AMPUTEE REHABILITATION

The First Step Towards Success

Faculty/Presenter Disclosure

- **Faculty:** Patrick Gross

- **Relationships with commercial interests:**
  - **Not Applicable**

Objectives

- By attending this session, the attendee will be able to
  - Better appreciate the realities facing individuals post amputation
  - State the admission criteria for the HSC amputee rehabilitation program
  - State the minimum criteria for an individual to be fitted with a prosthesis

AMPUTEE REHABILITATION

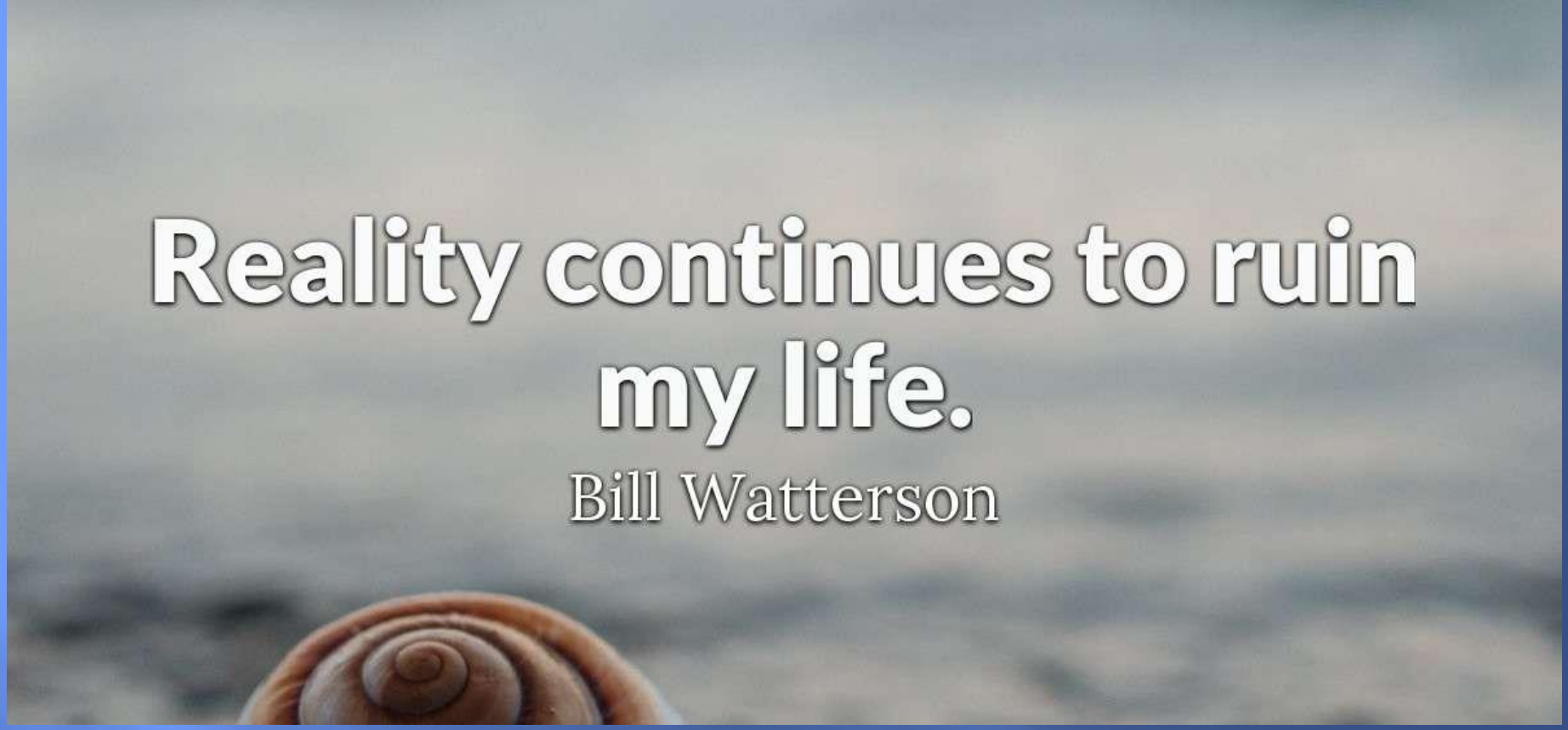
The First Step Towards Success

Managing Expectations

Expectations

"Happiness depends not on how well things are going but whether things are going better or worse than expected."

