

## **Ideas for hospital in-patient oral health care.**

This is a presentation of a "4-step" process for access to dentistry in hospitals that would make dental care available to all in-patients determined to need improved oral health (OH) care and/or oral hygiene counseling for patients who have not have dental care within (a period to be determined) and (possibly) admitted with a Dx of a chronic illness category with a research-established risk link to oral health status (diabetes, CVD, RA, Sjögrens, etc.).

RDHs could contribute to this program through patient oral hygiene counseling and instruction as well as assessment and measurement procedures. In-patients would no longer be an unserved population with respect to OH care.

Existing research into the OH contribution to chronic illness risks would be the justification.

Step 1 – Need assessment upon admission: Has the patient received dental or periodontal care within (a period to be determined) and/or was the patient admitted with a Dx of a chronic illness category with a research-established risk link to oral health status (diabetes, CVD, RA, Sjögrens, etc.)?

Step 2 - (Assessments, measurements) RDHs could support in-hospital OH by conducting assessments using salivonomics or strips. Hospital dentists, periodontists, and RDHs could collaboratively process the data from the assessments or measurements to identify and refer (in-house), in collaboration with the patient's attending physician, those patients in need of OH care, for such care. RDHs could also help with OH hygiene counseling and instruction for those inpatients in need of such

guidance. Criteria would need to be established and receive consensus.

Step 3 - Patient receives in-hospital dental or periodontal care.

Step 4 – The patient's discharge summary would include OH instructions and referral to "ordinary" out-of-hospital OH care. The discharge process should address patient drug reconciliation needs concerning possible polypharmacy impacts and associated xerostomia as part of the quality assurance strategy. OH could in these ways be addressed in hospital quality assurance and care improvement.

### **Citations on assessment/measurement technologies:**

(1) Salivanomics

United Healthcare (2020). Salivary Testing (1) salivary diagnostic testing as part of oral disease risk assessment; (2) salivary flow measurement (to detect xerostomia). At: <https://www.uhcprovider.com/content/dam/provider/docs/public/policies/dental/salivary-testing.pdf>

Also: Verhulst MJL, Teeuw WJ, Bizzarro S *et al* (2019). A rapid, non-invasive tool for periodontitis screening in a medical care setting. *BMC Oral Health* (19) 87.

<https://doi.org/10.1186/s12903-019-0784-7> At: <https://bmcoralhealth.biomedcentral.com/articles/10.1186/s12903-019-0784-7> Abstract: Background - Since periodontitis is bi-directionally associated with several systemic diseases, such as diabetes mellitus and cardiovascular diseases, it is important for medical professionals in a non-dental setting to be able

examine their patients for symptoms of periodontitis, and urge them to visit a dentist if necessary. However, they often lack the time, knowledge and resources to do so. We aim to develop and assess “quick and easy” screening tools for periodontitis, based on self-reported oral health (SROH), demographics and/or salivary biomarkers, intended for use by medical professionals in a non-dental setting. Methods - Consecutive, new patients from our outpatient clinic were recruited. A SROH questionnaire (8 questions) was conducted, followed by a 30 s oral rinse sampling protocol. A complete clinical periodontal examination provided the golden standard periodontitis classification: no/mild, moderate or severe periodontitis. Total periodontitis was defined as having either moderate or severe. Albumin and matrix metalloproteinase-8 concentrations, and chitinase and protease activities were measured in the oral rinses. Binary logistic regression analyses with backward elimination were used to create prediction models for both total and severe periodontitis. Model 1 included SROH, demographics and biomarkers. The biomarkers were omitted in the analysis for model 2, while model 3 only included the SROH questionnaire. The area under the receiver operating characteristic curves (AUROCC) provided the accuracy of each model. The regression equations were used to create scoring algorithms, composed of the remaining predictors, each with its own weight. Results - Of the 156 patients participating in this study, 67% were classified with total periodontitis and 33% had severe periodontitis. The models for total periodontitis achieved an AUROCC of 0.91 for model 1, 0.88 for model 2 and 0.81 for model 3. For severe periodontitis, this was 0.89 for

model 1, 0.82 for model 2 and 0.78 for model 3. The algorithm for total periodontitis (model 2), which we consider valid for the Dutch population, was applied to create a freely accessible, web-based screening tool. Conclusions - The prediction models for total and severe periodontitis proved to be feasible and accurate, resulting in easily applicable screening tools, intended for a non-dental setting.

