Achieving Physical Rehabilitation Goals Through Aquatic Therapy

Rehabilitation Institute of Michigan
Sue Boeve, Sr. CTRS
Rehabilitation Institute of Michigan
RIM Foundation SportsAbility Adaptive Sports Director

Aquatic Therapy & Rehab Industry Certified
Burdenko Method Therapist Certified
Certified Pool Operator
Arthritis Aquatics Certified
Risk Awareness and Safety Training Aquatics Certified
Certified Disability Sports Specialist
Presentation Objectives

1. Describe a minimum of 5 benefits related to water exercise and aquatic therapy for patients engaged in physical rehabilitation.

2. Define Aquatic Therapy

3. Review resources information including: current research, websites, certifications, organizations related to aquatic therapy treatment in physical rehabilitation.
Healthy Swimming Fast Facts (U.S. Census bureau 2016)

- Swimming is the 4th most popular recreational activity overall in the U.S.
- Swimming is the most popular recreational activity for children and teens (7-17).
Aquatic Therapy Defined

- Defined by the American Medical Association in 1995 in an attempt to distinguish the therapeutic procedure (aquatic therapy) from its passive modality cousins (hydrotherapy, Hubbard tank, whirlpool).
- It’s defined in two ways:
  1. By its intent (aquatic exercise).
  2. By its nature (a procedure; not a modality).
Aquatic Therapy Defined

• “Purposeful, therapeutic exercise in the water utilizing a variety of positions including supine, vertical, and reclined positions.” Cirullo

• There is no such thing as an “aquatic therapist”. You are a TR, OT, PT, etc. who specializes in aquatics or aquatic therapy. Your license, registration, certification defines your field.

• CPT codes for aquatic therapy not restricted to a single profession.
Evolution of Aquatic Therapy

- Using water as a therapeutic tool predates all other modalities of physical medicine (DeVierville, 2004).
- It extends back to ancient Mesopotamian, Egyptian, Indian and Chinese civilizations who used water for soothing and healing purposes.
Aquatic Therapy Research and Trends

• www.theaquatictherapist.com
• www.aquaticnet.com
• www.atri.org
Aquatic Therapy Research and Trends

- Aquatic Therapy's New Role in Emerging Senior Living Trends (www.info.seniorlivingnews.com) 2017
- Research is trending toward interventions that focus not only on the pool but on approaches that combine healthy eating, land based exercise, water therapy and lifestyle changes. Kaenz 2017
- 2017 abstracts include underwater gait analysis for Parkinson’s which has implications for other neuro diagnosis; submersion research for SCI and pediatric research for a variety of conditions.
The Magic of Water....

- **Assistance** – Muscles that have to strive against gravity are released from the task.

- **Support** – The body can relax and stretch more easily, with less chance of injury.

- **Resistance** – Water provides resistance in every direction and with every kind of movement.
Principles/Physics of Water

- Buoyancy (Archimedes' Principle)
- Hydrostatic Pressure (Pascal’s Law)
- Viscosity
- Turbulence/Hydrodynamic Forces (Bernoulli Effect; Street of Von Karman)
Principles/Physics of Water

• Relative Density (Specific Gravity)

• Rotational Forces (Bourgier’s Theorem; Metacentric Effect)

• Transfer of Thermal Energy

• Refraction and Reflection
Benefits of Aquatic Therapy

- Improve circulation
- Improve abnormal muscle tone/tension
- Decrease pain
- Improve range of motion
- Use limited weight bearing
- Improve strength
- Improve functional mobility
Benefits of Aquatic Therapy

- Improve sensation
- Improve perception/spatial awareness
- Improve relaxation
- Improve morale
- Improve self-esteem
- Improve overall fitness
- Provide recreational opportunity
Aquatic Therapy Can Benefit Clients with:

- Spinal Cord Injury
- Traumatic Brain Injury
- Stroke
- Amputation
- Orthopedic injury/surgery
- Developmental disability
- Cerebral Palsy
- Multiple Sclerosis
- Bariatric Issues
- Arthritis/Fibromyalgia
Types of Therapy in the Pool

- Aquatic Exercise
- Bad Ragaz
- AiChi
- BackHab
- Burdenko Method
- Feldenkrais
- Halliwick
- PNF
- Watsu
- Adapted Aquatics
In Addition to Therapy On Site RIM Therapists Can Assist with:

- Transition from the hospital/clinic pool to the community (discharge planning).
- Information on pools in the area including temperatures, entry, locker rooms, lifeguards.
- Home pool evaluations and recommendations.
In Addition to Therapy On Site RIM Therapists Can Assist with:

- Recreational water sports (water skiing, kayaking, boating, fishing) – RIM SportsAbility offers these at no charge to participants.
- Travel/vacation plans involving swimming/snorkeling/scuba (many adaptive opportunities!)
- Caregiver training.
Aquatic Certifications/Method Training

- **Life Saving (Certification)**
  - Focuses on ability to monitor and rescue in emergency situations in a variety of water settings. Training: Local Red Cross, YMCA, Colleges

- **Water Safety Instructor, WSI (Certification)**
  - Focuses on ability to teach swimming including all standard strokes and diving. Training: Local Red Cross, YMCA, Colleges

- **Risk Awareness and Safety Training, RAST (Certification)**
  - Standards of aquatic risk management and emergency responses specific to aquatic therapy and rehabilitation setting (CPR pre-requisite). Training: ATRI conference sites – www.atri.org
Aquatic Certifications/Method Training

- Aquatic Therapy and Rehab Industry Certification (ATRIC)
  - Pre-requisites include minimum of 30 course hours, minimum of 200 teaching hours, RAST or similar water safety certification, CPR, successful completion of board exam.
  - Information: ATRI web site – [www.atri.org](http://www.atri.org)

- Watsu (Certified Water Practitioner)
  - Pre-requisites include 100 hours of training (Watsu 1 and 2), 20 hours of practice sessions, 8 course credit hours of supervision; current CPR; 10 sessions with a professional Watsu Practitioner.
  - Information: [www.waba.edu](http://www.waba.edu)
Aquatic Certifications/Method Training

