

Integrating Sleep Medicine into the Dental School Curriculum: *Current and Future Plans at UMSOD*

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Maryland Sleep Society
October 27th, 2023

- *No disclosures of conflicts of interest.*

Objectives

- *Review the history, trends, and status of pre-doctoral sleep medicine education in the U.S.*
- *Outline the University of Maryland School of Dentistry's current sleep medicine curriculum, philosophy of care, and future goals*
- *Discuss UMSOD's pre-doctoral SRBD/OSA screening protocol*



A brief history and status update of U.S. pre-doctoral sleep medicine education

- **1978: National Survey of US Medical Schools**²
 - Pre-doctoral MD Programs: <1 hour of sleep medicine education
 - 93% of American medical schools had, “essentially no preparation of physicians to deal with clinical sleep disorders”
- **1988: Taskforce Consensus Document on Medical School Curriculums**³
 - “No complete and truly global understanding of human health and disease is possible without an understanding of sleep and its recognition as a system on par with circulation, digestion and reproduction.”
- **1991: National Survey of US Medical Schools**⁴
 - Pre-doctoral MD Program: <2 hours of sleep medicine education
 - % of schools listing the topic of sleep disorders increased from 54% to 63%

- **1992: National Commission on Sleep Disorders Research**⁵
 - Recognized the epidemic of sleep disorders, its consequences, and the complete lack of sleep education
 - Urged health care professionals to
 - increase the number of sleep medicine experts
 - validate experts via training, testing, credentialing, and accreditation of their facilities
 - increase pre-doctoral university educational hours in topics of sleep
- **1995: American Academy of Sleep Medicine Taskforce 2000**⁶
 - Established competency-based goals for pre-doctoral medical education in sleep medicine
 - Set goal to establish sleep medicine curriculums in all medical schools by 2000
- **1998: AASM Taskforce 2000 National Survey of US Medical Schools**⁷
 - Majority of respondents (65%) are teaching sleep medicine in some capacity
 - 2.11 pre-doctoral and 4.8 post-doctoral hours of sleep medicine achieved
 - Taskforce 2000 competency-based goals not met
- **2003: National Survey of U.S. Dental Schools**⁸
 - Pre- & Post-doctoral Dental Programs: 2.5 hours of sleep medicine education

- **2006: National Commission on Sleep Disorders Research, Guest Editorial by Dr. Dement**⁹
 - “Teaching somnology and sleep medicine remains outside the mainstream educational system. As a result, vast numbers of health professionals are inadequately informed.”
- **2006: AASM & AADSM Clinical Practice Guidelines for OAT (updated in 2015, 2017)**¹⁰
- **2011: Global Survey of Medical Schools**^{* 11}
 - Pre-doctoral MD Programs: <2.5 hours of formal instruction in sleep medicine
- **2009, 2012: Sleep Research Society Survey**¹²
 - Cohesive, self-sustaining, and independent administrative structures for sleep medicine academic curriculums rare
- **2012: National Survey of US Dental Schools**^{* 13}
 - Pre-doctoral DDS Programs: 3.92 hours of formal instruction in sleep medicine
 - 75.5% of US pre-doctoral DDS programs are providing some sleep medicine education

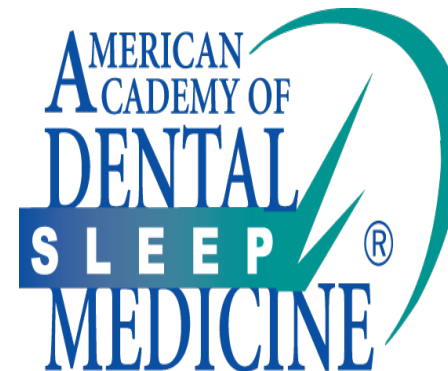
- **2013: UNC School of Dentistry hosts Inaugural National Dental Educators Conference**¹⁴
 - Evaluated the status of sleep medicine education in US and Canadian dental schools
 - Found that dental schools are not meeting the educational needs of their students with respect to sleep medicine
- **2017: American Dental Association House of Delegates Policy Statement**¹⁵
 - “The Role of Dentistry in the Treatment of Sleep Related Breathing Disorders”
- **2018: American Academy of Dental Sleep Medicine Policy Statement**¹⁶
 - “A Dentists Role in Treating Sleep Related Breathing Disorders”
- **2021: AASM Position Statement: Sleep is Essential to Health**¹⁷
 - “It is the position of the AASM that sleep is essential to health. Because of sleep’s significant and multifaceted connections to health and chronic disease, sleep education should have a prominent place in K-12 and college health education, medical school and graduate medical education, and educational programs of other health professionals.”

