Objectives

1. Participants will be able to list 3 advantages of standing programs.
2. Participants will be able to list 2 key elements that are vital when implementing a standing program.
3. Participants will be able to describe 2 reasons why a therapist would choose a walker vs a gait trainer for a patient.
4. Participants will be able to site 3 advantages and 3 disadvantages of different gait trainers for various diagnoses.
5. Participants will be able to site 3 advantages of implementing early mobility technology in their clinics.

He who would learn to fly one day must first learn to stand and walk and run and climb and dance; one cannot fly into flying.

Friedrich Nietzsche

What are the Benefits of a Standing Program?

- Improves mortality (Hidde 2012)
- Improves psychosocial impact (Nordstrom 2014)
- Standing is exercise for kids who are unable to walk (CP GMFS level IV) (Israel-Mendlovic 2014)
- Increases BMD (Caulton 2004, Katz 2006)
What are the Benefits of a Standing Program?

• Improves ROM (Gibson 2009, Singer 2009, Robinson)
• Improves hip alignment (when stood in abduction) (Martinson)
• Pressure relief

(Also see reference Paleg 2013 - systematic review)

The Evidence-BMD

• Improved vertebral BMD, but not tibial BMD

Gudjonsdottir, B et al. Effects of a Dynamic Versus a static Prone stander on Bone Mineral Density and Behavior In Four Children with Severe Cerebral Palsy. 2002

• There is potential value in additional research concerning effects of standing on BMD

The Evidence-ROM


• Improve hamstring length – popliteal angle
• Decrease in hamstring length when standing program stopped

Singer et al. Non Surgical management of ankle contractures following acquired brain injury. 2009.

• Standing frame was effective in improving ankle ROM

Robinson, et al. No difference between wearing a night splint and standing on a tilting table in preventing ankle contractures early after stroke. 2008

• Standing is as effective as using a night splint in preventing contractures.

The Evidence-Hip Alignment


• Straddled (abduction) standing 1hr/day may reduce migration of hip


• Daily standing program with hip abduction in first 5 years may enhance acetabular development

Types of Standers

Rifton Prone Stander  
Supine Stander  
Mobile Prone Stander  
Zing Supine/Prone Stander  
Squiggles Supine/Prone Stander

How to Choose a Stander

Zing Stander  
Squiggles Stander
How to Choose a Stander

- Supine vs prone
- Abduction vs no abduction
- Ease of caregiver use
- Will it be used
- Will it fit in the patient's house/environment
- Will it accommodate interaction with family members, especially siblings
- Are you getting WB in the LE
- Alignment/support

Prone vs Supine

**Prone**
- For hip ROM
- Practice extension
- Fair head control
- Do not need to access respiratory or abdomen
- Patient/family are comfortable with this position

**Supine**
- Knee extension ROM
- Practice flexion
- Poor/no head control
- Need to access respiratory or abdomen
- Patient/family are comfortable with this position

Ginny Paleg

Abduction vs no abduction

**Abduction**
- Hips at risk for subluxation
- GMFCS level IV and V
- Tight adductors
- Recent hip surgery

**No Abduction**
- No issues with hips
- No issues with tight adductors
- Pain with abduction
- BMD is a greater concern

Ginny Paleg

Dosage

(Ginny Paleg 2013)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Time needed in stander</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROM</td>
<td>45 min/day for ambulatory</td>
</tr>
<tr>
<td></td>
<td>60 min/day for non-ambulatory</td>
</tr>
<tr>
<td>BMD</td>
<td>60-90 min/day</td>
</tr>
<tr>
<td>Hip alignment</td>
<td>60 min/day with hips 30-60 degrees of hip abd (total)</td>
</tr>
<tr>
<td>Spasticity</td>
<td>30-45 min/day</td>
</tr>
</tbody>
</table>

Justification

- Mention the benefits of the stander:
  - ROM
  - Bone density
  - Lung clearance
  - Digestion
  - Interaction with family and peers
- Multiple standers were tried!
  - List which standers and why they did and did not work
- Parents were trained in use of stander and plan on using it everyday

If you can't fly then run, if you can't run then walk, if you can't walk then crawl, but whatever you do you have to keep moving forward.

