Nocturnal Scratch:
Ontology & Terminology

NOCTURNAL SCRATCH

Digital Measures Development

www.dimesociety.org/tours-of-duty/digital-measures-nocturnal-scratch

A project by the
DIGITAL MEDICINE SOCIETY
Ontology of "Nocturnal"

**Class**

- **Nocturnal**
  - A delimited duration of time/time period; of intended sleep; not restricted to any specific time of the day or night

**Concepts**

- **Total sleep opportunity**
  - Amount of time that an individual allows themselves to try to sleep

- **Sleep opportunity**
  - **Total sleep opportunity** (TSO)

- **Attempted sleep**
  - **Intended sleep**
  - The time between bed time and awake time, when a person intends to sleep

- **Wakefulness episode**

- **Sleep episode**

**Properties**

- **Start / end**
- **Duration**
- **Total sleep time (TST)**
- **Sleep stage**
- **Main sleep event**
- **Start / end**
- **Type**
- **Sleep measurement** modalities, surveys, sleep quality, ambient temperature, other metadata

**Values (or nested properties)**

- **Lights on/lights off time** or **Bed time/get up from bed time**
- **Hours, minutes, seconds**
- **Duration; % of TSO**
- **Light sleep (NREM N1, NREM N2), deep sleep (NREM N3), REM sleep**
- **Y/N**
- **Sleep onse/sleep offset**
- **Sleep onset latency (SOL), Wake after sleep onset (WASO), Wake after sleep offset (WASF)**
- **Duration, % of TST, % of TSO**
- **Sleep diary, EEG, PSG, actigraphy, videography, etc.**
- **Device model, Evaluation algorithm, Device placement**
"Nocturnal" period in the measurement of nocturnal scratch

- Defined in the context of sleep as the total sleep opportunity delimited by bed time (start)/getting up from bed (end)
  - Start/end times should be determined by a suitable measurement modality (sleep diary, EEG, PSG, actigraphy, videography, etc.)
- Each of the "optional" sleep outcome measures needs to be defined if they are included as a part of the measurement (YES/NO). The more optional sleep outcome measures are included, the more granular the measurement will be.

For nocturnal scratch, in the context of use as a COA, total sleep opportunity is more relevant to support the COA content validity, because scratching before falling asleep contributes to the impact of nocturnal scratch behavior on patient sleep quality.

—Nocturnal Scratch Project Team
Table 1. Measurement of nocturnal period as defined by sleep outcome measures

<table>
<thead>
<tr>
<th>Nocturnal scratch outcome measures</th>
<th>Property</th>
<th>Use of property</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total sleep opportunity</strong></td>
<td>Start/end time of TSO (bed time/get up from bed)</td>
<td>Required</td>
</tr>
<tr>
<td></td>
<td>Duration of TSO</td>
<td>Required</td>
</tr>
<tr>
<td><strong>Sleep episodes</strong></td>
<td>Main sleep event (Y/N)</td>
<td>Optional</td>
</tr>
<tr>
<td></td>
<td>Sleep stages</td>
<td>Optional</td>
</tr>
<tr>
<td></td>
<td>Start/end time of sleep episodes (wake up/fall asleep)</td>
<td>Required (*if sleep episodes are measured)</td>
</tr>
<tr>
<td></td>
<td>Sum of all sleep episodes (= total sleep time, TST)</td>
<td>Required (*if sleep episodes are measured)</td>
</tr>
<tr>
<td><strong>Wakefulness episodes</strong></td>
<td>Type (SOL, WASO, WASF)</td>
<td>Optional</td>
</tr>
<tr>
<td></td>
<td>Main sleep event (Y/N)</td>
<td>Optional</td>
</tr>
<tr>
<td></td>
<td>Start/end time of wakefulness episodes (wake up/fall asleep)</td>
<td>Required (*if sleep episodes are measured)</td>
</tr>
<tr>
<td></td>
<td>Sum of all sleep episodes (= time spent awake)</td>
<td>Required (*if sleep episodes are measured)</td>
</tr>
<tr>
<td><strong>Metadata</strong></td>
<td>Sleep measurement modality</td>
<td>Required</td>
</tr>
<tr>
<td></td>
<td>Ambient temperature</td>
<td>Optional</td>
</tr>
<tr>
<td></td>
<td>Surveys</td>
<td>Optional</td>
</tr>
<tr>
<td></td>
<td>Other metadata</td>
<td>Optional</td>
</tr>
</tbody>
</table>

We believe here is where we should propose a new name - such as "sleep-time scratch", since "nocturnal" implicitly means "during the night." New term anchored in sleep context is more patient-centric, as some patients may not sleep mainly during the night (e.g. infants, shift workers).”

-Nocturnal Scratch Project Team
**Summary**: Definition & outcome measures of nocturnal scratch

**Definition of nocturnal scratch**

**Scratching** is an action/behavior, of rhythmic and repetitive skin contact movement

Performed during a delimited time period of **intended and actual sleep**; not restricted to any specific time of the day or night

**Outcome measures of nocturnal scratch**

**Total scratch time** (sum of all scratch bouts) measured during a delimited measured period of intended and actual sleep within the **total sleep opportunity**

Total scratch time can be also represented as a percentage of the measured total sleep opportunity period
Acknowledgements

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Let us know how you’ve used this resource in action!

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