Robb Rutledge, Author and neuroscientist


Reality continues to ruin my life.
Bill Watterson

Patient Expectations

Family and staff expectations

Well-meanies

CANADIAN REALITIES

Epidemiology

Incidence 43/100,000 in Canada

Etiology:

Lower extremity

1. Vascular (PAOD)	**70-90% (diabetes 40-55%)**
2. Trauma	10%
3. Malignancy	5%
4. Congenital	3%

Upper extremity

1. Trauma 90%

Other causes include burns, malignant tumors, infection, congenital, PVD.

Epidemiology:

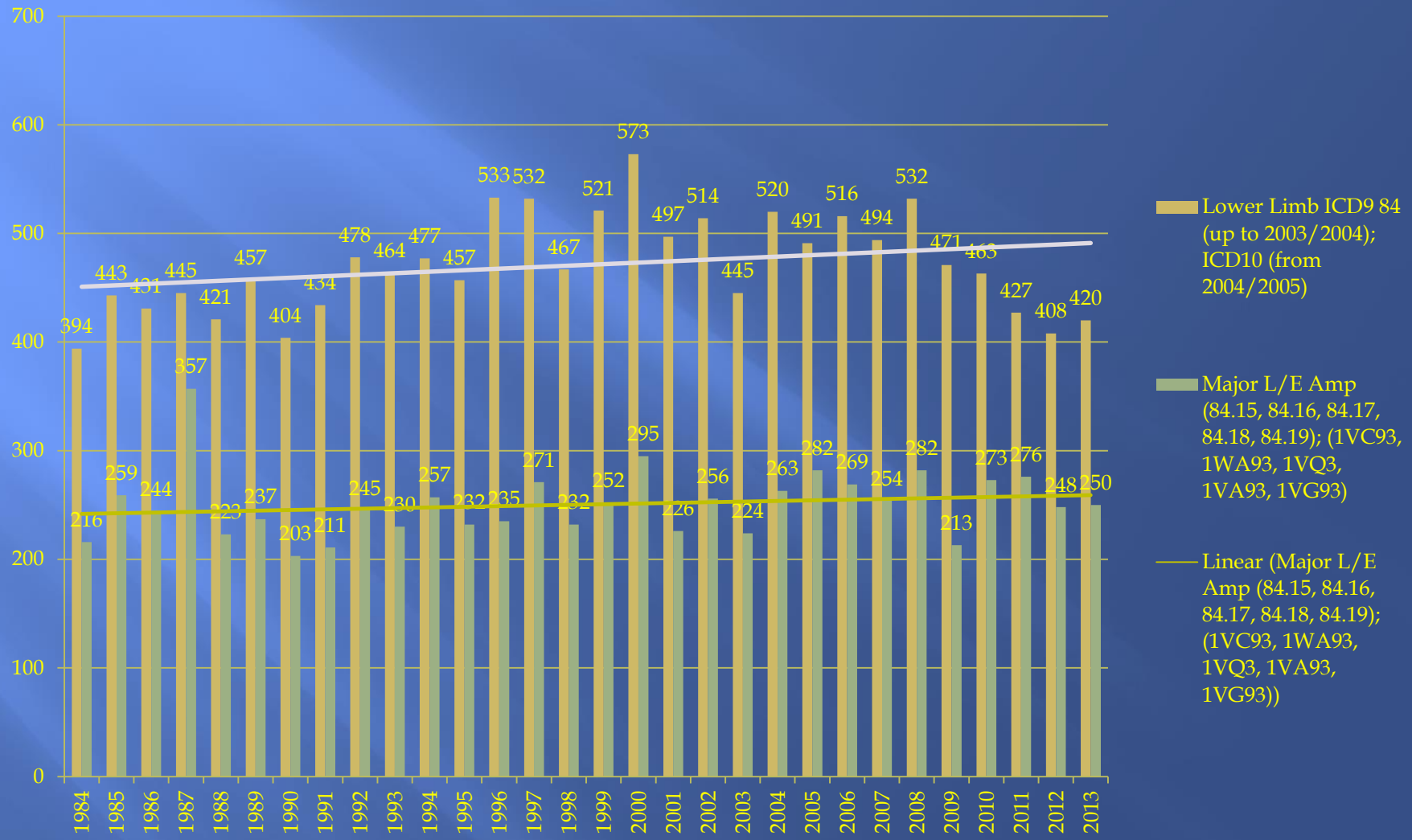
- **Lower : Upper extremity (Major amputations) 20:1**
- Male: Female ratios
  - Lower extremity 3:1
  - Upper extremity 4:1
- Major amputations
  - Combined AK/BK 90%
  - Combined AE/BE 73%
- BK:AK 2:1

