

American Dental Hygienists' Association Hyposalivation with Xerostomia Screening Tool

By **Margaret J. Fehrenbach, RDH, MS**

Saliva provides several protective components that maintain a healthy oral environment. In the absence of these protective factors, a patient becomes more susceptible to oral diseases such as caries, candidiasis and periodontal disease, all of which can result in significant oral care concerns. Therefore, it is important for oral health care providers to be knowledgeable about salivary hypofunction with xerostomia; recognize its presence by using the proper means of assessment, including identification of risk factors; and assist patients in managing the condition.

Screening tools are becoming commonplace in preventive health care. For a screening tool to be considered necessary, the condition or disease must significantly impact public health.¹ Salivary hypofunction with xerostomia affects millions of people in the U. S., particularly women and the elderly.² Approximately 10 percent of the general population experiences dry mouth on a daily basis, and this figure increases to 25 percent in elderly populations.³ It is important to remember that diminished salivary function with oral dryness is not directly related to aging, but results mainly from systemic disease and related medications or medical therapies, so any screening tool must take this complexity into account.

The number of xerostomia cases has increased greatly over time because people are taking an increased number of medications; there are more than 400 prescription and non-prescription medications associated with xerostomia. Patients are more susceptible to oral diseases when they take more than one medication, which is known to contribute to xerostomia. Even general dental health practitioners "are seeing this trend in their offices, which is why they are trying to learn all they can about this condition. The more they know, the better they will be at diagnosing and treating patients."⁴

The purpose of this article is to show how to use the newly created screening tool to help in the screening, assessment and management of hyposalivation patients with xerostomia.

Background on the Screening Tool

The tool was created by ADHA with development funded by an unrestricted educational grant from GlaxoSmithKline. The tool was developed in accordance with the ADHA *Standards for Clinical Dental Hygiene Practice*, which address patient assessment, management, treatment and evaluation and advocates for the application of evidence to clinical decision making.^{5,6} However, the tool is intended only for assessment, and it does not include recommendations for (nor does ADHA endorse) product-specific treatments for hyposalivation with xerostomia.

Hyposalivation is the decreased flow of saliva. Xerostomia (or dry mouth) is the subjective sensation of oral dryness.³ It is important that we as oral health care practitioners recognize that xerostomia is not a diagnosis, but a symptom with multiple possible causes, some of which are not salivary in nature.⁷ However, non-salivary factors are less common than those related to salivary function, and range from post-stroke state to mouthbreathing.

Salivary hypofunction can affect the patient's quality of life in terms of changes in dietary habits, nutritional status, ability to speak and psychological health.

The most common causes of xerostomia are conditions or circumstances that result in alterations in salivary gland function—quantitative, qualitative, or both.³ Medication use is the most frequent causative factor, often affecting salivary output, which in turn can affect salivary composition.⁸

Hyposalivation and xerostomia are, along with altered saliva composition, conditions that fall under the broader category of salivary gland hypofunction.⁹ Salivary hypofunction can affect the patient's quality of life in terms of changes in dietary habits, nutritional status, ability to speak and psychological health. Among the protective functions of saliva are antimicrobial activity, control of pH, remineralization, maintaining the integrity of the oral mucosa, and mechanical cleansing action and removal of food debris from the oral cavity as well as lubrication of the oral cavity.

Without these functions associated with saliva, the risk for developing oral diseases such as caries, *Candida* infection (most common) and periodontal disease increases.¹⁰ All three components of salivary gland hypofunction have implications for these aspects of quality of life; however, it still is not yet possible to ascertain altered saliva composition chairside. **Instead, the major concern for oral health care providers is to assess hyposalivation with xerostomia.**

Specific Aims of the Screening Tool

As often demonstrated in health care, early detection and prompt intervention decrease the incidence of disease and improve quality of life. However, early detection of and intervention in hyposalivation are compromised by the overriding fact that complaints of oral dryness do not usually occur until salivary function has been reduced by approximately 50 percent. **The severity of xerostomia as noted by patients is also poorly correlated with salivary gland function.**¹¹

Thus, patients with hyposalivation with xerostomia receive treatment only when they report symptoms of xerostomia to their oral health care provider—a report that often comes too late for early intervention. Therefore, inaccurate or blunted self-awareness may impede needed dental or medical care. A recent study demonstrated that self-reporting was not always an effective method for detection of hyposalivation and that the visual observations of the clinician may also be of limited value.¹²

Traditionally, the method of assessing hyposalivation was to question the patient regarding four criteria, which ultimately elicited subjective responses:

1. Does your mouth feel dry when eating?
2. Do you have difficulty swallowing food?
3. Do you have to sip liquids to aid in swallowing?
4. Is the amount of saliva in your mouth "too little" most of the time?^{11,13}

