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ORIGINAL ARTICLE

Clinical examination of subjects with halitosis

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OBJECTIVE: To develop and apply a detailed clinical protocol for screening and assessing subjects with a complaint of halitosis.
DESIGN: Cross-sectional.
SUBJECTS AND METHODS: Several methods were used to recruit subjects with a complaint of halitosis, including a newspaper advertisement. A definition of halitosis arising from within the oral cavity, which is not related to generalized chronic gingivitis, chronic periodontitis or pathology of the oral mucosa was used. An extensive list of exclusion criteria was applied at the initial visit. Eligible subjects were asked to follow strict instructions and complete a questionnaire prior to their second visit for data collection. The clinical examination consisted of an organoleptic assessment, Halimeter® reading and periodontal examination.
RESULTS: The best method of recruiting subjects was advertising. Of 66 individuals recruited, four failed to attend the screening visit and 25 were excluded. The main reasons for exclusion were poor oral hygiene and existing periodontal disease. Thirty-seven completed the full protocol, resulting in identification of 18 with halitosis and 19 controls.
CONCLUSIONS: Application of the exclusion criteria resulted in significant attrition of eligible participants. Our results suggest that organoleptic assessment should be regarded as a useful standard for defining subjects with halitosis.
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Keywords: halitosis; organoleptic scoring; Halimeter®; clinical protocol

Introduction

Halitosis is a broad term describing a range of unpleasant or offensive odours emitted in the breath, which can have a variety of causes. A useful classification system for different types of halitosis was published by Yaegaki and Coil (2000). This classification system comprises three categories: pseudohalitosis, halitophobia and genuine halitosis. Pseudohalitosis is the term used to describe a condition in which a patient believes significant malodour is present but examination reveals the absence of any offensive odour (Richter, 1996; Yaegaki and Coil, 1999b, 2000). Halitophobia is characterized by a patient's persistence in believing that he or she has halitosis despite reassurance, treatment and counselling (Eli *et al*, 1996; Yaegaki and Coil, 1999b, 2000). Genuine halitosis is oral malodour beyond socially acceptable levels and can be subdivided into physiological and pathological halitosis, although in some cases both may exist concurrently. Physiological halitosis occurs through digestive processes in the stomach (for example following the ingestion of garlic or spicy foods) or through normal putrefactive processes in the oral cavity (Attia and Marshall, 1982; Yaegaki and Coil, 2000) and is not related to systemic disease or pathology. Pathological halitosis may have oral and non-oral causes. Oral causes include periodontal pathology, or pathology of the mucous membranes, whilst extra-oral causes include respiratory tract infections or systemic disorders, such as poorly controlled diabetes mellitus, hepatic cirrhosis and kidney disease (Rooth and Ostenson, 1966; Chen *et al*, 1970; Simenhoff *et al*, 1977; Ansai and Takehara, 2005). Halitosis arising from within the oral cavity which is not due to generalized chronic gingivitis, chronic periodontitis or pathology of the mucous membranes is thought to arise mainly from bacterial metabolism on the dorsum of the tongue (Donaldson *et al*, 2005). The odour produced consists of a mixture of many gases, including volatile sulphur compounds (VSCs) such as hydrogen sulphide and methyl mercaptan (Tonzetich, 1971).

There are three generally accepted methods for measuring and assessing the extent of oral malodour in subjects with halitosis. The first is the organoleptic or 'sniff' test, whereby an examiner uses his or her sense of smell to score another person's halitosis thereby closely resembling day-to-day situations when halitosis is a cause for concern (Schmidt *et al*, 1978; Rosenberg, 1997; Greenman *et al*, 2004). Another commonly used method is the Halimeter® (Interscan Corporation, Chatsworth, CA, USA) which is a portable sulphide monitor that measures the levels of VSCs (mainly hydrogen sulphide

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and methyl mercaptan) present in the breath (Rosenberg *et al*, 1991). The third method is highly sensitive gas chromatography, which is not often used, in the clinical setting because of the expensive, complex and non-portable nature of the equipment (Tonzetich, 1971; Ochiai *et al*, 2001). Most clinicians and researchers have used a combination of organoleptic and Halimeter® assessments to identify subjects with halitosis.

