I. Quantitative Measures of Upper Extremity & Motion Analysis

A. Surveillance / Monitor
B. Objective assessment of UE activity & performance
C. Augmenting performance during intervention

II. Opportunities

A. Previously
1. Videotape; parent diaries (Adolph et al., 1998)
2. Kinematics / kinetic in lab (Duff et al., 2003, 2009)
3. Direct supervision in rehab

B. Now
1. Trackers / Inertial sensors / Markerless systems (i.e., Kinect)
2. Wireless SEMG systems (Trigno™, Delsys, Inc)
3. Indirect tele-rehabilitation

III. Trackers / Inertial sensors

A. Advantages
1. Minimal set-up
2. Portable - allows home & community monitoring

B. APDM Opal Sensors (Horak et al., 2015)
1. 3 Axes of data collection
   a. Acceleration: Translational acceleration (m/s²)
   b. Gyroscope: Angular velocity (rad/s)
   c. Magnetometer: Magnetic heading (μT)
2. 20-200 Hz sampling rate
3. Stream in real time or log data to download later
4. Demonstration

C. Case examples
1. Correlation with clinical assessments (Duff et al., 2016; 2017)
2. Interlimb Coordination (Duff et al., 2017; Garrison & Wade, 2015)

IV. Triggered biofeedback

A. Rational/Questions (Duff et al. 2007; Gilbert & Tassin, 1984; Waters & Pelijovich, 1999)
B. Procedures - Results

V. Tele-rehabilitation

A. Advantages – Challenges
B. Sample programs (Burdea et al., 2011; Buick et al., 2016; Cason, 2009; Kanitkar et al., 2017)
VI. References