Name _____					/ /	
HYPOSALIVATION with XEROSTOMIA SCREENING TOOL						Points
SOURCE BY DENTAL HYGIENE ASSESSMENT						
CONTRIBUTORY HISTORY		<input type="checkbox"/> None		<input type="checkbox"/> Present (10 pts each); <i>indicate related history below</i>		
DIRECT RELATIONSHIP	<input type="checkbox"/> Autoimmune Disorder: Sjögren's Syndrome or Other			<input type="checkbox"/> Diet Disorder: Anorexia, Bulimia, and/or Dehydration		
	<input type="checkbox"/> Cancer Therapy: Recent Chemo and/or H&N Radiation			<input type="checkbox"/> Infection: Hepatitis, HIV, Tuberculosis, or Other		
	<input type="checkbox"/> Diabetes (either type)			<input type="checkbox"/> Mental Condition or Dementia		
	<input type="checkbox"/> Dialysis			<input type="checkbox"/> Thyroid Disease: Hypo/Hyperthyroidism		
	<input type="checkbox"/> _____			<input type="checkbox"/> _____		
LONG-TERM DAILY INTAKE		<input type="checkbox"/> None		<input type="checkbox"/> One (5 pts); <i>check type below</i>		<input type="checkbox"/> Two or more (10 pts total); <i>check type below</i>
MORE THAN ONE MONTH	<input type="checkbox"/> Alcohol (any form)		<input type="checkbox"/> Antihypertensive		<input type="checkbox"/> Garlic, Gingko, or Other	
	<input type="checkbox"/> Antidepressant		<input type="checkbox"/> Antipsychotic		<input type="checkbox"/> Non-Steroidal Antiinflammatory	
	<input type="checkbox"/> Antidiarrheal		<input type="checkbox"/> Bronchodilator		<input type="checkbox"/> Painkiller, Sedative, or Tranquilizer	
	<input type="checkbox"/> Antihistamine or Decongestant		<input type="checkbox"/> Caffeine (any form)		<input type="checkbox"/> Tobacco (any form)	
	<input type="checkbox"/> _____		<input type="checkbox"/> Diuretic		<input type="checkbox"/> _____	
	SYMPTOM QUESTIONS BY DENTAL HYGIENE ASSESSMENT					
Feeling Constantly Thirsty?		<input type="checkbox"/> None		<input type="checkbox"/> Slight (1 pt)		<input type="checkbox"/> Moderate (2 pts)
Difficulty Chewing Food?		<input type="checkbox"/> None		<input type="checkbox"/> Slight (1 pt)		<input type="checkbox"/> Moderate (2 pts)
Difficult Swallowing Food?		<input type="checkbox"/> None		<input type="checkbox"/> Slight (1 pt)		<input type="checkbox"/> Moderate (2 pts)
Saliva Amount?		<input type="checkbox"/> Regular		<input type="checkbox"/> Low (1 pt)		<input type="checkbox"/> Very Low (2 pts)
Dryness Amount?		<input type="checkbox"/> Regular		<input type="checkbox"/> High (1 pt)		<input type="checkbox"/> Very High (2 pts)
Dryness Frequency?		<input type="checkbox"/> None		<input type="checkbox"/> Occasional (1 pt)		<input type="checkbox"/> Constant (2 pts)
Dryness Duration?		<input type="checkbox"/> None		<input type="checkbox"/> Short-term (1 pt)		<input type="checkbox"/> Long-term (2 pts)
Mouth Changes? <i>Select below</i>		<input type="checkbox"/> None		<input type="checkbox"/> One (1 pt)		<input type="checkbox"/> Two (2 pts)
ASK	<input type="checkbox"/> Bad or Stale Breath?		<input type="checkbox"/> Denture Poor Hold?		<input type="checkbox"/> Soreness in Mouth?	
	<input type="checkbox"/> Burning Mouth?		<input type="checkbox"/> Spicy Food Sensitivity?		<input type="checkbox"/> Stickiness of Tongue?	
Additional Eye, Nose, Throat, Skin, Genital Dryness?				<input type="checkbox"/> None		<input type="checkbox"/> Yes (1 pt)
ORAL SIGNS BY DENTAL HYGIENE DIAGNOSIS						
Tissue Changes? <i>If noted, circle specific signs (1 pt each group)</i>		<input type="checkbox"/> None		<input type="checkbox"/> Atrophy/Redness		<input type="checkbox"/> Cheilitis/Fissured
Oral Diseases? (1 pt each)		<input type="checkbox"/> None		<input type="checkbox"/> Caries		<input type="checkbox"/> Fungal
Saliva/Gland Changes? (1 pt each)		<input type="checkbox"/> None		<input type="checkbox"/> Enlarged		<input type="checkbox"/> No Pooling
Failure To Express? <i>Indicate gland(s) (1 pt each)</i>		<input type="checkbox"/> None		<input type="checkbox"/> Parotid		<input type="checkbox"/> Sublingual/Submandibular
RISK LEVEL BY DENTAL HYGIENE ASSESSMENT (tally points and circle level)						TOTAL
LOW RISK		MODERATE RISK			HIGH RISK	
From 1 to 10 points		From 11 to 20 points			Greater than 20 points	
DENTAL HYGIENE PLANNING AND IMPLEMENTATION						
<input type="checkbox"/> Document in patient record; <input type="checkbox"/> Correlate with other oral disease risk tools; <input type="checkbox"/> Recommend palliative management; <input type="checkbox"/> Monitor by evaluation over next 6-month period		<input type="checkbox"/> Document in patient record; <input type="checkbox"/> Correlate with other oral disease risk tools; <input type="checkbox"/> Recommend palliative management; <input type="checkbox"/> Perform diagnostic salivary tests to evaluate for high risk <input type="checkbox"/> If negative, monitor by evaluation over next 3-month period; <input type="checkbox"/> If positive, consider high risk and proceed with planning			<input type="checkbox"/> Document in patient record; <input type="checkbox"/> Correlate with other oral disease risk tools; <input type="checkbox"/> Recommend palliative management; <input type="checkbox"/> Perform diagnostic salivary tests for baseline <input type="checkbox"/> Refer to oral surgeon and/or physician for further testing if from unknown source or for prescribing medication(s), and follow-up evaluation/treatment	
Copyright ADHA 2010 *ADHA Standards for Clinical Dental Hygiene; Fox PC: Xerostomia: Recognition and Management, Access Supplementary, Feb. 2008.						