Many publications in the area of halitosis research do not clearly define the type of halitosis under investigation and, to the authors' knowledge, no consensus on standards for screening and assessment exists. Yaegaki and Coil (2000) published guidelines for investigating subjects with halitosis but did not specify the type of halitosis under investigation and therefore no exclusion criteria were documented. Other authors also have not described any exclusion criteria in their protocols (Rosenberg *et al*, 1991; De Boever and Loesche, 1995). The only exclusion criterion indicated by Schmidt *et al* (1978) was gross dental abnormalities. It is essential that the type of oral malodour under investigation is strictly defined and exclusion criteria published, otherwise it is difficult to extract useful information from results generated by different groups of investigators. Differing protocols have been used, without uniform agreement, for examining subjects with halitosis (Schmidt *et al*, 1978; Rosenberg *et al*, 1991; Yaegaki and Coil, 2000; Kazor *et al*, 2003; Roldan *et al*, 2003). The aim of the current study was to develop and apply a detailed clinical protocol for screening and assessing subjects with a complaint of halitosis, in order to recruit patients with halitosis arising from within the oral cavity, which is not related to generalized chronic gingivitis, chronic periodontitis or pathology of the mucous membranes.

Subjects and methods

Ethical approval was obtained from Glasgow Dental Hospital Research Ethics Committee. All subjects gave written informed consent prior to enrolment. Participants were recruited from four sources (Figure 1). These were staff at Glasgow Dental Hospital & School (GDH&S); patients referred to the Departments of Oral Medicine and Periodontology, GDH&S; Glasgow Research Initiative in Dental Primary Care (a local research network of primary care dental practitioners); and to aid recruitment an advertisement was placed in a free regional newspaper that has a daily circulation of 120 000 readers across Central Scotland.

Screening of participants

Previously described guidelines (Schmidt *et al*, 1978; Rosenberg *et al*, 1991; De Boever and Loesche, 1995; Richter, 1996; Yaegaki and Coil, 2000; Roldan *et al*, 2003) were adapted and expanded to form the following exclusion criteria: poor oral hygiene (generalized visible