- *“Sleep medicine education at the pre-doctoral level in the US in medicine and dentistry shows a **slow trend** to increased number of hours.”¹*
 - Pre-doctoral DDS Programs: 3.92 hours (from 2.5 h in 2003)¹¹
 - Pre-doctoral MD Programs: <2.5 hours (from <1 h in 1978)¹³
- Barriers: insufficient time, lack of trained staff/qualified instructors, lack of resources, lower priority/relevance to program¹¹

How do most dentists receive training in sleep medicine today?

- **Formal Pre-Doctoral Sleep Medicine Curriculum**
 - Tufts University School of Dental Medicine
 - UNC School of Dentistry
 - University of Tennessee College of Dentistry
 - West Virginia University School of Dentistry
- **Dental Sleep Medicine Fellowships**
 - Tufts University School of Dentistry
 - University of Pacific Dental School
- **Continuing Education**
 - American Academy of Dental Sleep Medicine Mastery Program
 - Spear Dental Education
- **Mini-Residencies**
 - Tufts University School of Dentistry
 - University of Michigan School of Dentistry
 - UCLA School of Dentistry

SPEAR®



University of Maryland School of Dentistry

Sleep Medicine Curriculum

- **Faculty**
 - Larry Cohen, DDS, Comprehensive Care Department
 - Dennis Stiles, DDS, Advanced Education in General Dentistry
 - Stephanie Dennison, DDS, Comprehensive Care Department
- **Philosophy of Care**
 - Sleep Medicine vs Dental Sleep Medicine
 - Prevent, Control, Resolve
 - Comprehensive, interdisciplinary care
- **Current Focus**
 - Awareness of and introduction to sleep medicine
 - Proper screening and referral of at risk SRBD patients



University of Maryland School of Dentistry

Sleep Medicine Curriculum

- **Didactic**
 - **D3 Removable Prosthodontics Course (REST 538C)**
 - Introduction to Sleep Medicine (4 hours)
 - Sleep (physiology, upper airway anatomy, sleep disorders)
 - OSA (pathophysiology, diagnosis, management)
 - Dentistry's Role (screening, prevention, management)
 - Oral appliance therapy
 - Myofunctional therapy
 - **D3 Treatment Planning Course (TXPL 538)**
 - Systemic Phase Case Review (1 hour)
 - Case based review of risk factors for OSA
 - Proper referral protocol to PCP
 - **H1 Hygiene Course**
 - Introduction to Sleep Medicine (2 hours)

University of Maryland School of Dentistry Sleep Medicine Curriculum

- **Clinical**
 - No formal pre-doctoral clinical sleep medicine curriculum
 - Dr. Cohen and Dr. Dennison work to educate faculty and students in the clinical setting regarding proper SRBD screening/referral
 - No clinical training in oral appliance therapy, myofunctional therapy
- **Research**
 - **ODSC- 599 Research with a mentor**
 - D4 students can elect to do sleep medicine research with Dr. Dennison



