Robotic Technology in Neurorehabilitation

Dylan J. Edwards PhD

Director, Laboratory for NIBS and Robotics; Director, Restorative Neurology Clinic

The Burke Medical Research Institute

Associate Professor of Clinical Neurophysiology, Weill Cornell Medicine

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Ekso Bionics Analyst Day, New York, Dec 2016

Burke Rehabilitation Center, New York

Intro:

- Neurorehabilitation defined
- Size of industry
- What is current practice and why is it changing?

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Why should a practitioner or clinic adopt Ekso?

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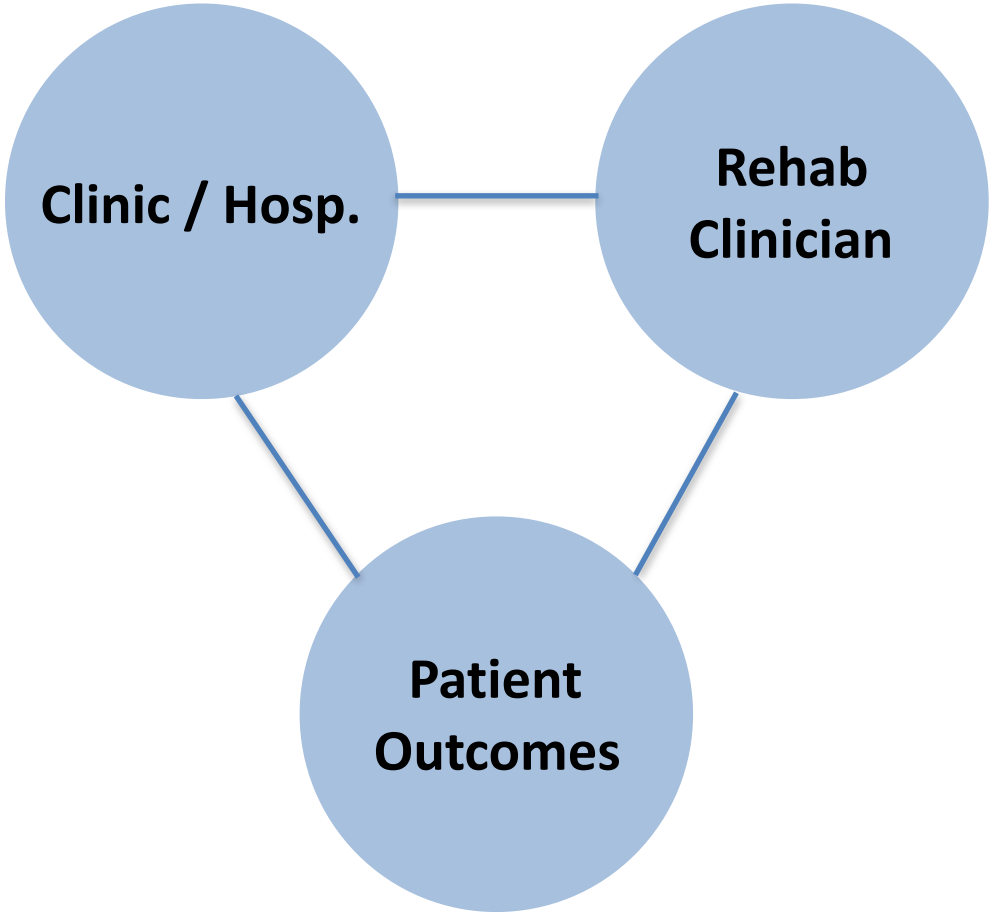