Martin Luther King Jr.
We all need to keep moving…..

Importance of Upright Mobility

- Psychological and cognitive development
- Improved interactions with caregivers
- Increased engagement and exploration of the environment
- Improved visual awareness
- Object interaction
- Autonomy and independence

(Biringen 1995, Biringen 2008, Dosso 2013)

Importance of Upright Mobility

- Bowl and bladder function
- Prevention of contractures
- Improve BMD
- Strength
- Lung function

Locomotor Training

- Repetitive Reciprocal Movement
- Start Young
- Task Specific
- Frequent

Over ground gait training works just as well as weight support treadmill training

(Senthivelkumar 2014, Park 2015, Swe 2015)
Over Ground vs TM Training

Senthilvelasum, T. Comparison of body weight-supported treadmill training versus body weight supported over ground training in people with incomplete tetraplegia: a pilot randomized trial. 2013

- 5/week for 30 min for 8 weeks both groups improved, no difference between groups

Park, B. Effects of conventional over ground gait training and a gait trainer with partial weight support on spatiotemporal gait parameters of patients after stroke.

- Support needed and walking speed improved no differences

Swy, N, Sendhilmarthan, S, van den Bos, M, Barr, C. Over ground walking and body weight supported walking improves mobility equally in cerebral palsy: a randomized controlled trial.

- 3x/week 30 min session TM compared to their usual walking devices

How to Choose??

Try multiple gait trainers

How to Choose??

Low tone

- Kidwalk, Meywalk/Miniwalk, Rifton Dynamic Pacer, Mustang

More trunk support

- Rifton Pacers, Kidwalk

Less trunk support

- Crocodile, Nurmi Neo, Meywalk

Gait trainer to walker

- Crocodile, Nurmi Neo, Rifton Pacer

Results

Types of Walkers Recommended | Reasons for Recommending | Posterior vs Anterior
---|---|---
- Rifton | Clinical assessment | 65% used posterior support
- Kaye SW | Time child spends in walker | 63% used anterior support
- Litegait | Current evidence |
- Pony | Funding by agency |
- Gator | Time to adjust |
- Crocodile | Access to a particular walker |
- Bronco | Vendors supply of walker |
- | Family preference |

Gait Trainers vs Walkers

- Gait trainers provide more support at trunk and pelvis
- Gait trainers help the patient to be an independent ambulator when otherwise would need assistance
- Walkers can provide support for balance/weakness when ambulating
- Walkers can be useful after surgery or injury
Types of Gait Trainers
- Rifton
- Dynamic Pacer
- Kidwalk
- Meywalk
- Miniwalk

Types of Walkers
- Crocodile
- Kaye Reverse Walker
- Guardian FWW
- Ottobock Nurmi Neo

Walker or Gait Trainer?
- Does the patient require trunk support?
  - Yes
  - No

  Has the patient enough endurance?
  - Yes
  - No

  A lot
  - Rifton
  - Kidwalk
  - Meywalk

  Just a little
  - Crocodile
  - Nurmi neo

  Is he/she independent in a walker?
  - Yes
  - No

Gait Trainer
- Crocodile
- Nurmi neo
- Kaye
- FWW

Patient Video

Justification
- Mention the benefits of independent walking:
  - Explore the environment independently
  - Interact with family and peers
  - Without this equipment they have no means for independent mobility

Multiple gait trainers/walkers were trialed!
  - List which gait trainers and why they did and did not work
  - Be sure to mention that a less costly option was tried

Parents were trained in use of gait trainer and plan on using it everyday as this is his/her only means of independent mobility

REFERENCES
REFERENCES


8. Singer et al. Non Surgical management of ankle contractures following brain injury. 2009

9. Robinson, et al. No difference between wearing a night splint and standing on a tilt table in preventing ankle contractures early: after stroke


REFERENCES


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9/22/2016

Alternative Forms of Mobility

A Paradigm Shift

“The field of Rehabilitation is undergoing a paradigm shift from considering power mobility as a final option for older children once all other forms of mobility have been tried and found ineffective, to a therapeutic modality that can be used to support development, exploration and participation for a wide range of infants and children with disabilities.”

