

Updates in Assistive Technology and Exoskeletons



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*Work Related Injuries Workshop
April 30th & May 1st, 2018*

What is an exoskeleton?

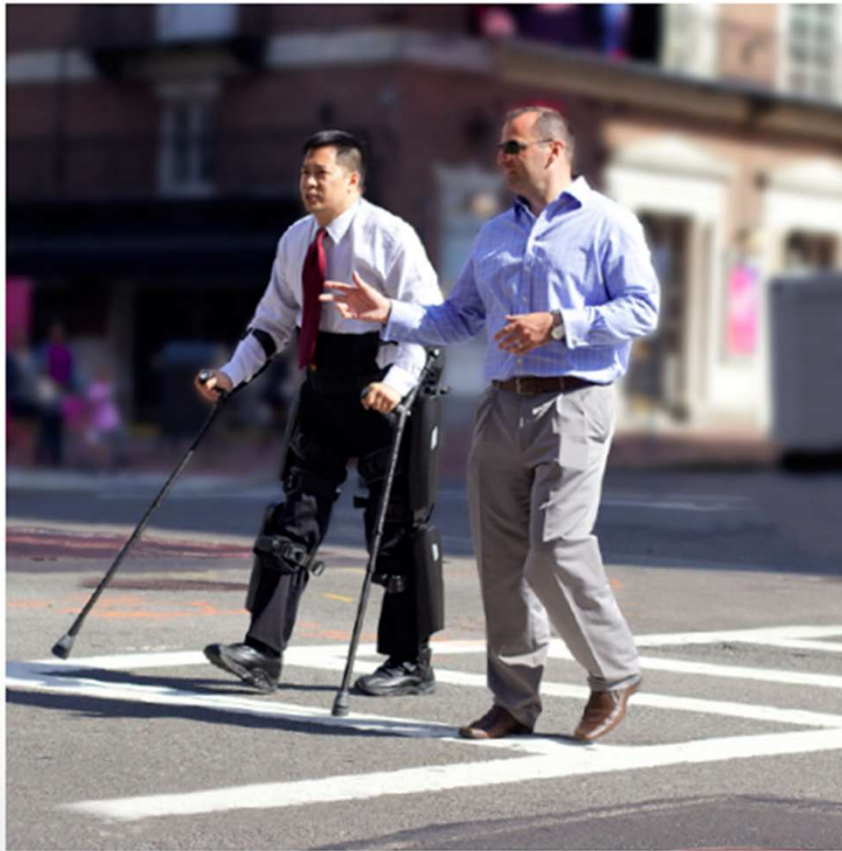
ReWalk provides powered hip and knee motion to enable individuals with spinal cord injury (SCI) to stand upright, walk, turn, and climb and descend stairs.





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Community Use



Need for Speed

ReWalk provides a functional natural gait of the legs and the fastest walking speed -up to .71 m/s- of any exoskeleton technology.

Why is walking speed important?