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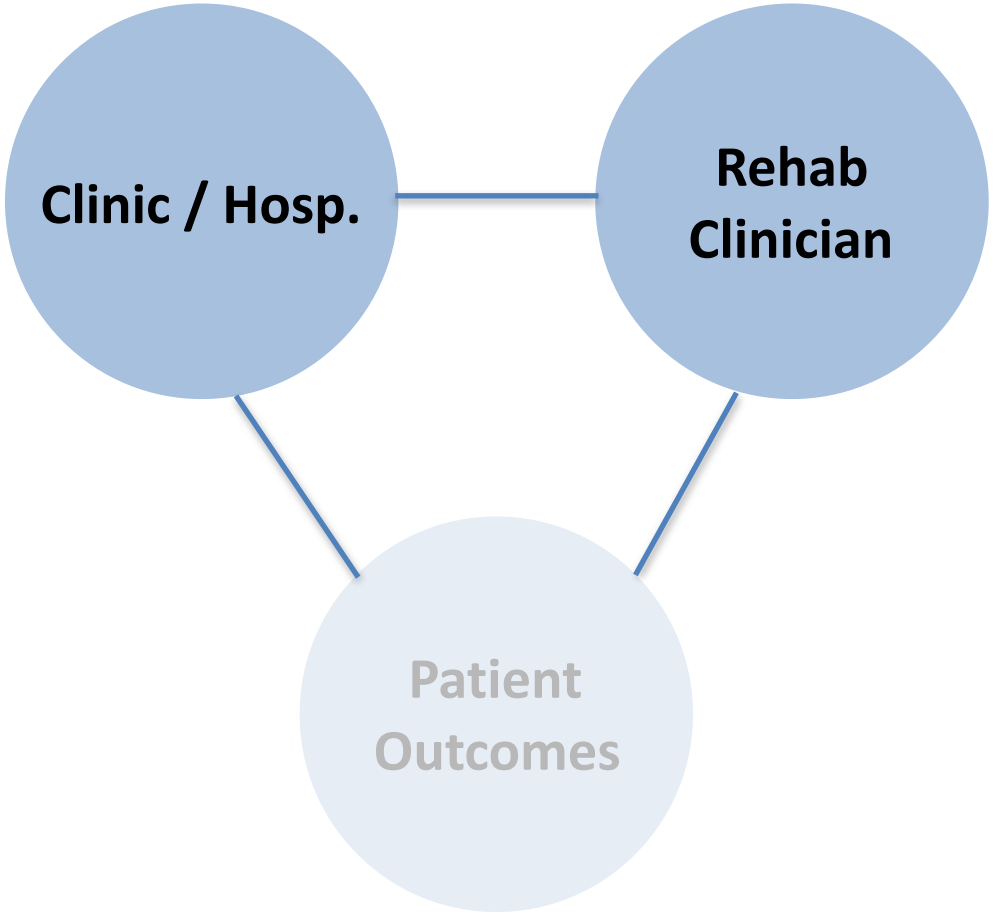

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Why should a practitioner or clinic adopt Ekso?

Clinic / Hosp.

- Exquisitely little space required relative to other gait training devices, movable
- Patients are not confined to a single therapy room, but can explore the center giving great exposure
- Potential reduced human resource cost (on average, less therapists required per patient)
- Inherent data on therapy and outcome without extra cost

Why should a practitioner or clinic adopt Ekso?

Rehab Clinician

- occupational health and safety – a profession that is at the forefront of reducing manual burden is itself, at present, a contradiction

- data from device – sensitive and ongoing data on what was done in therapy – having a better grasp of what the therapy was (across session for each patient and between patients), is a major leap forward for rehab medicine

- hard data for patient feedback, without having to perform extra tests

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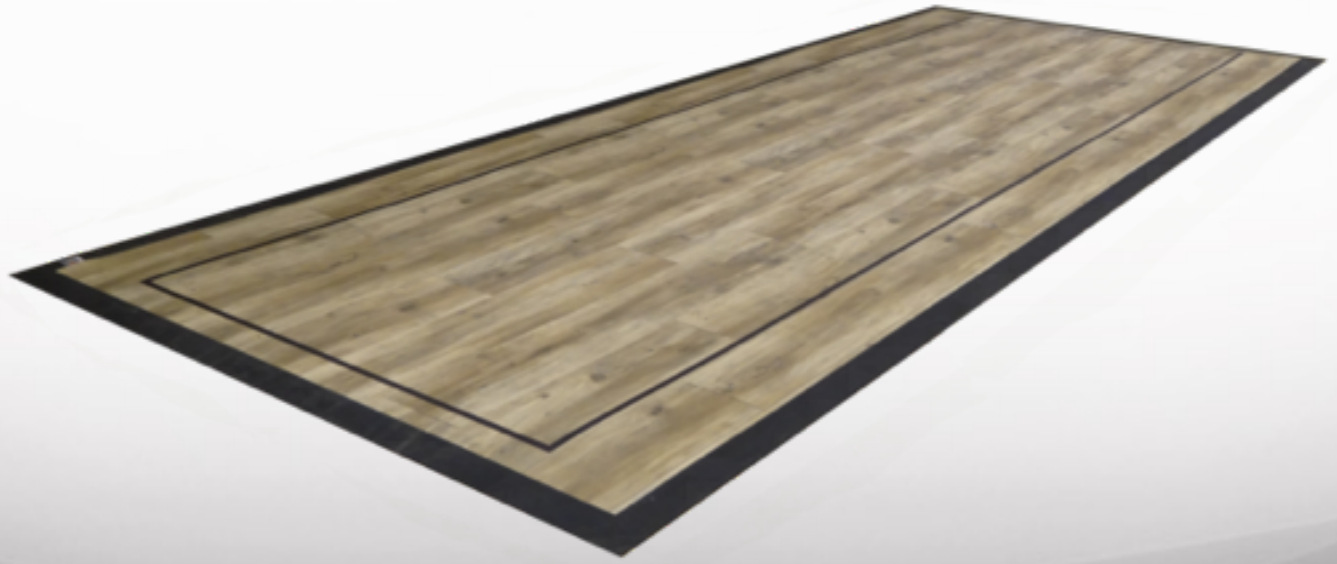
Results and Analysis

