P1752 Sleep Schema Subgroup Meeting

Sponsored by IEEE Engineering in Medicine & Biology (EMB) Standards Committee

- 2 April 2019
- Teleconference
Attendance

• Put your name and affiliation in the chat window for attendance today.
• If you are joining only via phone, please email charlotte.chen@philips.com with “P1752 Sleep Schema Subgroup call” as subject
• The document shows attendance is under https://ieee-sa.imeetcentral.com/omh/folder/WzIwLDEwMjY4MDg1XQ/.
  --If you attended the call, please verify that your name is listed
  --If you name is not listed, either edit the document above or email charlotte.chen@philips.com
Agenda

1. Attendance
2. Modified timelines
3. Update from the qualitative schema task group
4. Update from quantitative schema task group
5. Action Items
6. Q&A
Sleep Schema Subgroup Deliverables

- Clinically important sleep attributes
- Common sleep attributes of the existing relevant devices and apps
- Standard Comparison Report (Review and mapping)
- Proposed sleep schemas (modified and new) and use cases (quantitative and qualitative)
  1. Quantitative Measurement Schemas (including macrostructure, microstructure and etc.)
  2. Qualitative Measurement Schemas (including subjective sleep experience, other sleep related phenomena and etc.)
Timeline for Stage 2

- **July 23, 2018**
  - Kick Off

- **March 21, 2019**
  - Complete review Quantitative Sleep Schemas

- **April 14, 2019**
  - Complete drafting Qualitative Measure Schema Development
  - Complete Quantitative Schemas and Use Cases
  - Complete reviewing qualitative measure schemas
  - All the deliverables are ready by May 12, 2019
Qualitative Schema Task Group Updates (Banu)
Status

• Follow up of meeting held on March 5, 2019

--- Process of drafting survey schemas

--- Working Members: Charlotte Chen, Banu Rekha and Stephanie Battista

--- List of Drafts completed and ready for subgroup review:

ISI, FOSQ, PSQI, KSS, OSA Berlin – Uploaded in iMeet
## P1752 Sleep WG

Qualitative Sleep Measures - Drafting of Schemas

### Choice of Questionnaire

<table>
<thead>
<tr>
<th>S.No</th>
<th>Name of Questionnaire</th>
<th>To be drafted by</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The Stanford Sleepiness Scale (SSS)</td>
<td>Banu</td>
</tr>
<tr>
<td>2</td>
<td>Epworth Sleepiness Scale</td>
<td>Drafted by Simona (Available in imeet)</td>
</tr>
<tr>
<td>3</td>
<td>Karolinska Sleepiness Scale</td>
<td>Banu</td>
</tr>
<tr>
<td>4</td>
<td>Pittsburgh Sleep Quality Index (PSQI)</td>
<td>Banu</td>
</tr>
<tr>
<td>5</td>
<td>Insomnia Severity Index (ISI)</td>
<td>Charlotte</td>
</tr>
<tr>
<td>6</td>
<td>OSA Berlin Questionnaire</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Stop-Bang Questionnaire</td>
<td>Stephanie</td>
</tr>
<tr>
<td>8</td>
<td>Restless Legs Syndrome Diagnostic Index (RLS-DI)</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Narcolepsy</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Functional Outcomes of Sleep Questionnaire</td>
<td></td>
</tr>
</tbody>
</table>

- **Yellow**: Draft Completed
- **Pink**: Pending
Next Steps

• Get feedback and suggestions from members for the drafted schemas

• Assign members for drafting the remaining two schemas

• Complete the entire set of questionnaires and submit for approval by a couple of weeks
ISI Schema

ISI Sample Data

https://ieee-sa.imeetcentral.com/omh/folder/WzIwLDExNjM1MTQ1XQ
FOSQ Schema
FOSQ Sample Data

https://ieee-sa.imeetcentral.com/omh/folder/WzlwLDExNjM1MTQ4XQ
Link to the drafted qualitative schemas and sample data (scratch pad):

https://ieee-sa.imeetcentral.com/omh/folder/WzIwLDEwMjY4MDgwXQ

Link to the drafted qualitative schemas and sample data (ready for review):

https://ieee-sa.imeetcentral.com/omh/folder/WzIwLDExNjM1MTQwXQ
Quantitative Schema Task Group
Updates
According to Open mHealth, each schema includes at least the following sections:
- schema header (“reference” section: SNOMED, LOINC, RxNORM, or UCUM)
- ”definitions”
- ”properties”
- ”required”