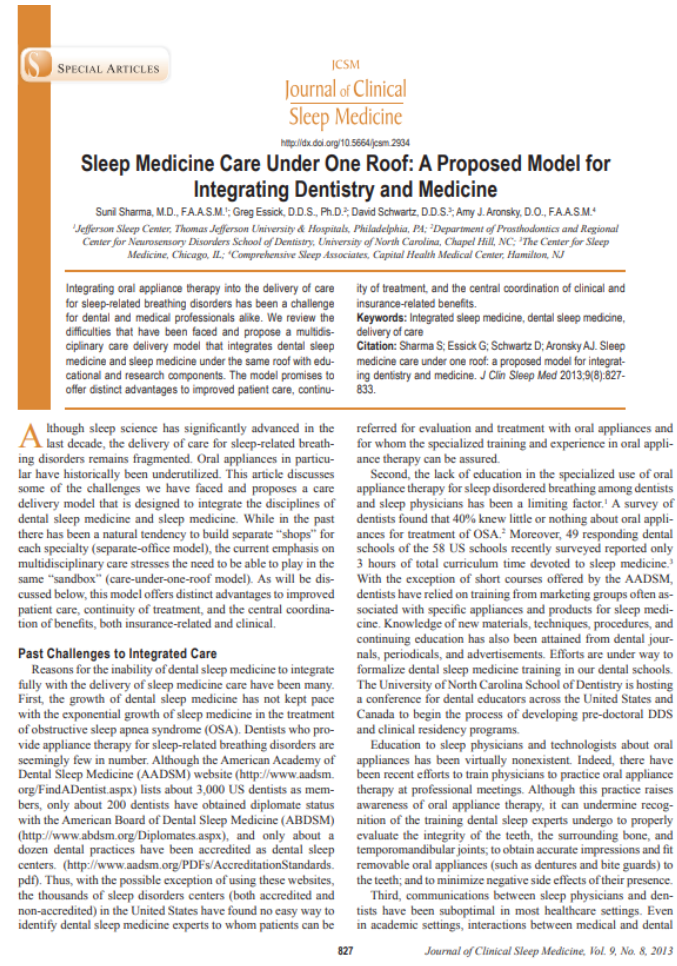
University of Maryland School of Dentistry Sleep Medicine Curriculum

- **Interdisciplinary Efforts**

- Ongoing, 2-year UMB IPE Seed Grant

- Purpose:

- Develop formal UMSOD pre-doctoral OSA screening/referral
 - Incorporate OSA into medical history form in EHR/Axium
 - Develop sleep medicine referral form in EHR/Axium
- Develop UMB IPE activity for pre-doctoral dental and medical students to mimic interdisciplinary management of OSA patient




University of Maryland School of Dentistry

Sleep Medicine Curriculum

- **Other**
 - Post-Graduate AEGD introductory sleep medicine presentation given by Dr. Stiles
 - UMSOD Sleep Medicine Interest Group established 2023
 - Sleep Bootcamp
- **Future Goals:**
 - Develop a Sleep Medicine Senior Clerkship
 - Establish a **comprehensive 4-year sleep medicine curriculum** (didactic, clinical) that trains our pre-doctoral students to:
 - Develop a strong foundational knowledge in sleep medicine
 - Expertly screen for and refer pediatric and adult patients at risk for SRBD
 - Expertly manage OSA patients with the use of oral appliance therapy

Implementation of dental sleep medicine in dental curricula

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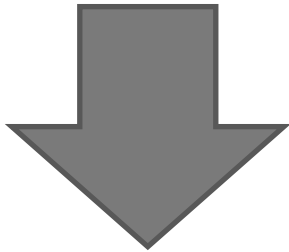
Predoctoral Dental				
Year 1	Fall	Gross anatomy	3	Introduction to sleep breathing disorders/anatomy of the airway
Year 1	Fall	Physiology	1	Clinic correlation of physiology and patient care associated with DSM
Year 1	Summer	Introduction to patient care	1	Patient examination and assessment of DSM—use of ESS, STOP, BANG, pediatric questionnaire; Mallampati tongue classification, pharyngeal space grading, tonsillar grading; evaluation of nasal breathing/anatomy of INV; ENV; columella (cottle test); and evaluation of the craniofacial profile of adolescents
Year 2	Fall	Introduction to clinical dentistry	3	Developing skills using DSM assessment forms
Year 2	Spring	Principles of medicine	1	Systemic conditions and management of comorbidities associated with DSM
Year 2	Summer	Cranio-mandibular occlusion	4	Eligible candidates for appliance therapy; options; 3-h laboratory
Year 3	Fall	Prosthodontics treatment planning	2	DSM appliance techniques—impressions, bite registrations, etc. billing/coding
Year 3	All	Clinical experience	Varies	Direct patient examination, assessment, referrals for DSM Students must meet treatment benchmarks
Year 4	Fall/Spring	Rotation to the sleep clinic	6	Capstone event

