P1752.2
Cardiorespiratory Subgroup Teleconference

Working Group Sponsored by IEEE Engineering in Medicine & Biology Standards Committee

May 4, 2023
8 AM PDT; UTC 3:00 PM
P1752.2
Cardiorespiratory Subgroup

Agenda
May 4, 2023

Attendance & Introductions
Items:
✓ Preparation (session March 7, 2023):
  • Review JSON schema coding
  • Informed by IEEE 1751.1 schemas
    • Esp familiarize with “Metadata” and “Utility” schemas
    • Consider: Samples -> Schemas
✓ Assessing dependencies: Organization of CR schema
✓ CR schema structure

Other business
✓ Subschema groupings
✓ Schema timeline / initial draft target
IEEE 1752.1
Standard for Mobile Health Data

+

IEEE 1752.2
Standard for Mobile Health Data

- Metabolic
- Cardiorespiratory

https://opensource.ieee.org/omh/1752
Impactful Healthcare

Relevance

Morbidity & mortality
... WHO category of highest consequence

Preventative medicine
... overall intervention of highest impact

Health care delivery & economics
... need for digital biomarkers with
  semantic interoperability
  contextuality

Cardiovascular disease #1
  cerebrovascular
  heart failure
  dysrhythmias

Physical activity & mvt
  CR fitness

Apps

Wearables & ext. detectors

Internal/implant sensors*

CR fitness

Hypertension

... need for digital biomarkers with semantic interoperability and contextuality
Cardiorespiratory Schema

**Proposed Structure**

- **Electrical Systoles**
  - Pulse
  - Pulse Dynamics
  - Rhythm

- **Blood Pressure**
  - Systolic, diastolic
  - Cardiodynamics

- **Respiratory**
  - Ventilatory dynamics
  - Gas Exchange
  - Anomalies
Atomicity

- Determine desired granularity of schema’s data representations

Balancing parsimony and complexity

- Pragmatics and the 80/20 rule
  - Example: OmH explicitly determined relationship of physical activity to glucose to be outside 80/20 region...

Balancing permissiveness and constraints

- Pragmatics for value sets units, cardinality

Designing for data liquidity

- Data interchange: Data’s meaning same for sender and receiver
  - Header schema: Operational context for metadata - data payload
    - Data point creation and identification
    - Acquisition provenance (informed by M2DK mPROV ?)
  - Measurement schema: Clinical context for metadata

Alignment with clinical data standards

- Semantic interoperability by relying on existing vocabularies (ex. SNOMED, LOINC, etc) and units of measure (UCUM Codes)

Modeling of time

https://www.openmhealth.org/documentation/#/schema-docs/schema-design-principles
Cardiac Depolarization Event

Assessing Dependencies

Electrical

Mechanical

Pulsatile

"Downstream" result of ventricular contact

ECG signals, electrograms

heart sounds, +/- seismic

pulsation contact

PPG noncontact

Different measurements

Data differences

PRSteiner - Dartmouth
Cardiac Systolic Event Dependencies -> Extensibility

Electrical ~
AE: Yes
VE: Yes

Mechanical ~
AE: Maybe
VE: Yes

Pulsatile ~
AE: No
VE: Yes

ECG signals, electrograms
heart sounds, +/- seismic
pulsation contact, noncontact
PPG contact, noncontact

Atrial event (AE) detection
Ventricular event (VE) detection
Compatible extensibility layers

Future Proofing

Enhancing clinical relevance

Proposal
- Tiered Structure for the Cardiac Schema
- Separate schemas for Cardiac and Respiratory

Examples:
- Differentiate atrial, atrial-paced, ventricular, ventricular paced (all types)
- Waveform morphology analytics