More-Is-More?: Aligning Expectations for 21\textsuperscript{st} Century Rehabilitation

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International Seating Symposium 2013
Nashville, TN

Objectives

- Identify strategies to align expectations between patients and therapists during post-SCI rehabilitation
- Discuss 3 types of evidence-based rehabilitation technology
- Identify 2 references for each recovery-based intervention: Functional electric stimulation (FES), Locomotor Training (LT), and Whole Body Vibration (WBV).
Special Thanks

- Lester Butt, Ph.D., ABPP; Toby Huston, PhD – Craig Hospital
- Charles Bombardier, Ph.D., ABPP – Motivational Interviewing presentation at Congress Meeting (ASCIP) 2009- University of Washington/Harborview Hospital
- Candy Tefertiller, PT, NCS, ATP-Craig Hospital

Is there a need to align expectations?

“...patients may be increasingly expecting to walk because of the current media and scientific attention given to neural plasticity, locomotor training and ‘recovery’ programs. Such media exposure may heighten the expectations of walking in patients with serious motor complete SCI.”

Harvey et al, 2012

- Therapists - significantly more accurate at predicting walking at 1 year than patients.
- “…patients who primarily focus on walking after SCI, but never attain it, have a lower quality of life, higher dependence and more depression at 1 year after SCI than their counterparts who master independence from a seated position.”

Harvey et al, 2012

- “Effective therapy following spinal cord injury (SCI) relies on a working partnership between patients and physiotherapists …It is therefore potentially problematic … if patients and physiotherapists have markedly different expectations …about the likely outcomes for the fundamental motor skill of walking. ….For example, if patients expect to walk, they may be unwilling to learn wheelchair and transfer skills…”
So, how are you tempted to respond?

- “When are we going to work on my legs? I want to walk.”
- “I only want to do recovery therapy.”
- “I won’t need a wheelchair. We need to work on walking.”

Confrontational; ‘Expert’-driven

- “You’ve got to be kidding! Don’t you know you’re paralyzed?”
- “Of course you want to walk. Everyone here does, but you need to learn to push this wheelchair.”

Avoidant; Dismissive

- “We’ll have to wait and see.”
- “We can talk about that later.”
- “Have you talked to your doctor about that?”
- “I don’t think that’s going to happen anytime soon. You need to focus on today.”
- [Nod, smile] “So, let’s see that transfer.”
Denial is not the enemy

- Denial can be a protective component of coping
- Confronting denial only results in conflict
- Maintenance of hope is pivotal for relationship building and continued motivation within rehabilitation
- Relationship and alliance allows aligning of expectations

“The therapeutic relationship, irrespective of one’s discipline, is a partnership with respect for your client’s autonomy.”
~ Lester Butt, PhD

Motivational Interviewing (MI)

... collaborative, person-centered form of guiding to elicit and strengthen motivation for change.

Respectful conversation focused on building rapport and instituting self-directed change
Suggestions based on MI

- **Use open-ended questions/statements to start conversation**
  - “All this can seem really overwhelming.”
  - “How are you holding up through all this change?”

- **Withhold judgment or confrontation**
  - Accept them where they are, denial included

- **Really listen to the patients goals and reflect them back in conversation**
  - “Getting up on your feet is really important for you right now.”
  - “You would really like to be as independent as possible when you leave here.”

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“...upright movement permeates American aphorisms...”

- Stand up for yourself
- Put your best foot forward
- You stood me up
- One step at a time
- Baby steps
- Put one foot in front of the other
- Step up!
- Take a stand

Indicate progress or independence

“When Walking Fails” by Lisa Iezzoni, MD
Suggestions based on MI

- Allow patients to interpret, problem-solve and make decisions regarding their situation
  - Avoid “you should”, “you need to”
  - “In addition to walking, what else do you see yourself needing to do when you go home?”
  - “Let’s think through your day at home. How much help do you think you’d need right now? Can we do anything to decrease that amount?”
  - [‘Bad’ decision made] “I certainly understand your position on this. Is it OK if we go through the pros and cons of your decision now?”

- Put the patient in control

“People are generally better persuaded by the reasons which they themselves discovered than by those which have come into the minds of others.”

Paschal’s Pensees (17th Century)

“As I hear myself talk, I learn what I believe.”

~Bem Self-Perception Theory
When are we going to work on my legs? I want to walk.

“I really hope you do. We hope for the same goals that you have. Unfortunately, right now, no one in the world knows how to fix muscles that aren’t working on their own, but you will be the first one to notice any changes in your muscles or movements. It’s your job to let me know when/if that happens, and I will work my hardest to help you get stronger. For now, we will work on strengthening and preparing the rest of your body by …”

I only want to do recovery therapy

“Tell me more about what that means to you.”

