	*1990	12,305	7.2	92.8	88.1	6.0
	2000	9,932	9.8	90.2	82.5	5.2
	2010	8,331	3.2	94	90	18.2

*unweighted data; age group of 65+ was examined in 1990 instead of 65-74 age group

Trend of dental utilisation and sources of referral

We noted a definite rising trend in patients' attendance at the periodontics clinics from 16,789 attendances in 2006 to 28,719 in 2010 (Table 3). "New" attendances at the periodontics clinics refer to patients who visit the clinic for the first time in a particular year. This is a measure of number of patients for a particular year. These may be patients who have never received care at the clinic before or patients who continued care from previous years. A "repeat" attendance refers to the "new" patient making another visit in the same year.

Repeat attendances were seen to have higher annual increments compared to new attendances. About 70% of clinic attendances were made by patients aged 30-59 years - a total of 14,538 in 2007 to 20,407 in 2010. Attendances of patients aged 7-17, 18-29 and 60 years and above made up 5%, 10% and 15% of total clinic attendances respectively during the study period. A larger proportion of patients were referred from dental clinics at distant locations, followed by those within the same premises as the periodontics clinics. Very few were referred by physicians and fewer still from private dental clinics.

Table 3

Dental attendance and sources of referral at periodontics clinics from 2006-2010

Attendance by age group	2006	2007	2008	2009	2010
7-17	N.A.	1,188	1,031	1,032	1,115
18-29	N.A.	2,112	2,368	2,142	2,699
30-59	N.A.	14,538	15,452	17,614	20,407
60+	N.A.	2,829	,3096	3,646	4,498
Total attendance	16,789	20,667	21,947	24,434	28,719
New attendance	5,226	5,953	6,538	6,532	7,527
Repeat attendance	11,563	14,714	15,409	17,902	21,192
Sources of referral	2006	2007	2008	2009	2010
Dental clinics, same premise	N.A.	1,466	994	688	1,333
Dental clinics, distant location	N.A.	1,281	1,667	1,985	2,099
Health clinic	N.A.	129	535	255	427
Hospital	N.A.	79	141	194	274
Private clinic	N.A.	101	117	156	189
Total	N.A.	3,056	3,454	3,278	4,322

*N.A. = Not available***Dental procedures**

The total number of dental procedures, comprising periodontics and periodontal-related procedures had increased almost two-fold from 32,045 procedures in 2006 to 61,999 in 2010 (Table 4). Out of these, periodontics accounted for 75.3% (n=24,123) in 2006 and rose to 82.7% (n=51,244) in 2010. Consistently over 90% of periodontics

procedures were non-surgical. The most common was counselling, followed by supra- and subgingival debridement. The least recorded was for splinting of teeth. There were more resective surgeries as compared to regenerative surgeries. The highest number of periodontal-related procedures was restorations while the least was fixed prosthodontics. All procedures showed increasing numbers performed at the clinics.

Table 4. Dental procedures at periodontics clinics from 2006-2010

Procedures	2006	2007	2008	2009	2010
A. Periodontics					
<i>Non-surgical</i>					
Counseling	11,078	15,562	17,706	21,289	23,899
Supra- and subgingival debridement	10,443	14,368	15,396	18,307	19,364
Abscess management	729	770	871	869	1,104
Desensitisation		499	830	1,240	1,817
Occlusal adjustment	273	477	562	1,167	1,117
Splinting	256	384	310	354	417
Sub-total	22,779	32,060	35,675	43,226	47,718
<i>Surgical</i>					
Resective surgery	674	934	894	1073	1200
Regenerative surgery	132	308	305	389	472
Others	503	897	741	1193	1613
Sub-total	1,309	2,139	1,940	2,655	3,285
B. Periodontal-related treatment					
Restorations	3726	5,118	5,151	5,979	6,358
Fixed prosthodontics	233	447	414	675	535
Endodontics	789	823	1,018	1,316	1,480
Extraction	2,814	760	1,039	1,185	1,327
Denture	360	648	654	714	1,055
Implants	35	122	114	171	241
Sub-total	7957	7,918	8,390	10,040	10,996
All procedures	32,045	42,117	46,005	55,921	61,999
%Periodontics over all procedures	75.2%	81.2%	81.8%	82.0%	82.3%
%Non-surgical procedures over total of all periodontics procedures	94.6%	93.7%	94.8%	94.2%	93.6%

Discussion

The paucity of data on periodontal status and treatment needs in low-to-middle income countries, and the need to fill this gap prompted the analysis and presentation of the periodontal disease trends and treatment in Malaysia. Our analysis was based on aggregated secondary data from various sources, and because of this we were not able to do perform hypothesis testing or regression analysis. Nonetheless, much of the descriptive analyses are useful to provide

insight on disease trends and treatment patterns in the country, and perhaps for countries with similar backgrounds.

The most obvious trend was the increase in periodontal treatment needs among the adult population due to the rise in prevalence and severity of periodontal disease. Of major concern is that the prevalence and severity of periodontal disease among Malaysians presents a more serious pattern of disease distribution than most developed and developing countries^{4,15}. The major burden of periodontal conditions, for instance, has shifted from having dental calculus to more complex conditions involving shallow and deep pockets. Another key observation is the increased need for periodontal care among the 15-19 year olds.