Atlas of amputations and Limb Deficiencies: Surgical, Prosthetic, and Rehabilitation Principles, 3rd Edition, 2004. Ch 38.
Manitoba Statistics 1996-2006

MANITOBA REALITIES

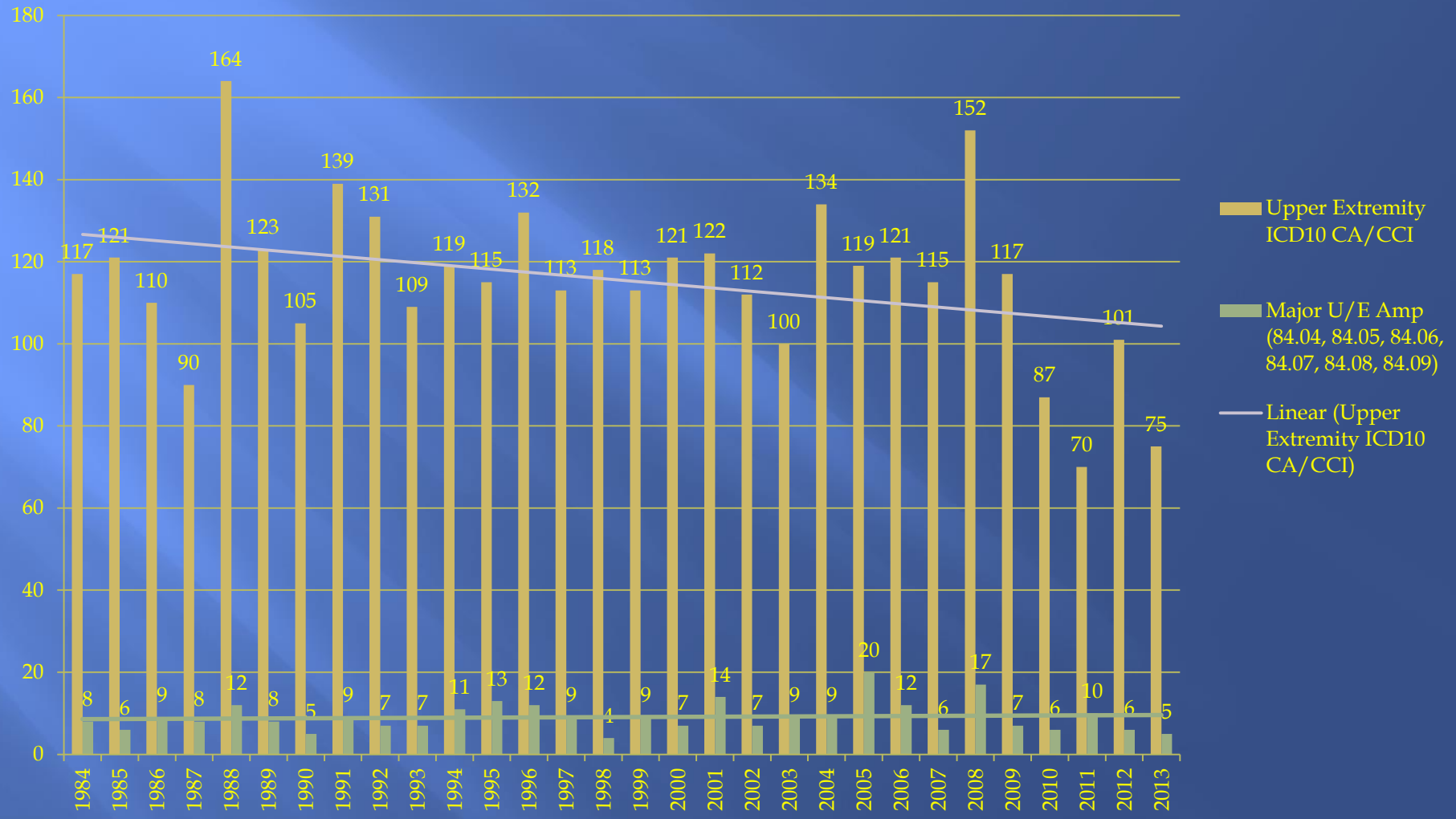
Incidence of L/E Amputation in Manitoba

(Manitoba Health)



Incidence of U/E Amputation in Manitoba

(Manitoba Health)



HSC Rehabilitation Hospital

Amputee Rehab Program (187 consults in 2017)

Inpatient

9 Inpatient amputee beds

(60 patients in 2017)

Day Program

(90 amputee outpatients in 2017)

WHO THE #@*% IS A REHAB CANDIDATE?

Rehab Candidate (Inpatient)

- Recent or remote upper and lower extremity amputee, requiring rehab for further independence +/- prosthetic training
- Unable to live in the community
- Medically and surgically stable
- Intact weight bearing surfaces
- Adequate cognitive and physical potential to achieve either prosthetic ambulation or wheelchair independence

Rehab Candidate (Inpatient)

- Patients who can tolerate about an hour of active participation in therapy per day**

Please note we don't expect the acute care physiotherapist to actually spend one hour with this patient. We expect to see that if there was more time available they could continue to work out (ie not exhausted after getting out of bed and bed exercises)

PATIENT REALITIES

Sad Facts

- 36% (vascular BK) and 50% (vascular AK) 1 year mortality
- 85% 4 year mortality rate post amputation for PVD
- 10-12% 1 year and 52% 4 year risk of contralateral amputation for vascular amputees