Nonaka T, Kaczor-Urbanowicz KE, Wong DTW, “Oral-Systemic Connection: The Salivonomics and Exosomics Connection,” Chapter 17, Glick M, Ed. (2019), *The Oral-Systemic Health Connection: A Guide to Patient Care*, 2<sup>nd</sup> ed. (Quintessence, LCCN 2018044816), pp. 342-356.

Koneru S, Tanikonda R (2014). Salivaomics - A promising future in early diagnosis of dental diseases. *Dent Res J (Isfahan)* 11(1): 11-15. At:

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3955304/>

Abstract: Human saliva plays an important role in the health of the oral cavity and of the body as a whole. Salivary diagnostics is a dynamic and emerging field in the diagnosis of oral and systemic diseases. Saliva reflects the physiologic state of the body, including emotional, endocrinal, nutritional, and metabolic variations. The collection of saliva samples is noninvasive, safe, and inexpensive. Traditional clinical criteria are insufficient for determining sites of active disease, for monitoring the response to therapy, or for measuring the degree of susceptibility to future disease progression.

Salivaomics includes five diagnostic alphabets proteins, mRNAs, miRNAs, metabolic compounds, and microbes offering

substantial advantages because disease states may be accompanied by detectable changes. Salivaomics, the future of saliva-based techniques for early diagnosis of dental diseases, is promising and may offer a robust alternative for clinicians to use in the near future to make clinical decisions. Keywords: Biomarker, microbiome, proteome, saliva, transcriptome.

## (2) Strips

Carlén A, Hassan H, Lingström P (2010). The ‘Strip Method’: A Simple Method for Plaque pH Assessment.

DOI:[10.1159/00031527](https://doi.org/10.1159/00031527) At:

[https://www.semanticscholar.org/paper/The-%E2%80%98Strip-Method%E2%80%99%3A-A-Simple-Method-for-Plaque-pH-Carl%263%A9n-](https://www.semanticscholar.org/paper/The-%E2%80%98Strip-Method%E2%80%99%3A-A-Simple-Method-for-Plaque-pH-Carl%263%A9n-Hassan/458a3c58bf4678f4a1a824a45eab0ab0546c4114)

[Hassan/458a3c58bf4678f4a1a824a45eab0ab0546c4114](https://www.semanticscholar.org/paper/The-%E2%80%98Strip-Method%E2%80%99%3A-A-Simple-Method-for-Plaque-pH-Carl%263%A9n-Hassan/458a3c58bf4678f4a1a824a45eab0ab0546c4114) Aim:

The aim of the study was to evaluate if pH indicator strips could be used for measurements of plaque pH acidogenicity in situ.

Method: Interproximal plaque pH was measured before and up to 60 min after a 10% sucrose rinse in 30 healthy volunteers using pH indicator strips and the microtouch method in parallel.

Results: It was found that the ‘strip method’ could determine changes in plaque pH to the same extent as the microtouch method (correlation coefficient 0.99).