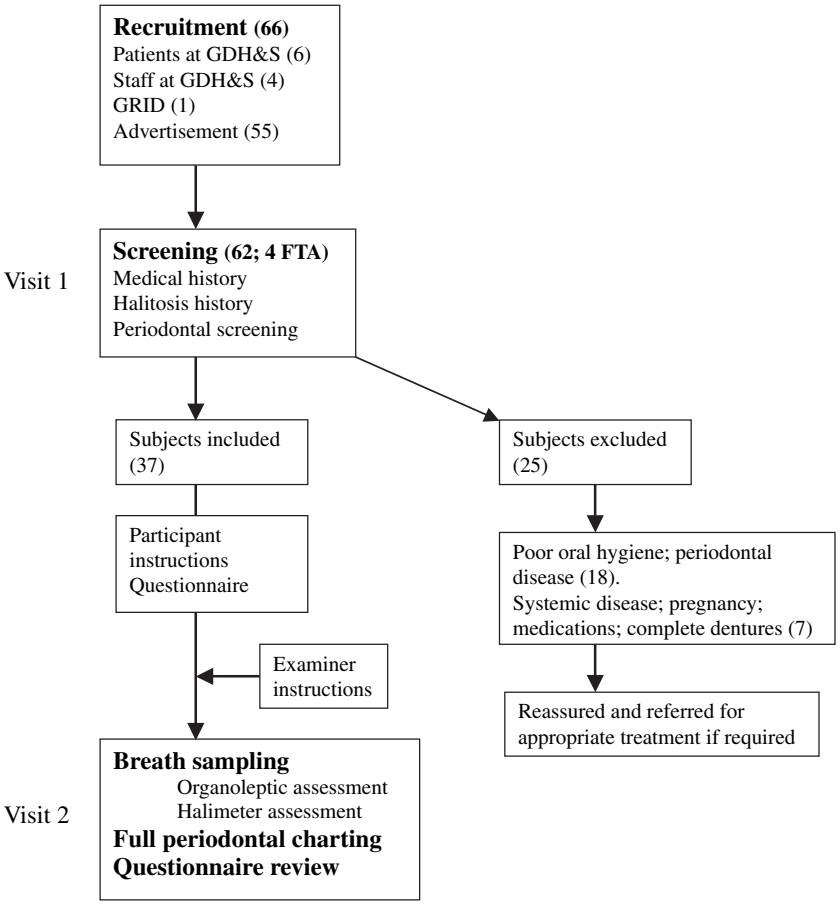

Figure 1 Flow diagram of study protocol. The number of participants is illustrated in parentheses. GDH&S, Glasgow Dental Hospital and School; GRID, Glasgow Research Initiative in Dental Primary Care; FTA, failed to attend

plaque and calculus deposits), generalized chronic gingivitis (visual signs of gingivitis) generalized chronic periodontitis (clinical probing depths of ≥5 mm; more than five sites with clinical probing depths of >3 mm but ≤5 mm) and caries (cavitation in one or more teeth that may cause food trapping); pathology of the oral mucous membranes or attached gingivae; diseases of the respiratory tract, including sinus disorders and asthma; diabetes mellitus, kidney, liver or stomach disorders and HIV/AIDS; Sjögrens syndrome; antibiotic therapy in the previous 4 weeks; prescribed medication that can cause xerostomia as listed in the British National Formulary; edentulousness and smoking. During the period of recruitment for this study (2002) the percentage of tobacco smokers in the Scottish population was 28% (http://www.ashscotland.org.uk/). Subjects who were pregnant were also excluded.

Subjects who were recruited by one of the above mechanisms were invited to an initial screening visit. Those to whom none of the exclusion criteria applied were re-appointed and asked to adhere to the following instructions and complete a questionnaire (Roldan *et al*, 2005) (Appendix 1). The purpose of the questionnaire was to verify the general health status of the participants and attempt to exclude any psychosomatic cause of halitosis (Yaegaki and Coil, 1999a).

Participant instructions

For 48 h prior to the halitosis assessment, subjects were asked to avoid: (i) eating foods containing garlic, onions and strong spices; (ii) consuming alcohol and (iii) using mouthwashes. On the morning of the appointment, subjects were asked to refrain from drinking coffee, eating mints, using minted chewing gum or scented oral hygiene products, and to avoid wearing heavily scented perfumes or aftershaves. This was essential in preventing dietary or cosmetic odours from influencing organoleptic and Halimeter® (model number RH17R; Chatsworth, CA, USA) assessments. Subjects were asked to have a light breakfast a minimum of 2 h prior to the breath odour assessment and to brush with water to remove overnight plaque deposits and food debris prior to the examination.

Examiner instructions

The examiner followed the same prehalitosis assessment instructions as the participants for 24 h prior to undertaking the examinations, the only exception being the use of fluoridated toothpaste.

Clinical procedures carried out at the second appointment

After following the participant instructions, individuals presented between 09:00 and 10:30 hours for the following sequence of measurements to determine whether they had halitosis or not. Patients with halitosis were assigned to the 'halitosis' group and those who did not were assigned to the 'control' group of non-halitosis subjects.

Organoleptic assessment

The primary indicator of halitosis used in the study was the organoleptic score with halimeter measurements used to give additional data. A four-point organoleptic scale ranging from zero to three was used (Schmidt *et al*, 1978). On this scale, zero represented no malodour, one represented slight but not objectionable odour, two represented definite objectionable odour and three represented very strong odour. A score of zero or one defined the control subjects. A score of two or three indicated halitosis. A single examiner conducted all the organoleptic measurements. Prior to the start of the study five subjects were scored by the examiner in this study and another examiner. There was 100% agreement between them.