Dillingham, T.R. Reamputation, Mortality, and Health Care Costs Among Persons With Dysvascular Lower-Limb Amputations. Arch Phys Med Rehabil Vol 86, Mar 2005

Geertzen JH, Martina JD, Rietman HS. Lower limb amputation. part 2: Rehabilitation - a 10 year literature review. Prosthet Orthot Int. 2001 Apr;25(1):14-20.

Ebskov. Incidence of reamputation and death after gangrene of the lower extremity. Prosth and Orth Int, 1980, 4, 77-80

Mobility after lower-limb amputation

- The aim of rehabilitation is to restore and preserve maximum independence of action for as long as possible
- Up to 85% of vascular amputees fitted with prosthesis but use decreases over time
  - 85% walk in home 1 year post fitting, 31% after 5 years
  - Those totally dependent upon a w/c increases from 13% (1 year) to 39% (5 year)
- Successful lifetime rehabilitation requires the recognition that mobility will be largely dependent on a w/c. All should be provided with a w/c from the outset and homes be fully adapted for w/c use

Collin C; Colin J. Mobility after lower-limb amputation: Br J Surg 1995 Aug;82(8):1010-1

Mobility after lower-limb amputation

- The naïve assumption that the ability to walk in a gymnasium 3 months after amputation constitutes the essence of successful rehabilitation will deprive many patients of full mobility from the beginning of their convalescence. … Many will become prisoners in their own homes as the years go by…

Collin C; Colin J. Mobility after lower-limb amputation: Br J Surg 1995 Aug;82(8):1010-1

WHO THE #@*% IS A PROSTHETIC CANDIDATE?

When Do I Get My Leg?