TABLE 1 Dental sleep medicine (DSM) curriculum integration, 2020–21

Program	Term	Course	Hours of instruction	Topic
Dental Hygiene				
Year 3	Fall	Clinical methods	4	Introduction to DSM
Year 3	Spring	Clinical methods	7.5	Patient examination and assessment
Year 3	Spring	Dental materials	3	DSM oral appliances
Year 4	Fall	Clinical experience	Varies	Working in groups of two students, the students integrate DSM in direct patient examination and assessment in the dental hygiene clinic with the use of Epworth sleepiness scale (ESS); snore/tired/obstruction/pressure (STOP) scale; body mass index/age/neck/gender (BANG) scale; pediatric/adolescent sleep questionnaire; Mallampati tongue classification; pharyngeal space grading; tonsillar grading; evaluation of nasal breathing/anatomy of internal nasal valve (INV); external nasal valve (ENV); columella (cottle test); and evaluation of the craniofacial profile of adolescents

UMSOD Pediatric SRBD/OSA Screening

- **SCREEN** pediatric patients



- **PREVENT** SRBD/OSA development via intervention during craniofacial growth → establish optimal airway



UMSOD Pediatric SRBD/OSA Screening

- **Medical History**
- **Extraoral Exam**
- **Intraoral Exam**
- **Dental Exam**
- **Parent Reported Symptoms**

UMSOD Pediatric SRBD/OSA Screening

Medical History

Obesity

Allergic Rhinitis
Tonsillitis

ADHD, Mood Disorders,
Developmental concerns

Snoring

Extraoral Exam

Forward head posture

Adenoidal face

Mouth breathing

Retrognathia,
Micrognathia

Nasal obstruction,
inflammation, deviation

Intraoral Exam

Adeno-tonsillar hypertrophy

Mallampati
Classification III/IV

Macroglossia
Ankyloglossia

Dental Exam

Bruxism
Acid erosion

Xerostomia
Caries
Gingival inflammation

Narrow, tapered arch
form

UMSOD Pediatric SRBD/OSA Screening



UMSOD Pediatric SRBD/OSA Screening

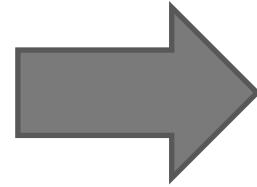
- Medical History
- Extraoral Exam
- Intraoral Exam
- Dental Exam
- **Parent Reported Symptoms**

UMSOD Pediatric SRBD/OSA Screening

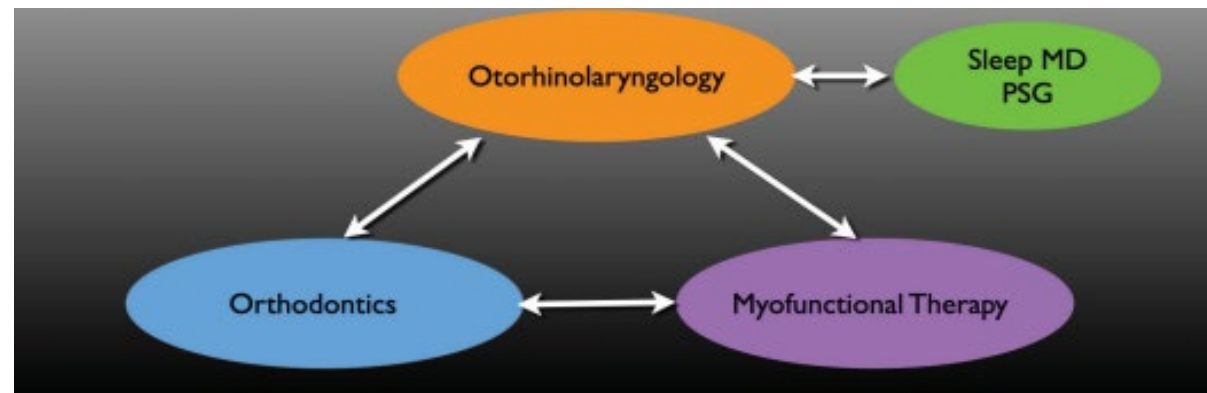
- **Parent Reported Symptoms**
 - Snoring?
 - Enuresis?
 - Moving around during sleep? Sleepwalking?
 - Mouth breathing?
 - Tired/groggy in the morning?
 - Peer or conduct issues?