(a) Mouth air: Organoleptic assessment of mouth air involved the subject closing his/her mouth and breathing through his/her nose for 3 min to allow any malodorous gases to accumulate in the oral cavity. The subject was then asked to breathe gently at a distance of 15 cm from the examiner, who recorded the organoleptic score.
(b) Lung air: A second organoleptic assessment involved the subject breathing through his/her nose and maintaining an oral seal for 3 min. Following this, the subject was asked to exhale, emptying as much air from the lungs as possible, at a distance of 15 cm from the examiner. The organoleptic examiner did not attempt to score the initial outflow of air but left a three second gap before assessing air that was emitted from the lungs.
(c) Nose air: A final organoleptic assessment was obtained by asking the subject to rapidly inhale through his/her mouth and exhale gently through one nostril, then the other. Each exhalation was given an organoleptic score.

Halimeter® measurements

The Halimeter® (model number RH17R) was always used after organoleptic scoring had taken place, to avoid examiner bias. The subject was asked to close his/her mouth and to breathe through the nose for 3 min before the Halimeter® reading was taken. It was used according to the manufacturer's instructions (Instruction Manual for Halimeter®) with a newly calibrated detector, except for the following modification: in order to ensure that subjects had their mouths open to the same extent while recording the Halimeter® score, the disposable drinking straw, which was in turn attached to the Halimeter®, was fixed to a wooden spatula. The tip of the straw was positioned directly over the dorsal surface of the tongue. The entire assembly was held in place by the subject's upper and lower incisors gently biting on the edges of the tongue spatula. The subject was asked not to exhale or inhale whilst the Halimeter® reading was collected. The highest score obtained by the Halimeter® during that time was recorded. This procedure was repeated twice more at 3-min intervals, resulting in three Halimeter® readings from which a mean odour score was calculated.

Periodontal examination

A full periodontal charting was performed with measurements of clinical probing depth, clinical attachment level and presence or absence of bleeding on probing recorded at six points around each tooth.

Statistical analysis

Data from the periodontal examination and the Halimeter® assessment were collated and entered into Minitab (version 12). Descriptive statistics were produced for periodontal indices (clinical attachment level, clinical probing depth, recession and bleeding on probing) and the Halimeter® scores. The periodontal indices were continuous measurement scales and were normally distributed; therefore two-sample *t*-tests were used for comparing halitosis and control groups. The Mann–Whitney test was used to compare the Halimeter® scores between halitosis patients and control subjects. A *P*-value of <0.05 was accepted as statistically significant.

Results

Figure 1 illustrates the number of subjects recruited, screened, included and excluded. Three of the control subjects and one of the halitosis patients wore partial dentures. Of those included in the study, 15 participants who felt that they presented with halitosis did not have objectionable odour levels when measured organoleptically or by the Halimeter®. The questionnaire revealed that two of this group had suffered bereavements in the last two years and one had experienced an incident of work-related stress. Both factors may have played a significant role in the subjects' perception of halitosis. Table 1 illustrates the demographic, periodontal and Halimeter® data for the halitosis and the control groups. Three halitosis patients and two control subjects had five sites or less with a clinical probing depth of 4 mm. The individual organoleptic and Halimeter® scores are presented in Table 2. The Halimeter® readings are included for comparison with the organoleptic scores. Eleven patients with halitosis defined organoleptically also had Halimeter® readings of >200 ppb, the level described by Kazor *et al* (2003) as defining halitosis. Of the remaining seven subjects, five were within the range of 170–199 ppb and two had scores of <170 ppb, which is the level suggested by the Halimeter® manufacturer as the threshold for defining halitosis (Instruction Manual for Halimeter®).

Table 2 Organoleptic and Halimeter® scores for the control subjects and halitosis patients

Control subjects			*Halitosis patients*		
Organoleptic score			*Organoleptic score*		
Mouth	*Lung*	*Halimeter® score (ppb)*	*Mouth*	*Lung*	*Halimeter® score (ppb)*
1	0	82	2	0	130
1	0	86	2	0	155
1	0	87	2	1	173
1	0	93	2	1	179
1	0	96	2	0	180
1	0	98	2	0	193
1	0	106	2	0	194
1	0	109	2	0	207
1	0	111	2	0	238
1	0	112	2	0	261
1	0	115	2	0	294
1	0	123	2	0	314
1	0	129	2	1	318
1	0	130	2	1	327
1	0	146	2	1	335
1	0	156	2	0	368
1	0	173	2	1	414
1	0	189	3	1	936
1	0	196			

