SAMPLE Diagnostic Report

**Scientific Report**

**Sleep study conditions:** Diagnostic study.

**Technical comments:** Good quality study.

**Sleep quality:** The patient reported a good quality sleep which was better than usual. Sleep architecture shows multiple periods of stage two, several periods of stage two/three, one period of stage four and two REM periods (supine and non-supine REM sampled during both periods). Several short wake periods and one extended wake period were present.

**Sleep Latency:** 17.0min  
**Sleep Efficiency:** 80.2%  
**Total Arousal Index:** 25.5/hr

**Sleep Quality** is the description of the patient sleep architecture, the amount of NREM sleep (stages 1, 2, 3, 4), REM/dreaming sleep, and central apneas/hypopneas present during the study.

**Normal sleep architecture** should have 75-80% as NREM sleep of which approximately 45% will be stage 2 sleep and 20% will be stages 3 and 4 sleep (also known as slow wave sleep). **REM sleep** should account for 20-25% of total sleep and 5% of the time available for sleep is spent awake. Also comments are made as to the body position the patient slept – supine or non-supine.

Normal values for:
- **Sleep Latency** (time after lights out to the onset of sleep) < 20 minutes
- **Sleep Efficiency** (amount of sleep time divided by the amount of time available for sleep as a percentage) > 80%
- **Arousal Index** (number of awakenings or changes in brain wave frequency per hour) < 10/hr

**Respiratory events** has the description of the patients breathing during sleep. Sleep Services Australia uses the AASM (Chicago criteria) for the classification of sleep disordered breathing.

An **apnoea** is the complete absence of breathing for more than 10 seconds. Apnoeas are categorized as follows:
- Central – where no effort is made to breathe,
- Obstructive – where no breathing occurs despite repeated efforts to suck air into the lungs against a blocked upper airway.
- Mixed – where there is a combination of effort to breathe and no effort to breathe.

A **hypopnoea** is the partial or incomplete absence of breathing for 10 seconds, like apnoeas these maybe central or obstructive.

Comments are made if oxygen desaturation, snoring or arousals are present with the respiratory events.

| SpO2 Baseline: | Wake | 95  | %     |
| SpO2 Baseline: | NREM | 93  | %     |
| Mean SpO2 Nadir: | NREM | 88  | %     |
| SpO2 Nadir: | NREM | 89  | %     |
| AHI: Total | 6.8 | /hr | REM | 92 | % |
| SpO2 Nadir: | NREM | 5.7 | %     |

**Oxygen saturation summary values and Apnoea and Hypopnoea Index (AHI)**

**SpO2 baseline values** are given when awake, in NREM and REM sleep. In normal subjects a slight drop in values from wakefulness to sleep are seen in the order 1-2%.

**Mean SpO2 Nadir** – This is the average oxygen saturation value the patient drops to.

**SpO2 Nadir** – This is the lowest oxygen saturation value the patient drops to.

**Total Apnoea and Hypopnoea Index** is the number times per hour the patient has respiratory events regardless of the sleep stage. This is broken down into the 2 main sleep stage categories NREM and REM sleep, some patients will show a worsening of sleep disordered breathing when in REM sleep.

**Normal values:**
- SpO2: Awake 92-98%  
- Asleep (NREM or REM): 91-98%

**Normal AHI:** < 5/hr  

**AHI indicating sleep apnoea:**
- **Mild** sleep apnoea: 5-15/hr  
- **Moderate** sleep apnoea: 15-30/hr  
- **Severe** sleep apnoea: > 30/hr
SAMPLE Diagnostic Report

(continued)

Periodic Leg movements: PLMs were present frequently throughout the study with associated arousals.

Periodic Leg Movements, the muscle twitching condition which usually effects the legs manifesting in jerking of the legs during sleep. It is a common condition which affects about 10% of the population. It is defined by 4 or more movements of 0.5-5 seconds duration within a 5-90second period. A normal PLM index <5 episodes/hr.

Snoring: Snoring was present throughout the study.

ECG: The dominant rhythm is Sinus with an average heart rate of 76 bpm. No arrhythmias were present.

T. Smith (Sleep Scientist) 17/01/08

Physician Report

Conclusion: Mild Obstructive Sleep Apnoea which is predominantly supine based and worse in REM sleep associated with mild oxygen desaturation. Few events observed in non supine sleep. Moderate sleep fragmentation with respiratory and PLMS related arousals.