UMSOD Pediatric SRBD/OSA Screening

- Medical History
- EOE/IOE
- Dental Exam
- Parent Reported Symptoms

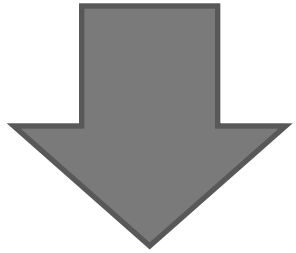


- Referral to PCP/ENT
- Referral to orthodontist, myofunctional therapist

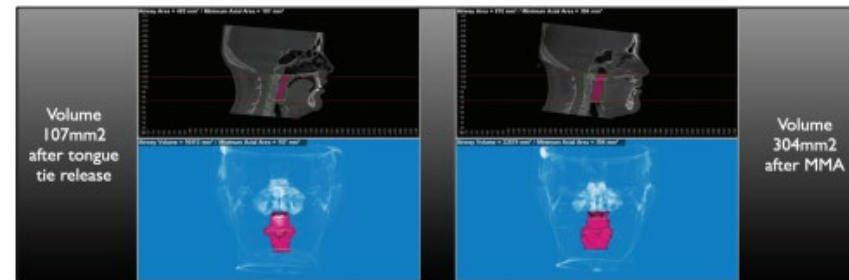


UMSOD Adult SRBD/OSA Screening

- **SCREEN** adult patients



- **CONTROL** via referral, OAT, MFT
- **RESOLVE** via oral surgery, orthodontics, airway prosthodontics



Photos courtesy of Dr. Jeff Rouse

UMSOD Adult SRBD/OSA Screening

Medical History

Obesity

Hypertension, Atrial Fibrillation, CHF, Stroke

Type II Diabetes

Snoring, Prior OSA diagnosis

Extraoral Exam

Forward head posture

Neck circumference
M 17", F 15"

