The Road To Recovery: Bouncing Back From Injury with Rehabilitation
PHYSIATRY

From Greek *physicos* (physical) and *iatreia* (art of healing)

Physical Medicine and Rehabilitation
Physiatry

- Physical Modalities date to ancient times
- Modern medical specialty began during WW I
- Coalesced during and after WW II and the polio epidemic
  - Addressing the need of injured veterans and polio survivors
- Physiatry formally recognized as a medical specialty in 1947
- Today, over 7000 board-certified physiatrists nationwide
Physiatry: Training

- 4 – year medical school
- Residency programs
  - 81 accredited programs in the US
  - 4 years Training
- Fellowships
  - Programs allow for sub-specialization
  - Spinal cord, sports medicine, pain, pediatrics
Conditions Treated

- Stroke
- Traumatic Brain Injury
- Spinal Cord Injury
- Nerve injury
- Amputation
- Multiple Sclerosis
- Burns
- Degenerative Arthritis
- Neurologic Disease
- Rheumatoid Arthritis
- Total Joint Replacement
- Trauma
- Cancer
- Vascular Disease
- Cardiac Disease
- Pulmonary Disease
Physiatry: Improving Function

- Goal is prevention, diagnosis, and treatment of disorders that may produce temporary or permanent impairment
- Restoration of function
- Maximize quality of life
- “Whole-istic” approach (the whole patient, not just the body part): patient centered
Physiatric Approach to care

- **Examples**
  - **Traumatic brain injury**: improve cognitive and social functioning, return to work skills
  - **Acute disc herniation**: Maximize function and decrease pain with injection techniques, physical therapy, while avoiding surgical intervention
  - **Post-hip replacement**: decrease pain and improve functional gait/activities
  - **Sprained ankle**: strengthen and improve proprioception
Physiatric Approach to Care

- **Examples**
  - **Post MI**: optimize cardiac function
  - **Spinal cord injury**: manage spasticity and assess need for appropriate adaptive equipment
  - **Post-Stroke**: increase mobility and range of motion in patients with spasticity, use focal treatment with botulinum toxin in conjunction with physical therapy
BACKGROUND
Strengthening

- Initial catabolic response
- Increase muscle size/cross section
- New myofibril proteins
- Muscle hypertrophy
Muscle Hypertrophy

- Dominant mechanism for strength and long term training
- Improvement in strength starts quickly with a strengthening program (often before hypertrophy can occur)
Muscle Hypertrophy

- Changes are secondary to:
  - Neural Adaptations: Learning more efficient motor unit recruitment from:
    a) Coordination
    b) Learning
    c) Activation of Prime Movers
Response to Aerobic Exercise

Def:

Rhythmic, prolonged Activity @ a level sufficient to provide a beneficial training stimulus to the Cardiopulmonary and Muscular systems.
Response to Aerobic Exercise

- Increased capillary density to muscles (for fuel transfer)
- Increased Muscle Size
- Increased Enzymes
- Increased Utilization of Fat as a energy source for muscular activity
Manual Muscle Testing

- 5 - Normal Strength
- 4 – Muscle is weak but moves the joint against a combination of Gravity and some resistance
- 3 – Muscle can move the joint fully against gravity
- 2 – Muscle moves the joint when gravity is eliminated
- 1 – A flicker of movement is seen or felt in the muscle
- 0 – No movement
Scandinavian Study

- 1985
- 30 healthy Males:
  - Bed rest except for bathroom privileges
    - 30 days
  - Muscle biopsies at initiation and completion
  - Results: 40% muscle loss
Recovery

4 days recovery for every 1 day of immobility
PROPROCPTION

- Somatic Sense: Collects sensory information from the body
  - Pain
  - Thermoreceptive
  - Mechanoreceptive

- Contrast to: Special senses:
  - Sight
  - Hearing
  - Taste
  - Touch
  - Smell
  - Vestibular
PROPRIOCEPTIVE

- **Mechanoreceptive**
  - Maintain the stability and orientation of the body to its surroundings

- **Position Sense**
  - Static: Appreciation of Different Body Parts with respect to one another
  - Dynamic: Neuromuscular systems feedback about the presence and rate of movement
REHABILITATION
Rehabilitation: The Team

- Physical Therapy
  - Mobility, Balance, Transfers
- Occupational Therapy
  - ADL’s, Upper Body Strengthening, ROM
- Speech Language Pathology
  - Communication and Cognition
- Rehabilitation Nursing
- Psychologist
- Recreational Therapist
- Physician
Rehabilitation Levels

- Inpatient Rehabilitation Facility (Acute)
- Sub-Acute Rehabilitation
- Home Health Associations
- Out-Patient
Rehabilitation:

- **Sub-Acute**
  - 1-1.5 hours daily
  - 1 skilled therapy
  - Medical monitoring weekly
  - Lower Nursing: Patient ratio
  - Slower Paced

- **Inpatient Rehab: Acute**
  - 3 hours therapy daily
  - PT, OT, SLP
  - Daily Medical monitoring
  - Specialty Nursing
  - Psychology
  - Recreational Therapy
  - More Aggressive
Functional Assessment

- Symptoms
  - Neurological
  - Respiratory
  - Cardiovascular
  - Musculoskeletal

- Impairments
  - Communication
  - Eating
  - Grooming
  - Toileting
  - Dressing
  - Mobility
  - Ambulation

"On the up side, you're the healthiest patient on ICU."
Assessment

- Psychological
- Social
- Vocational
- Family
- Lifestyle issues
- Motor vehicle use
Prevention