• Halliwick (Rhine System)
  - Training includes philosophy, 10 point concept and hands on water training. Information: www.halliwick.net

- Arthritis Aquatics (Certification)
  - 2 day workshop; Information: www.arthritis.org

- Burdenko Method (Certification)
  - Intensive training – 3 day course for Levels 1-3; 3 day course for Levels 4-6; Full week in New York under E. Burdenko for “Master Burdenko Instructor Certification”. Information: www.burdenko.com

- Feldenkrais
  - 300 hours of training to become a Feldenkrais practitioner. Additional training for aquatics component developed by Debbie Ashton, BS, MA.
  - Information: www.feldenkrais.com lists training sites.
Resources for Equipment:

Kieffer and Associates (Equipment)
www.kiefer.com; 800-323-4071

Sprint Rothhammer
www.sprintaquatics.com; 800-235-2156

Aquatic Therapy & Rehab Institute (ATRI)
www.atri.org

Access to Recreation (Beach chair, etc.)
www.accesstr.com; 800-634-4351

Aquatic Resource Network (ARN)
www.aquaticnet.com

Water Wear (pool clothing and shoes)
800-321-7848
For questions or more information about RIM aquatic therapy….

- Sue Boeve
(248) 305-7386
sboeve@dmc.org
Dual Diagnosis: TBI & SCI
Rehabilitation Institute of Michigan
Objectives

• How Often does TBI occur in SCI?
• Does TBI Impact Rehabilitation Outcomes in SCI?
• What Are The Long-Term Consequences of SCI with TBI?
Overview

• Spinal Cord Injury
  – 282,000 persons estimated living with SCI in 2016
  – Annual incidence of SCI: 54 cases per million
    • 17,000 new SCI cases each year.
    • Does not include fatal accidents

National Spinal Cord Injury Statistical Center, 2016
Demographics since 2010

SCI

- **Age**: Average 42, formerly 29
  - bimodal distribution
- **Gender**: 80% males
- **Ethnicity**: African-Americans and Hispanic males are over-represented in SCI population.
- **Marital Status**: More likely to be single
- **Education/SES**: More likely to be lower than average

National Spinal Cord Injury Statistical Center, 2016
# Causes

since 2010

## SCI Causes

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>MVA</td>
<td>38%</td>
</tr>
<tr>
<td>Falls</td>
<td>30.5%</td>
</tr>
<tr>
<td>Violence</td>
<td>13.5% (88% GSW)</td>
</tr>
<tr>
<td>Sports</td>
<td>9% (65% diving)</td>
</tr>
<tr>
<td>Medical/surgical</td>
<td>5%</td>
</tr>
<tr>
<td>Other</td>
<td>4%</td>
</tr>
</tbody>
</table>

National Spinal Cord Injury Statistical Center, 2016
Classification

SCI: Neurologic level and extent of lesion

The most vulnerable levels of injury are C5-C7, T4-7 & T10-L2.

National Spinal Cord Injury Statistical Center, 2016
Overview

• Traumatic Brain Injury
  – Incidence: (2013 CDC) 2.8 Million TBI-related ED visits, hospitalizations, deaths occurred in the USA.
  – TBI diagnosed in more than 282,000 hospitalizations; 2.5 million ED visits
  – Rates of TBI ED visits increased by 50% (2007-2013); hospitalization rates increased by 11%; deaths decreased by 7%
Overview

• TBI Causes in 2013
  – Falls (47%)
  – Struck by or Striking an Object (15%)
  – MVA (14%)

• Risk Factors
  – Age: >65 years and <4 years
<table>
<thead>
<tr>
<th>TBI Severity</th>
<th>LOC – Hours</th>
<th>PTA – Days</th>
<th>GCS</th>
<th>CT/MRI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>≤ 0.5</td>
<td>≤ 1</td>
<td>13-15</td>
<td>Normal</td>
</tr>
<tr>
<td>Mild Complicated</td>
<td>≤ 0.5</td>
<td>≤ 1</td>
<td>13-15</td>
<td>Abnormal</td>
</tr>
<tr>
<td>Moderate</td>
<td>&gt; 0.5 to &lt; 24</td>
<td>&gt; 1 to &lt; 7</td>
<td>9-12</td>
<td>Abnormal</td>
</tr>
<tr>
<td>Severe</td>
<td>≥ 24</td>
<td>≥ 7</td>
<td>3-8</td>
<td>Abnormal</td>
</tr>
</tbody>
</table>
INCIDENCE OF SCI with TBI

• 16 to 59% of SCI patients have co-occurring TBI. (Macciocchi et al. 2008).
• 50% to 80% of TBI classified as MILD.
• Mode of Injury a Factor
  – Traumatic SCI with co-occurring TBI involved in MVA ≥ 50% of all cases.
  – Violence
  – Sporting Injury
  – Falls/Flying Objects
What is the Effect of Co-Occurring TBI on the Functional Outcomes of Individuals with SCI?

  - Compared TBI/SCI with SCI
  - 82 persons over period of 1997-2000
  - 41 with TBI/SCI (21 mild, 11 moderate, 9 severe)
    - 51% had abnormal brain imaging.
  - 41 with SCI only
  - All similar to level of injury, education, and admission Motor FIM score.
  - Evaluated Admission, Discharge and Change scores on Motor and Cognitive FIM scores.
What is the Effect of Co-Occurring TBI on the Functional Outcomes of Individuals with SCI?

- Admission Motor FIM scores equivalent between Groups.
- TBI/SCI group lower Cognitive FIM at admission and discharge, but Cognitive FIM change not different between groups.
- TBI/SCI smaller FIM Motor change.
- TBI severity did not influence FIM Motor change.
- TBI severity (severe) had greater Cognitive FIM change.
What is the Effect of Co-Occurring TBI on the Functional Outcomes of Individuals with SCI?