We postulate that the observed trend of periodontal disease may be attributed to

urbanisation transition among Malaysians as the country moves into the higher end of the middle-income bracket¹⁶⁻¹⁷. With urbanisation, people are likely to adopt new habits such as smoking, refined diet intake high in sugars and fat, excessive alcohol consumption and lead more sedentary yet stress-inducing lifestyles. Some of these lifestyle habits pose as risk factors for severe periodontal disease, and are also common to many non-communicable diseases (NCDs)¹⁵. Further, the increased proportion of population aged 55 years from 12% in 2010 compared with 9% in 2000 may also explain the higher proportions of periodontal disease which is parallel to the increasing life expectancy of Malaysians¹⁸.

We noted that improved access to specialist periodontal services had coincided with an increased demand for care (Table 5). Yet the types of procedures rendered at the government specialist periodontal clinics did not reflect the increased need for complex care. Types of periodontal treatment rendered were predominantly non-surgical. This is not surprising as mechanical and

chemical antimicrobial remains as the mainstay of preventive and curative periodontal therapy¹⁹⁻²¹. At the same time, we also observed that a substantial amount of resources were being expended in handling non-periodontics care such as restorations. With the increased need for complex care compounded with rising patient expectation, the demand for surgical periodontics and other advanced periodontal treatments such as regenerative therapy can be expected to grow. This changing consumer demand may be a cause for a review of the mix of clinical personnel to meet current and future challenges. For instance, some types of periodontal procedures may be performed by general dental practitioners without a formal speciality degree if given adequate training; turning them into necessary members of the periodontal team. In addition, dental nurses with post-basic training in periodontics can be more fully utilised to provide nonsurgical treatment such as debridement and chairside health education.

Table 5: Number of dental facilities and human resource for periodontics 2006-2010

	Clinic facilities		Dental personnel		
	Periodontics Clinic	Dental unit (Chair)	Periodontist	*Dentist	Post-basic dental nurse
2006	13	26	15	2,940 (1,368)	34
2007	13	28	16	3,165 (1,540)	39
2008	16	31	18	3,640 (1,692)	43
2009	16	34	18	3,974 (1,858)	44
2010	17	36	18	4,386 (2,055)	49

*Figures in parenthesis refer to number of dentists (general dental practitioners) in the public sector

Source: Oral Health Division, Ministry of Health

With regard to the observed rise in clinic attendances, the absolute number of outpatient visits is still low when measured against what is expected given the high levels of population treatment needs for complex periodontal care in year 2010 itself. Three reasons may explain this. First, the available facilities are still not able to match the need of the population in spite of the

growth in the services. Secondly, it may be possible that many periodontitis patients do not translate their needs into demand because they have low awareness of periodontitis or do not know where to seek

treatment - and as a result, they are not seeking dental treatment. Finally, it is also possible that periodontitis patients may be seeking treatment at private dental clinics, although this cannot be supported by documented evidence.

From the utilisation trend evident in this study (Table 3), increased periodontal treatment needs in the population (Table 2) and the expected population growth¹⁸, it is predicted that demand for care would grow. With projected growth of additional human resource and dental facilities, more periodontitis patients will be seen and treated, however, no amount of curative work will ever solve chronic conditions as

widespread as periodontal disease. More downstream efforts to curb periodontal disease incidence and progression must be given emphasis. Effective preventive and promotive measures should continue and be given priority through concerted efforts involving the private sector and the higher education providers. Higher education providers offering undergraduate and postgraduate dental programmes must emphasise effective implementation of primary prevention measures through periodontal risk assessment, and early detection of periodontal disease through effective screening procedures.

Instead of focusing on managing oral health needs by specific oral diseases such as dental caries for example, some of the existing resources within and beyond the healthcare system could perhaps be mobilised or spread out to meet common needs of the dental patient in general. These needs include ensuring people have access to: good living conditions, appropriate healthcare including oral healthcare, effective toothbrushing skills, feasible options to practice a healthy and nutritious diet, do not smoke and adopt effective life coping strategies. In order for this to be attainable, policy-makers, educators, non-governmental organisations, families and their support systems will need to play positive roles in pushing forward the agenda to enhance periodontal health awareness among public and healthcare workers. It is unfortunate that generally there are yet to be nationwide, evidence-based, effective oral health promotion strategies and policies to promote oral and periodontal health³. National health programmes that integrate common health promotion measures at individuals, community and professionals will also result in oral disease prevention¹³.

Conclusion

The rising periodontal treatment needs in the population do not seem to have been met. In spite of the upward trend of clinic attendance, the mix and distribution of treatment provided did not reflect the increasing needs for complex periodontal treatment. The analysis presented in this paper strongly suggests that it is indeed timely and prudent that the disease is given its due attention. There is a need to further

evaluate existing public health promotion strategies as well as the dental education curriculum to improve periodontal health of the Malaysian population. In meeting the population periodontal needs, more efforts must be geared to create awareness of oral and periodontal health or *absence* of it, encourage patients to substitute “symptom-driven” dental visit patterns with “health-promoting” ones and help people develop personal health-related skills such as self-screening for early signs of periodontal disease and keeping their mouths clean effectively.

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