Mouth breathing

Retrognathia, Micrognathia
TMD

Nasal obstruction,
inflammation, deviation

Intraoral Exam

Adeno-tonsillar hypertrophy

Mallampati Classification
III/IV

Macroglossia
Ankyloglossia

Dental Exam

Bruxism
Acid erosion

Xerostomia
Caries
Periodontal Disease

Narrow, tapered arch form

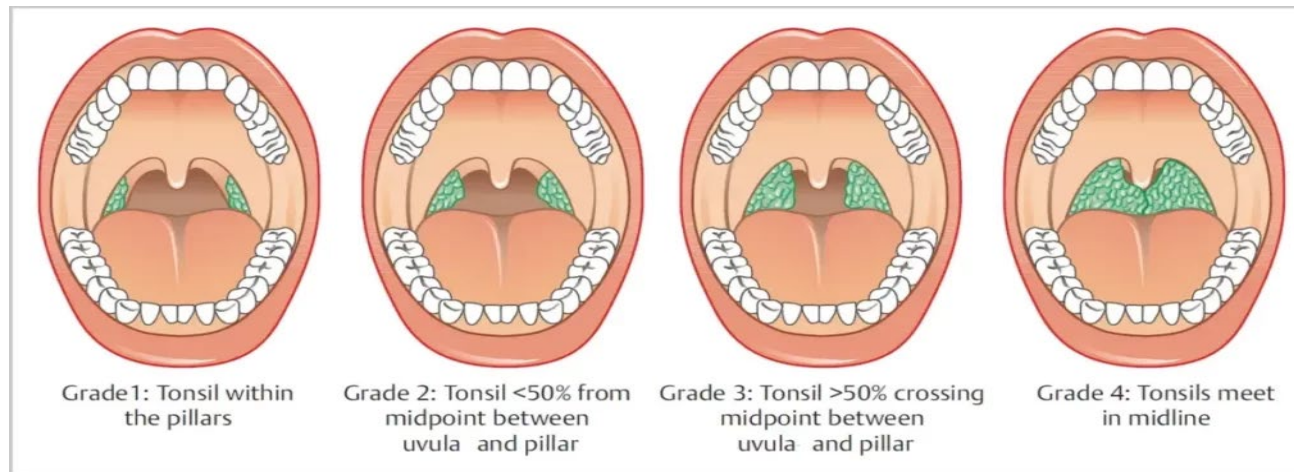
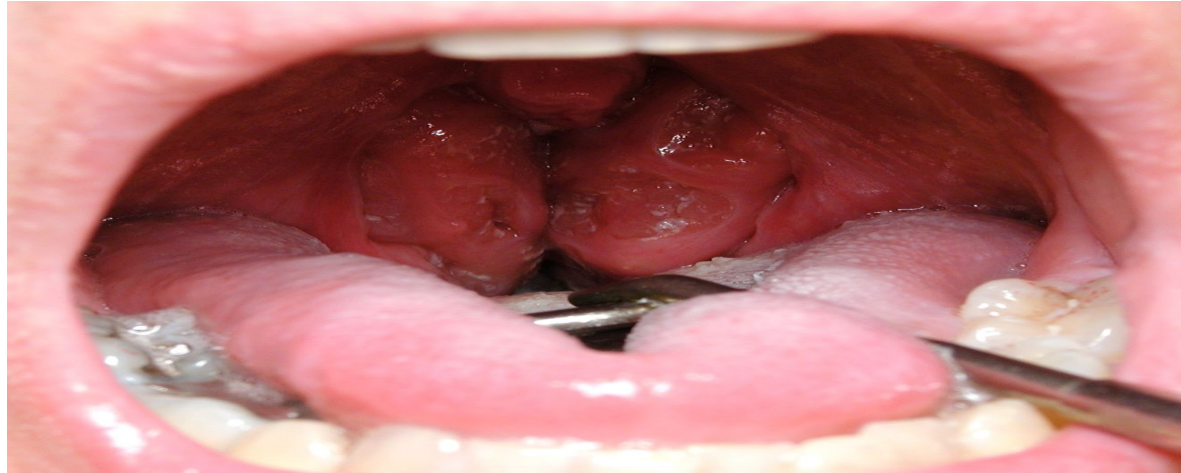
UMSOD Adult SRBD/OSA Screening

- Medical History
- **EOE/IOE/Dental Exam**
- Patient Reported Symptoms
- OSA Screening Tools

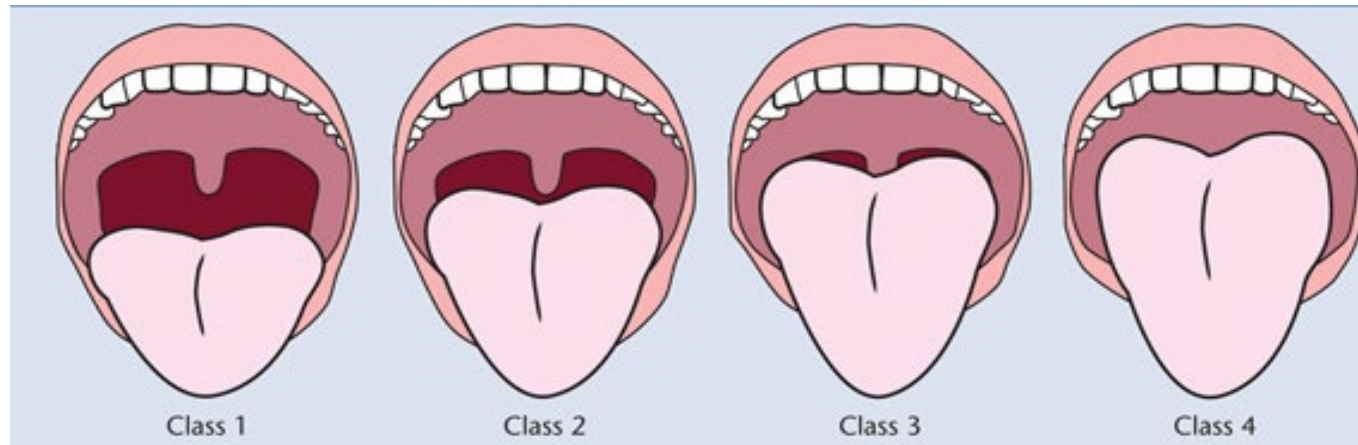
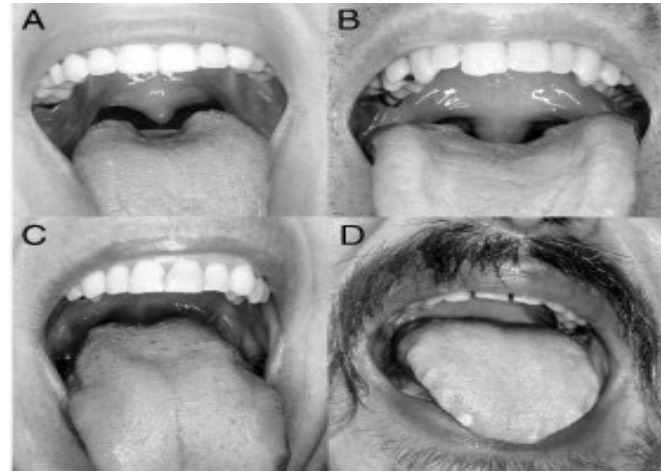
Retrognathia, Micrognathia, Forward Head Posture