• Main Outcomes:
  – TBI/SCI: smaller functional gains in generally equivalent time of acute rehabilitation.
  – TBI/SCI: disadvantaged compared to SCI in terms of cognitive skills
  – TBI severity did not impact functional motor change.
  – Brain Injuries seem to limit functional gains.
Level of SCI and Severity of TBI

- Macciocchi, Seel, Warshowsky & Thompson (2012)
- Prospective study (n=189) of 16 to 59 year olds admitted to acute SCI rehabilitation.
- Level of SCI: Tetraplegia, Paraplegia
- Severity of TBI: No TBI, Mild, Mild Complicated, Moderate, Severe
- Evaluated: FIM Motor and Cognitive scores (admission and discharge); Days to Admission Acute Rehab, LOS Acute Rehab, Neuropsychological measures (Attention, Working memory, Processing Speed, Learning and Memory).
Level of SCI and Severity of TBI

- Macciocchi, Seel, Warshowsky & Thompson (2012)
- No Demographic differences between SCI Severity.
- Most were involved in automobile crashes.
- No differences for TBI risk factors.
- No differences in TBI Severity.
Level of SCI and Severity of TBI

• **OUTCOMES**
  – Tetraplegia
    • TBI not related to time from injury to acute rehab.
    • TBI not related to Acute Rehab LOS
    • TBI not related to FIM Motor Change scores
    • TBI was related to admission FIM Comprehension and Problem Solving scores
    • TBI related to admission/discharge FIM Memory scores.
Level of SCI and Severity of TBI

OUTCOMES

- Paraplegia
  - TBI was related to time from injury to acute rehab.
  - TBI was related to acute rehab LOS
  - TBI was related to FIM Motor Change scores
Level of SCI and Severity of TBI

• Macciocchi, Seel, Warshowsky & Thompson (2012)

• Paraplegia and Severe TBI (compared to no TBI)
  – Lower discharge functioning in almost all FIM Motor measures.
  – Had Longer Acute Rehabilitation Stays

• Tetraplegia and Severe TBI (compared to no TBI)
  – Not related to acute rehabilitation motor outcomes.
  – Moderate and severe TBI affected functional cognitive and neuropsychological performance.
Long-Term Functional Outcomes

• Bombarier, Lee, Tan, Barber & Hoffman (2106)

• Evaluated Functional One-Year Outcomes
  – 105 SCI (tetraplegia -58% and paraplegia patients).
  – Varying degree of TBI (9% mild complicated or worse) or no TBI (67%).
  – Outcome data collected from structured telephone interview.
Long-Term Functional Outcomes

• Bombarier, Lee, Tan, Barber & Hoffman (2016)

• Comparing TBI/SCI with SCI
  – Equivalent in terms:
    • Divorce
    • Employment Rates
    • Satisfaction with Life
    • Current Depression
    • Current Alcohol Use
    • Past-Year history of Depression
    • Past-Year histories of: UTI, Pressure Ulcers, Days Hospitalized.
Long-Term Functional Outcomes

• Nott, Baguley, Heriseanu, Weber, Middleton, Meares, Batchelor, Jones, Boyle & Chilko (2014)

• Evaluated Community Re-Integration an Average of 3.6 Years post Acute Rehab Discharge in TBI/SCI, SCI only, and TBI only Patients (n=30 in each group).
Long-Term Functional Outcomes

• Nott, Baguley, Heriseanu, Weber, Middleton, Meares, Batchelor, Jones, Boyle & Chilko (2014)

• OUTCOMES
  – Length of Acute Rehab longer for TBI/SCI and SCI patients.
  – TBI/SCI and SCI received more daily care and support.
  – Similar levels of Community Reintegration among all three groups
  – High Level of Productive Engagement in Work, Study, or Volunteer Activities in all groups.
Long-Term Functional Outcomes

• Nott, Baguley, Heriseanu, Weber, Middleton, Meares, Batchelor, Jones, Boyle & Chilko (2014)

• OUTCOMES
  – Fatigue, Pain, Sexual Dysfunction, Depression, Sleep Disturbance frequently reported by all groups.
  – TBI patients reported higher Stress Levels
TBI/SCI Take Away Messages

• Mild TBI/SCI – cognitive deficiencies resolve as typical.
• Longer Acute Rehabilitation Stay Beneficial.
• TBI/SCI *does not* result in Poor Outcomes or hamper Functional Community Reintegration.
DMC
Rehabilitation Institute of Michigan
Managing the Pediatric Burn Patient in the Outpatient Setting

Beth Angst, OTRL
Senior Occupational Therapist
Children’s Hospital of Michigan
Objectives

• To gain a general understanding of the needs of the pediatric burn patient
• To gain ideas of how to support the patient and their family in the outpatient process
Pediatric Burn Injury

Primary Etiology:
- Spill scald
- Immersion scald
- Contact
Pediatric Burn Injury

- Spill scald: Ramen noodles, tea, coffee
- Immersion scald: bath water (sink)
- Contact: curling irons, straightening irons, clothes irons, fireplace doors, firepits

(Think prevention)
Pediatric Burn Injury

Other etiologies:

- Flame
- Chemical
- Abrasion/friction burns

Pedestrians versus Motor vehicle
Pediatric Burn Injury

• Abrasion/friction injuries
  – Usually small areas but deep
  – Extended healing times
    • Increases scarring
  – Often happen over a bony prominence so near joints
    • Increases scarring due to body feeling it needs strength in that area
Pediatric Burn Injury

• Abrasion/friction injuries
  – Can Impact function
    • Jaw/mouth
    • Elbow
    • Wrist
    • Ankle
Pediatric Burn Injury

- Abrasion/friction burns
  - Poor cosmetic results
  - Often accompanied by other injuries
    - Broken bones
    - Bruised areas
    - Internal injuries
    - Head injuries
Pediatric Burn Injury

What should you know in order to help the patient and their family?
Pediatric Burn Injury

Dressings:

• Dressings and how they are managed has direct impact on healing and potential for scarring

• Important to know properties of dressing

• Generally all burn wounds should be kept covered for best healing
Pediatric Burn Injury

- Xeroform Dressing
  - NEVER pull it off
  - Will adhere to wound until healed
Pediatric Burn Injury

• Xeroform Dressing
  – Can bathe with it on
  – Pat Xeroform dry
  – Apply bacitracin over top
  – Re-wrap
  – Can be left intact for a week or more
Pediatric Burn Injury

