



Recommendation Title: Demonstrate that modeling and simulation can improve clinical outcomes

Recommendation Code: LF1B

Category: Limb/Whole Body, Function, Outcomes

Recommendation

Background and Relevance

The neuromusculoskeletal system is exceedingly complex due to the highly nonlinear multi-muscle, multi-articular nature of human movement. As a result, principles that govern muscle coordination are not well understood, and a scientific basis for understanding and treating impaired movement that would provide the ability to predict the outcome of surgical and rehabilitation interventions remains a major challenge. Modeling and simulation of human movement offers much potential to determine how neuromuscular impairments contribute to abnormal movement patterns and predict the functional consequences of clinical interventions. However, studies are needed to establish that modeling and simulation can predict the functional consequences of specific clinical interventions.

Objectives

1. Develop a modeling and simulation framework to *predict* how specific patients will respond to specific interventions.
2. Identify clinical interventions that yield optimal outcomes.

Recommended Actions

- 1) Conduct studies to identify “optimal” clinical outcomes. Define improvement for specific populations (e.g., pain vs. mobility vs. quality of life)
- 2) Verify models predict optimal outcomes.
- 3) Develop effective longitudinal studies to identify positive or negative outcomes and establish optimal outcomes.