Real-time Fall Prediction & Prevention in Hospitalized Patients
Falls in Canada

- #1 cause of traumatic brain injury
- #1 cause of injury-related death in Canada
- 4x as many hospitalizations as MVAs
Impact of Falls in B.C.

- $1,200,000,000/year
- $272/capita
- 55 hospitalizations/day
- 20,000 hospitalizations/year
- 555 deaths
Falls and the Elderly

• Cause of 95% of hip fractures
• 1/5 falls -> serious injury
  • -> Complications, long-term care, death
Falls in the Elderly in Hospital

- Disorientation
  - Get up to void/drink

Medical:
- Illness
- Drugs
- Low BP
- Pain
- Sundowning

Situational:

Demographic:
- Reduced balance
- Poor vision
- Weakness
- Reaction time
Your CHALLENGE...
Your Challenge:

• In Real-time:
  • Accurately predict that a patient in bed is in a situation where they are at risk of falling
  • Take action to prevent a fall
Prediction - considerations

- High sensitivity and specificity
- Discriminating “normal” from at-risk activity
  - Sitting up, rolling over, family/MD visit
- Disable on-demand, but reactivate automatically
Prediction - considerations

• **Sensors**
  • Tabs, pressure sensors (on bed or floor), thermistors, accelerometers, RFID, webcams, IR motion sensors, bed-rail sensors, EEG, EMG, Fitbits, other wearables

• **Software – Big data, AI**
Prediction - considerations

- Detect at-risk situation early enough to allow time to intervene?
- Power consumption
- Reliability
Response - considerations

- Type of action
  - Voice reassurance/orientation?
  - Alarm? – how and where?
  - Turn on lights?
  - Deploy safety measure?
  - Activate webcam?
  - Staff notification?
Response - considerations

- Escalation
  - If counter-measure is not working, then what?
- Scalability
- Governance
Response - considerations

- Nursing Usability
  - Nuisance alarms and “alarm fatigue”
  - Integration with existing technology
  - Is the technology specific about who is at risk?
- Shift changes, lost devices
Response - considerations

- Patient Usability
  - Comfortable?
  - A risk – entanglement, choking
- Privacy – IoT
Want to save a life? Here’s your chance...