SAFETY

ReWalk safely in your community

ENJOYMENT

Walk with the crowd

LOWER LIMB LOADING

Faster walking speeds result in increased loading on lower limbs

Exoskeleton Acceptance and Process

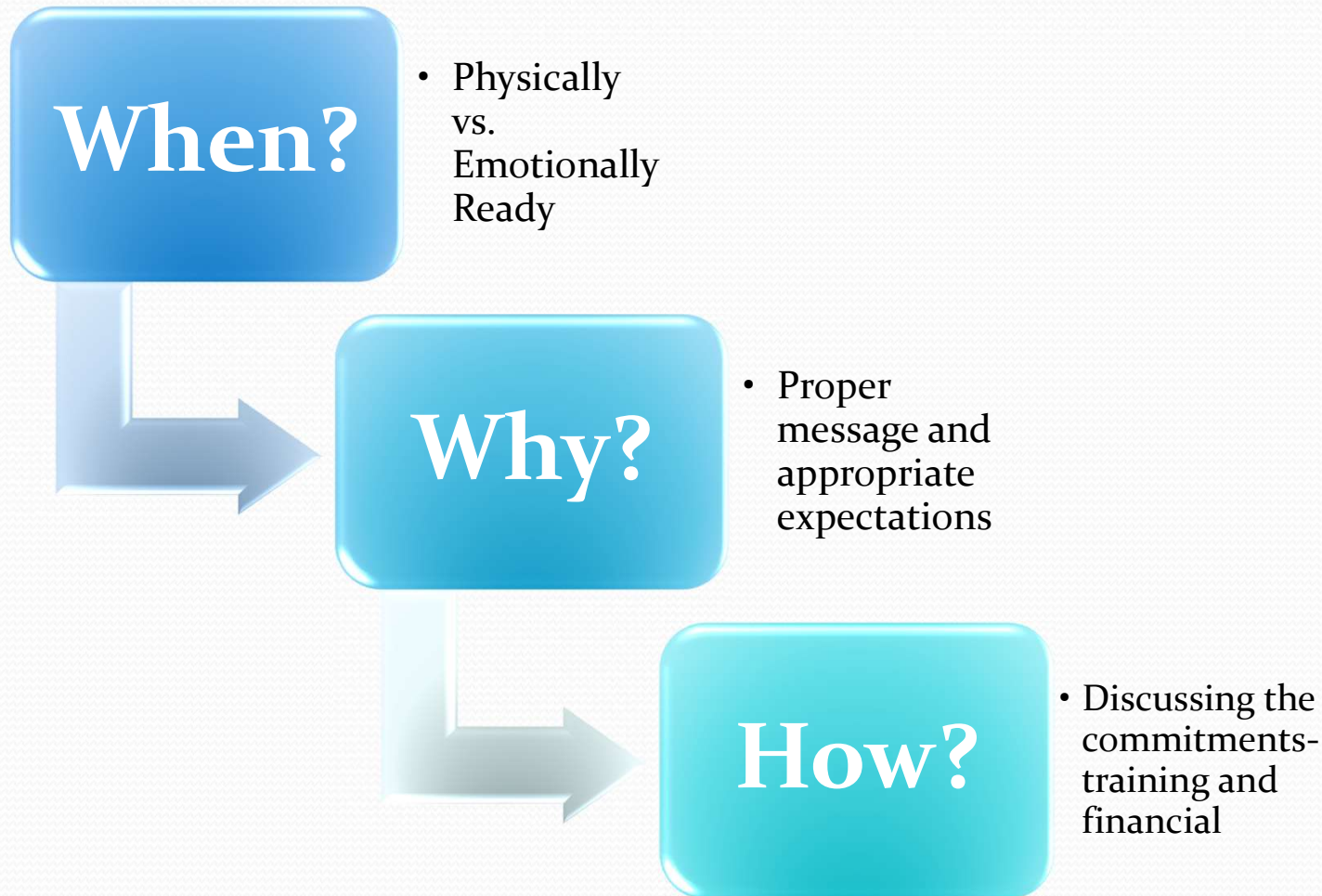
- Over 450 Systems placed worldwide
- Broad Network of Certified ReWalk Advanced Training Centers
- Reimbursement support- More than 200 positive coverage decisions
 - National Policies-
 - VA Coverage
 - Recent German BG and SHI Coverage
 - Italian Work Comp- INAIL
- Direct Clinical Training Teams in US and EU
- Direct Field Service Engineer Teams in US and EU
- Clinic Partnership Programs

Basic Training

Advanced Training

Certified ReWalker and Companion

When, Why and How of Exoskeleton Candidacy



Exoskeleton Reimbursement Support

ReWalk Reimbursement Support- Over 200 Third Party Payments!

- ✓ Private Insurances
- ✓ VA- Broad Coverage Policy
- ✓ Work Comp

The ReWalk reimbursement team can help your clients throughout the process

- Contacting your insurer to get started
- Preparing resources for your clinicians and insurers
- Respond to insurer questions
- Coordinate appeals
- *Keep you informed as we act your behalf each step of the way*

Who can use a ReWalk?

- **Lower extremity paralysis or paresis**
- **Sufficient upper body strength and ROM to use crutches**
- **Sufficient LE ROM to allow for ambulation**
- **Fair or better trunk control**
- **Ability to tolerate standing/gait program**
- **Height ~5'3" – 6'2"**
- **Weight < 220lbs**
- **Healthy bone density – clinician judgement**
- **Physician approval**

Complete or Incomplete Power Assistance



**Complete
SCI**

Provides Minimum Current
Necessary to Walk at Pre-Set
Speed

**Clinician
Defined Max-
Current**

**Clinician
Defined
Walking Speed**



**Some Muscle
Function**

Provides Minimum Current
Necessary to Walk at Pre-Set
Speed

Device Senses Current Need, Provides
Seamless, Constant Adjustment

Exoskeleton Medical Benefits

Walking is widely promoted as a healthy activity by the American Heart Association and other organizations

Walking may provide such benefits as:

Reduce risk of Heart Disease, Diabetes and Stroke
Improve Body Composition
Prevent Bone Density Loss
Many More...



