AASM Scoring Manual Updates

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Speaker:

[X] 1. I do not have any potential conflicts of interest to disclose, OR

☐ 2. I wish to disclose the following potential conflicts of interest

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☐ 3. The material presented in this lecture has no relationship with any of these potential conflicts, OR

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1.
Objectives

• Articulate and apply updated AASM Scoring Manual requirements
• Discuss anticipated changes – what is coming next...
AASM Scoring Manual Updates
2015 Version 2.2 Updates
Newly Added Section: Sleep Staging Rules for Infants

• Ages for which infant sleep staging rules apply
• Technical specifications
• General scoring of sleep stages
• Scoring Stage W, Stage N (NREM), Stage R & Stage T
• References
Replaces 1971 Version

- Replace the (very) old Parmalee and Anders* scoring rules for infants

Who are Infants?

• Define applicable ages
  • 0-2 months (37-48 weeks) post term

• Define
  • Conceptional age (CA)
  • Gestational age (GA)
  • Premature, full-term, post-term, neonate

Technical Specifications for Infants

- Electrode placements and recording parameters for infants
  - Reduced distance for chin EMG electrode placements (1 cm vs 2 cm)
  - Reduced distance for EOG electrode placements (0.5 cm vs 1 cm)
  - Bilateral EEG recording with additional midline central placements
    - C4-Cz, C3-Cz
  - Synchronized audio & video

Key Terminology

- Stage W (Wakefulness)
- Stage N (NREM) - analogous to the previously used terminology of “quiet sleep”
- Stage R (REM) - analogous to the previously used terminology of “active sleep”
- Stage T (Transitional) - analogous to the previously used terminology of “indeterminate sleep”

General Scoring of Infant Sleep Stages

- Score infant sleep based on a combination of
  - Behavioral observation
  - Respiratory characteristics
  - EEG, EOG & EMG characteristics
- Rules include methods for resolving discordant characteristics to determine an epoch score
- Examples of sleep stage/state are included

Newly Added Section: HSAT Rules for Adults

- HSAT Utilizing Respiratory Flow and/or Effort Parameters
- HSAT Utilizing Peripheral Arterial Tonometry (PAT)

Addresses
- Technical specifications for equipment and recordings
- Parameters and data to be reported
- Respiratory event rules

Key Terminology for HSAT Scoring

- Monitoring time (MT): Total recording time minus periods of artifact and time the patient was awake as determined by actigraphy, body position sensor, respiratory pattern, or patient diary
- Respiratory event index (REI): Total number of respiratory events scored × 60 divided by monitoring time (MT)

Technical Requirements

• FDA approved device with unique identifier
• Must meet minimum definition for CPT codes 95800, 95801 or 95806
• Must record oximetry & a measure of heart rate
• Must display raw data & allow manual scoring or editing of events
• Requires ability to calculate REI based on MT

Respiratory Event Rules

- Scoring apnea & hypopnea based on respiratory flow & effort sensors
- Scoring respiratory events based on PAT
  - Peripheral arterial tone
  - Oxygen desaturation
  - Heart rate changes derived from oximetry

HSAT References

• Clinical guidelines

• Technology evaluation

AASM Scoring Manual Updates
2016 Version 2.3 Updates
Summary of 2016 Version 2.3 Updates

• A new Technical Specifications section in the Movement Rules chapter, which includes new rules and figures for electrode placement for monitoring or detecting movements, along with rules about video PSG requirements for diagnosing sleep-related rhythmic movement disorder and REM sleep behavior disorder

• New rules, figures, and clarifications for scoring periodic limb movements in sleep (PLMS)

Summary of 2016 Version 2.3 Updates

• A revision to the rule for scoring bruxism so that masseter EMG activity is included as a way to detect bruxism
• A new rule and figure for scoring sleep stages when 3 or more segments of an epoch meet criteria for different stages
• A new note clarifying how to score an arousal immediately preceding a transition to wake

Deadline for Implementation

- All AASM-accredited sleep facilities were required to implement the new rules in Version 2.3 by Oct. 1, 2016

The Dreaded Multi-Stage Epoch

- A new rule and figure for scoring sleep stages when three or more segments of an epoch meet criteria for different stages
The Rule is the Same So Far

• Score sleep stages in 30-second, sequential epochs commencing at the start of the study
• Assign a stage to each epoch
• If two or more stages coexist during a single epoch, assign the stage comprising the greatest portion of the epoch

No Problem Here — A Little W, Mostly N₂
Scoring Challenge:
Here Each Segment is Close to 15 sec
But This is New

- When three or more segments of an epoch meet criteria for different stages (stage W, N1, N2, N3, R):
  - Score the epoch as sleep if the majority of the epoch meets criteria for stage N1, N2, N3, or R
  - Assign the sleep stage that occurs for the majority of sleep within the epoch

Most of This Epoch is Sleep – Score as ?