Tonsillar Hypertrophy



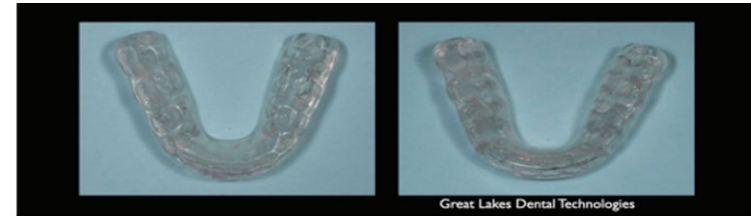
Mallampati Classification



Macroglossia



Bruxism, TMD



Acid Erosion



Narrow/Tapered Arch Form

- **Broad or square** arch forms may **accommodate** the tongue without impinging on the airway
- **Narrow or tapered** arch forms suggest less room to accommodate the tongue and potential risk for obstruction of posterior airway



Photos courtesy of Jay A. Nelson, DMD, FAGD

UMSOD Adult SRBD/OSA Screening

- Medical History
- EOE/IOE/Dental Exam
- **Patient Reported Symptoms**
- OSA Screening Tools

Patient Reported Symptoms

- Snoring
- Witnessed apneas
- Choking arousals
- Gasping arousals
- Frequent nocturnal awakening
- Unrefreshing sleep
- Excessive daytime sleepiness
- Motor vehicle accidents

UMSOD Adult SRBD/OSA Screening

- Medical History
- EOE/IOE
- Patient Reported Symptoms
- **OSA Screening Tools**

OSA Screening Tools

1. Epworth Sleepiness Scale, STOP BANG, Berlin questionnaire
2. High Resolution Pulse Oximetry (HRPO)
3. Home Sleep Apnea Test (HST)
4. Smart Phone Apps: Snore Lab, Reviva Softworks Ltd.

OSA Screening Tools

Berlin Questionnaire

Attending MD _____
PCP _____

Patient Information
Height: _____ Age: _____
Weight: _____ Male/Female _____

Category 1

Do you snore?
 Yes
 No
 Don't Know

Your snoring is?
 Slightly louder than breathing
 As loud as talking
 Louder than talking
 Can be heard in adjacent room

Describe the snoring frequency
 Nearly every day
 3-4 times a week
 1-2 times a week
 1-2 times a month
 Never or nearly never

Has your snoring ever bothered other people?
 Yes
 No

Has anyone noticed that you quit breathing during your sleep?
 Nearly every day
 3-4 times a week
 1-2 times a week
 1-2 times a month
 Never or nearly never