- (Livingstone and Paleg, 2013)
Benefits of Power Mobility

**The most obvious:** **IMPROVE FUNCTIONAL MOBILITY**

- Effects of Power Wheelchairs on the Development and Function of Young Children With Severe Motor Impairments (Jones et al 2012)
- Results showed improvements in Battelle Developmental Inventory (BDI), PEDI-functional skills, The Early Coping Inventory (ECI)
- Conclusion of the study: Use of power wheelchairs as young as 14mo. can enhance development and function

**POWER MOBILITY CAN PROMOTE OVERALL DEVELOPMENT NOT JUST FUNCTIONAL MOBILITY**

**Benefits of Power Mobility**

- **COGNITIVE** (Lynch et al, 2009)
- **LANGUAGE** (Jones, 2012; Lynch, et al 2009)
- **VISUAL-PERCEPTUAL DEVELOPMENT** (Uchiyama et al, 2008)
- **CAUSE AND EFFECT** (Nilsson and Nyberg, 1999, 2011)

**Benefits of Power Mobility**

- **INDEPENDENCE** (Bottos, Bolcati, Sciuto, 2001)
- **SOCIAL AND PLAY SKILLS** (Tefft et al, 2011; Guerette et al, 2013; Ragonesi et al, 2010)
- **SELF-INITIATED MOVEMENT** (Butler, 1986; Deitz et al, 2002)

**Benefits of Power Mobility**

- Most important to the role of the child…
  - Enhance participation in family, school and community life (Wiart, et al 2003 and 2004; Evans et al, 2007)
  - Lack of purposeful movement can result in passive dependent behavior (Butler, 1997)

**Benefits of Power Mobility**

If Power Mobility has been proven to be an effective means of providing independent mobility to children with severe physical and mental disabilities…
then why does it continue to be so underutilized?????
1. AGE
8 months versus 18 months
• The majority of early power mobility research that focused on age of use included only children that were able to use a joystick (cited by Livingston and Paleg, 2013)
• What do the clinical therapists suggest…
  • Start when a typically developing child begins to crawl (Galloway et al, 2008; Lynch et al, 2009)

2. SAFETY AWARENESS
• What would happen if we treated typically developing infants like we treat infants with immobility…..

3. Could starting too young impede development of ambulation or other motor skills?
• There is no evidence to support this thought (Jones et al, 2012; Bottos, et al 2001; Paulsson et al 1994)
*Power Mobility does not mean permanent means of mobility!

4. READINESS
• How will they be ready for power mobility if we do not give them an opportunity to practice?
  • PRACTICE…learning power mobility is similar to a child learning to walk or use a tricycle. It needs time, practice, and adaptations to the individual
Barriers to Power Mobility

5. DEVICE LIMITATIONS
   • (mostly with power wheelchairs)
   • Weight of device
   • Ramps
   • Special Car/Van
   • Home Remodeling
   • Funding

What is Your Role?

• Help identify child’s postural abilities and support options to maximize efficiency of the proposed device
• Consider modifications and alternative approaches to training, compensatory strategies and technology to accommodate for visual, sensory or musculoskeletal limitations
• Remember the need for practice

Beyond the Power Wheelchair

WHEN THINKING ALTERNATIVE FORMS OF MOBILITY

THINK OUTSIDE THE BOX

THINK.....

Go Baby Go

Cole Galloway developed a mobility device that infants and toddlers with special needs could use that was:
   • Readily available
   • Low cost
   • Easy to store
   • FUNCTIONAL
   • FUN

Motorized Cars
Why a Motorized Car

Case studies found:
- Improved Daily Mobility
- Improved Movement
- Increased Socialization
- Improved Vocalization

(Huang et al, 2014; Logan, et al 2014)

Meet Our Patient

Let’s Play Fair!

What is Your Role?

- Consider adding a motorized ride on toy while completing a wheel chair evaluation.
- Attend a Go Baby Go workshop and help fellow therapists transform a ride on car to power mobility for children with special needs
- Get the word out, maybe a power wheelchair is not the only option or the first option.

