

# Halitosis, what experiences and methods apply Dutch dental hygienists

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## Abstract

**Objectives:** The aim of this research is to gain more insight in the methods and experiences of dental hygienists in the Netherlands regarding the treatment of patients with halitosis.

**Material and methods:** A total of 92 dental hygienists completed the questionnaire (consisting of 19 questions on personal and professional characteristics, clinical observation and treatment of halitosis, the referral of patients with halitosis, the presence and usefulness of a protocol). The questionnaire was distributed using a social media platform for dental professionals in oral health care from all over the Netherlands.

**Results:** 83.4% of 90 dental hygienists had paid attention to the patient's breath but only 37.8% of dental hygienists always informed the patient. Reasons for not informing patients were the fear of the patient's possible reaction or because other oral health problems were more important. Of the included dental hygienists 67.8% had never referred a patient for treatment of halitosis. 86.7% of the dental hygienists stated there was no protocol for diagnosis and treatment of patients with halitosis. However, 90.0% of the dental hygienists acknowledged a protocol would be useful.

**Conclusions:** The majority of the dental hygienists in the Netherlands had paid attention to the patient's breath, but only a small group of dental hygienists informed their patients about halitosis. In dental practices halitosis is an underestimated problem. During the coronavirus pandemic people are more aware with the smell of their breath. Dental hygienists indicated scaling and root planning and/or providing information and instruction by patients with a bad breath.

## KEYWORDS

Dental hygienist, Halitosis, Methods, The Netherlands, Treatment

## 1 | INTRODUCTION

Halitosis is an unpleasant odour of the mouth and/or the nose,<sup>1</sup> which occurs in approximately one in seven people.<sup>2</sup> People with halitosis are now more than ever aware with the smell of their bad breath because they have to wear a mouth- or facemask due to the coronavirus pandemic. Therefore, the topic of halitosis, especially

in this present period related to COVID-19, must be highlighted. Moreover, professionals might be inclined to look for solutions to improve someone's breath and the public oral health.<sup>3</sup>

The main cause of halitosis is an intraoral problem and is related to the bacterial decomposition of rapidly evaporating sulphur compounds.<sup>4</sup> Other causes of intraoral halitosis are the presence of tongue coating, gingivitis, other periodontal problems or a

combination of the factors.<sup>2</sup> Several causes of extraoral halitosis are some systematic diseases, some metabolic disorders and the use of certain medications.<sup>5</sup> Halitosis has several main categories such as pseudo-halitosis, real halitosis and halitophobia. Bad breath only occurs in patients who have real halitosis. Patients with pseudo-halitosis or halitophobia think they have a bad breath, but they do not have halitosis.<sup>6-8</sup> Another phenomenon is that patients have a temporary halitosis due to reduced saliva production or of consuming certain foods.<sup>5</sup> In the Netherlands, dental hygienists belong to the profession of paramedics and they have an important role in the diagnosis, treatment and referral of patients with halitosis.<sup>4,9</sup> It is important that dental hygienists analyse the cause of odour of the mouth and treat various oral problems that are responsible for the unpleasant odour of the mouth.<sup>4</sup> In addition, it is the responsibility of the dental hygienist to inform patients about the causes of halitosis, because halitosis can affect the social life of the patient.<sup>9,10</sup> Halitosis is a serious social problem, which may reveal underlying pathology that is beyond the intraoral field of the dental hygienist.<sup>4</sup> Halitosis can be prevented in a healthy person through periodic oral examinations and good oral hygiene.<sup>5</sup> If the problem still persists, the dental hygienist should consult a general practitioner.<sup>8</sup> The number of publications about halitosis in dental and medical journals has increased.<sup>11</sup> The study by Buunk-Werkhoven et al.,<sup>9</sup> among oral health professionals in the Netherlands, shows that attention to and treatment of halitosis did not take place at every patient contact, not even among those who were able to treat patients with halitosis. Besides, it is important to provide training aimed at increasing assertiveness, and at the social and communication skills of dental hygienists to improve the diagnosis and treatment of patients with halitosis. A recommendation of the study was to establish a guideline on the screening, diagnosis and treatment of halitosis, to improve the attitude and behaviour of oral health care professionals and stimulating optimal oral health care. To date, there is still no guideline for establishing a diagnosis and treatment of halitosis.<sup>9</sup>

Before COVID-19 and based on the results of the Dutch study by Buunk-Werkhoven et al.,<sup>9</sup> this present study on the topic of halitosis has been re-examined. The aim of this research is to gain more insight into the methods and experiences of dental hygienists in the Netherlands regarding the treatment of patients with halitosis.

