Care for the Person with Amputation

Gait training for the person with lower extremity amputation

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- Upon completion of this module, the attendee will be able to:
- Implement a gait training program for people with lower limb amputation
- Identify exercises to improve walking with a prosthesis
- Identify modifications for higher level activity

Major desire of most Amputees

- To walk
- Walking disability after structured traditional rehabilitation.

Prosthesis

- A tool for walking
- Does not make it easy
- Prosthetic componentry
  - No evidence that specific components impact gait
  - Improve endurance
- Myoelectric not as developed for LE as UE

Walking Needs

- Sufficient physical capacity
  - Aerobic capacity
  - Muscular force
  - Balance
  - Flexibility
  - Proprioception
  - Control

The patient must:

- Trust the prosthesis to accept the weight of the body.
- Feel/understand the capability of the foot/knee
- Balance on one foot (SLS)
- Advance the limb forward
- Adapt to environmental demands
- Volume management

Cocharane Reviews:

- "There is a lack of evidence from randomised controlled trials to inform the choice of prosthetic rehabilitation, including optimum weight of prosthesis, after unilateral TFA in older dysvascular people." Cumming J et al. 2015
- "Randomised controlled trials to examine key interventions is urgently required" in the amputee population. Barr S, 2018

- Miller (2017) community based exercise program on balance, balance confidence and gait in individuals with LLA.
- Results: each participant experienced clinically meaningful improvements in balance, balance confidence, and walking ability.

- Better balance predicts increased participation in the community.
- No program has proven superior to another in improving walking ability in LE amputees.

More Statistics

- Obesity does not impact patient rehab outcomes:
  - 2MWT
  - L-test

Vivas et al. (2017)

Gait training

- Overground or treadmill
- Part task or full task training
  - Both show functional gains

Problems with walking after amputation

- Diminished proprioceptive input
  - Loss of ankle
  - Loss of knee
- Modified COM
- Fear of falling

Amputee postural changes

- COG is shifted over intact limb
- Small BOS
- External rotation intact
- Hyperextension of intact knee
- Retraction and elevation of pelvis (affected)
- Depression affected shoulder

Safety

Contractures

- Difficulty using a prosthesis and increased energy expenditure
  - Thomas test position for stretching
  - Prone TID x 20 minutes
  - Moist heat prior to manual therapy

Gait Training

- Find out capabilities of prosthesis
  - Foot
  - Knee
- Roll off prosthetic toe

Gait Training

- Must learn boundaries of prosthesis
- How to flex muscles in socket
- How to make heel contact
- How to load the toe
  - Push off
  - Flex knee

Energy Expenditure

Prosthetic Training progression

- Weight shifting and stepping forwards, sideways, backwards
- Higher level balance: ball toss, golf swing, tilt boards
- Sit to stand to sit with equal weight bearing

