

Diagnosis and treatment of patients with halitosis by dental hygienists and dentists in the Netherlands

Yvonne A. B. Buunk-Werkhoven^{1,2}, Jorien G. Buls¹, Elbrig Osinga³ and Josef J. M. Bruers^{4,5}

¹Dutch Dental Hygienists' Association (Nederlandse Vereniging van Mondhygiënisten; NVM)-Foundation for Research and Education, Nieuwegein, The Netherlands; ²SPOH ARTS: International Oral Health Psychology, Amsterdam, The Netherlands; ³Privat practice; ⁴Royal Dutch Dental Association (Koninklijke Nederlandse Maatschappij tot bevordering der Tandheelkunde; KNMT), Nieuwegein, The Netherlands; ⁵Academic Centre for Dentistry (Academisch Centrum Tandheelkunde Amsterdam), Amsterdam, The Netherlands.

Objectives: The aims of this study were to ascertain the knowledge level of halitosis in dental hygienists and dentists in the Netherlands and to examine how they deal with patients with halitosis. **Methods:** A written survey (comprising 29 questions on personal and professional characteristics, clinical observation and treatment of halitosis, the referral of patients with halitosis and expert knowledge of halitosis) was randomly distributed to a sample of 327 Dutch dentist members of the Royal Dutch Dental Association (Koninklijke Nederlandse Maatschappij tot bevordering der Tandheelkunde; KNMT) and to a sample of 205 members of the Dutch Dental Hygienists' Association (members of the Nederlandse Vereniging van Mondhygiënisten; NVM). A total sample of 168 oral health professionals (92 NVM-dental hygienists and 76 dentists) was included. **Results:** This sample can be considered as representative of the population of dental hygienists and dentists working in the Netherlands. Knowledge of halitosis in NVM-dental hygienists and dentists was generally the same. In both professions, attention to, and treatment of, halitosis did not take place at every patient contact, even among those who were able to treat patients with halitosis. **Conclusions:** This study supports the importance of training programmes aimed at increasing assertiveness, as well as the social and communication skills of dentists and dental hygienists to improve the diagnosis and treatment of patients with halitosis. A guideline on screening, diagnosis and treatment of halitosis may be useful to improve the attitude and behaviour of oral health-care professionals, ultimately aimed at stimulating optimal oral health care.

Key words: Knowledge, halitosis, dentists, dental hygienists, the Netherlands

INTRODUCTION

In a Dutch dental dictionary¹, halitosis is defined as an unpleasant-smelling odour from the nose and/or mouth, regardless of cause and/or origin. Besides being an unpleasant-smelling odour, it is also an offensive odour, emanating from the oral cavity or breath^{2,3}.

Although the term halitosis has only existed since 1921⁴, having bad breath is a worldwide problem that is centuries old. In medical papyri of ancient Egypt, which date from about 1550 BC, they refer to bad breath⁵. In addition, Roman and Greek writers describe the problem, and it is also mentioned in the Jewish Talmud⁶. The figures on the global prevalence of halitosis are inconclusive, ranging from 15% to 93%^{2,3,7–11}. Moreover, whereas 20 years ago only

15% of the Dutch population suffered from halitosis⁸, a recent study on halitosis in the Netherlands showed that almost 90% of subjects 16 years of age and older regularly experienced halitosis¹⁰.

Nearly 80 years after the launch of the term halitosis, a method for the classification of halitosis (with corresponding 'treatment needs') was developed by Miyazaki *et al.*¹². From this method, acknowledged by the International Society for Breath Odour Research and which has since been recognised as the worldwide standard for classification of halitosis, one can conclude that halitosis comprises the following key categories: genuine halitosis; pseudo-halitosis; and halitophobia^{3,13,14}. With genuine halitosis, the patient actually does have bad breath. With pseudo-halitosis and halitophobia, the patient thinks that he/she has bad breath; however, this is not the case. With the

correct measuring equipment and explanation, someone with pseudo-halitosis can be convinced that there really is no bad breath present. However, a patient with halitophobia continues to feel that they have unpleasant breath. Genuine halitosis can be divided into physiological and pathological halitosis, and pathological halitosis is divided into extra-oral halitosis and intra-oral halitosis¹⁵. As halitosis can have different causes, a multidisciplinary approach is important³. However, the majority of cases of halitosis (80–90% of cases in culturally diverse environments) has an intra-oral origin and therefore the dentist and dental hygienist can play a central role in the treatment of this condition^{3,10,11,16–18}.