9 sec Wake, 17 sec N1, 4 sec N2: SCORE N1
4 sec N2, 12 sec Wake, **14 sec N1: SCORE N1**
Even with the New Rules, There is Still Some Ambiguity

Wake or N1 or N2?
Take Home Point

- If the majority of the epoch is sleep – score it as sleep
- Score as the sleep stage that occupies the majority of the sleep time
- Only score W if more than half of the epoch is W
Scoring Arousals and Awakenings
Wake Begins With an Arousal

• A new note was added clarifying how to score an arousal immediately preceding a transition to wake

• **Note 5**
  • An arousal may still be scored if it immediately precedes a transition to stage W
  • That is, both the arousal and transition to wake are scored

Arousal Plus Awakening From Sleep

Score the arousal AND the awakening
Technical Specifications for Movement Rules
New Technical Specifications for Movement Rules

• Includes new rules and figures for electrode placements for monitoring or detecting various movements
  • Anterior tibialis
  • Flexor digitorum superficialis / extensor digitorum communis
  • Masseter
  • Paraspinal
Leg EMG Electrode Placement

- Rule has not changed
- Place surface electrodes in the middle of the anterior tibialis muscle so that they are 2–3 cm apart or 1/3 of the length of the anterior tibialis muscle (whichever is shorter)
  - Raise foot/flex foot up to locate the anterior tibialis muscle on the outside of the calf
- Both legs should be monitored - preferably on separate channels

Filtering and Impedance

• Nor have these requirements
  • They were notes - now they are rules

• Avoid the use of the 60 Hz (notch) filter

• Impedances need to be less than 10,000 Ω - less than 5,000 Ω is preferred
  • MY NOTE – these should be EEG (gold cup) electrodes!

Option to Add Upper Limb Recordings

• For detecting transient muscle activity in REM sleep
  • Flexor digitorum superficialis
    • Bend fingers at base to locate muscle in inner forearm
  • Extensor digitorum communis
    • Bend fingers up to locate muscle in outer forearm

Limb Movements in REM Without Atonia

Chin and limb muscle activity seen in REM
Masseter Electrodes

• For detecting bruxism add masseter muscle electrodes
  • Note - characteristic changes in masseter EMG are often more prominent than changes in the chin EMG
• Ask the patient to bite down to activate and locate the muscle group
  • Place electrodes 2 to 3 cm apart
• A single masseter electrode may be referenced to a chin EMG electrode

Masseter Electrode Placement
Masseter Muscle Activity in the Frontal and Central EEG Channels
Paraspinal Electrodes

- Used for monitoring rhythmic movement disorders
- Place surface electrodes to monitor the large muscle groups involved
  - Place electrodes 2 to 3 cm apart

Paraspinal Electrode Placement
Movement Disorders Diagnostic Requirements

- There are also newly added requirements for diagnosing sleep-related rhythmic movement disorder and REM sleep behavior disorder
  - For diagnosis of RMD use time-synchronized video PSG to accurately characterize the type of movement occurring
  - For diagnosis of RBD time-synchronized audio-equipped video PSG is essential to document complex motor behaviors and vocalizations (dream enactment) during REM sleep

Recording Movement Disorders

- Record additional EMG channels to detect transient muscle activity in REM sleep for diagnosing REM sleep behavior disorder
  - Flexor digitorum superficialis
  - Extensor digitorum communis
    - Optional but highly recommended!

New Rules for Scoring PLMS
New PLMS Scoring Rules

- New rules, figures, and clarifications for scoring PLMS were added
  - Duration requirement (0.5 seconds) added to the identification of a LM event based on a minimum amplitude increase in EMG voltage of 8 μV above resting EMG
- Several notes were elevated to rules
  - Arousals associated with LMs
  - LMs in proximity to respiratory events

Scoring Criteria

• When there are leg movements on 2 legs counted as one movement (time between onsets is less than 5 seconds) the beginning of the first movement is used to determine the interval to the next movement

• When wake is seen in between limb movements the 90 second clock keeps ticking
  • Remember not to score limb movements during epochs scored as wake

Intervening Waking

When wake is seen between limb movements the 90 second clock keeps ticking

Must be less than 90 seconds

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Do not score this movement
New PLMS Scoring Rules

• Understand the RULES!
  • When a period of wake (< 90 seconds) separates a series of LMs the subsequent LMs are counted as part of a PLM series
  • NOT the LM that occurs in wake!
Clarifications Added
Clarification of Some Rules

• Scoring Hypopnea – clarification added to address reimbursement issues
  • It is the responsibility of the individual practitioner to confirm and follow the criteria that should be used for reporting to the patient’s payer in order to be reimbursed and qualify the patient for therapy.

• Reporting HSAT – clarification added to address reimbursement issues
  • For reimbursement purposes, individual practitioners may need to indicate that monitoring time (MT) is being used in place of total recording time (TRT)
  • For reimbursement purposes, individual practitioners may need to indicate that REI is a surrogate for AHI

Sneak Preview
Anticipated 2017 Version 2.4 Updates

• Electrical and physiological calibrations to document appropriate system response
  • Impedance checks
  • Patient calibrations
• Additional notes to assist with pediatric respiratory scoring
• Changes in EOG electrode placement measurements
• FAQ section on the AASM Scoring Manual website
Summary

• We have discussed
  • Recent significant 2015 & 2016 AASM scoring manual updates
  • And a preview of anticipated updates for the AASM scoring manual in 2017......
Questions???

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