Discussion

In this paper a detailed clinical protocol for screening and assessing subjects with a complaint of halitosis has been described. Some authors have not recorded any exclusion criteria (Rosenberg *et al*, 1991; De Boever and Loesche, 1995; Yaegaki and Coil, 2000). Roldan *et al* (2003) and Winkel *et al* (2003) used the following exclusion criteria: untreated periodontitis with clinical probing depths of ≥4 mm; systemic antibiotics within the previous 4 weeks; presence of systemic disease; pregnancy and xerostomic inducing drugs. However, no mention was made of local disease such as dental pathology, other than periodontitis, and pathology of the oral mucous membranes or attached gingivae. In addition smokers were not excluded. Smokers were asked to refrain from smoking for 12 h prior to the clinical examination but no method of monitoring compliance was described in the protocol. Smokers

Table 1 Demographic and clinical data for halitosis patients and control subjects

	Halitosis patients (H) (n = 18)	*Control subjects (C) (n = 19)*	*P-value*	*95% confidence interval for difference (H-C)*
Median age (range)	39.5 (16–51)	41 (21–62)		
Males	6	8		
Mean clinical attachment levels (±s.d.) mm	1.13 (±0.65)	1.23 (±0.70)	0.60	−0.55, 0.33
Mean clinical probing depths (±s.d.) mm	1.60 (±0.37)	1.50 (±0.30)	0.38	−0.13, 0.33
Mean % sites bleeding on probing (±s.d.)	34 (±14)	26 (±10)	0.04	5, 17
Mean recession (±s.d.) mm	−0.50 (±0.59)	−0.26 (±0.62)	0.25	−0.64, 0.17
Median Halimeter® score (range)	249.5 (130–936)	112 (82–196)	0.001	77, 202

were excluded from the present study to avoid sampling breath that may consist of stale tobacco odour which would affect the organoleptic evaluation. It has also been shown that tobacco smoke contains VSCs (Stedman, 1968), as well as causing drying of the oral mucosa, which could affect organoleptic and sulphide monitor readings. With regard to the participant instructions prior to the clinical assessment for halitosis, subjects were not asked to starve overnight but to have a light breakfast a minimum of 2 h prior to the breath odour assessment as it has been shown that starvation and/or dehydration can exacerbate oral malodour (Sulser *et al*, 1939; Best and Taylor, 1950; Vander *et al*, 2001). Subjects were asked to continue with their normal oral hygiene measures but not to use flavoured oral hygiene products on the morning of the appointment. It was felt that plaque accumulation and food debris might influence the halitosis assessment. These patient instructions differ from previous research in this area (Roldan *et al*, 2003; Winkel *et al*, 2003).

Advertising was clearly useful for recruiting volunteers to the study; 55 people responded within a 2-week period. However, application of the strict exclusion criteria resulted in significant attrition of the number of patients with halitosis arising from within the oral cavity which is not related to generalized chronic gingivitis, chronic periodontitis or oral mucosal pathology. It is also interesting to note that 15 subjects with an initial complaint of halitosis were found not to have organoleptically detectable malodour. In this subgroup the questionnaire uncovered three patients who may have been suffering from pseudohalitosis due to stressful life events. However it is possible that other participants in this subgroup were also suffering from this condition and may illustrate the difficulty of identifying these patients, despite using a questionnaire or taking a careful verbal history. Another possible explanation is that the subjects' oral malodour may have had a dietary cause and after following the instructions to avoid eating highly flavoured foods prior to the second appointment, these subjects' oral malodour decreased. This indicates the utility of giving strict guidelines on food intake prior to an appointment to assess halitosis to reduce the possibility of false positives. Patients thought to be suffering from pseudohalitosis should be offered treatment and reviewed at a later date. Those who persist in believing that they have oral malodour in spite of treatment, when no detectable odour is present, should be referred for counselling (Yaegaki and Coil, 1999b). The findings that some people who replied to the advertisement complaining of halitosis were found not to suffer from it and that relatively low numbers responded to the advertisement suggest that genuine halitosis may not be as widespread a public health problem as has been previously claimed (Tessier and Kulkarni, 1991), or that individuals who have genuine halitosis are unaware that they suffer from this condition.