Over the years, more and more has become known about the causes and treatment of halitosis. This has led to an increasing number of publications about halitosis in medical and dental journals¹⁹. However, in the Netherlands, there are, on a national basis, no scientifically based guidelines in use for the diagnosis and treatment of halitosis. Nevertheless, several studies indicate that, given the potential social consequences of halitosis, it is vital for oral health professionals to make patients aware of the presence of halitosis and that they should be prepared to practice in a culturally diverse environment in a sensitive and appropriate manner, to provide optimal oral health and hygiene care to improve patients' oral health-related quality of life and well-being^{10,16–20}.

Therefore, the purpose of this survey was to ascertain the knowledge level of dentists and dental hygienists in the Netherlands regarding halitosis and how they treat patients with this condition.

MATERIAL AND METHODS

Material

In February 2012, a written questionnaire was sent, together with a stamped addressed envelope, to 327 Dutch dentists and to 205 members of the Dutch Dental Hygienists' Association (NVM). Both groups were randomly selected, invited to fill in the questionnaire and to return it within 2 weeks. Student members, retired members and members who were working abroad were excluded. A reminder for responding within another week was included in the procedure.

Of the 327 dentists approached, 75 participated in the study by submitting the completed questionnaire. Furthermore, eight dentists sent back a questionnaire which had been completed by the dental hygienist working in the dentist's practice. Of the 205 NVM-dental hygienists invited to participate in the study, 84 responded. In addition, the response from one dental hygienist appeared to be a questionnaire answered by a dentist. All in all, responses were received from

83 (26%) dentists and from 85 (41%) dental hygienists, which resulted in a research group consisting of 76 dentists and 92 NVM-dental hygienists.

In the group of dentists, 56% were male and 44% were female, and 60% had more than 10 years of clinical experience. All dentists were educated in a '5 year course' (University master's degree): 37% in Amsterdam, 30% in Nijmegen, 21% in Groningen, 7% in Utrecht and 5% abroad. Furthermore, 38% were professionally employed in the western part of the Netherlands, 26% in the eastern part, 23% in the southern part and 13% in the northern part.

All NVM-dental hygienists in this study were female and 62% had more than 10 years of clinical experience. Thirty-five per cent of NVM-dental hygienists had been educated in a '2 year training programme', 43% in a '3 year training programme' and 22% in a '4 year training programme' (higher professional bachelor's degree). For 32% the place of education was Amsterdam, for 27% Nijmegen, for 24% Utrecht and for 16% Groningen, whilst 1% was educated abroad. In addition, 48% was professionally employed in the western part of the Netherlands, 21% in the southern part, 16% in the eastern part and 15% in the northern part.

The group of dentists in this study could be considered as representative of the population of dentists working in the Netherlands, in terms of university of qualification, location of professional employment and clinical experience. However, female dentists are somewhat over-represented in this study²¹. The group of NVM-dental hygienists appeared to be, in every respect, an adequate representation of the population of dental hygienists in the Netherlands^{22–24}.

Questionnaire

The questionnaire used in this survey consisted of 17 questions: five on some personal and professional characteristics, four on clinical observation of halitosis, four on treatment of halitosis, two on the referral of patients with halitosis and two on knowledge about halitosis. Specific knowledge about halitosis was measured using a newly developed index to reveal the status of the professional's knowledge on this matter. This index consisted of 12 items and used a response scale of 'correct', 'no idea' and 'incorrect'.

The questions were mainly structured with a closed answer format. When multiple answers were possible, this was stated in the question. The survey was pre-tested by 10 dentists and dental hygienists.