- Mepitel AG dressings
  - Has silver in it
  - Has adherent property but doesn’t stick to wound
  - Used in areas of expected combined depth
  - Stays in place 1-2 weeks
  - Cannot get wet
Pediatric Burn Injury

Encourage good diet that is high in protein:

- No water
- No Juice
- No Pop
Pediatric Burn Injury

Encourage Exercises:

• If exercises assigned should be completed 5 times per day
• Generally 1-3 repetitions for 30 second to 1 minute hold
• Can encourage singing songs like ABCs or Twinkle, Twinkle for distraction
Pediatric Burn Injury

Encourage Mobility:

• Our pediatric burn patients are not given mobility devices (Wheelchairs, crutches, or canes)

• Ambulation should be encouraged unless limited by orthopedic injuries
Pediatric Burn Injury

Facilitate home care post healing:

• Lotion and massage to area 2-3 times per day
  – Cocoa butter with vitamin E
  – Shea butter with vitamin E

• Sunscreen (SPF 30 or greater) to protect all burn areas
Pediatric Burn Injury

Encourage follow through with pressure therapy regimen:

- Full Pressure Garments
  - Worn 23 hours per day
  - Provided with 2 sets
    - Wear one, wash one
  - New garments every 3 months due to growth
Pediatric Burn Injury

• Other pressure therapy
  – Silicone gel (worn 8-24 hours+)
  – Tubigrip
Pediatric Burn Injury

Encourage follow through with techniques to address itching:

- Family should have medication for patient
  - Can have multiple medications
- Lotion and massage helps
- Pressure garments help
Pediatric Burn Injury

Be alert to possible “minor” head injury:

• Listen to families if they notice changes in behavior, school performance etc

• Often not detected early

• Refer to Physical Medicine & Rehabilitation Doctor for further evaluation
Pediatric Burn Injury

Call
Children’s Hospital of Michigan
Outpatient Pediatric Burn Clinic
with questions

313-831-3220
Managing the Burn Patient in an Outpatient Setting
Presented by: Linda McKinney, PT Senior Physical Therapist

Rehabilitation Institute of Michigan
Objectives

• Will define the focus for outpatient therapy.
• Will be able to have a general understanding of the importance of garments in the management of the burn patient.
• Will have a general understanding of the importance of wound management in outpatient therapy.
Focus of Outpatient Therapy

Expand on everything that was started in acute care and in inpatient rehabilitation. Including prevention of scar contractures, promoting wound healing, range of motion, strengthening, cardiovascular endurance, garment usage and care, and most importantly patient education.

The patient / client has come a long way but still has a long road to recovery. And it takes a team to make it through.
The Team

- Burn Surgeon
- PMR Physician
- Burn Nurses
- Internal Case Manager
- Neuropsychologist
- Physical Therapist
- Occupational Therapist
- Speech Therapist
- External Case Manager
- Vocational Counselor
- Patient
Initial Evaluation

- Pain
- Range of Motion
- Strength
- Skin Care / Wounds
- Bed Mobility
- Transfers
- W/C Mobility
- Gait and Stair Management
- Patients / Clients Goals
Treatment

• Pain management techniques
• ROM (areas where burns cross a joint)
• Bed mobility
• Transfers
• W/C mobility
• Gait / Stair management
• Garment use and care
• Wound and scar management
• Patient / Client education
Goals of Treatment

- Closure of wounds
- Full ROM (or as close as possible)
- Minimal to no scar contractures or banding
- Good to normal strength
- Independent ambulation
- Independent function of ADL’s
- Maximize cosmesis when healing
- Initiate recreational / work activities again
- Address patient / client goals
Wound Management

- Wounds are usually well on their way to healing, if not already healed, by the time they get to outpatient rehab.
- Continue with the burn clinic treatment plan in conjunction with them. Monitor the wounds while the patient is being seen in therapy.
- Perform any wound care that is needed.
The Dreaded Scar

• May begin in acute care, carries over to inpatient rehab and then continues in outpatient rehab.
• One of the most important aspects of the rehabilitation process for a burn patient.
• Scar is red, raised and itchy. They tend to occur where there is tension on the wound, especially near joints which could cause a contracture.
• Hypertrophic scars - red and raised and stay in the area of the burn.
• Keloid scars - raised and bumpy and go outside the area of burn.
• Webbing and banding – they form a thick web or band and limit movement. Most commonly found on neck, elbow, armpit and fingers.
Scar Management

- Scar healing can take a couple years.
- Keeping the skin lubricated is extremely important.
- Cocoa butter or Shea butter are commonly used and a good choice. Lotions or creams with perfumes and alcohol should not be used. They can irritate and dry out the skin even more.
- Scar massage needs to be done daily, actually a few times a day.
- Itching is often a huge problem while wounds and scars are healing. It is extremely important not to scratch any area that was burned. Also, graft sites should not be scratched either. Putting lotion and patting the area is the best choice.
- Soft tissue mobilization and stretching are necessary to help prevent contractures and stretch the skin so the patient can move better.
Pressure Garments

- Designed specifically for the patient and should be used as soon as most of the wounds are closed.
- Pressure helps produce a thinner more pliable scar.
- Used 23 hours a day for at least 6 months but most patients need them for at least 12-24 months.
- The more they wear them the more optimal the results.
Types of Garments

- Chin straps
- Face masks
- Gloves
- Body suits
- Thigh or knee high garments
- Vest garments
- Lower leg garments
Take Away Tips about Garments

• We need to make sure garments fit correctly and are doing what they are supposed to be doing.
• Garments are needed not only for the injury site but the donor sites as well.
• In order to get garments there can not be any open areas larger than a quarter.
• It takes about 2-3 weeks to fabricate however depending on the insurance authorization time is added to that.
• Need to make sure patient regained weight and that it is stable otherwise garments wont provide enough pressure.
• If they have chronic edema, they will have to wait.
• For neck wounds a watusi collar is a good option.
• Clean with Dawn dish soap and roll up in a towel to dry.
• ALL INSURANCES PAY FOR 2 SETS!!
More Take Away Tips