According to Fox and others, patients with dry mouth responding positively to these questions have a lower median flow rate than those who respond negatively.¹¹ However, a recent survey of nearly 500 oral health care providers found that approximately 68 percent of respondents reported constant thirst as the most common symptom communicated by patients with a complaint of xerostomia, and only 44 percent reported difficulty eating, swallowing or speaking.¹⁴ These findings indicate the need to update the basic screening questions; the new risk assessment tool was designed to address this need.

Although subjective dryness complaints do not correlate well with measurable salivary gland dysfunction, some symptoms have been found to have predictive value when patients are questioned in great detail about their dryness. In general, questions that focus on oral activities dependent on salivation, such as eating and swallowing, are most likely to identify patients with salivary hypofunction with xerostomia.³ This questioning helps to define the group requiring further evaluation, including measurement of salivary output.

An additional consideration supporting the need for a hyposalivation screening tool is the probability of intermediate levels of xerostomia. A screening tool would help the practitioner not only detect the *presence* of disease, but also determine its *nature*. Neither the amount of *saliva* nor the degree of *xerostomia* need remain static in a given patient; either can be characterized as occasional or constant; likewise, occasional periods of xerostomia can be characterized as long-term or short-term.¹⁵

Therefore, this screening tool for salivary hypofunction with xerostomia includes both oral symptoms and oral signs to focus on detection at an early stage, which is intended to contribute to comprehensive preventive oral care and disease management before a critical point is reached. The screening tool needs to be convenient, efficient and accurate so as to encourage routine use in providing dental care; thus it was designed to be easy to fill out by checking boxes and making notations, and then adding the numbers up to provide a simple risk assessment as well as planning and implementation steps.

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Once a patient responds positively to any of these questions, the clinician must consider the clinical parameters resulting in hyposalivation with xerostomia before determining a diagnosis. Clinical parameters include the pertinent facts from the medical and dental histories, medications and any other patient-reported symptoms, and visual signs noted by the clinician. Flow charts that have been produced for initial screening are useful but not very precise with regard to factors implicated and so do not provide the clinician with a ready evaluation of the patient's risk.¹⁶

Diagnostic testing for hyposalivation may also be part of the evaluation but when to utilize these somewhat time-consuming tests was often unclear; these tests still have their place but are not useful for initial screening purposes. However, their intrinsic value for baseline assessment makes them appropriate for use once risk level has been ascertained. These tests measure the flow and also quantity of saliva. The Modified Schirmer Test (MST) is an adaptation of the lacrimal tear flow test; paper strips are placed in a blue dye that marks the amount of flow so as to yield fast results that are easy to interpret by both the patient and clinician. Other tests, such as the volumetric test, measure the quantity of saliva produced over a period of time. Saliva is collected in a calibrated cylinder and the results are compared against standard expected flow rates.¹⁷