- Well healed (average of 3-4 months)
- Tolerating 60 x 60
- Volume not fluctuating

Positive predictors of walking ability following lower limb amputation

- More distal amputation level
- Unilateral amputation
- Good cognitive ability
- Non-vascular cause for amputation
- Fewer stump problems including stump or phantom limb pain, and contractures
- Good physical fitness
- Pre-amputation walking status
- Independence in activities of daily living
- Ability to stand on one leg
- Younger age

Sansam, K et al. Predicting walking ability following lower limb amputation: a systematic review of the literature. Journal of Rehabilitation Medicine 2009; 41:593-603

HSC Guidelines for Lower Extremity Prosthetic Fitting

1. A transtibial prosthesis would be considered to assist with transfers as well as for ambulation

2. A transfemoral prosthesis will be of no assistance for transfers. Therefore for above knee amputees to be considered for prosthetic fitting the following criteria would need to be met,
   - Transfer independently
   - Demonstrate safe wheelchair use
   - Remaining limb must be able to bear weight
   - Be able to rise to stand independently and balance for short periods of time within the confines of a walker safely
   - Be able to stand in parallel bars for 10 minutes safely
   - Have sufficient cardiovascular stamina to be able to hop a short distance in parallel bars

These activities should be performed independently or with the level of assistance that will be available at home.

HSC Guidelines for Lower Extremity Prosthetic Fitting (cont'd)

Bilateral transfemoral amputees would be considered for training in prosthetic ambulation if the following criteria could be met,

- Transfer independently
- Demonstrate safe wheelchair use
- No significant comorbities
- Hip extensor and abductor strength 5/5
- No flexion contractures
- Full AROM and 5/5 strength of upper extremities
- Ability to maintain 60% of max heart rate for 20 minutes

These guidelines should be used as a starting point to determine the suitability of candidates.

Energy cost of prosthetic ambulation

Unilateral TTA	15-30% more energy
Bilateral TTA	30-60% more energy
Unilateral TFA	70-100% more energy
Bilateral TFA	240-300% more energy

466-707% more than wheeling and 70-80% slower

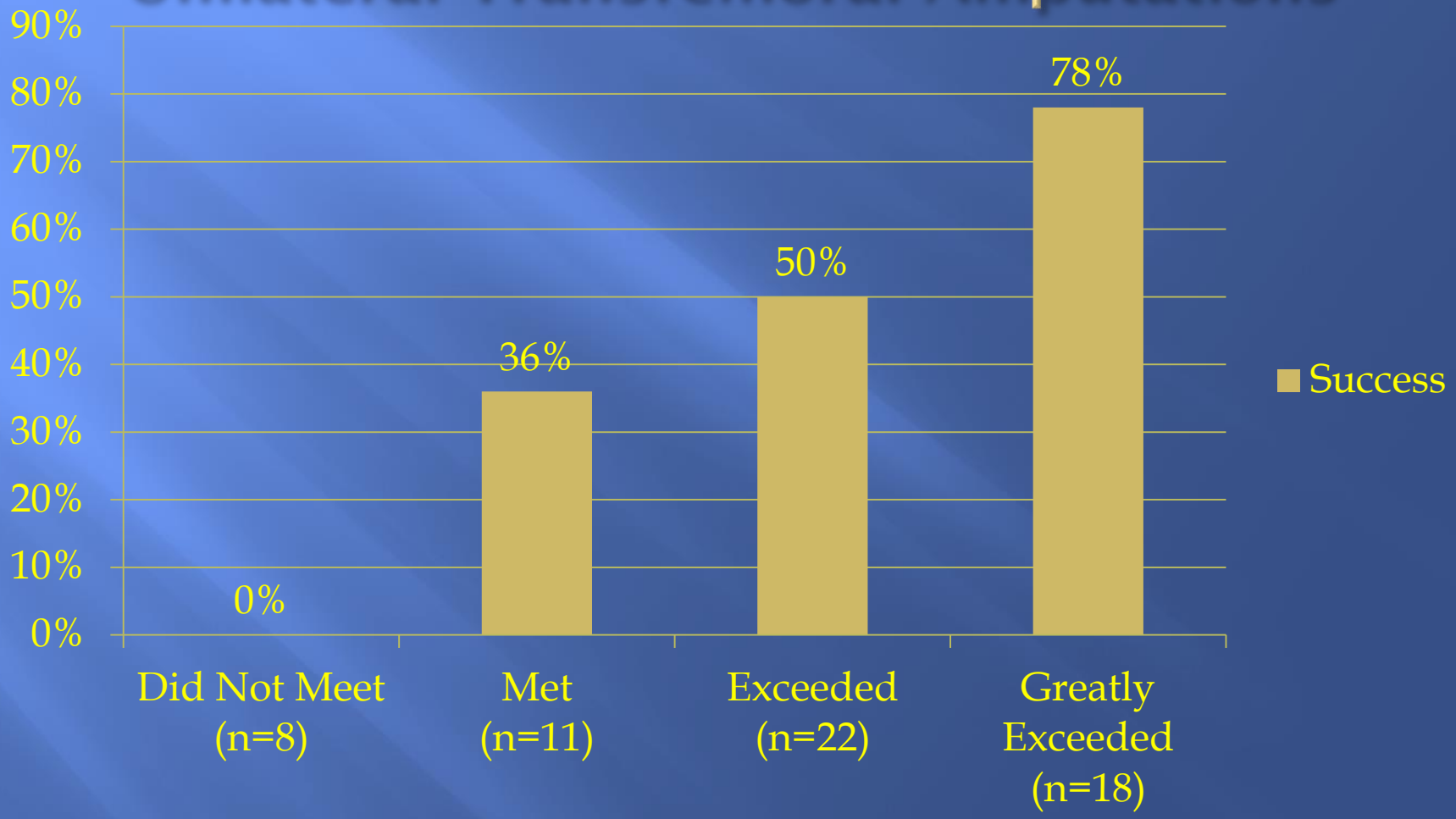
"This is an important consideration given that much of the involved patient population has preexisting CV disease, and that an amputation at any level creates new demands on the system as a whole, most notably the cardiac and respiratory systems"