• Straight Medicaid takes about 3 months.
• HMO Medicaid takes about 3-5 days.
• Require doctors note for all Medicaid.
• All auto go through Wright and Filippis. Barton Carey does measurements at burn clinic but the actual processing of the order goes through Wright and Filippis.
• Every 2-3 months old order new garments.
• Burn clinic at DRH is Monday and Tuesday from 10-3. If patients need something they can be a walk in to clinic.
Thank you for your time and attention

Any Questions???
Definition of “TRAUMA”

• Greek origin meaning “wound”
• Serious injury to the body, as from physical violence or an accident….The Free Dictionary
• An injury (such as a wound) to living tissue caused by an extrinsic agent….Merriam-Webster
A deeply distressing or disturbing experience
Hand Injury Facts

- The hand consists of 27 bones, including the 8 carpal (wrist) bones
- High potential for injury as there are so many structures and means of injury
- 6 General categories
  - 1. Lacerations; can include tendon, nerve, vascular
  - 2. Fractures and dislocations
  - 3. Soft tissue injuries/Amputations; can include degloving injuries with or without fractures
– 4. Infections
– 5. Burns; can include electrical, thermal, chemical
– 6. High pressure injuries, i.e., grease or paint gun injuries
– Other common injuries include:
  • Nail or nailbed injuries/infections
  • Sprains/strains of fingers and wrist
  • Traumatic rupture of tendons/ligaments
  • Crush injuries
  • Nerve injuries or compressions
“Optimal hand function is essential for good quality of life”

- Mechanism of injury is important
  - Clues about structures involved
  - What forces were applied to the hand and in what direction
  - Any special features? ie., bite to hand would have high risk for infection
  - Blunt trauma creates different injuries than penetrating trauma
  - Any history of dislocation or reduction in pt’s past?
• Previous injuries
  – May predispose person to further injury
  – Premorbid hand may not have been 100%
• Occupation?
• Leisure interests/hobbies?
• Dominant hand?
• May need psych assessment/treatment
• Legal ramifications if injured in work place or from a violent situation/crime
• Access to X-rays, often helpful to look at
• GSW Injury approx 1 year post onset
Hand Rehabilitation

• Hand therapists  OT’s and PT’s
  – 85% of CHT’s are OT’s
  – Specialize in injuries to the upper limb to return pt to meaningful participation in daily activities
  – Have strong educational component in psychosocial development/pathology
  – Tailor Rehab program to individual pt needs, consisting of:
    • Splinting
    • Exercises/Activities to increase ROM, strength, FMC
    • Use of modalities
• Activity analysis; activity modification; compensatory techniques
• Joint protection/energy conservation/ADL training
• Sensory re-ed/Desensitization
• Wound care/scar management
• Manual therapy techniques
• Compression therapy techniques/taping tech
• Pain management
• Mirror therapy
• Patient Education post injury/surgery/safety concerns
• FCE’s/Work Conditioning/Work Hardening
OT/PT Evaluation

• Work closely with surgeons and treating physicians to ensure the most optimal therapeutic outcome for the patient, beginning with a referral for therapy

• Use of a client centered approach to assess all areas of function, at pts level:
  – Relevant history re: medical issues, vocational and psychosocial concerns and leisure interests
  – Skin/Connective tissue assessment; wounds, scars, bruises, adhesions, contractures, edema
  – Musculoskeletal system re: ROM, muscle strength, pinch/grip strengths, coordination
  – Sensation and neurological signs, numbness/tingling
Evaluation continued

– Pain assessment/rating scale 0-10
– Functional evaluations of hand ability
– Mechanism of injury
  • Clean vs untidy…can affect overall outcome
  • Crush injury? Vascular injury?
  • Associated injuries to surrounding tissues?
– Wound evaluation: Size, depth, characteristics, signs of infection
– Edema evaluation; circumferential/volumetric
– Splinting needs?
OT/PT Treatment

• Early wound care
  – Careful debridement of dead tissue that comes away easily
  – Whirlpool/soaks
  – Wound dressing: clean, moist, occlusive, (depends on wound)

• Edema control treatment *High priority Tx*
  – Elevation, ROM especially Active, massage, compression wrapping/garments, cold treatments, Estim/TENS
Treatment continued…

• Treatment of stiffness due to immobilization
  – Hand susceptible to permanent loss of ROM the longer immobilized; ROM ex’s decrease edema and stiffness, promote tendon gliding
  – Early movement promoted with physician recommendation
  – Exercises; active initially, then passive or in protected positions and Active assistive
  – Dynamic splinting when indicated
  – Follow protocols per injury
Treatment continued…

• Positioning is important to prevent joint contracture…..Splinting as necessary
  – “Safe position” prevents contracture of collateral ligaments, esp MP joints
    • Wrist 20-25 degree extension
    • MP’s 70 degree flex
    • IP’s 0 degree extension
• Splinting also used to increase ROM, usually later in treatment cycle
• And to rest, support and protect the hand
• There are exceptions to the “safe position”
Treatment continued…

• Scar management
  – To promote softening, flattening, scar maturation, hypersensitivity and improve ROM
  – Pressure garments, tubigrip sleeves, Coban/Coflex, silicone gel sheeting, foam, Elastomer, massage and mobilization

• Strengthening exercises/activities when appropriate per protocols and healing status

• Use of Modalities to enhance circulation, ROM, connective tissue elasticity when appropriate
Treatment of specific injury

• Tendon/nerve repairs
  – Need to be protected 4-6 weeks in a position of decreased tension....Splinting
  – Specific protocols, some surgeons specify certain protocol to follow

• Amputations/Replantations
  – Neuroma formation is usually inevitable
  – Desensitization/light protection
  – Light constant pressure to decrease hypersensitivity
  – Gel caps, compression glove, Coban
RADIAL NERVE SPLINT with outrigger
RADIAL NERVE SPLINT  Low profile
Treatment specifics, cont.