Initial Testing: Zeno™ Walkway

- Using an initial sample size of 5 patients, we assessed their gait patterns on the Zeno walkway both prior to and after a 6 week intervention using the Ekso exoskeleton. Patients were asked to walk across the mat and back, as the walkway collected key measurements.
- Therapy sessions, which lasted about 1.5 hours each, were done three times per week for a total of 6 weeks.

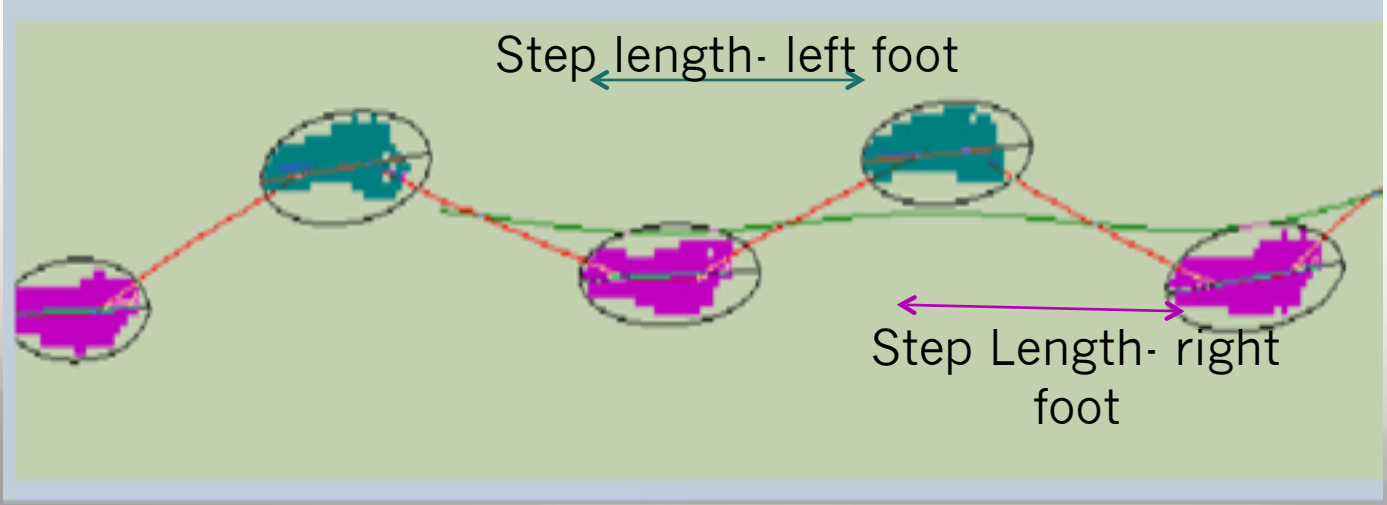


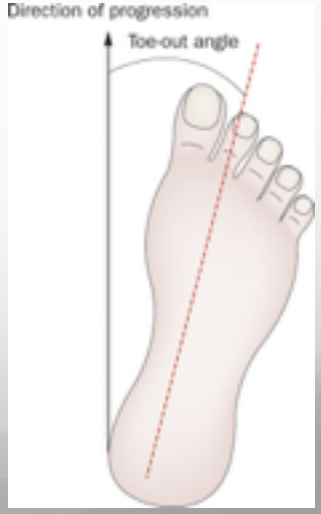
Prokinetics Zeno™ Walkway. Collects data using pressure sensors during both static and