## 2 | MATERIALS AND METHODS

### 2.1 | Ethics statement

This study, which only requires completing an online questionnaire, does not fall under the scope of the Medical Research Human Subject Act (CCMO, 2020).<sup>12</sup> It was conducted according to universal ethical principles, in accordance with the Declaration of Helsinki, and participation was on a voluntary basis. The potential respondents were informed about what their participation entailed. By answering the digital questionnaire they consented to the anonymous use of the information given for research purposes.

### 2.2 | Sample and procedure

On 13 November 2020, a digital questionnaire was distributed using a social media platform for dental hygienists, dentists and other employees in oral health care from all over the Netherlands. Dental hygienists were invited to fill in the questionnaire within two weeks. Undergraduate students dental hygiene and dental hygienists who were graduated or working abroad were excluded. In the procedure a reminder for responding was included after four days and again after eight days.

### 2.3 | Questionnaire

The questionnaire used in this study was partly based on the questionnaire used in a previous Dutch study about diagnosis and treatment of patients with halitosis by dental hygienists and dentists by Buunk-Werkhoven.<sup>9</sup> The questionnaire consisted of 19 questions: five on personal and professional characteristics, four on the clinical observation of halitosis, three on the treatment of halitosis, four on the referral of patients with halitosis, two on the presence and usefulness of a protocol for patients with halitosis and one on how dental hygienists acquired their knowledge about halitosis. Some questions could be answered with more than one answer, such as 'What is the reason for not telling a patient had a bad breath', 'What was/were the reason(s) for referral' and 'To who do you usually refer?' (see Table 1,2).

### 2.4 | Statistical analysis

Analyses of the data on the subject were described by using the standard statistical programme IBM SPSS (version 24). Data were analysed by descriptive statistics. Question 10 contained an open answer and this required qualitative data analysis. All answers were transcribed and after full reading organised into themes and labelled with a code name (open coding). The main themes were 'examining tongue'/ 'tongue scraper', 'recommend mouthwash', 'asked additional questions to determine the cause', 'information, instruction and treatment of oral hygiene', 'referral', 'discussed diet' and 'discussed medication'. The second process was identifying relationships among the open codes (main themes) according to axial coding and this was reviewed. The resulting themes were categorised under the last three main themes, according to a selective coding process in line with the coding process as described in Attride- Stirling<sup>13</sup>.

## 3 | RESULTS

### 3.1 | Study population and response

A response was received from 103 dental hygienists, of which 11 participants did not complete the questionnaire. They were labelled as 'Missing' and excluded from the study. Out of the final response rate,

more than three-quarter (76.1%, n = 70) had a professional Bachelor degree (a program of four years): 46.7% (n = 43) of them were graduated in Amsterdam, 33.7% (n = 31) in Utrecht, 15.2% (n = 14) in Nijmegen and 4.3% (n = 4) in Groningen. Most dental hygienists were professionally employed in the provinces of Noord-Holland (30.4%, n = 28) and Zuid-Holland (29.3%, n = 27). 40.2% (n = 37) of the dental hygienists had between one and five years of clinical work experience. Dental hygienists acquired their knowledge about halitosis during their education dental hygiene (88.0%, n = 81), keeping up with scientific literature (65.2%, n = 60) and discussions with colleagues (47.8%, n = 44).

Table 1 shows that 83.4% (n = 75) of dental hygienists 'usually' or 'always' pay attention to the patient's breath during a patient contact. 37.8% (n = 34) of dental hygienists always inform the patient, when he/she has a bad breath. Reasons for not informing a patient were the fear of the patient's possible reaction (47.6%, n = 27) or because other oral health problems were more important and required attention first (27.6%, n = 16).