Statistical analysis

The data on the aforementioned subjects were described using bivariate analysis (chi-square test and

t-test; $P < 0.05$) to explore differences between dentists and dental hygienists (IBM SPSS Inc., Chicago, IL, USA). Using the items of the developed index on knowledge of halitosis, a sum score was calculated based on the responses on these items. Correct responses were scored with 1 point and incorrect or indecisive responses with 0 (zero) points. This sum score theoretically ranged from 0 to 12 and it was assumed that the higher this score for a dentist or dental hygienist, the more knowledge he or she had about halitosis.

Ethics statement

The ethical board, Central Committee on Research Involving Human Subjects, affirms that research which requires filling in a questionnaire just once generally does not fall under the scope of the Medical Research Involving Human Subjects Act (CCMO, 2014)²⁵.

In the covering letter to the dentists and NVM-dental hygienists it was stated that answering the written questionnaire was on a voluntary basis and that by doing so they consented for the anonymous use of the information given for research purposes.

RESULTS

Table 1 shows that attention to halitosis is not usual in every patient contact. This was particularly the case for dentists: 55% stated that they are always alert for halitosis, whereas fewer (25%) stated that this mouth problem is routinely included in a dental anamnesis. Besides, informing a patient that he or she has bad

Table 1 Attention to halitosis by dental hygienist members of the Nederlandse Vereniging van Mondhygiënisten (NVM) and by dentists

	Dental hygienists(%)	Dentists(%)
Are you attentive to halitosis during patient contacts*		
Never		1
Mostly not	1	8
Now and then	14	36
Usually	39	37
Always	46	18
Do you tell a patient that he/she has bad breath*		
Never		4
Mostly not	3	16
Now and then	15	37
Usually	44	31
Always	38	12
Do you attend to halitosis in the dental anamnesis*		
Yes	47	25
No	24	33
Only when a patient brings it up	29	42
<i>n</i>	90-91	75-76

**P* (chi-square test) <0.05 and Cramer's *V* > 0.15.

breath appears to be not in every case self-evident (43%). For NVM-dental hygienists these percentages are higher: 85%, 47% and 82% respectively.

From Table 2 it was clear that almost all NVM-dental hygienists (93%) and most dentists (73%) had at one time treated patients with halitosis. In the 6-month period before this survey, 52% of NVM-dental hygienists had treated fewer than five patients with halitosis and 48% had treated five patients or more. Dentists treated fewer patients (87% had treated fewer than five patients in the 6-month period before the survey). Eight (81%) of 10 NVM-dental hygienists stated that they had never referred a patient for treatment of halitosis. In most cases, they found themselves able to treat these patients. Also, more than half (55%) of the dentists acknowledged that they

Table 2 Treatment of patients with halitosis by dental hygienist members of the Nederlandse Vereniging van Mondhygiënisten (NVM) and by dentists

	Dental hygienists(%)	Dentists(%)
Have you ever treated patients with halitosis*		
Yes	93	73
No	7	27
How many patients did you treat in the past 6 months*		
<5	52	87
5-10	32	7
11-15	12	4
>15	4	2
<i>n</i>	85-91	55-75

**P* (chi-square test) <0.05/Cramer's *V* > 0.15.

Table 3 Referral of patients with halitosis by dental hygienist members of the Nederlandse Vereniging van Mondhygiënisten (NVM) and by dentists

	Dental hygienists(%)	Dentists (%)
Have you ever referred a patient for treatment of halitosis*		
Yes	19	45
No	81	55
What was/were the reason(s) for referral		
Patient had form of extra-oral halitosis	12	12
I did not know how to treat the patient*		12
My treatment did not succeed*	82	47
Different reason*	12	35
To whom do you usually refer		
A specialist outside the dental profession	18	12
A halitosis 'office hour' within or without the practice*	94	47
Different*		35
What is the most important reason for not referring*		
I do not treat halitosis patients	1	12
I am not acquainted with the possibilities for referral	18	26
I can treat halitosis patients myself	71	43
Different reason	10	19
<i>n</i>	17-91	34-76

**P* (chi-square test) <0.05 and Cramer's *V* > 0.15.

Table 4 Presence of a treatment protocol for patients with halitosis in practices where dental hygienist members of the Nederlandse Vereniging van Mondhygiënisten (NVM) and dentists are employed

	Dental hygienists(%)	Dentists(%)
Is a treatment protocol present in the practice		
Yes	19	11
No	81	89
Would you find the presence of a treatment protocol useful		
Yes	86	79
No	14	21
<i>n</i>	91	73–75

had never referred a patient for treatment of halitosis. In more cases than in the group of NVM-dental hygienists they explained this by pointing out that they encountered no patients with halitosis or that they had no information on possibilities for referral. If patients with halitosis are referred, most NVM-dental hygienists and dentists said that this was because their treatment did not succeed (*Table 3*).