Results and Analysis

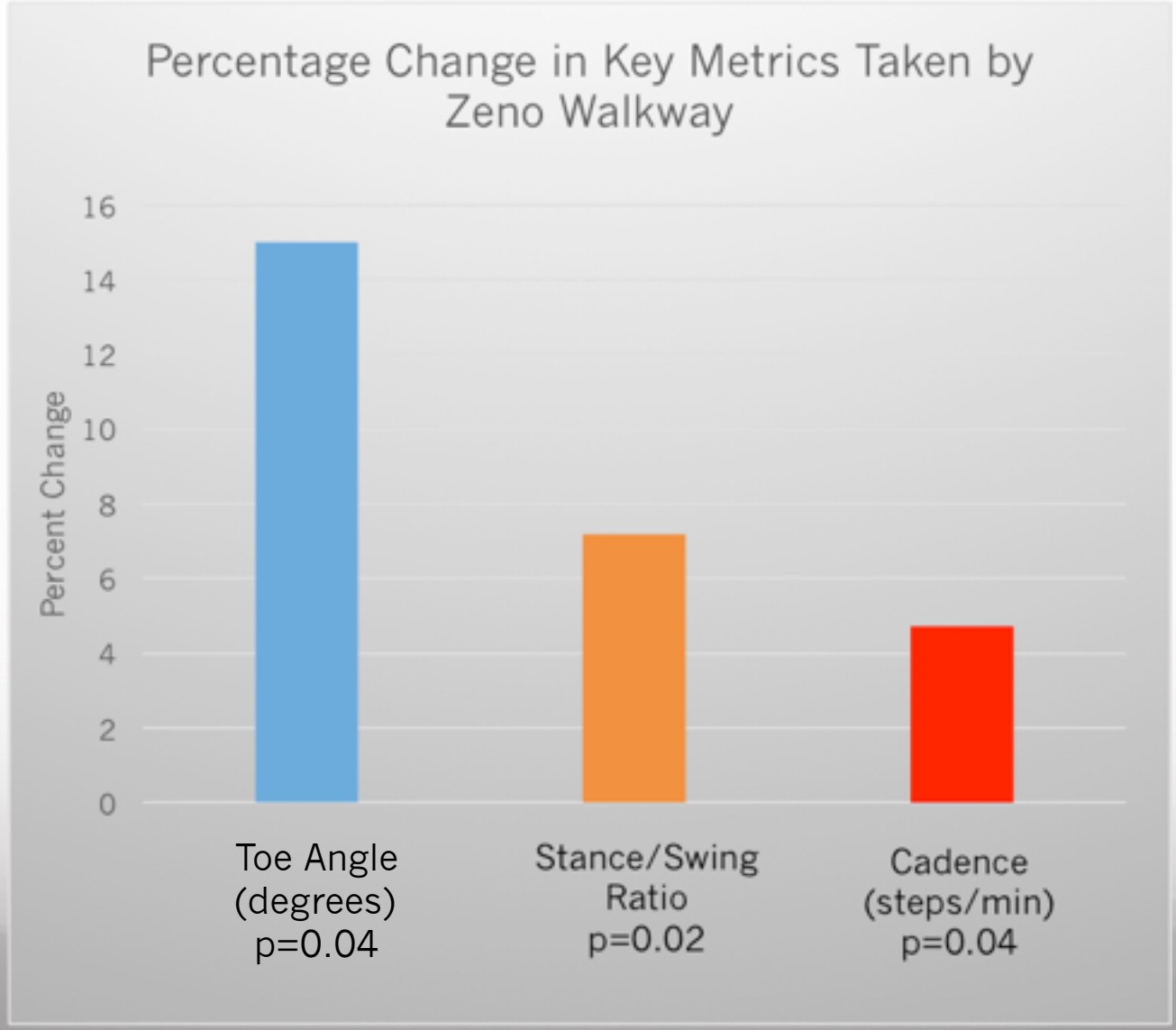
Zeno Walkway Metrics

- Step Length: The distance from heel to heel on one side for a step
- Cadence: The number of steps per minute
- Toe Angle: From center (0 degrees) how wide an angle the toe is from the heel when facing forward
- Swing to stance ratio: The ratio of swing time (time spent in the “swing” phase) vs stance time (time spent in the ”stance” phase) for a given leg





Objective zeno walkway data



The Walking Improvement for SCI with Exoskeleton (WISE) trial

Rationale: Increased efficacy data required in US setting for SCI

Logic:

- SCI neuro-rehabilitation of gait can be practically and feasibly implemented in US rehab centers
- Independent gait outcome can be equivalent to dose-matched conventional therapy (primary), and is better than usual care
- Staff load for dose-matched therapy is less using Ekso, and therefore more practical, economic and safe

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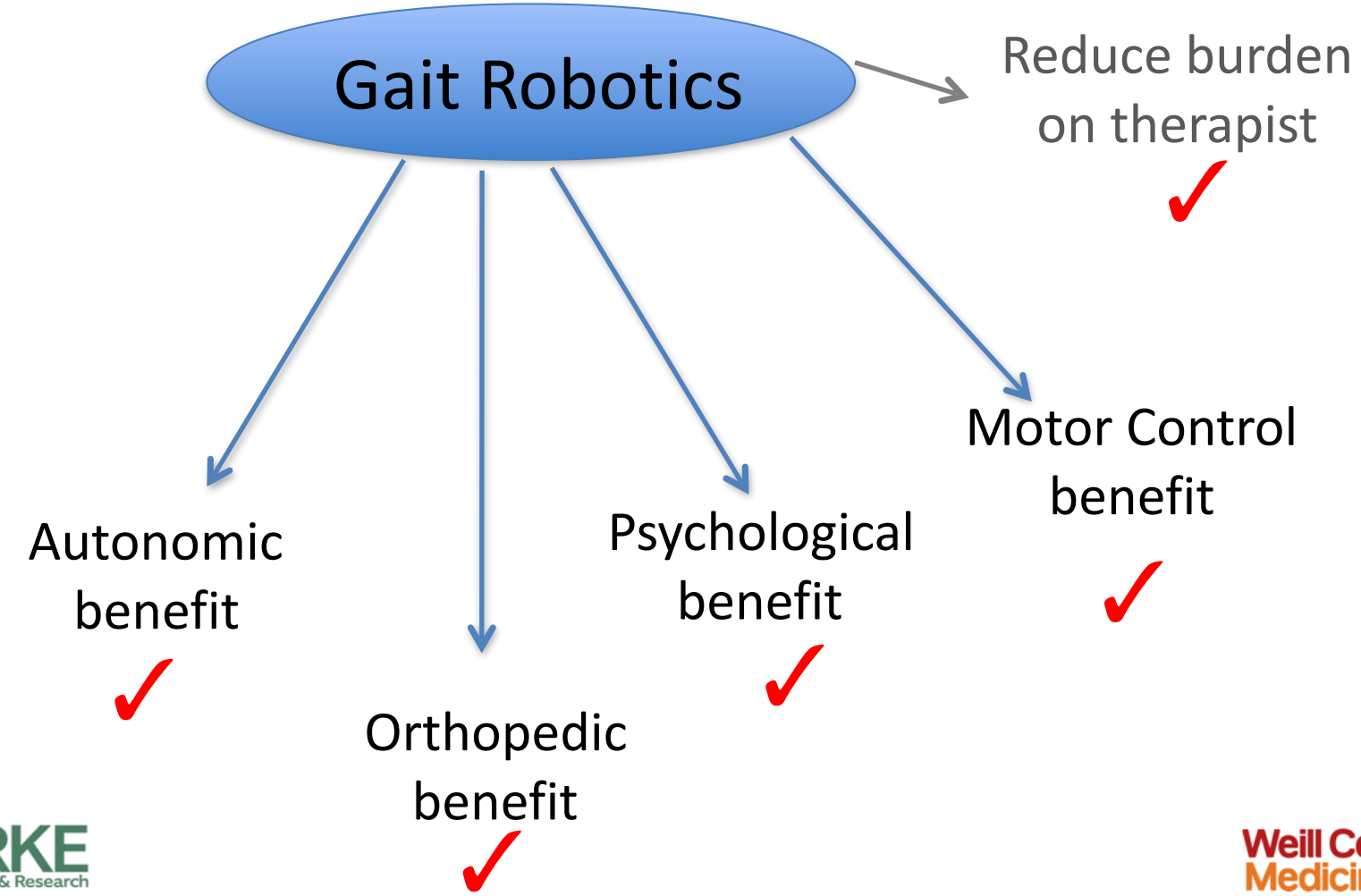