Suggest the following:
- Start with these fields for developing a new schema;
- During schema development, we could create new/modify existing fields as needed;
Drafted Schemas and Sample Data

--sleep_episode and sample data (Simona)
Sleep_Episode Schema (1)

```json
{
  "$schema": "http://json-schema.org/draft-04/schema#",
  "type": "object",
  "description": "This schema represents one sleep episode, which can be the main sleep event (i.e., a night sleep for most people) or a nap.",
  "references": [
    {
      "description": "The SNOMED code represents Sleep, function (observable entity)",
      "url": "http://purl.bioontology.org/ontology/SNOMEDCT/298338008"
    }
  ],
  "definitions": {
    "unit_value": {
      "$ref": "unit-value-1.x.json"
    },
    "duration_unit_value": {
      "$ref": "duration-unit-value-1.x.json"
    },
    "time_frame": {
      "$ref": "time-frame-1.x.json"
    },
    "date_time": {
      "$ref": "date-time-1.x.json"
    }
  },
  "properties": {
    "latency_to_sleep_onset": {
      "description": "Amount of time between when person starts to want to go to sleep and sleep onset.",
      "$ref": "#/definitions/duration_unit_value"
    },
    "latency_to ARISING": {
      "description": "Amount of time between final awakening and when person stops wanting to go to sleep.",
      "$ref": "#/definitions/duration_unit_value"
    }
  }
}
```
"total_sleep_time": {
  "description": "The total amount of time spent asleep within the effective time frame.",
  "$ref": "#/definitions/duration_unit_value"
},

"light_sleep_time": {
  "description": "The amount of total sleep time spent in light sleep.",
  "$ref": "#/definitions/duration_unit_value"
},

"deep_sleep_time": {
  "description": "The amount of total sleep time spent in deep sleep.",
  "$ref": "#/definitions/duration_unit_value"
},

"rem_sleep_time": {
  "description": "The amount of total sleep time spent in REM sleep."
},

"number_of_awakenings": {
  "type": "integer"
},

"is_main_sleep": {
  "type": "boolean"
},

"effective_time_frame": {
  "description": "The initial sleep onset time maps to start_date_time, the final awakening time maps to end_date_time and total sleep episode duration maps to total_sleep_time."
},

"allOf": [
  {
    "$ref": "#/definitions/time_frame"
  },
  {
    "required": ["time_interval"]
  }
]
"sleep_maintenance_efficiency_percentage": {
  "description": "The amount of time spent asleep as a percentage of the sleep episode bounded by the effective time frame.",
  "allOf": [
    {
      "$ref": "#/definitions/unit_value"
    },
    {
      "properties": {
        "unit": {
          "const": [
            "%"
          ]
        }
      }
    }
  ],
  "required": [
    "effective_time_frame"
  ]}
```json
{
    "effective_time_frame": {
        "time_interval": {
            "start_date_time": "2016-02-05T21:35:00Z",
            "duration": {
                "value": 520,
                "unit": "min"
            }
        }
    },
    "latency_to_sleep_onset": {
        "value": 17.5,
        "unit": "min"
    },
    "latency_to_arising": {
        "value": 5.2,
        "unit": "min"
    },
    "total_sleep_time": {
        "value": 487,
        "unit": "min"
    },
    "light_sleep_time": {
        "value": 312,
        "unit": "min"
    },
    "deep_sleep_time": {
        "value": 37,
        "unit": "min"
    },
    "rem_sleep_time": {
        "value": 138,
        "unit": "min"
    },
    "number_of_awakenings": 1,
    "is_main_sleep": true,
    "sleep_maintenance_efficiency_percentage": {
        "value": 93.7,
        "unit": "%"
    }
}
```
Schema Review/Modification Progress
List of reviewed & revised schemas and sample data:

--ambient_light
--ambient_sound
--apnea_hypopnea_index
--deep_sleep_percentage
--light_sleep_percentage
--sleep_body_movement
--sleep_onset_latency
List of reviewed and to be revised schemas and sample data:

--ambient_temperature
--arousal_rate
--sleep_episode
--sleep_stages
--snore_count
--time_in_bed
--total_sleep_time
--wake_after_sleep_onset
Action Items

By April 14, 2019:

- Finish revising the quantitative schemas
- Finish drafting subjective schema for shortlisted questionnaires

Start reviewing qualitative schemas and sample data
Future Meetings

- Continue with Tuesdays at 8:30 AM Pacific / 11:30 AM Eastern
- Upcoming meetings
  - May 7, 2019
Adjournment