There are issues, raised by the organoleptic and halimeter readings, which need to be placed into the context of a useable clinical definition of halitosis. Published studies include protocols with different organoleptic scales for defining halitosis. Most researchers use either a zero to three organoleptic scale (Schmidt *et al*, 1978), or a zero to five scale described by Rosenberg *et al* (1991) and Yaegaki and Coil (2000). In the present study, a zero to three organoleptic scale (Schmidt *et al*, 1978) was used to define halitosis. As the authors wished to dichotomize the subjects according to their organoleptic score into simply, halitosis and control subjects it was felt that a smaller organoleptic scale would be more appropriate and more reproducible. In this study a single odour judge assessed the participants. This varies from the ADA guidelines on oral malodour products which recommend two odour judges (Wozniak, 2005). However, as problems exist with the subjective nature of the organoleptic method and the lack of 'bad breath olfactory standards' for training and calibrating organoleptic judges it was decided that only one judge should be used in the study. Prior to the start of the study the odour judge was calibrated against another judge and there was 100% agreement between their scores. Some authors have debated whether judges should be trained and calibrated (which may introduce bias) and whether a panel rather than a single judge should be employed (Rosenberg and McCulloch, 1992). Rosenberg *et al* (1991) showed a poor correlation within a panel of judges and between the same panel and the Halimeter®. The difficulty with using a panel of judges is ensuring that each judge samples the same concentration and composition of volatile compounds present in breath on exhalation during sequential sampling (Rosenberg *et al*, 1991). Clearly the inherent subjectivity of the organoleptic score indicates that it should not be the sole method for defining patients with halitosis.

In this study organoleptic assessments of mouth, lung and nose air were recorded. All the control subjects scored zero for lung air but seven of the halitosis patients scored one for lung air. All the halitosis and control subjects had an organoleptic score of zero for nose air (data not shown). Nose air as well as being a reliable indicator of health of the nasal airways may also be a better indicator of lung health, as lung air is likely to be continuously contaminated with residual mouth air during the sampling procedure, whereas the findings of our study indicate that nose air is not. Therefore, it may be unnecessary to include assessment of lung air in future studies.

The Halimeter® is a more objective way of assessing halitosis however, the arbitrary fixing of threshold measurements for halitosis using the Halimeter® may lead to wide variation between studies. Iwanicka-Grzegorek *et al* (2005) used a threshold of 125 ppb for halitosis, Roldan *et al* (2003) used a level of ≥170 ppb, (Richter, 1996) a value of ≥150 ppb and Kazor *et al* (2003) ≥200 ppb. In our study the Halimeter® was used to quantify VSC levels as an adjunct to the organoleptic scoring which we used as the gold standard for defining halitosis. No threshold for halitosis was set as VSCs are not the only constituents of oral malodour. A complication of setting a Halimeter® threshold is that some patients with objectionable malodour defined

organoleptically may have a Halimeter® reading below the threshold, whereas others without organoleptically detectable halitosis may have a Halimeter® reading above the threshold. This may be explained in two ways. Firstly, the Halimeter® is mainly sensitive to the VSCs hydrogen sulphide and methyl mercaptan. Other compounds such as volatile fatty acids and the polyamines, putrescine and cadaverine, may be detected organoleptically but not using the Halimeter®. Secondly, the Halimeter® is more sensitive to hydrogen sulphide than methyl mercaptan but organoleptically methyl mercaptan is more objectionable. The Halimeter® manufacturer states that the majority of the control subjects tested in their laboratories had Halimeter® scores of <170 ppb (Instruction Manual for Halimeter®). The findings of the present study partly agree with this statement and further corroborate the ADA guidelines which suggest the use of organoleptic measurement as the primary indicator of halitosis (Wozniak, 2005).

