P1752.2
Cardiorespiratory Subgroup Teleconference

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

June 22, 2023
8:00 AM PDT; UTC 3:00 PM
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Cardiorespiratory Subgroup

Agenda
June 22, 2023

Attendance & Introductions
Items:
✓ Review scope & goals
✓ Subschema status updates
  * Pulse & rhythm
  * Blood pressure & hemodynamics
  * Respiratory & gas exchange
✓ Discussion:
  * Needs
  * Identified challenges & roadblocks
✓ Task: Subschema status updates

Other business
✓ Next CR subgroup meeting: July 27th -> 20th, 2023?
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*

Hypertension

... need for digital biomarkers with
  semantic interoperability
  contextuality
P1752 Open mHealth Purpose:

The purpose of this Working Group is to provide standard semantics to enable meaningful description, exchange, sharing, and use of mobile health data across a wide spectrum of use cases addressing consumer health, biomedical research, and clinical care needs. These standard semantics will be in the form of common data and metadata schemas...

Summary Addendum: Promotion of personalized healthcare
Cardiorespiratory Schema

Proposed Structure

Pulse
- Blood Pressure
  - Systolic, diastolic
  - Cardiodynamics

Respiratory
- Ventilatory dynamics
- Gas Exchange
- Anomalies

Rhythm
- Pulse Dynamics
  - Electrical Systoles
  - Pulse
Compatible extensibility layers

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

Assessing Dependencies

Electrical

Mechanical

Pulsatile

"Downstream" result of ventricular contraction

ECG signals, electrograms

heart sounds, +/- seismic

pulsation contact

PPG noncontact

Data differences

Different measurements

PRSteiner - Dartmouth
Pulse Schema

**Subschema Dependencies**

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

- **Respiratory**
  - Ventilatory dynamics
  - PPG
  - Anomalies

**Electrical Systoles**

**Pulse**

- Pulse Dynamics
- Rhythm

**Mechanical pulse waveform**
Pulse rate at a given time

Semi-stationary pulse rate trends

Heart rate variability
- *Time domain, frequency domain, spectral turbulence*
- *Multiscale entropy*
- *Complexity index and fractal dimension*
- *Contextuality frameworks* (provocations & modulators)

Dysrhythmia states

Pragmatically requires electrical sensing

Clinical utility dictates use of atrioventricular data and morphology data