Yu, G.V. Syme's amputation : A retrospective review of 10 cases. Clin Podiatr Med Surg. 22(2005) 395-427

Predicting Prosthetic Use Post Rehabilitation for Individuals with Unilateral Transfemoral Amputations

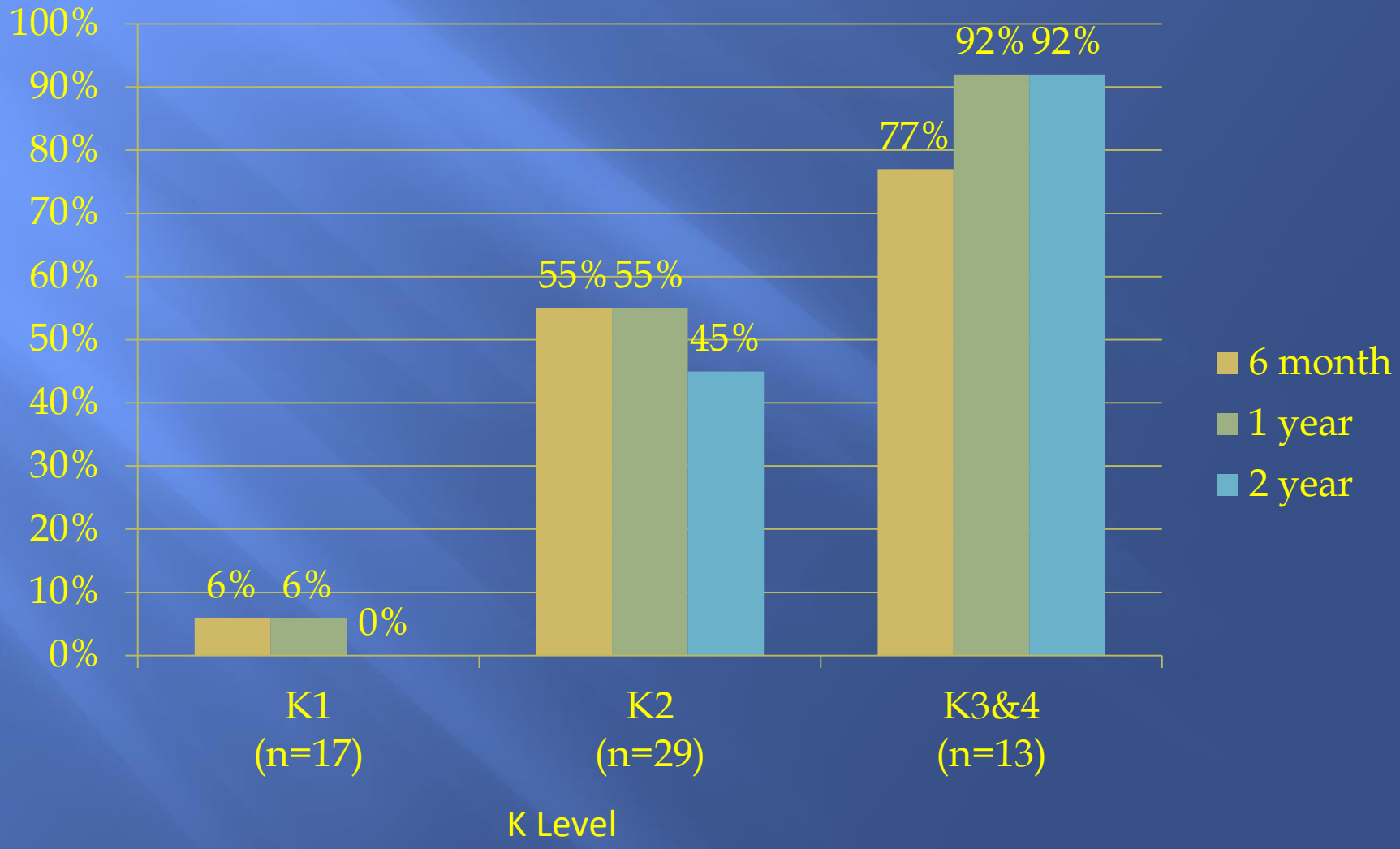
- Allied Health Research Grant funded by the HSC Foundation
- Review of unilateral transfemoral amputees fit between 2006-2012
- "Success" = evidence of prosthetic use for an average of 1-2 years post discharge from formal rehabilitation or prosthetic use up until death

Predicting Prosthetic Use Post Rehabilitation for Individuals with Unilateral Transfemoral Amputations



HSC Fitting Guidelines

Predicting Prosthetic Use Post Rehabilitation for Individuals with Unilateral Transfemoral Amputations



Predicting Prosthetic Use Post Rehabilitation for Individuals with Unilateral Transfemoral Amputations

K-Level	n	6 month	12 month	2 year	Evidence of wearing prosthesis long-term (avg 1-2 yrs post formal d/c or up to death)
1	17	1	2	0	1 (6%)
2	29	16	17	13	16 (55%)
3 & 4	13	10	12	12	12 (92%)

49% "success" rate

Predicting Prosthetic Use Post Rehabilitation for Individuals with Unilateral Transfemoral Amputations

- Why stopped using
  - Discomfort
  - Poor fit
  - Stump pain
  - Weight gain
  - Easier using a wheelchair
  - Health decline

Cognition

- Prosthetic use requires not only the physical competencies of strength, balance and coordination, but also the cognitive capacity to learn new skills and adapt them to different situations and environments.
- Most prevalent causes of lower-limb amputation, PVD and DM, are linked with deterioration in cognitive function.
- Increasing age of amputation due to improved medical management of PVD and DM.
  - 5-10% of all persons aged 65+ are affected with dementia

Coffey, L et al. Cognitive functioning in persons with lower limb amputations: a review. Disability and Rehabilitation 2012; 34:23, 1950-1964

Cognition

- Review of 30 papers
  - Multiple ways of measuring cognitive function
    - Suitable screening tools include MoCA
      - Quick
      - > sensitivity to cognitive abnormalities associated with vascular mild cognitive impairment than MMSE[1]
  - Prevalence of dementia >10% among persons with L/E amputations (5-10% in general population >65 yo). "Relatively common".
  - Cognitive deficit, particularly in area of memory and executive function, is predictive of greater functional limitations over time and negatively correlated with being fit for a prosthesis.

