Topics to be covered

- What are patient considerations in technology?
- How is patient-centered design executed?
- What are implications for clinical trials?
- How does patient centered technology impact data?
Patient Considerations
Patient Burden vs. Sensitivity
Mechanical Considerations

- Ease of use
  - Donning, doffing
  - Comfort
  - Connectivity
- Interference
  - Size
  - Weight
  - Wires
- Cosmetics
Software Considerations

- Computer literate?
- Internet Access?
- Cell phone / tablet user?
PD-Specific Considerations

- Tremor
- Bradykinesia
- Elderly population
- Cognitive impairment
- Assistive devices
Patient Centered Design
Web-based reporting
Patient Design Considerations
Patient Interface
Symptom and Activity Rating
Instructional Videos

Task 3 of 5
Finger Taps

Skip this video
Patient Focus Group Feedback

- Easy-to-don
- Light-weight
- Comfortable

- Wireless “docking” station
- Orientation independent
Focus Group Results

- Focus groups provided feedback on hardware, software, and video instructions on four separate occasions.

Patient training
Implications for Clinical Trials
- Patient Burden vs. Sensitivity of Data
- Subject retention
- Data reliability
Impact on Clinical Trial Data
Real-world examples
Patient Compliance

- 97% of motor tasks completed as instructed
- Compliance improved over time

Sample Reports

- Medication titration – tremor
- Bradykinesia titration – bradykinesia
- No response
Continuous Monitoring
Tremor can be differentiated from voluntary motion by taking advantage of separation in the frequency spectrum.
Continuous Tremor Monitoring

• Algorithms process data from a single sensor to quantify tremor.
• Complete temporal picture of severity during daily life.

Recently Published

Isolating dyskinesia is significantly more challenging because it overlaps with voluntary movements in the frequency spectrum.
Two “stationary” tasks

In the absence of voluntary motion, a single sensor on the hand can be used to quantify dyskinesia

- Currently integrated into Kinesia HomeView

Dyskinesias Quantification

- Series of representative activities of daily living
- Use two sensors (hand, leg) and more sophisticated processing to predict an overall dyskinesia score
- Upcoming study to evaluate continuous scoring

\[
\begin{align*}
R &= 0.86 \\
\text{RMSE} &= 0.39
\end{align*}
\]
Hair Brushing

R = 0.88
RMSE = 0.35

Cutting Food

R = 0.91
RMSE = 0.37

Drinking from a Cup

R = 0.85
RMSE = 0.41

Bagging Groceries

R = 0.91
RMSE = 0.37

Dressing

R = 0.89
RMSE = 0.39
Conclusions

- There is a trade-off between patient burden and sensitivity of data.
- Keeping the patient in mind during the design process and throughout clinical use improves the user experience and increases the likelihood of patient acceptance.
- Patient data demonstrates acceptance and clinical efficacy of Kinesia HomeView technology to assess Parkinson’s disease.
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