Category 2

How often do you feel tired or fatigued after you sleep?
 Nearly every day
 3-4 times a week
 1-2 times a week
 1-2 times a month
 Never or nearly never

During your wake time, do you feel tired, fatigued or not up to par?
 Nearly every day
 3-4 times a week
 1-2 times a week
 1-2 times a month
 Never or nearly never

Have you ever nodded off or fallen asleep while driving a vehicle?
 Yes
 No

If yes, how often does it occur?
 Nearly every day
 3-4 times a week
 1-2 times a week
 1-2 times a month
 Never or nearly never

Category 3

Do you have high blood pressure?
 Yes
 No
 BMI= _____

Category 1 positive (≥ 2)
 Category 2 positive (≥ 2)
 Category 3 positive (1 or BMI $>$ 30)



Snorning
Tired
Observed apneas
Pressure (high)
BMI >35
Age >50
Neck circ
Gender (M)

Epworth Sleepiness Scale

SITUATION	CHANCE OF DOZING (0-3)
Sitting and reading	
Watching TV	
Sitting, inactive in a public place (e.g. theater or meeting)	
As a passenger in a car for an hour without a break	
Lying down to rest in the afternoon when circumstances permit	
Sitting and talking to someone	
Sitting quietly after a lunch without alcohol	
In a car, while stopped for a few minutes in traffic	
TOTAL SCORE	___ / 24

High Resolution Pulse Oximetry

- Minolta 300i



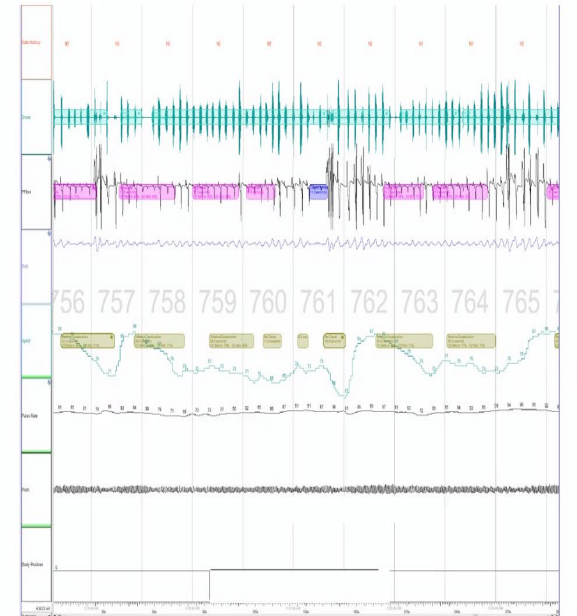


Home Sleep Apnea Test

WATCH-PAT200---ITAMAR

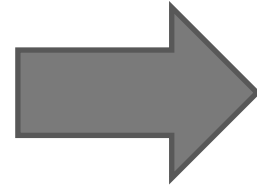


Out of Center Sleep Testing (OCST)



UMSOD Adult SRBD/OSA Screening

- Medical History
- EOE/IOE
- Dental Exam
- Patient Reported Symptoms



- Referral to PCP
- Referral to orthodontist, oral surgeon, myofunctional therapist

Conclusions

- *Progress in pre-doctoral sleep medicine education has been slow over the decades but shows ever renewed interest and effort in medical and dental school pre-doctoral and post-graduate curriculums.*
- *Due to expertise in the stomatognathic system as well as the routine nature and volume of dental visits, dentists are well equipped to screen for and help manage SRBD.*
- *The sleep medicine curriculum at UMSOD introduces D3 pre-doctoral and hygiene students to sleep medicine and SRBD/OSA screening and referral protocols.*
- *UMSOD seeks to develop a comprehensive, integrated, and interdisciplinary sleep medicine curriculum in which students are adequately trained to screen for SRBD/OSA, properly refer at risk patients, and safely and effectively help manage OSA via OAT, myofunctional therapy, and referral to dental specialists.*
- *Continued effort is required to achieve these goals, but doing so will have a significant impact on health outcomes and the public health crisis that is SRBD.*

- *Thank you!*
- *For more information contact:*
 - *Stephanie Dennison at sdennison1@umaryland.edu*

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