- Open fractures/Degloving injuries/Burns
  - Splinting as necessary to protect repairs and prevent joint contractures, often need to accommodate pins or dressings
  - Edema control important
  - Early ROM to uninjured fingers/joints
  - Appropriate wound care and dressings to prevent infection
  - Strengthening, scar management when feasible
  - Dynamic splinting as necessary to increase ROM
  - Pressure garments with excessive scarring
Finger flexion static progressive splint to increase ROM
Case Study: M.O.

• 22 yo single R hand dominant male sustained crush injury of the L hand with open wounds and Fractures of the index, middle and ring finger tips, when patients’ fingers got caught in a chain and sprocket system at work, on 10-13-2016.

• Surgery done same day consisting of washout of heavily contaminated open Fx’s of IF, MF, RF with nailbed repair of L IF, soft tissue repair of IF, MF, Rf and closed reduction of L IF distal phalanx Fx

• Injured fingers splinted with alumifoam splints
Post op visit
M.O. Case Study, cont.

- O.T. initiated on 11-9-16; Initial eval revealed:
  - Pain level reported as 4/10 at rest, 6/10 with activity; constant tingling, electrical and radiating
  - Minimal limitation with AROM of the L fingers
  - Reported constant numbness of pads of L IF, MF and RF with lack of sensation (light touch), but c/o’s hypersensitivity to touch
  - L hand weakness:
    - Grip: L 29.3#  R 89.0#
    - Lateral pinch: L 14.8#   R 25.3#
    - 3 point pinch: L 3.5#   R 18.8#
M.O. Case Study, cont.

• FMC min impaired with 9 Hole Peg test:
  – L 35 seconds, R 17 seconds

• Healed incisions present across nailbeds and pads of fingers; scars very hypersensitive to any touch

• Nails beginning to grow in somewhat unevenly

• Functional deficits:
  – Avoids use of finger tips/pads with prehension
  – Unable to do any lifting/gripping
  – Unable to work as a maintenance technician
M.O. Case Study, cont.

• Min to moderate difficulty with self care/ADL’s requiring use of 2 hands and severe difficulty with keyboard use or pinching with L hand

• Patients’ Goal: “Full recovery of L hand use or as much as possible”

• Treatment Program
  – Desensitization – soaks, Fluidotherapy, scar massage, tactile stimulation, gel pad tips
  – ROM, coordination and strengthening ex’s
  – Wound care, prn, after surgery on L RF
January, 2017  Prior to L RF nail removal
M.O. Case Study, cont.

- Returned to work 12-16-16, on restrictions
- Complications during course of Treatment
- Developed infections around nailbed L RF and needed additional surgery for removal of nail on 1-26-17
- OT on hold for 2 weeks, then resumed Tx
- Returned to work 2-9-17 on one handed restriction
- Had occasional episodes of inflammation, pus, but not infected any longer
Post surgical removal of RF nail
4-11-17

Min pain(2/10)
Full AROM
L Grip 73.6#
3 pt pinch 16.6#
Lat pinch 24.6#
Working FT
Newlywed!
REFERENCES

“Hand Injuries”, www.emedicinehealth.com/hand, 4-1-2016, Author Chad Tarr, M.D.”


http://www.aota.org/About Occupational-Therapy/Professionals/RDP

“Treatment of the Complex Hand Injury”, Lecture by Kurt Krueger, OTRL, CHT, 10-1-2008

THE END and THANK YOU!!
SPEECH-LANGUAGE PATHOLOGY: USE OF COMPUTER APPLICATIONS (Apps)
Patty La Bella, M.A., CCC/SLP Senior Speech Language Pathologist
RIM Neuro Outpatient
What is our Role as SLPs?

“The overall objective of speech-language pathology services is to optimize individual’s abilities to communicate and to swallow, thereby improving quality of life.”

-Framework for Speech-Language Pathology Practice, ASHA Scope of Practice
OUR TRAINING

• Master’s Degree
• Certificate of Clinical Competence is awarded by our national organization, American Speech-Hearing Association. Membership is renewed yearly. A total of 30 CEUs are required over a three year period to maintain certification.
• Completion of Fellowship Year under the supervision of a certified SLP
• State Licensure renewal every two years.
Diagnoses of Patients Evaluated and Treated

- Stroke
- Brain Injury including Aneurysm, Neoplasm, Encephalopathy, Hypoxia
- Degenerative Neurological Diseases including Multiple Sclerosis, ALS, Parkinson’s Disease
- COPD resulting in trachs/vents
Why Use Apps?

- Practices target treatment areas as established by SLP
- Practice outside treatment helps support the principles of neuroplasticity.
- Portable
- Socially acceptable
- Many are “user friendly”
- Fun
- Helps patients feel that they are part of the “technological world” like their peers without injury
- Assists SLPs in data collection
- Apps are very commonly used in Intensive Aphasia Programs throughout the country
Drawbacks to Using Apps

- Some patients will be uncomfortable using technology
- Budgetary concerns in purchasing products
- Most Apps are available on Apple platform.
- Patients with physical deficits may not be able to use device
Additional Information

- Apple offers over 900 Apps.
- Apple has 365 Apps that are “native” to Apple products (calendar, ibook, reminders, etc.).
- Rapidly growing industry-new Apps are being added constantly.
- More research is needed in the effectiveness of the use of Apps in our field.
Aphasia Apps

- Tactus Naming Therapy: Improves word retrieval by offering naming practice, describing, name test and flash cards.

- Tactus Comprehension Therapy: Targets comprehension of single words in 5 languages with 10 different categories of nouns.
Aphasia Apps (continued)

- **4 Pics 1 Word**: Targets word associations, word retrieval, naming and reasoning. Patient must use 4 pics to find out how they are related by choosing 1 word.

- **Tactus Conversation Therapy**: Targets higher-level expressive language, problem solving and linguistic-cognitive communication given variety of functional ADL related scenarios.
Aphasia Apps (continued)

- Tactus Reading App: Improves reading comprehension at phrase and sentence level. Also improves oral reading skills.
- Tactus Writing App: Improves spelling using fill-in-the blank, copy, spell what you see and spell what you hear.
Apraxia Apps

- **Tactus VAST App**: Uses evidence-based technique to practice single words, multi syllables, phrases and sentence with video feedback.
- **Small Talk Lingraphica**: Allows practice of automatic speech and colors.
• Small Talk Lingraphica: Several free apps available to express basic needs and to practice basic speech skills.