In the majority of practices in which NVM-dental hygienists (81%) and dentists (89%) are employed, there is no protocol for the diagnosis and treatment of patients with halitosis. However, most NVM-dental hygienists (86%) and dentists (79%) acknowledged that such a protocol would be useful (*Table 4*).

Table 5 shows that for both NVM-dental hygienists and dentists, education and literature are the most important sources for knowledge on halitosis. An overview of the proportions of NVM-dental hygienists and dentists who gave a correct response on the 12 knowl-

Table 5 Ways in which dental hygienists and dentists have acquired their knowledge on halitosis

	Dental hygienists(%)	Dentists(%)
In which way(s) have you acquired your knowledge		
By education	74	70
Through literature	63	63
By peer contacts/peer consultation*	69	46
By continuing vocational training*	71	46
Through information from the professional organisation*	67	53
Through information from commerce*	5	3
Number of mentioned knowledge sources†	3.5	2.8
<i>n</i>	89	76

**P* (chi-square test) <0.05 and Cramer's *V* > 0.15.

†*F* = 12.9 (ANOVA), *P* < 0.05.

edge items can be found in *Table 6*. From this it becomes clear that the knowledge on halitosis of NVM-dental hygienists and dentists is generally the same. On average, in both groups the number of correct responses was just over 7. Further review, in particular on diagnosis (items b and c) and on indication and referral (items j, k and l) showed that a considerable lack of knowledge on halitosis exists. Besides, no relevant statistical relationship could be established between the level of knowledge on halitosis and the personal and professional characteristics (including those on halitosis) of NVM-dental hygienists and dentists. There was one exception: when these dental health providers had treated more patients with halitosis in the 6-month period before the survey, they on

Table 6 Percentage of correct reactions of dental hygienist members of the Nederlandse Vereniging van Mondhygiënisten (NVM) and dentists on a number of knowledge statements concerning halitosis

	Dental hygienists(%)	Dentists(%)
(a) In case of halitosis the bad smell can come from the mouth as well as the nose	64	66
(b) Pseudo-halitosis is the initial stage of pathological halitosis	33	37
(c) Extra-oral halitosis is a variant of physiological halitosis	14	17
(d) A bad smell has always to do with poor oral hygiene	94	95
(e) Mostly a bad morning breath disappears after toothbrushing or having breakfast	88	88
(f) The remedy for extra-oral halitosis is the use of tongue scraper and/or the use of a mouthrinse	100	100
(g) A bad taste in the mouth goes together with bad breath	57	68
(h) A patient can well conceive if he/she has a bad breath	87	92
(i) Performing a organoleptic measurement requires wearing a mouth cap	92	84
(j) If a patient suffers from halitophobia, referral to a psychologist is indicated	48	41
(k) When halitosis has an extra-oral cause, referral to a gastrointestinal specialist is indicated	46	53
(l) When uncertainty about the presence and/or origin of halitosis exists, referral of a patient for diagnosis to halitosis 'office hour' is indicated	21	20
Number of correct answers		
Mean (%)	7.3 (71.3)	7.5 (62.5)
Median	7.0	8.0
Modus	7.0	8.0
Standard deviation	1.8	1.7
Minimum	3.0	3.0
Maximum	11.0	11.0
<i>n</i>	89	76

Shaded areas: Items b,c,d,f,g,h, and k are incorrect statements.

average appeared to have more knowledge of halitosis. Those who treated no patients scored 7.2, those who treated one to 10 patients scored 7.2 and those who treated more than 10 patients scored 8.6 ($P < 0.05$).