Table 3 shows that dental hygienists indicated scaling and root planning (applied 11 times) and/or providing information and instruction (applied 48 times) when a patient appeared to have a bad

**TABLE 1** Attention to halitosis by dental hygienists in the Netherlands n = 90

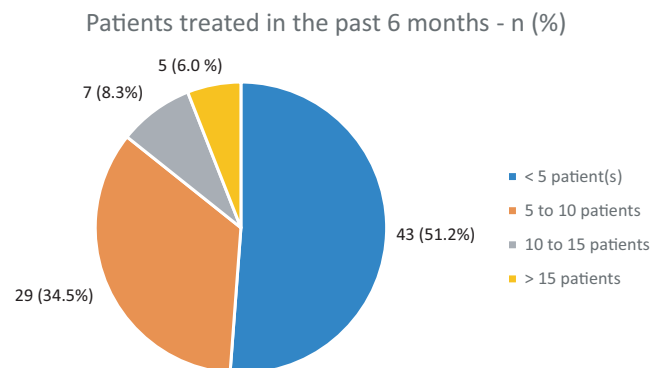
| Are you attentive to halitosis during patient contacts? n (%)           |    |        |
|---|----|--------|
| Never   | 0  | (0.0)  |
| Mostly not  | 1  | (1.1)  |
| Now and then  | 14 | (15.6) |
| Usually   | 33 | (36.7) |
| Always  | 42 | (46.7) |
| Do you tell a patient that he/she has bad breath? n (%)                 |    |        |
| Never   | 3  | (3.3)  |
| Mostly not  | 3  | (3.3)  |
| Now and then  | 20 | (22.2) |
| Usually   | 30 | (33.3) |
| Always  | 34 | (37.8) |
| If you don't say it, what is the reason? n (%)                          |    |        |
| Because of the (possible) reaction of the patient                       | 27 | (47.6) |
| It takes a lot of time  | 3  | (5.2)  |
| My estimation is that the patient is not doing anything about this      | 4  | (6.9)  |
| Other oral health problems are more serious and require attention first | 16 | (27.6) |
| Different   | 8  | (13.8) |
| Do you attend to halitosis in the dental anamnesis? n (%)               |    |        |
| Yes   | 31 | (34.4) |
| No  | 22 | (24.4) |
| Only when a patient brings it up  | 37 | (41.1) |

**TABLE 2** Referral of patients with halitosis by dental hygienists in the Netherlands n = 29

| What was/were the reason(s) for referral? n (%)   |    |        |
|---|----|--------|
| Patient had a form of extraoral halitosis   | 7  | (24.1) |
| I did not know how to treat the patient   | 2  | (6.9)  |
| My treatment did not succeed  | 15 | (51.7) |
| My treatment did not succeed & different  | 2  | (6.9)  |
| I did not know how to treat the patient & different   | 1  | (3.4)  |
| Different   | 2  | (6.9)  |
| To whom do you usually refer? n (%)   |    |        |
| A specialist outside the dental profession  | 4  | (13.8) |
| A halitosis 'office hour' within or outside the practice  | 15 | (51.7) |
| A specialist outside the dental profession & A halitosis 'office hour' within or outside the practice | 3  | (10.3) |
| A halitosis 'office hour' within or outside the practice & different                                  | 2  | (6.9)  |
| Different   | 5  | (17.2) |

**TABLE 3** Act when a patient appears to have a bad breath n = 59

| How do you act when a patient appears to have a bad breath? N              |    |
|--|----|
| Use of different anamneses and additional questions to determine the cause | 26 |
| Refer a patient to a periodontist  | 1  |
| Refer a patient to a general practitioner                                  | 3  |
| Refer a patient to a halitosis consultation                                | 2  |



**FIGURE 1** Frequency treatment of patients with halitosis by dental hygienists in the Netherlands n = 84

breath. In addition, dental hygienists recommended a tongue scraper (applied 30 times) and mouthwash (applied 13 times).

