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A Narcolepsy Detection Enhancement Paradigm: Automated Nocturnal Detection and Notification of Sleep Onset Rapid Eye Movement Periods

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Introduction

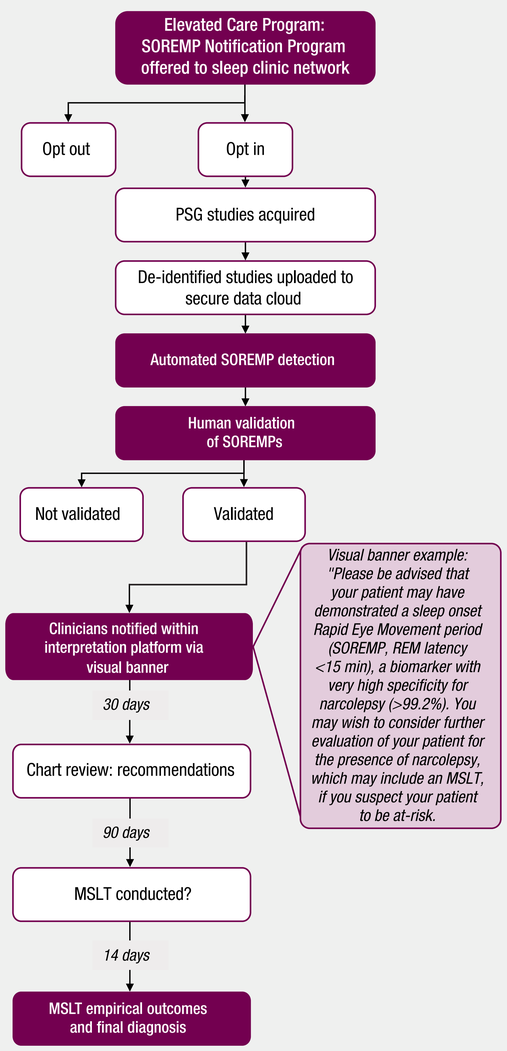
- Narcolepsy frequently remains undiagnosed for many years following symptom onset, likely due, in part, to a combination of limited narcolepsy-specific education for clinicians and few opportunities to gain experience, as well as substantial medical comorbidity (eg, sleep apnea) that may be associated with similar symptoms[1]
- Rapid eye movement (REM) sleep detected by polysomnography (PSG) occurring within 15 minutes of nocturnal sleep (sleep onset REM period; SOREMP) is a known biomarker for hypocretin-deficient narcolepsy[2]
  - However, among patients who undergo routine diagnostic sleep testing, as few as 4% with a SOREMP receive further evaluation for narcolepsy, suggesting that SOREMPs are often underappreciated in these individuals[3]
- To enhance identification of SOREMP episodes, an automated process was developed to detect and advise sleep clinicians of SOREMPs occurring during overnight PSG

Objective

- To evaluate the impact of automated SOREMP notification on clinician recommendations for narcolepsy diagnostic evaluation and multiple sleep latency test (MSLT) outcomes

Methods

Figure 1. Study Design

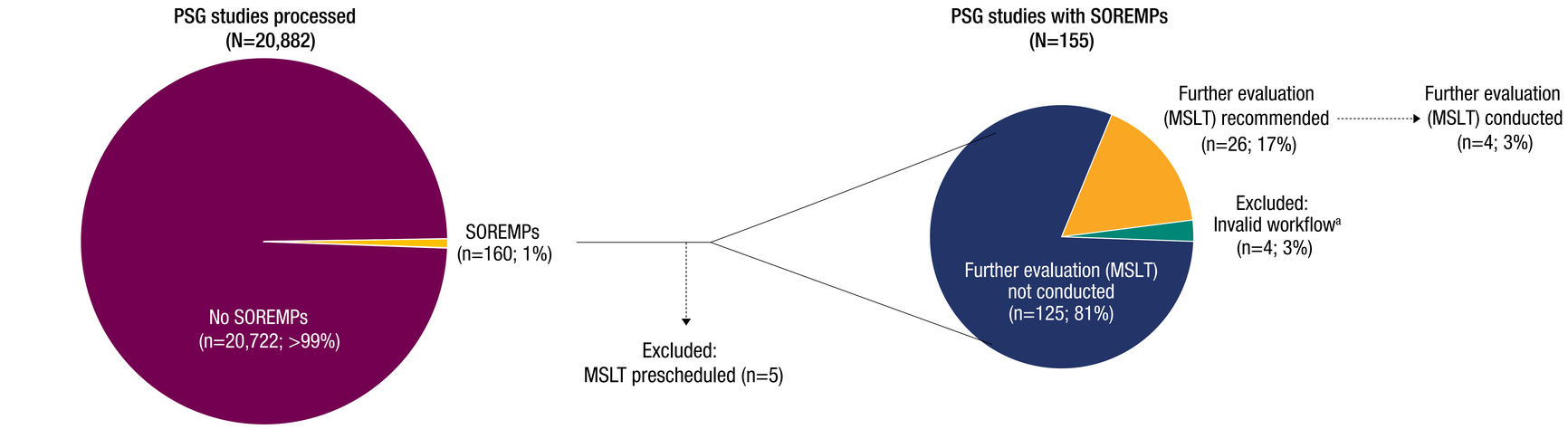


MSLT, multiple sleep latency test; PSG, polysomnography; REM, rapid eye movement; SOREMP, sleep onset rapid eye movement period.