Exoskeleton Medical Benefits



Meta Analysis:

- A statistical analysis of several separate but similar experiments or studies in order to test the pooled data for statistical significance

- Published in March 2016 edition of *Medical Devices: Evidence and Research*
- 14 studies (8 ReWalk™, 3 Ekso™, 2 Indego®, 1 unspecified exoskeleton); 111 patients
- Improvements in spasticity and bowel movement regularity were reported in 38% and 61% of patients, respectively
- The physiologic demand of powered exoskeleton-assisted walking was 3.3 metabolic equivalents...comparable to self-reported exertion of an able-bodied individual walking at 3 mph
- **No serious adverse events occurred**

Conclusion: “Powered exoskeletons allow patients with SCI to safely ambulate in real-world settings at a physical activity intensity conducive to prolong use and known to yield health benefits”

Exoskeleton Medical Benefits

“Assuming regular exoskeleton use sufficient to yield the aforementioned health benefits, it is likely that the initial expense of providing personal exoskeletons for home use to individuals with SCI (typically \$70,000–\$100,000) may be offset by savings attributable to prevention of physical maladies and associated costs in SCI patients”



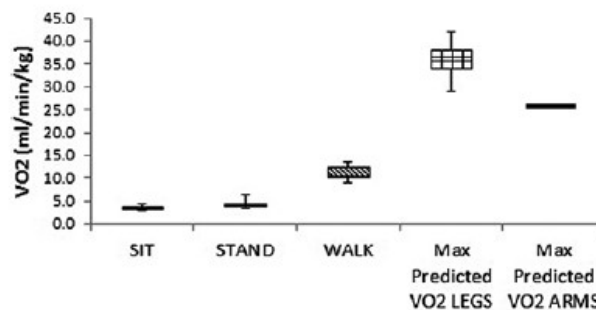
Exoskeleton Medical Benefits

JRRD

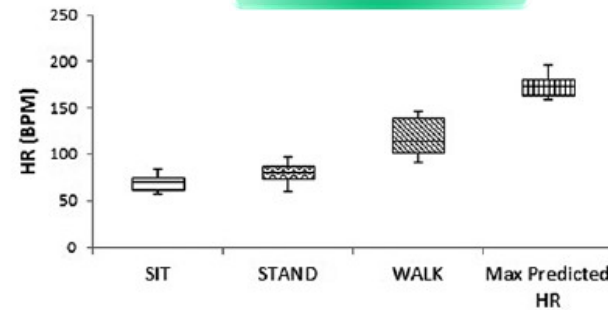
Heart rate and oxygen demand of powered exoskeleton-assisted walking in persons with paraplegia

Measurements During Various Activities

VO2



Heart Rate



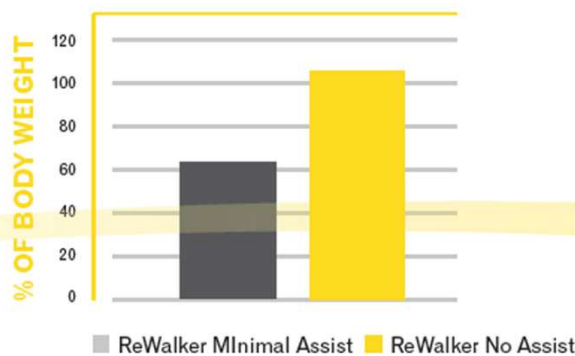
“Although the results of this study did not address long-term changes in oxygen demand with habitual use, routine use of the device to increase activity energy expenditure would be expected to have positive cardiopulmonary and metabolic benefits.”

Exoskeleton Medical Benefits

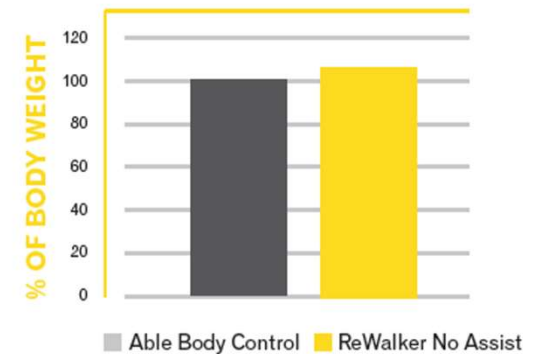
Vertical ground reaction forces on the ReWalkers' lower limbs increased with greater walking speeds and were similar to the able-bodied control group.



The no-assist ReWalker group walked at faster speeds and averaged higher peak vertical ground reaction forces as a percent of body weight than the minimal assist group (107% vs. 63%).



The no-assist ReWalker group averaged similar peak vertical ground reaction forces as a percent of body weight to the able-bodied control group (107% vs. 100%).



Conclusion: Powered exoskeleton-assisted walking in persons with motor-complete SCI generated vGRF similar in magnitude and pattern to that of able-bodied walking.

Meet The ReWalkers



Meet The ReWalkers