Conclusion is the Respiratory and Sleep Physicians summary of the condition which has been diagnosed from the sleep study. It contains the comments of the severity of sleep disordered breathing and other conditions such as Periodic Leg movements

Clinical Recommendations:
1. Optimise sleep hygiene, weight reduction and review nasal and upper airway patency.
2. Measures to minimise supine position during sleep should be associated with reduced severity of sleep disordered breathing.
3. Consider for treatment with mandibular advancement splint with follow up sleep study on treatment to assess benefit.
4. If splint is not tolerated or effective, nasal CPAP may be an alternate treatment option, with review.

Dr Linda Schachter (Sleep Physician) 17/01/2008

The Clinical Recommendations are the advised directives from the Respiratory Sleep Physician to the Referring Practitioner to follow with their patient. The list of clinical recommendations is in ranking order of treatment options that should be trialed/implemented.

Please note: Our Respiratory Sleep Physicians are available to discuss the results and management with the Referring Practitioner.

Staging and Scoring criteria

<table>
<thead>
<tr>
<th>Staging analysis</th>
<th>EEG was recorded from Fp1 - Right outercanthus placement. Wake and NREM was staged according to Rechtschaffen and Kales.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiratory analysis</td>
<td>Respiratory effort was recorded from uncalibrated thoracic, abdominal respiratory inductive plethysmography, nasal pressure and snore signal extracted from nasal pressure, Respirinonas, Obstructive and Central Apnoeas and Respiratory Effort Related Arousals have been scored in accordance with Chicago Criteria, AASM Task Force Report. Sleep related breathing disorders in adults – Recommendations for syndrome definition and measurement techniques in clinical research. Sleep 1999;22(5):667-89</td>
</tr>
<tr>
<td>Leg movements</td>
<td>Uncalibrated piezo sensors. Sleep data was acquired using Somte ambulatory device. Sleep and respiratory analysis was performed manually.</td>
</tr>
</tbody>
</table>

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Sample Diagnostic Report

Patient Name: J. Smith

Study Date: 10/01/2008

Sleep Statistics

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recording Start Time</td>
<td>21:00:00</td>
</tr>
<tr>
<td>Recording End Time</td>
<td>09:00:01</td>
</tr>
<tr>
<td>Lights Out Time</td>
<td>23:14:59</td>
</tr>
<tr>
<td>Lights On Time</td>
<td>06:49:00</td>
</tr>
<tr>
<td>Time Available For Sleep</td>
<td>7:34.0</td>
</tr>
<tr>
<td>Total Sleep Time</td>
<td>6:4.0</td>
</tr>
<tr>
<td>Sleep Efficiency (%)</td>
<td>80.2</td>
</tr>
<tr>
<td>Sleep Onset Latency (min)</td>
<td>17.0</td>
</tr>
<tr>
<td>Stage REM Latency (min)</td>
<td>131.5</td>
</tr>
</tbody>
</table>

Sleep Stage Table

<table>
<thead>
<tr>
<th>Sleep Stage</th>
<th>Duration (min)</th>
<th>Sleep Time %</th>
<th>Event Type</th>
<th>NREM</th>
<th>REM</th>
<th>All Sleep</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage NREM</td>
<td>314.0</td>
<td>86.3</td>
<td>Spontaneous Arousals</td>
<td>6.1</td>
<td>33.6</td>
<td>9.9</td>
</tr>
<tr>
<td>Stage REM</td>
<td>50.0</td>
<td>13.7</td>
<td>Respiratory Arousals</td>
<td>3.8</td>
<td>3.6</td>
<td>3.8</td>
</tr>
<tr>
<td>Awake</td>
<td>64.0</td>
<td></td>
<td>Limb movement Arousals</td>
<td>12.8</td>
<td>6.0</td>
<td>11.9</td>
</tr>
</tbody>
</table>

Arousals/hr Sleep

<table>
<thead>
<tr>
<th>Event Type</th>
<th>NREM</th>
<th>REM</th>
<th>All Sleep</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supine</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Respiratory Events per hour