- Medical Issues
  - Hypertension
  - Diabetes
  - Hypercholesterolemia
  - Deep Vein Thrombosis (DVT)
  - Ileus
  - Decubitus Ulcer (Bed Sores)
  - Infection
Barriers to Discharge

- **Level of Assistance**
  - Dependent: 100%
  - Maximum Assist: 75%
  - Moderate Assist: 50%
  - Minimum Assist: 25%
  - Minimum Contact Guard Assist
  - Independent

- **Bowel and Bladder Status**
Advanced Diagnosis and treatment

- Special diagnostic tests
  - EMG, nerve conduction studies

- Sample Treatment options
  - Therapeutic exercise
  - Heat and cold therapy
  - Manual medicine
  - Biofeedback
  - Physical/occupational/speech therapy
  - Prescription medicine
  - Injection techniques
Stroke Statistics

- 600,000 strokes annually in U.S.
- Third leading cause of death in U.S.
- Leading cause of adult disability—4.4M have disabilities—25-50% partially/totally dependent in routine activities
What Is a Stroke?

A disturbance of blood flow to the brain that causes damage to the brain

Either concentrated in one area of the brain or more widespread

May cause temporary or permanent paralysis

May cause problems with speech, swallowing, and other functions

Brain damage may be temporary or permanent
Stroke Rehabilitation

- **Elements of Stroke Rehabilitation**
  - Prevent complications
  - Reduce effects of damage to the nervous system
  - Learn techniques to offset or adapt to any physical disabilities
  - Maintain long-term function
  - Resume family and community life
Goals of Rehabilitation

- Restore patient to maximum mobility
- Help patient regain functional independence and confidence
- Teach patient and family how to prevent future strokes
- Help patient adjust psychologically and socially
Allied Team Members

- Rehab Nurses
- Recreational Therapy
- Speech Language Pathology
- Medical Social Services and Case management
- Psychologist
- PT’s
- OT’s
Stroke

Rehabilitation During *Initial* Hospitalization
Stroke

- 41 yo Female
- Acute onset of headache, left side weakness
- History of hypertension (non-compliant on medication), Smoking 1 ppd, estrogen therapy.
Stroke

- Initial Evaluation:
- CT Scan: Right Middle Cerebral Artery Stroke
- Exam
  - Hemiplegia
  - Left Neglect
  - Left Agnosia
  - Spasticity
**Early Management**

- **Blood Pressure management**
- **Intracranial Pressure Bolt placement:**
  - Pressure was elevated and treated in the ICU with:
    - *Mannitol (sugar solution)*
    - *Concentrated Salt Solution (3%, normal salt solution is 0.9%)*
- **Serial CT scans and Intracranial pressure monitoring**
- **Nutrition support: Feeding tube placed.**
Stroke

- Continued elevated Intracranial pressure
- Treatment surgically: Hemicraniectomy
Additional Acute Intervention

Tracheostomy Tube placement (Breathing tube in the neck)

Gastrostomy tube
Stroke

- **Early Movement (Mobilization)**
  - Within 12-24 hours, if possible
  - Daily active/passive exercises
  - Progressively increasing activity
  - Encouragement to resume self-care and socialization
Managing Problems

- Swallowing difficulties: dysphagia (dis-fage-EE’-a)
- Pressure sores
- Bladder or bowel problems
- Falls
REHABILITATION AFTER HOSPITALIZATION
Stroke

- Screening for Rehabilitation
- Medicare Regulations
  - Identify patients who will benefit
  - Identify problems needing treatment
  - Determine appropriate treatment setting as soon as possible
    - Inpatient rehab., Sub-acute rehab
Stroke

- Admission to a Rehabilitation Program
- At least moderately stable medically
- Able to learn
- Physical endurance sufficient to:– sit supported for at least 1 hour per day – participate in rehabilitation
Problems Suggestive of Poor Rehabilitation Outcomes

- Severe functional/motor/cognitive problems
- Severe visual/spatial problems
- Less than full consciousness
Interdisciplinary Rehabilitation
Disabilities in 2 or more of the following

- Mobility
- Pain
- Incontinence
- Daily activities

- Swallowing
- Thinking
- Communication
- Emotions
- Setting Rehabilitation Goals
- Goals should be:
  - Both short- and long-term
- Realistic  Agreed upon by all parties
- Specific about roles, tasks, and activities
• 41 yo female
  • Rehabilitation interventions
    • ROM
    • Skin Protection
    • Out of Bed
    • Nutrition – supplemental tube feeds
    • Wound Management (craniectomy site)
    • Neurologic status
TYPICAL TREATMENT ACTIVITIES
Movement/Mobility Problems

- Techniques to regain motor control
- Compensatory training to improve function
- Adaptive devices/orthotics
Orthotics
Exercise

- Functionally based
  - Closed chain
  - Open chain
  - Eccentric/concentric
Mobility
Exercise

- Repetition
- Neuroplasticity
- Restoring Mechanics
- Electrical Stimulation
  - Bioness. Walk-aid
- Constraint induced
Speech & Language Problems
- Usually treated by a speech pathologist
- Specific goals for different disorders
- May use nonverbal communication
- May use assistive devices
  - Dynavox, Computers
Hypothetical Recovery Paths of Cognitive Functioning

- Preinjury Functioning
- Brief PTA
- Mild TBI: Anterograde Memory Problems
- Moderate TBI: Anterograde Memory Problems
- Severe TBI: Anterograde Memory Problems

Figure 3
PM&R: Adding Quality to Life

- All age groups
- Treatment/rehabilitation for all physical/motor disabilities
- Personal/school/job-related issues
- Re-entry into family/community