### **Other citations:**

Hijjaw O, Alawneh M, Ojjoh K, Abuasbeh H, Alkilany A, Qasem K, Al-Essa M, AlRyalat SA (2019). Correlation between Xerostomia index, Clinical Oral Dryness Scale, and ESSPRI with different hyposalivation tests. *Open Access Rheumatol* 11:11-18. DOI: [10.2147/OARRR.S188937](https://doi.org/10.2147/OARRR.S188937) At:

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6324613/#>

**Abstract:** **Background and objective** Xerostomia is a subjective measure of dry mouth, while hyposalivation is an objective measure of reduced saliva flow rate. In this study, we aim to assess the association between commonly used xerostomia scoring systems, with different hyposalivation measures among Sjogren Syndrome (SS) patients. **Methods** In a cohort of SS patients, we assessed xerostomia using Xerostomia index, clinical oral dryness scale (CODS), and the European League Against Rheumatism SS Patient-Reported Index (ESSPRI), and we assessed hyposalivation using unstimulated whole saliva flow (UWS), stimulated whole saliva flow (SWS), and stimulated parotid flow (SPF). We analyzed the association between xerostomia and hyposalivation using association tests in SPSS. **Results** We included a total of 49 patients in this study, of which 34 (68%) had primary SS, and 15 (32%) had secondary. CODS was significantly correlated with SWS ( $P=0.048$ ), with a negative correlation coefficient of 0.216, and with SPF ( $P=0.009$ ), with a negative correlation coefficient of 0.291. The dryness domain of ESSPRI was significantly correlated with UWS ( $P=0.031$ ) with a negative correlation coefficient of 0.233. **Conclusion** CODS is the scoring system with the highest correlation with hyposalivation, particularly SWS and SPF, followed by ESSPRI dry domain, which is correlated with UWS. Xerostomia index is not correlated with hyposalivation. **Keywords:** Sjogren syndrome, xerostomia, hyposalivation, XI, CODS, ESSPRI.

ADA (2015). Managing xerostomia and salivary gland hypofunction. At:

[https://www.ada.org/~media/ADA/Science%20and%20Research/Files/CSA\\_Managing\\_Xerostomia.pdf?la=en](https://www.ada.org/~media/ADA/Science%20and%20Research/Files/CSA_Managing_Xerostomia.pdf?la=en)

Villa A, Connell CL, Abati S (2015). Diagnosis and management of xerostomia and hyposalivation. *Ther Clin Risk Manag* 11: 45-51. DOI: [10.2147/TCRM.S76282](https://doi.org/10.2147/TCRM.S76282) At:

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4278738/>

Abstract: Xerostomia, the subjective complaint of dry mouth, and hyposalivation remain a significant burden for many individuals. Diagnosis of xerostomia and salivary gland hypofunction is dependent upon a careful and detailed history and thorough oral examination. There exist many options for treatment and symptom management: salivary stimulants, topical agents, saliva substitutes, and systemic sialogogues. The aim of this review is to investigate the current state of knowledge on management and treatment of patients affected by xerostomia and/or hyposalivation. **Keyword:** saliva stimulation, dry mouth, saliva substitutes, sialogogues.

Escobar A, Aitken-Saavedra JP (2017). Xerostomia: An Update of Causes and Treatments. DOI: 10.5772/intechopen.72307 At:

[https://www.ada.org/~media/ADA/Science%20and%20Research/Files/CSA\\_Managing\\_Xerostomia.pdf?la=en](https://www.ada.org/~media/ADA/Science%20and%20Research/Files/CSA_Managing_Xerostomia.pdf?la=en) Abstract:

Xerostomia or dry mouth sensation is considered a complex condition that affects several stomatological functions that drives to the detriment of the quality of life of individuals who suffer from it. Often, xerostomia is accompanied by a decrease in salivary flow or hyposalivation, and this condition leads to oral health problems such as dental caries, candidiasis, and mucosal complications. Currently, the diagnosis and

therapeutic methods for this condition are varied and it is difficult to achieve favorable results in all cases, since the etiology seems to be multifactorial where both local factors and systemic conditions would participate. This chapter presents, in a concise shape, the relevant data about etiology of xerostomia, such as age, autoimmune diseases, systemic diseases, infectious diseases, neuropathic complications, psychogenic factors and therapeutically consumption of drugs among others, and the current available treatments.