<table>
<thead>
<tr>
<th>Event Type</th>
<th>NREM</th>
<th>REM</th>
<th>All Sleep</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time spent (min)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypopnoeas</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Obstructive Apnoeas</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mixed Apnoeas</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Central Apnoeas</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RDI</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Respiratory Events – Duration in seconds

<table>
<thead>
<tr>
<th>Event Type</th>
<th>Apnoeas</th>
<th>Hypopnoeas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Longest Event (sec)</td>
<td>15.0</td>
<td>24.9</td>
</tr>
<tr>
<td>Average duration (sec)</td>
<td>12.8</td>
<td>16.9</td>
</tr>
</tbody>
</table>

Desaturation Events/hr

<table>
<thead>
<tr>
<th>Event Type</th>
<th>NREM</th>
<th>REM</th>
<th>All Sleep</th>
</tr>
</thead>
<tbody>
<tr>
<td>Desaturations &gt; 2%</td>
<td>5.7</td>
<td>12.0</td>
<td>6.6</td>
</tr>
<tr>
<td>Desaturations &gt; 3%</td>
<td>2.5</td>
<td>3.6</td>
<td>2.6</td>
</tr>
<tr>
<td>Desaturations &gt; 5%</td>
<td>0.6</td>
<td>1.2</td>
<td>0.7</td>
</tr>
</tbody>
</table>

Heart Rate Summary/min

<table>
<thead>
<tr>
<th>Event Type</th>
<th>Average Heart Rate Asleep</th>
<th>Average Heart Rate REM</th>
<th>Average Heart Rate NREM</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>76</td>
<td>73</td>
<td>76</td>
</tr>
</tbody>
</table>

**Sleep Stages breakdown:** The amount of time spent in NREM, REM sleep and awake.

**Arousal breakdown:** Stating the likely causes of the arousals/awakenings, that is, arousals post respiratory events (Apnoea or Hypopnoea), arousals post leg movements (PLMs) and arousals which cannot be attributed to respiratory events or leg movements, referred to as spontaneous arousals.

**Respiratory Event breakdown:** Hypopnoeas and Apnoeas are separated, as are the different types of Apnoeas as mentioned on page 1, the average duration and longest duration of apnoeas and hypopnoeas.

**Desaturation Events:** The number of times the SpO2 values drops 2%, 3%, 5% from baseline per hour in sleep stages NREM, REM and in any stage of sleep.
Sample Diagnostic Report

This section is commonly referred to as the **hypnogram** page, it shows graphs of the entire study and is excellent in exhibiting trends, for example, at a glance this patient has more hypopnoeas, dips in SpO2, snoring, when in the supine position.

**Patient Name:** J. Smith  
**Study Date:** 10/01/2008

**Time**  
**Hrs:** 0 1 2 3 4 5 6 7 8 9 10 11 12 1 AM 2 AM 3 AM 4 AM 5 AM 6 AM 7 AM

**Epoch**  
11:10:30 PM 12:30 1:30 2:30 3:30 4:30 5:30 6:30 7:30 8:30 9:30 10:30 11:30 12:30 1 AM 2 AM 3 AM 4 AM 5 AM 6 AM 7 AM

**Light**
- **ON:** 11:10:30 PM
- **OFF:** 7:10:30 AM

**Hypnogram**
- **R:** REM
- **W:** Wake
- **1:** Stage 1
- **2:** Stage 2
- **3:** Stage 3
- **4:** Stage 4

**Arousal**
- **REM:** Red
- **Sleep:** Green
- **WAKE:** Black
- **OFF:** White
- **ON:** Blue

**Respiratory events**
- **Cn.A:** Central Apnea
- **Ob.A:** Obstructive Apnea
- **Mx.A:** Mixed Apnea
- **Hyp:** Hypopnea
- **Uns:** Unspecified
- **REPA:** Rebreathing

**Body Position**
- **F:** Front
- **L:** Left
- **B:** Back
- **R:** Right

**SpO2**
- Graphical summary of the SpO2 values over the entire night, scale is 50-100%

**Sound**
- Graphical summary of the snoring throughout the night

**Average Heart Rate**
- Average heart rate throughout the night, scale 20-120bpm

**Graphical expression of amount of time spent at a given SpO2 value**
- **X Axis:** 0-100%
- **Y Axis:** 0-3hrs