Weight shifting and stepping forwards, sideways, backwards

Eyes Open / Eyes Closed

Weight shifting and stepping forwards, sideways, backwards

Eyes Open / Eyes Closed

Weight shifting and stepping forwards, sideways, backwards

Eyes Open / Eyes Closed

Balance Re-education

Restoration of horizontal plane pelvic rotation

Prosthetic Training

- Higher level balance

Prosthetic Training

- Higher level balance

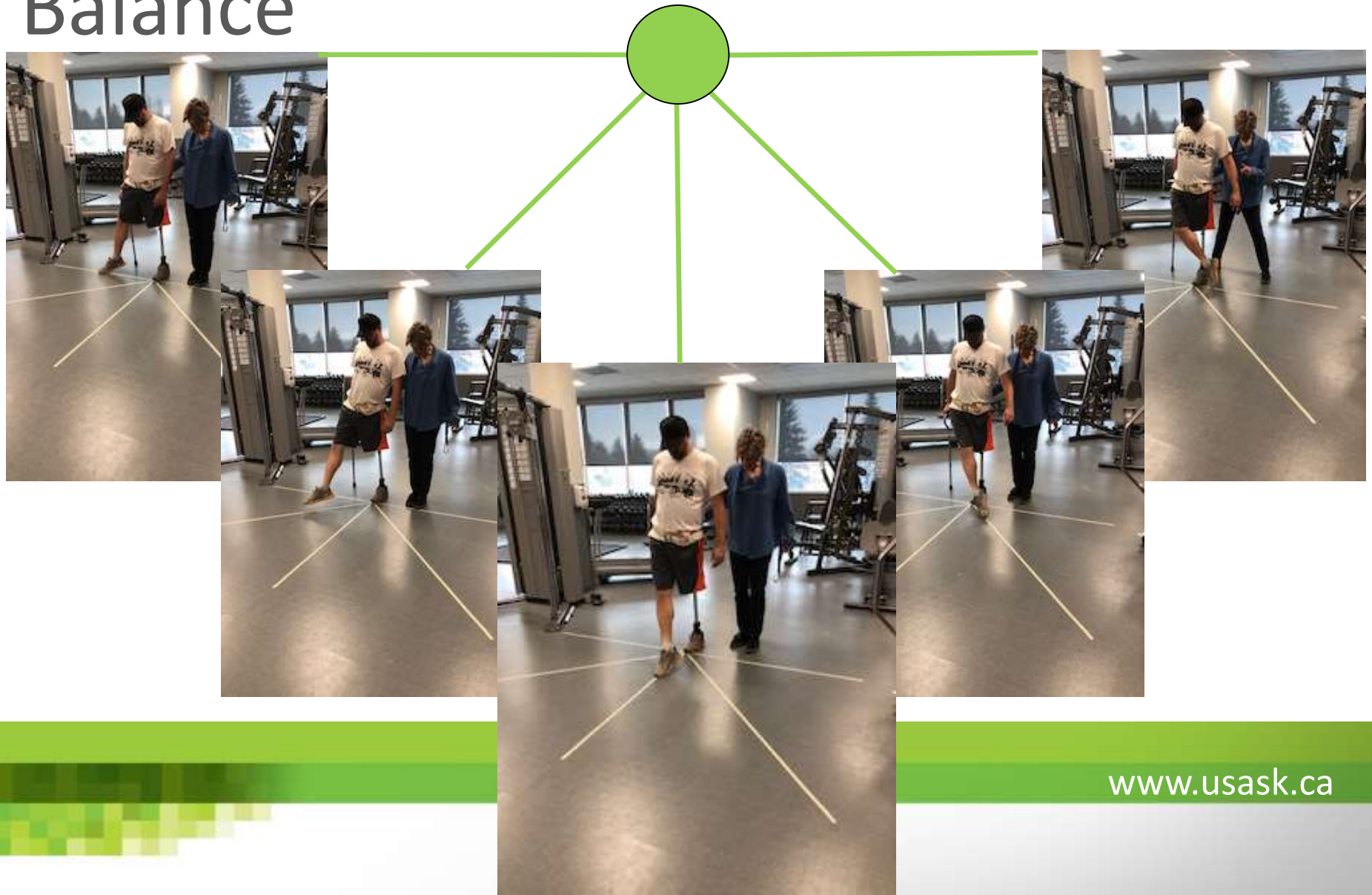
Prosthetic Training

- Higher level balance

Prosthetic Training

- Strength and Balance
  - Agility walking /gait
    - Side stepping/ back stepping
    - Narrow walking
  - Braiding

Balance



Strengthen with prosthesis?

- Do not add resistance to end of prosthesis if amputation was caused by vascular disorder or if patient is diabetic.
- May add to intact LE

Common gait deviations

- Lateral trunk lean
- Abduction
- Circumduction
- Vaulting
- Decreased trunk rotation
- Increased lordosis
- Uneven temporo-spatial parameters
- Poor knee control (TFA)

Shoes.. Heel height

Prosthetic Wear Schedule

- 1 hr BID for the first week
- Increase by 1-2 hours per week if no adverse skin reactions.

Cole E.S. (2003)

- Must learn to fall
- Must learn to recover from fall

Stairs

Stairs

Ramps

- Up ramp pylon tips back
- Down ramp pylon tips forward.

Secondary conditions associated with gait deviations

- Low back pain
  - Must do trunk strengthening/control
- Overuse of opposite limb
  - Arthritis
  - Excessive Pressure

- Not enough time spent gait training
- 2-6 weeks acutely in the process
- Limited access to structured exercise program
- Must create a continuum of care

Prosthesis

- Donning/doffing
- Hygiene
- Weight loss with exercise program affects
- Prosthetic fit
  - Need for multiple socks

Does amputation effect your life?
If so check out **Who Needs Twenty!**
A grass-roots community-based initiative dedicated to amputees, family/friends, caregivers, and healthcare professionals, or anyone effected by limb loss.

Find us at:

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or visit us online:

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Thank you