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Translating these rehabilitation strategies to treat humans with different disabilities presents significant challenges. One of these challenges is the current lack of objective, quantitative outcome measures with sufficient sensitivity to monitor changes in the earliest stages of recovery or that significant monitor the efficacy of assistive devices for the improvement of performance. Numerous national and international research organizations for all pathologies have been working to generate standards for the translation of basic science findings into human treatments. A common theme found in all such reports thus far is that available outcome measures for humans are inadequate. The Institute of Medicine, which advises the National Institutes of Health (N I H) and other funding entities in the United States, published recommendations stating a need for assessment tools utilizing "small number" methodologies, so that testing methods would not require large numbers of subjects in order to reach statistical significance. Proposed projects, therefore, must address clearly defined and restricted research questions in subjects that are carefully selected based on very specific and quantifiable criteria. The Institute of Medicine also requested that testing methods produce reliable results when administered in different facilities and can, then, be used in multi-center designs.

RECOMMENDATION I,
Develop, test and implement quantitative and sensitive biomechanical and neurophysiological measurement tool that assesses upper and lower extremity motor function.

For example, various topics associated with recovery could include suitable testing instrumentation and analyses that can identify motor unit activation in EMG during recovery, PDA for the assessment of pain, standing MRI to measure standing muscle skeletal artifacts, collection and analyses off fNIRS data to detect blood flow, measurements to evaluate dynamic strength as a measure for recovery from paralyses.

RECOMMENDATION 2,
Isolate or streamline suitable biomechanical and neurophysiological measures that are specific to the pathology, instrumentation or device used during compensation.

For example instrumentation and protocols to evaluate balance and gait on aging population will not have construct validity or repeatability for another population such as people with Parkinson disease. Loading rates of ground reaction forces may be more critical than the peak values for evaluating efficacy of assistive devices such as electrical stimulation device or orthotics. It would be highly advantageous to design measures

In summary, I believe the specificity of biomechanical and neurophysiological measure to defining the alterations in recovery will be critical to determining level of recovery and the subsequent treatment outcome for people with disabilities. Potentially, recovery of different motor functions, such as standing balance vs sitting balance, will occur at different rates; there will be a need for more than one measure to describe recovery. Further, it is so important that these biomechanical and neurophysiological measures are designed for clinical adaptability; otherwise the translation of these outcome measures to a clinical environment will not happen. Finally, the cost-benefit of improving clinical outcome measures and subsequent measurement of reporting on daily charts will be most relevant to the medical and the insurance communities as well as the consumer.