“The parts of your rehab program that are preparing you for walking in the future are… FES for fitness, mat skills for trunk control and upper body coordination/strength, wheelchair skills for endurance/aerobic training, ROM of legs to maintain flexibility…[incorporate patient’s comments/goals as well]”
Summary

- Accept the patient where they are, denial included.
- Address patients goals – sincerely listen and reflect them back to the patient
- Place the patient in charge of identifying new neural recovery
- Address “wheelchair level” activities as a foundation for potential future ambulation
- Familiarize yourself with current evidence and maximize “activity-based” therapies in their program as your facility/resources allow

Time-out:
Brainstorming
Discussion
Dialogue
Activity/Recovery-based Therapy

What is it?

● “The goal of this approach is to achieve activation of the neurological levels located both above and below the injury level using rehabilitation therapies in order to facilitate recovery after a debilitating neurological incident.” [Sadowsky 2009]

● Activity or exercise that promotes activation of the nervous system
Activity/Recovery-based Therapy

Evidence:

- CNS reorganization occurs in the brain as well as above and below the lesion in the cord itself spontaneously and in response to activity [Lynskey 2008, Kleim 2008, Behrman 2006, Wolpaw 2007]

- Exercise → spinal Brain-derived Neurotrophic Factor (BDNF) levels → neuronal survival, plasticity (Brown 2011)

Functional Electric Stimulation (FES)

- Neuromuscular electrical stimulation (NMES) handheld units for individual muscle training or eliciting flexor withdrawal during gait
Functional Electric Stimulation (FES)

- FES Foot drop system with/without thigh component during gait training (*AIS C-D)
- Stimulate anterior tibialis, gastrocnemius, and/or hamstring/quadriiceps during stance or swing

* Craig Hospital inpatient; outpatient self-pay programs
RT300 FES ergometer (*AIS A-C)

RT600 Elliptical Trainer (*AIS C-D)
FES Effects

- Sensory input - BDNF expression→axon regeneration [Lynskey 2008]
- Spasticity reduction (Epidural Spinal Cord Stimulation) [Lynskey 2008]
- Active muscle contraction - ↑muscle size, strength, composition, capillary number*
- Conditioning: ↑oxygen uptake (2x), ↑ventilation rate (3x), ↑heart rate (5/min)*; ↑peak VO₂
- Metabolic: ↑Lean muscle mass, ↓adipose tissue, ↓blood glucose, insulin levels*
- ”Electrical stimulation…promotes recovery and plasticity after neural injury” [Lynskey 2008]

* results as quoted by Martin et al 2012

Locomotor Training (LT) (*AIS C-D)

Types:
- Body-weight supported treadmill training (BWSTT)
  - Robotic
  - Manual facilitation
- Over ground training

Craig Hospital inpatient program; AIS A-B may participate as self-pay outpatients only
Locomotor Training (LT) (*AIS C-D)

Evidence:
- Early locomotor exercise improves locomotor function and decreases lesion size in rats [Brown 2011]
- Various locomotor training approaches result in increase in function
- Few RCTs – BWSTT and over ground training provide similar therapeutic results
Locomotor Training (LT)

- **BWSTT** (*AIS C-D*)
  - Task-Specific practice
  - Allows earlier gait training in AIS C patients
  - Helps to optimize gait mechanics and stepping cadence with relatively less facilitation and fewer staff than over ground training
  - Barbeau 2003 – when using UE assistive device, EMG activity in LEs decreased during gait

* Craig Hospital inpatient, outpatient and outpt self-pay programs

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Robotic Exoskeleton

- **Ekso Bionics** (*AIS A-D*)
  - Allows sit<>stand and ambulation on level and slightly inclined surfaces with an assistive device
  - Newly released ProStep feature – weight shift-operated step

* Craig Hospital outpatient self-pay program
Whole Body Vibration

- Vertically oscillating platform, adjustable frequency and amplitude; standing, sitting, direct UE weight bearing (*AIS A-D)

Evidence:

☒ 35-45 Hz @ 4 mm amplitude → greatest increases in EMG activity in UE and LE muscles (greater change in LE vs. UE) in able-bodied subjects [Hazell et al 2007]

☒ Decrease in quadriceps spasticity after 12 sessions at 50 Hz, results persist for up to 8 days [Ness 2009]

☒ Increased femoral artery blood flow [Herrero et al 2010]
How do we incorporate ABT into rehab?

- Inpatient
  - Early mobilization/activity
  - Functional training
  - Fitness
  - FES cycling
  - Locomotor Training (motor incomplete)

How do we incorporate ABT into rehab?

- Outpatient
  - 3rd party payer – Functional goals, optimizing independence
  - Private Pay - emphasizing health & wellness - fitness programs, FES classes, Locomotor training

- Craig Hospital PEAK Center -
  http://www.craighospital.org/Departments/Peak-Center/
Thank You!

- Questions??
- Further Discussion