The new screening tool for hyposalivation with xerostomia follows the dental hygiene process of care (assessment, diagnosis, planning, implementation, evaluation) outlined in the *Standards*. One expert in the field also recommends "a systematic assessment approach to the patient with xerostomia: listen for and elicit symptomatic complaints, examine for oral signs of salivary gland dysfunction, and evaluate salivary gland function."⁷ The National Cancer Institute's Scoring Criteria for Xerostomia, as well as the Radiation Therapy Oncology Group Scoring Criteria for Acute Radiation-Induced Salivary Gland Morbidity, were also taken into account when designing this tool.¹⁸

Using the Screening Tool

First, the oral health care practitioner needs to note any source of hyposalivation with xerostomia. To facilitate this, a list of the more commonly encountered *contributory medical history* factors having a known direct relationship to hyposalivation with xerostomia is included, such as cancer therapy by recent chemotherapy (within one year) and/or head and neck radiation (most common associated toxicity is xerostomia), diabetes (either type), diet disorder (including anorexia, bulimia and/or dehydration), infection (HIV, tuberculosis or other), Sjögren's syndrome (most common disease causing xerostomia), and thyroid disorders (hypo/hyperthyroidism). If present, other history factors less commonly encountered in everyday dental practice, such as cystic fibrosis or bone marrow transplant, can also be noted by the clinician in the spaces provided in that section.

Next are listed the most common substances with a *long-term daily intake* at more than one month that are known to cause hyposalivation. These address both causative medication use (most prevalent cause of xerostomia) and lifestyle choices. They include the most common medications prescribed long-term as well as over-the-counter medications taken chronically, including categories of antidepressant, antihistamine or decongestant, antidiarrheal, antihypertensive, antipsychotic, bronchodilator, diuretic, nonsteroidal anti-inflammatory, painkiller, sedative or tranquilizer. Also listed are herbal preparations that are now popularly taken on a daily basis, such as garlic, ginkgo, or other.

Lifestyle choices (also at a long-term daily intake) such as use of alcohol, caffeine, and tobacco in any of their forms can also be noted.¹⁵ If involved, other less commonly consumed products in this category, such as capsicum or antispasmodics, can be noted by the clinician in the spaces provided.

Secondly, the patient is asked if he or she experiences any **oral symptoms of hyposalivation with xerostomia** and to what degree. The *questions* about symptoms address constant thirst level, difficulty chewing food, or difficulty swallowing food, as well as others, constituting an update to the four traditional questions discussed earlier.^{11,13}

The tool also elicits the most commonly related *oral changes* reported to oral health care providers during dental hygiene assessment: halitosis, burning mucosal tissues, poor denture retention, spicy food sensitivity, oral ulcers/soreness, stickiness of the tongue, taste sensation loss, and dental hypersensitivity, as well as presence of systemic dryness in tissues including the eyes, nose, throat, skin and genital areas.^{3,7}

Thirdly, **oral signs of hyposalivation with xerostomia** are noted by the presence of related *tissues changes* using dental hygiene diagnosis during the intraoral and extraoral examinations normally performed on each patient, such as atrophy/redness, cheilitis/fissures, glossitis/stickiness, ulceration/debris, as well as the notation of related *oral disease* such as caries, candidiasis, halitosis or periodontal diseases.¹⁹

The clinician then can check by palpation for *saliva or gland changes* such as enlargement, stone(s), or viscous or opaque saliva, and also determine if saliva can be expressed from the main excretory ducts of the three major salivary glands (parotid,

submandibular and sublingual). These three major glands contribute around 90 percent of the mixed fluid in the mouth that is known as whole saliva; minor salivary glands scattered throughout the mouth contribute the remaining less than 10 percent.¹⁹ The saliva formed should also be in an amount that allows pooling at floor of mouth.

By noting the appropriate response category for each parameter on the screening tool based on both the patient interview and clinical examination, the clinician establishes a **risk level of hyposalivation with xerostomia** for the individual patient: *low, moderate, or high*. Finally, dental hygiene planning and implementation checklists are included for each of these three risk categories for completeness.^{17,21}

In addition to screening patients for their risk level in a dental practice, the tool could be adapted for other uses. For example, parts of it could be used as a pre-screening tool for patient education and awareness. Findings from the assessment might also be integrated into a patient education memorandum for homecare as well as a referral letter to the patient's physician for needed medical care or to a dental specialist for additional dental care.

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Validation of the Screening Tool

Screening tools of this type require validation through implementation. While the ADHA Hyposalivation with Xerostomia Screening Tool has not undergone rigorous evaluation through implementation, both a preliminary report of its use from a dental hygienist in a practice that serves head and neck cancer patients and a review by a content expert has been done. The dental hygienist felt that the tool met her needs enough to discern between moderate and high-risk patients, and that assessment could be accomplished in under three minutes. She expressed the belief that the tool's efficiency during patient care could be enhanced if adapted for use electronically, helping totaling up the numbers, and even making graphic presentations for the patient.

ADHA hopes to pursue formal validation of the tool in the future.

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