- Sleep studies were processed over 3 years

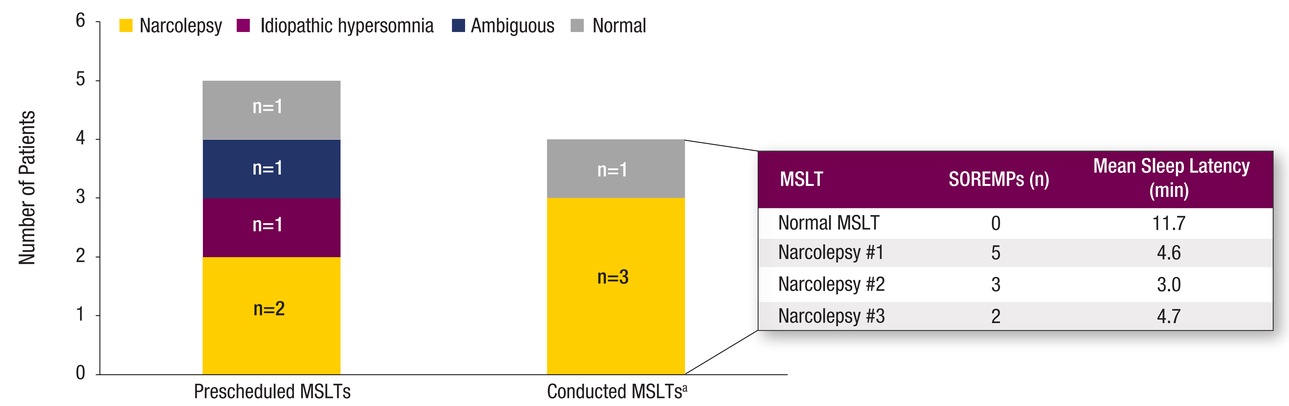
Results

Figure 2. Based on the Automated SOREMP Notification Program, 26 Patients (17%) Were Recommended for Further Narcolepsy Evaluation (MSLT)



MSLT, multiple sleep latency test; PSG, polysomnography; SOREMP, sleep onset rapid eye movement period.
[a]SOREMP detected during human validation but not during automated scoring (n=3); PSG study not completed due to patient medical issue (n=1).

Figure 3. When Conducted, MSLTs Most Often Supported a Narcolepsy Diagnosis

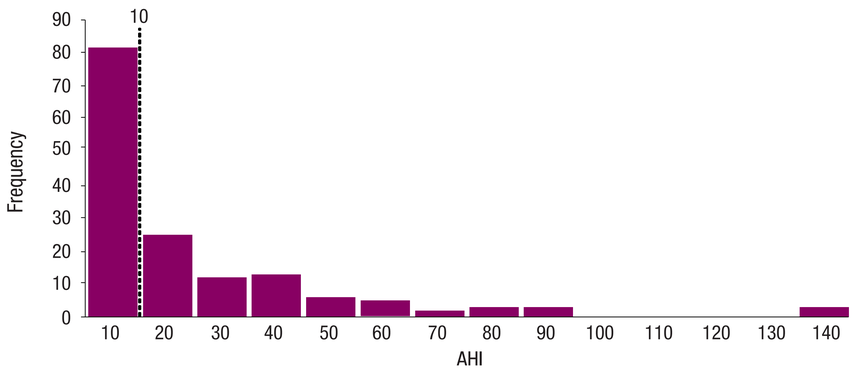


MSLT	SOREMPs (n)	Mean Sleep Latency (min)
Normal MSLT	0	11.7
Narcolepsy #1	5	4.6
Narcolepsy #2	3	3.0
Narcolepsy #3	2	4.7

[a]Based on recommendation for further evaluation by the automated SOREMP notification program.
MSLT, multiple sleep latency test; SOREMP, sleep onset rapid eye movement period.

- Of the 26 patients that were recommended for further evaluation, 4 had subsequent MSLTs conducted, 2 had MSLTs scheduled, and 20 had no action at time of printing
- The 4 MSLTs that were conducted based on recommendations from automated PSG screening were mostly consistent with narcolepsy
  - Three patients (75%) had numbers of SOREMPs and mean sleep latency values from MSLT that supported the narcolepsy diagnosis
  - One patient (25%) had a normal MSLT

Figure 4. SOREMPs Occurred More Frequently Among Patients With Lower AHI



AHI, apnea hypopnea index; SOREMP, sleep onset rapid eye movement period.

- The inverse correlation between apnea hypopnea index and occurrence of SOREMPs aligns with research demonstrating that SOREMPs during **nocturnal** PSG almost always indicate underlying narcolepsy and are not caused by sleep apnea[2]

Conclusions

- This study implemented enhanced identification and subsequent clinician notification of nocturnal SOREMPs using a novel sensitive SOREMP detection paradigm
  - This methodology resulted in the recommendation of further narcolepsy evaluation (MSLT) for 26 patients (17%) who may have otherwise gone undetected
  - Most MSLTs (75%) that were scheduled due to the recommendation and for which a diagnosis was listed were consistent with a diagnosis of narcolepsy
- This is a call to action for medical providers to critically evaluate patients who exhibit SOREMPs on nocturnal PSG, as it provides a unique opportunity to identify narcolepsy
- Further research is needed to better understand the low referral rate

References: 1. Thorpy MJ, Krieger AC. *Sleep Med.* 2014;15:502-7. **2.** Andlauer O, et al. *JAMA Neurol.* 2013;70:891-902. **3.** Cairns A, Bogan R. *Sleep Med.* 2017;32:150-6.

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