Most of the dental hygienists had at one time treated a patient with halitosis (89.1%, n = 82). 51.2% (n = 43) of the dental

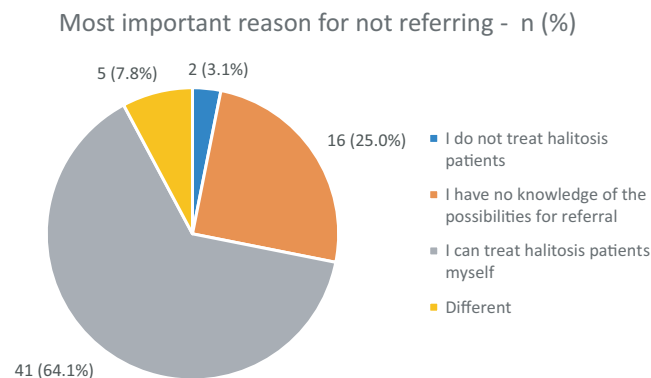


FIGURE 2 Reason for not referring patients with halitosis by dental hygienists in the Netherlands n = 64

hygienists had treated fewer than five patients in the past six months (Figure 1).

Of the included dental hygienists have 67.8% (n = 61) never referred a patient for treatment of halitosis. 64.1% (n = 41) of dental hygienists explained this by stating they provided adequate care of the patient themselves, and 25.0% (n = 16) of the dental hygienists had no information on the possibilities for referral. Some patients with halitosis were referred because the treatment by dental hygienists did not succeed (51.7%, n = 15). Dental hygienists chose the option 'different' (6.9%, n = 2) on this question, they referred patients with halitosis when a halitosis meter was needed and when the patient indicated his preference (Table 2 and Figure 2).

Of the included dental hygienists, which are employed in practices in the Netherlands, stated that there is no protocol for the diagnosis and treatment of patients with halitosis (86.7%, n = 78). However, 90.0% (n = 81) of the dental hygienists acknowledged a protocol would be useful.

## 4 | DISCUSSION

The aim of this research was to gain more insight in the methods and experiences of the Dutch dental hygienists regarding the treatment of patients with halitosis. The majority of the Dutch dental hygienists had paid attention to the patient's breath during a patient contact, but only a small group of the respondents inform their patients about halitosis. Reasons for not informing patients were the fear of the patient's possible reaction or because other oral health problems were more important and required attention first. There is a taboo on discussing this subject.<sup>5</sup> In dental practices halitosis is an underestimated problem, this was consistent with the results of this research. 41.1% of the dental hygienists included the subject of halitosis in their medical history when the patients indicated it themselves.<sup>14</sup> People with halitosis are now more than ever aware with the smell of their bad breath by wearing a mouth- or facemask because of the coronavirus pandemic. Fear arises about possibly having halitosis, which can cause psychological problems that have an impact on the quality of life of a

patient.<sup>5,15</sup> A possible consequence can be to keep some persons at a social distance. The degree to which people maintain their distance from each other depends on among other things on subjective mouth odour perception.<sup>11</sup> It is important to understand the aetiology and risk factors of halitosis to determine the cause of halitosis and to apply an appropriate treatment with a satisfied result.<sup>15</sup> A cause-related strategy is the basis of the treatment of halitosis.<sup>16</sup> More than half (51.2%) of dental hygienists in this sample had treated less than five patients in the past six months. It may also be the case that dental hygienists have little awareness of diagnosing, treating and/or addressing patients with halitosis during the patient contact. However, dental hygienists are more skilled when they have treated many patients with halitosis<sup>11</sup>

Dental hygienists indicated the options scaling and root planning and/or providing information and instruction when a patient appears to have a bad breath. In addition they use different anamneses, like medical history, oral hygiene history and nutritional history and ask patient additional questions to determine the cause of halitosis and ask patients additional questions to determine the cause of halitosis. A point of attention remains that in this study no distinction was made between pseudo-halitosis, real halitosis and halitosis where the dental hygienist notices it but the patient does not.