• Android free app allows patient’s to customize by downloading Google images of a personally related vocabulary.
Dysarthria Apps

• Conversation Paceboard: Helps patients use a reduced rate of speaking to enhance intelligibility.

• BlaBlaBla: Fun interactive app that helps patients improve their volume. As they increase their loudness, the picture of a face becomes larger. Great for visual feedback.
Dysphagia

• Small Talk Lingraphica: Helps patients communicate about their swallowing needs. Also shows different swallowing techniques.

• Swallow Prompt: Targets patients with poor secretion management. App beeps or vibrates to remind patients to swallow.
Memory Apps

• Memory Matches: Patients flip cards until a matching pair is revealed. App offers option to play against the clock.

• Tactus Space Retrieval: Evidenced-based treatment technique used with patients with dementia or memory deficits. Answers are recalled over multiple time intervals.
Attention/Left Visual Neglect Apps

- Tactus Visual Attention Therapy/Cognitive Training: Improves scanning skills from left to right. Also improves attention, processing speed, reading and memory.

- Seek and Find the Doodle: Patients find objects in time and non-stop mode. Targets attention, memory and left neglect.
Comprehensive Therapy Apps

• Combines 25+ cognitive games into a daily training program.

• Constant Therapy: Targets language, cognition, attention, memory, reading and comprehension skills.
Resources


Questions?
Wheelchairs: The Importance of Proper Positioning, Today and Tomorrow
Diane Thomson, MS, OTR/L, ATP
Diane Thomson, MS, OTR/L, ATP

- Rehabilitation Institute of Michigan 1995
- Senior Occupational Therapist SCI inpatient unit & outpatient wheelchair seating clinic
- Responsible for mentoring inpatient & outpatient staff
- BA in psychology 1993 & MS in Occupational Therapy 1995
- Advocate for CRT attending the CRT conference and Roll on Capitol Hill in Washington DC
Objectives

- Identify 3 reasons why proper seating and positioning is important for the client
- Identify 3 types of cushions that may be utilized for the client
- Discuss 3 reasons why advocating for wheelchair seating is important
Introduction / Overarching Concepts
“Confined to a Wheelchair?” NOT!

• Without a chair, people would be confined to bed or home
• An appropriate chair provides comfortable, efficient mobility, maximizes function and independence in multiple settings
• Minimizes risk for medical complications
• Second nature, not ever-languishing “day in a chair”
• [“Chair user” terminology is appreciated; rehab professionals should disavow the Telethon mentality]
Definition of Function

• Person must be able to complete daily functions which may include
  – Breathing
  – Eating
  – Bathing
  – Dressing
  – Toileting – cathing, entering bathroom
  – Mobility throughout environment
  – Community re-entry
  – School/work
  – Communication
Posture and Function

Skin integrity

Posture/anatomic positioning

Function – trunk stability, mobility, reach, access
Stability to Achieve Mobility

Instability and Immobility

Stability and Mobility
Stability to Achieve Mobility

- Posture shifts/changes to achieve movement and function

- In order to move one part of our body we stabilize another part of our body

- Postural options = necessary to function in sitting
Complications- Inappropriately Prescribed/Fitted Equipment

- Limited mobility, function, independence
- Pressure sores
- Contractures
- Postural asymmetries
- Spasticity
- Pain
- Upper extremity repetitive stress injury
- Psychosocial impact
- Impaired respiratory function
- Bowel and bladder issues
Team Players

- Patient
- Family/caregiver
- Therapist(s)
- Case manager
- Supplier
- Manufacturer rep
- Physician
- Other players including teacher, outside therapists, employer, counselor
Team Work

- It is important to have a full team of individuals working towards a clinically appropriate and functional seating and mobility system for the client.
Team Work

- The following should be present at the time of evaluation
  - Client – identifies needs to continue current or planned lifestyle
  - Caregiver – identifies needs to provide proper care to the client
  - Seating Therapist – identifies clinical needs while maintaining function
  - DME supplier – identifies appropriate equipment to meet the clinical and functional needs
  - Case Manager – identifies funding issues and medical issues
Wheelchair Seating & Mobility Evaluation
Wheelchair Evaluation Process

- Prescription & referral from physician
- Intake / Insurance
  - Insurance verified by hospital & supplier
  - Repair vs replace eval
- Therapy Evaluation
  - Goals
  - Assessment of needs
  - Trial equipment
  - Observation
- Specialized assessments
  - Pressure mapping
  - Skill evaluation
  - Alternative drive controls
  - Custom molding
- Final recommendation
- Documentation completion
- Final fit and delivery
- Education and training
Seating is Part of the Whole Picture

- Wheelchair
- Seating
- Support
- Pressure re-distribution
- Function
- Stability
- Mobility
- Reach
- Tolerance of sitting
Observation of Current Equipment

• Resting/static
  – How is their posture? Consider all elements - head, spine, pelvis, extremities
  – Categorize existing scoliosis/deviations from anatomic position
  – Shoulder/UE relative to hand rim or joystick

• Dynamic
  – Influence of movement, spasticity on postural control
  – Ease/efficiency of propulsion, eg shoulder girdle
  – Transfer ability
  – Condition of current equipment – disrepair/what is broken
CUSHIONS
Cushion Considerations

- Diagnosis
- Skin integrity
- Postural deformities
- Positioning needs
- Sensation
- Weight capacity
- Incontinence

Cushion Qualities

- Re-distribute pressure or off load bony prominences
- Stable support surface for pelvis and thighs
- Function effectively in different climates
- Limit heat retention in the heat/freezing in the cold
- Dissipate heat and moisture
- Be lightweight
- Be durable
Types of cushions

- Foam
- Viscous fluid
- Hybrid
- Air
- Off loading
- Custom mold
BACKS
Back to Basics