Adaptive Tricycles

Happiness is
...to ride a bike and feel the wind on your left cheek.

Every child deserves to ride a bike...no matter the level of ability.
Adaptive Tricycles

What can they offer?

- Hand Trykes
- Foot Trykes
- Hand-foot Trykes
- Recumbent Trykes
- Variety of Seating Options
- Rear Steer Control
- Vent Cart

Benefits of Cycling

Cognitive Health

- Improved Decision Making Skills (Vogt et al, 2013)
- Improved Reaction Times (Rigenbach et al, 2014; Vogt et al, 2013)
- Improved Perception of Exercise (Rigenbach et al, 2014)

Social Health

- Improved social skills (McDonald et al, 2011)
- Increased Self-Confidence (McDonald et al, 2011)
- Strengthened peer and family relationships (Pickering et al, 2013; McDonald et al, 2011)
- Increased participation in social environment including school (Pickering et al, 2013)

The Skies the Limit

- The most commonly studied physical benefits:
  - Strength
  - ROM
  - Cardiovascular System
  - Endurance
  - Balance

Benefits of Cycling

- Improved Unimanual and Bimanual Dexterity (Rigenbach et al, 2014)
- Weight loss (Ulrich et al, 2011)
- Motor Skills Development (Burt et al, 2007)

Benefits of Cycling

- Improved social skills (McDonald et al, 2011)
- Increased Self-Confidence (McDonald et al, 2011)
- Strengthened peer and family relationships (Pickering et al, 2013; McDonald et al, 2011)
- Increased participation in social environment including school (Pickering et al, 2013)
Therapist Say…

In 2010, Ambucs conducted a survey of 122 PTs and 29 Ots. Here are some highlights.

- Among clients who use the Amtryke in therapy, therapists report increased:
  - Positive affect: 97.1%
  - Responsiveness: 93.4%
  - Effort level: 93.8%
  - Degree of Focus: 83.2%

Parents Say…

In 2011, Ambucs conducted a survey of 286 parents whose child or adult dependent received an Amtryke. Here are some highlights.

Do you feel Amtryke has had a positive impact on child/rider?
- Yes: 97.7%
- No: 2.3%

Is your rider now able to perform tasks that s/he was not able to do before using an Amtryke?
- Yes: 56%
- No: 44%

Has your child or rider attempted to perform tasks independently since using an Amtryke?
- Yes: 59.7%
- No: 40.3%

Limitations of an Adaptive Bike

- Funding
- Storage
- Transportation
- What to do with the bike when the child outgrows it
- Decreased guidance on which bike to choose

Adaptive Bike Programs

- Southern California has 4 chapters of Ambucs that can provide children with Amtryke adaptive tricycles
- Function of the chapters:
  - Therapists evaluate the child on an amtryke tricycle to establish the best configuration to meet every child’s needs
  - Work with the families to purchase the adaptive tricycle
  - Build the tricycles and properly fit the child on the tricycle
  - Recycle Tricycles

Meet the Southern CA Chapters

- Red Star Riders www.redstarriders.com
  - Serving the greater LA Region, San Gabriel Valley and Inland Empire
- SoCal Trykers www.socaltrykers.wixsite.com
  - Serving the South Bay Region
- Pedal Pushers pedalpushers2014.wix.com
  - Serving North LA and The Valley
- OC Special Spokes www.ocspecialspokes.org
  - Serving Orange County

What is Your Role?

- KNOW YOUR RESOURCES and PARTNERS
- There are over 140 chapters in more than 30 states-find one in your region
  - www.ambucs.org
- Variety Club of Southern California
  - www.varietysocal.org
  - They will help purchase a tricycle of any brand for a family that meets their qualifications
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- Burt T, Porretta D, Klein R. Use of adapted bicycles on the earning of conventional cycling by children with cerebral palsy. Education and Training in Developmental Disabilities. 2015; 4(2): 400-09


- Evans M, Neophytou C, De Sousa L, Frank AD. Young people's experiences using EPIOC: potential for enhancing users development. Disability and Rehabilitation. 2007; 29:1281-84