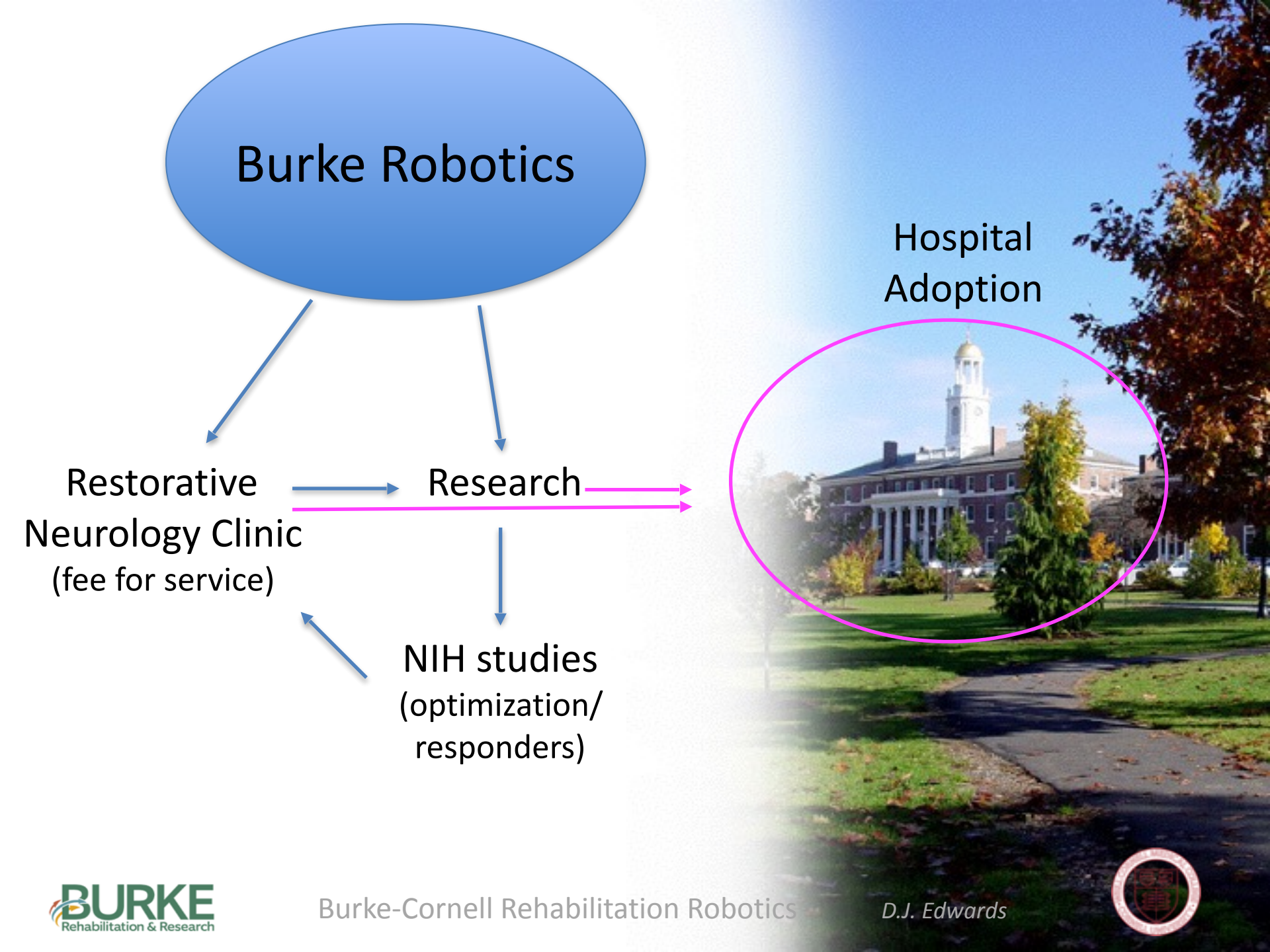
Success Stories!

https://www.youtube.com/watch?v=4uo2fkDOU5g

Defining Robotics - Ekso Bionics

What are robotic devices???

(Which of these powered devices are robotic? Why?)


Burke Robotics
Hospital Adoption
Restorative Neurology Clinic
(fee for service)
Research
NIH studies
(optimization/ responders)

Conclusions

Exoskeleton gait robots are increasingly incorporated into mainstream rehab

Robotic gait rehabilitation makes sense over human labour

Robotic devices can be cost superior to human labor

Randomized clinical trials are underway

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Thankyou