- Consider posture assessment when thinking about back
- Improves pressure redistribution
- Point of relaxation
- Movement patterns and efforts required for functional tasks such as reaching and wheelchair propulsion.
  - It is a priority to preserve upper limb function
- Balance and stability for safe wheeled mobility
- Vision and interaction with the environment
- Respiration and digestive systems
- Comfort
- Perception/body image of oneself
Back Height Case Example

16" vs. 12" Back Height to Improve Function
MANUAL CHAIRS
Standard Wheelchair (K0001)

- Weight is greater than 36 lbs.
- **Seat Height is 19” or taller**
- Weight capacity: 250 pounds or less
- These are the standard “depot” wheelchairs with fixed rear axles and minimal seat width/depth options.
Standard Hemi-height Wheelchair (K0002)

- Weight is greater than 36 lbs
- **Seat Height is less than 19” tall**
- Weight capacity: 250 pounds or less
- Standard wheelchair with fixed rear axles and minimal seat width/depth options.
- Allows hemi-propulsion technique (foot strike)
Lightweight Wheelchair (K0003)

- Weight 34-36 lbs.
- Weight capacity: 250 pounds or less
- May have swing away footrest and armrest
- Seat width and depth are still limited
High Strength, Lightweight Wheelchair (K0004)

- Weight less than 34 lbs.
- Some, limited options
  - Wheels, casters, arm rests, leg rests
- 2 rear axle height choices
- There is **no adjustability in the anterior-posterior direction (axle plate)**
Ultra-Light Weight Wheelchair (K0005)

• Weight less than 30 lbs.
• Adjustable rear axle position  
  – Up-down and anterior-posterior,
  – Allowing for a more individualized fit to the user’s needs.
• Custom seat width and depth
• Custom options
• Full time wheelchair user
### Frame Style – Rigid Vs. Folding

<table>
<thead>
<tr>
<th>Rigid Frame</th>
<th>Folding Frame</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frame stiffness makes propulsion more efficient</td>
<td>Has a cross or “x” brace that allows chair to fold from the middle</td>
</tr>
<tr>
<td>More durable, lighter weight</td>
<td>Heavier than rigid frame</td>
</tr>
<tr>
<td>Wheels must be removed to load into car</td>
<td>Requires less space when folded</td>
</tr>
<tr>
<td>Person uses less energy when self-loading into car</td>
<td>Propulsion less efficient</td>
</tr>
<tr>
<td>Less maintenance</td>
<td>More moving parts= less durability</td>
</tr>
</tbody>
</table>
Positioning Chairs

- **Recline**
  - Open hip angle
- **Tilt**
  - Weight shifts
- **Tilt Recline**
  - Open hip angle
  - Variety of positions
  - Weight shifts
Power Add Ons

- Power Add Ons – Power activated power assist wheelchair (PAPAW)
  - Why we use it
    - Weakness, long distances, degenerative disease, environment, transport, weight, cost / co-pay, travel

- Push activated
  - Emotion
  - Extender
  - Smart Drive

- Joystick
  - E-fix
Power Operated Vehicle (POV) / Scooter

- **Scooter**
  - **Pros**
    - Energy conservation
    - Weakness
    - Social acceptable
    - Less medical
    - Function
    - Portability
    - Respiratory issues (COPD, CHF)
    - Simple seating
  - **Cons**
    - Longer wheel base
    - Increased turning radius
    - Both Upper Extremities needed for safe tiller use
Group 1 & 2 Power

- Limited positioning needs
- Can do off shelf back and cushion vs captain’s seat
- Funding
- Single power only
- Decreased stability
Power Classifications

- **Group 3**
  - Single and multiple power seat functions
  - Increased suspension and stability
  - Power seating functions
  - Custom seating
  - Alternative drive control
  - Qualifying diagnosis

- **Group 4**
  - Same as group 3 with higher quality motors
  - Not Medicare funded
Group 3 Power Wheelchair

Power Classifications

• Group 5
  – Pediatric
• Sized Small/have extensive growth built into the system
• Solid seat and back/single or multiple power option
• Up to 125 lbs weight capacity
Power Positioning

• Why do they need it
  – Weight shift
  – Upright posture
  – Fatigue/weakness
  – Function
  – Pain relief
  – Pressure re-distribution
  – Circulation/swelling
  – ADL
    • Self care
  – Stability when driving chair
Advocacy

Being part of a community, being knowledgeable about resources.
HR 1361 & S 486

- Legislation to stop CMS for applying competitive bid pricing to CRT wheelchair accessories
- Impacts 171 wheelchair accessory codes with payment reductions ranging from 10% and 40%
- MAJOR disruption to access to CRT manual and power wheelchairs with Medicare and other payers
HR 750

- Creates separate category for CRT within the Medicare DMEPOS benefit
- Designates HCPCS specific codes as CRT and allows for creation of new codes
- Eliminates “in-the-home” restriction for CRT and adds functional considerations
- Expands clinical evaluation to all CRT mobility bases
- Increases supplier standards
- Allows nursing home residents to access CRT if part of move to community residence
- Clarifies exemption of CRT from competitive bidding
- (Currently waiting for Senate Companion Bill to be reintroduced)
Fighting For Complex Rehab

• The manufacturers, suppliers, case managers and clinicians need to advocate for appropriate reimbursement AND support consumer efforts
• Consumer organizations can advocate on a civil rights platform (decreased freedom of movement when they have limited access to CRT)
• Contact Representative and Senators and ask to cosponsor bills
• Keep Representative and Senators up to date with information

• Informational websites
  – www.access2crt.org
  – www.protectmymobility.org
  – www.ncart.us
  – Contact at NCART – Don Clayback – dclayback@ncart.us
What Can We Do?

- Educate in clinic
- Go to state and national legislators, private insurances
- Become involved in consumer organizations
- Know and understand entire process
  - Evaluation
  - Ordering of equipment
  - Funding
  - Laws
Why Is This Important?

- Advocacy on all levels including the national level for Medicare issues directly impacts all individuals who use complex rehab technology
- Without Medicare funding, the majority of individuals will not get the equipment they need which will also impact research and development
- Without research and development, all individuals who use wheelchairs will be impacted with subpar equipment
Questions?
DMC
Rehabilitation Institute of Michigan