DISCUSSION

The aim of this study was to ascertain the knowledge level of dental hygienists and dentists in the Netherlands regarding halitosis and to examine how they dealt with patients with this condition. The results demonstrate that in Dutch oral health-care practices attention to, and treatment of, halitosis is not common in every patient contact. Dutch NVM-dental hygienists reported that they were relatively more alert to halitosis than were Dutch dentists. NVM-dental hygienists also reported more often that they informed and treated their patients with halitosis themselves. Furthermore, NVM-dental hygienists, and especially dentists, stated that they referred patients for treatment of halitosis, mostly when their own efforts did not result in improvement. These results suggest a certain professional or supervised neglect regarding the treatment of patients with halitosis²⁶. Patients do not always get 'optimal care', and this is not only because of a lack of knowledge of halitosis in oral health professionals^{11,16}. Although there is a knowledge gap in the field of diagnosis, indication and referral of a small number of dentists and NVM-dental hygienists, their expert knowledge of halitosis is adequate. A possible explanation for not providing optimal care to patients may be reluctance on the part of oral health professionals, which seems to interfere with adequate professional care. This may, in part, be a result of the fact that giving a patient an unwelcome message may result in feelings of shame or embarrassment. In addition, oral health professionals may see no reason to discuss the issue of halitosis with a patient, even when they have diagnosed halitosis^{10,11,16}. The latter is a plausible explanation as it appears that the greater the social distance between two individuals, the lower the chance that one's attention is drawn to the halitosis of the other. Especially, regarding unknown persons, the chance is no more than 7%. This suggests that it is problematic to draw a person's attention to the presence of halitosis^{10,17}. Perhaps these reservations are also because in most practices there is no guideline available for the diagnosis and treatment of patients with halitosis. However, it is encouraging that most NVM-dental hygienists and dentists acknowledge that such guidelines are useful.

The present study has some limitations. First, it is a survey of a rather small group of oral health professionals, in which female dentists are somewhat over-represented. Second, the index for knowledge of halitosis is newly developed and its validity is not

certain. However, at face-value, this survey appears to be a useful method for assessing and evaluating expert knowledge about halitosis in Dutch oral health professionals. Third, the data relate to self-reported behaviour, rather than to actual behaviour. For that reason, some caution regarding the interpretation of these data is needed because what respondents say does not always match what they actually do. Socially desirable responses could be a possible explanation²⁷.

Nevertheless, the results provide a serious indication that the treatment of patients with halitosis needs improvement. This is important because patients with halitosis are at risk of not receiving 'optimal care', whilst the potential social and behavioural consequences of halitosis are substantial. Of note, beyond providing oral health care, oral health professionals are expected to emphasise the relationship between oral and systemic disease as contributors of the quality of life and well-being of their patients in general^{10,16,18,28}. Indeed, halitosis can be indicative of underlying diseases²⁹, besides the fact that in nearly all patients with halitosis complaints, an oral cause could be detected³⁰. Moreover, halitosis can have a substantial economic impact as it causes embarrassment and affects social communication. There are indications that patients are responsive to attention and advice on halitosis. For instance, a Nigerian study found that most respondents had a good impression of their own breath odour and that they appreciated it when they were informed that their breath was offensive³¹. Additionally, several training programmes aimed at increasing assertiveness are available to prepare health professionals to deal with, for instance, embarrassing or taboo issues regarding the prevention of acquired immune-deficiency syndrome (AIDS)³² and to promote parent-adolescent sexual health communication³³. There are various guidelines on how to implement, plan and evaluate social and communication skills training on such issues in the practices of health professionals. Such programmes include games, discussions and (videotaped) role plays to help health professionals learn to communicate with their patients about taboo topics and to supervise and interact with their patients effectively^{32,33}.

Finally, further research would provide more clarity. In particular, research in which the focus is directed to the use of available knowledge and efficiency of care in everyday oral health services^{34,35}.

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Conflict of interest

The authors declare that they have no competing interests.

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Correspondence to:

Yvonne A. B. Buunk-Werkhoven,
Dutch Dental Hygienists' Association (NVM)-
Foundation for Research and Education,
P.O. Box 1166,
3430 BD Nieuwegein,
The Netherlands.
Emails: Yvonne.buunk@mondhygienisten.nl,
Yvonne@spoh-arts.com