There was no difference between the halitosis group and the control group with regard to mean clinical probing depth and mean clinical attachment level. Both the control subjects and the halitosis patients were free of visible signs of gingivitis, but in our experience even patients with good oral hygiene and no visible signs of gingivitis may show mild bleeding on probing from a minority of sites. We used a dichotomous scoring system and the sites which bled showed minimal bleeding. The halitosis group had a significantly higher mean percentage bleeding score (34%) than the control group (26%) as seen in Table 1. This corroborates the findings of Yaegaki and Sanada (1992) but is in contrast to the work undertaken by Bosy *et al* (1994) and De Boever and Loesche (1995). In the present study, although there was a significant difference in bleeding scores between the two groups, the confidence intervals were very wide and therefore the difference is of doubtful clinical significance.

The variability in reporting of clinical methodology in halitosis research means that there is currently no accepted standard protocol for screening and assessing subjects with a complaint of halitosis. It is hoped that the work described in this paper will provide a basis for consistency in the enrolment of patients with halitosis into clinical research programmes and can be updated as future detection methods evolve.

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Appendix 1. Questionnaire

We would be grateful if you could complete this questionnaire. It is very important for us to know if you are receiving any medication and to be informed about diseases, which may influence complaints in the mouth. It will also help us to decide what measures must be taken during diagnosis and treatment.

MEDICAL HISTORY

1. How would you describe your general health?
   Good Average Poor
2. Have you suffered from any infectious disease e.g. TB, bronchitis, sinusitis?
   Yes No
   If yes, please describe……..
3. Have you suffered from any kidney/liver/stomach problems?
   Yes No
   If yes, please describe……..
4. Have you ever been operated on?
   Yes No
   If yes, please describe……..
5. Do you have problems with high blood pressure?
   Yes No
   If yes, please describe……....
6. Are you allergic to anything?
   Yes No
   If yes, please describe……
8. Are you taking any medicines, tablets, capsules etc?
   Yes No
   If yes, which ones?……..
   What for? ……

ORAL HISTORY

1. When did you last visit the dentist? ……
2. Approximate date of last scale and polish? ……
3. Approximate frequency of visits to the dentist?
   Only when I have pain Infrequent Regular

HALITOSIS QUESTIONNAIRE

1. Do you suffer from a dry mouth?
   Yes No
   If yes, when? ……
2. Do you breath through your mouth while sleeping?
   Yes No
3. Are you a smoker?
   Yes No
   If so, how many cigarettes do you smoke a day? …..
   How long have you smoked for? …….
4. How many times a day do you ingest liquids? ……..
   How many cups of coffee do you have a day? ……...
   How many alcoholic drinks do you have a day? …...
5. Do you ever miss meals?
   Yes No
6. Do you use a lot of garlic, onions or spices in your food?
   Yes No
7. Do you suffer from a bad taste in your mouth?
   Yes No
   If yes, when?……..…
8. What time of day do you find your breath is worst?
   after
   waking up when hungry when tired when thirsty
   morning afternoon whole day during work
   when talking with other people
   other…….
9. Have other people ever told you, you have bad breath?
   Yes No
   If yes, who?
   Partner Children Colleagues Others
10. How many times have people told you? ……...
11. Since when?…….years/months/weeks ago
12. How do they describe your bad breath?
    Weak Moderate Strong Very strong
13. What is your own opinion of the intensity of your bad breath?
    Weak Moderate Strong Very strong
14. Does your bad breath influence in a negative way……
    …..your work? Yes No
    …..your private life? Yes No
15. Has your bad breath led you to consult…….
    ….your dentist? Yes No
    ….your family doctor? Yes No
    ….a specialist? Yes No
16. How do you find your working life?
    Easy to cope with
    Often busy
    Occasionally busy
    Extremely busy

17. Have you experienced during the past 24 months any events, which have made a significant impact on your life?
    Yes No
    If yes, please specify……
18. Have you been treated for bad breath in the past?
    Yes No
19. Are you being treated or have you ever been treated for gum problems?
    Yes No
20. Are you being treated regularly by a dental hygienist?
    Yes No
21. How many times a day do you brush your teeth? ……
22. Do you use….. How often?
    ….interdental brushes Yes No ……..
    ….dental floss Yes No ……..
    ….mouthwashes Yes No ……..
23. Do you clean your tongue?
    Yes No
24. Would you like to mention anything that you think could be related to your bad breath?
    ……