More than half of the dental hygienists had never referred a patient for treatment of halitosis. Dental hygienists explained this by saying that they provided adequate care to the patient themselves or had no information on possibilities for referral. The majority of dental hygienists did not have a protocol for diagnosing and treating halitosis or how to break taboo on communicating with a patient about halitosis. Although there is need to develop a protocol, the results correspond to the study by Buunk-Werkhoven seven years ago, until now no protocol has been developed. This may be a possible explanation for the fact that dental hygienists are not always aware of halitosis, sometimes do not inform patients with halitosis and only refer patients when their own treatment has no effect. In the near future, it is desirable that the dental hygienist has a guideline in practice regarding screening, communication, diagnosis and treatment of halitosis. The latter may help the dental hygienist to improve attitudes and behaviour towards the treatment of halitosis.

This study has a few limitations. First, the sample is a small group of dental hygienists in the Netherlands, which may affect the external validity of the results. Second, social media had been used for inclusion, the study shows that mainly the young generation spends more time on social media.<sup>17</sup> Third, dental hygienists often give neutral answers, these answer options can be interpreted differently. Fourth, a self-reporting questionnaire had been used; the subject may not meet the inclusion criteria. In this research dental hygienists were approached through social media instead of via the Dutch Association of Dental Hygienists as in the study by Buunk-Werkhoven.<sup>9</sup> This could explain that the results are not completely consistent or that some results are different.

Due to the COVID-19 crisis, the previous research results and data collected before COVID-19 may provide indications as to what

might be areas of concern for future study orientation. Research showed that oral manifestations occur commonly during COVID-19. The age of the patients and the severity of COVID-19 predict the seriousness of the mouth lesions. Oral hygiene, infections, stress and underlying diseases could be factors of oral lesions in COVID-19 patients<sup>18</sup>

## 5 | CONCLUSION

The majority of the dental hygienists in the Netherlands have paid attention to the patient's breath during a patient contact, but only a small group of dental hygienists inform their patients about halitosis. Reasons for not informing patients were the fear of the patient's possible reaction or because other oral health problems were more important and required attention first. In dental practices halitosis is an underestimated problem. Halitosis can affect the quality of life and can create social distance. Dental hygienists indicated scaling and root planning and/or providing information and instruction when a patient appears to have a bad breath. In addition they use different anamneses, like medical history, oral hygiene history, nutritional history and ask patient additional questions to determine the cause of halitosis and ask patients additional questions to determine the cause of halitosis. More than half of the dental hygienists had never referred a patient for treatment of halitosis. Dental hygienists explained this by stating that they provided adequate care to the patient themselves or had no information on possibilities for referral. The majority of dental hygienists did not have a protocol for diagnosing and treating halitosis or how to break taboo on communicating with a patient about halitosis. Although there is need to develop a protocol, the results correspond to the study by Buunk-Werkhoven<sup>9</sup> seven years ago, until now no protocol has been developed.

## 6 | CLINICAL RELEVANCE

### 6.1 | Scientific rationale for the studies

The topic of halitosis, especially in this present period related to COVID-19, must be highlighted. Moreover, professionals might be inclined to look for solutions to improve someone's breath and the public oral health.<sup>3</sup> Before the COVID-19 and based on the results of the Dutch study this present study on the topic of halitosis has been re-examined.

### 6.2 | Principal findings

The majority of the dental hygienists paid attention to the patient's breath during a patient contact, only a small group of dental hygienists informed their patients about halitosis. The majority of dental hygienists did not have a protocol for diagnosing and

treating halitosis, although they acknowledged a protocol would be useful.

## 6.3 | Practical implications

There is a need for a guideline on screening, diagnosis and treatment of halitosis and an implementation process, to improve the attitude and behaviour of oral health care professionals and stimulating optimal oral health care.

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### CONFLICT OF INTEREST


All authors declare that there is no conflict of interest.

### AUTHOR CONTRIBUTIONS

CE and SS conceived and directed the study, which was based on previous research of YB-W. SS and CE carried out the implementation. CE and SS took the lead in writing this article and YB-W provided essential feedback and contributed to the revision of the draft manuscript by critically examining at the intellectual level.

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