1. Pendlebury, ST. Underestimation of cognitive impairment by MMSE versus the MoCA in patients with TIA and CVA. Stroke. 2010; 41:1290-1293.
Coffey, L et al. Cognitive functioning in persons with lower limb amputations: a review. Disability and Rehabilitation 2012; 34:23, 1950-1964

Cognition

- Prescreening of patients can save potentially wasted medical resources and significant effort on the part of both the patient and rehab team. Should be done routinely.
- Allows for more tailored rehabilitation & setting of realistic goals
  - Conversation of expectations at the start
  - Supports in place
  - Wheel chair independence
  - Simpler prosthetic components

Coffey, L et al. Cognitive functioning in persons with lower limb amputations: a review. Disability and Rehabilitation 2012; 34:23, 1950-1964
O'Neil, BF & Evans, JJ. Memory and executive function predict mobility rehabilitation outcome after lower-limb amputation. Disability and Rehabilitation, 2009; 31(13): 1083-1091

Prosthetic Fitting of Individuals with Cognitive Impairments

Being fit with a prosthesis is a relatively simple process. Casting and prosthetic fitting is done by the prosthetist. The training to use a prosthesis is a more complex issue.

1. Putting on a prosthesis is a complicated task with many steps and safety checks that must be completed to ensure client safety.
2. Knowing when to not wear a prosthesis because of skin irritation, blisters, rash, ulceration or if the integrity of the prosthesis is compromised, is just as important as learning how to put it on.
3. Learning to walk safely with a prosthesis requires endurance, strength and balance. Clients need to be able to follow directions and build upon previous learning to manage this safely.

Some clients may have the physical ability to manage a prosthesis, but do not have the cognitive ability to manage complex tasks associated with the prosthesis.

Individuals with cognitive impairments are put at greater risk if they do not have adequate and consistent supports to help keep them safe. "Consistent supports" would mean one or two individuals who are always with the individual to ensure safety and it does not mean occasional home care service with multiple different care providers.

_____ has been referred to our program for consideration of prosthetic fitting.

However, the Amputee Service Team feels this client does not have the cognitive ability to safely manage the complex tasks associated with the prosthesis. As a result, before proceeding with a trial of prosthetic fitting and training we require agreement to the following items:

- ☐ Prosthetic fitting and training will allow this client to be managed in a safer manner and we do not feel prosthetic fitting will put this client at an increased risk for falls or injury.
- ☐ This client will have a consistent care provider who will be able to assist them in managing to put on and take off the prosthesis and use it in a safe manner at all times.
- ☐ The primary care provider will attend therapy sessions consistently with the client to learn how to safely manage all aspects of prosthetic management.
- ☐ We understand that this will be a trial of prosthetic fitting and training. If this client is ultimately deemed not to benefit from prosthetic fitting by the Amputee Service Team, then no prosthesis will be provided and the prosthetic trial will end.

_____

Primary Care Providers Name (Please Print)

_____

Primary Care Providers Signature & Date

Expectation Management

ENSURING SUCCESS

Top 10 List

- Provided pre or post amputation
  - When do I get my leg?
  - How long do I have to stay in hospital?
  - Do I have to pay for my prosthesis?
  - Who will make my prosthesis?
  - How do they make my prosthesis, what does it look like?
  - What needs to change at home and who pays for it?
  - Can I drive again?
  - Phantom pain

Peer Visitor Network

What

- A number of experienced, trained amputees linked through an organization
- Peers have completed a standardized training program and received certification
- Program developed by the Amputee Coalition of America, adapted for Canada by the Amputee Coalition of Canada

Why

- To provide emotional and informational support to new amputees and their families. Serve as role model

How

- Visits are made upon referral only
- Peers are matched (sex, amputation level, age)

Recommendations

- Patients would benefit from being seen by a rehabilitation professional prior to their amputation (ideal) or as soon after their amputation as possible to beat the "well-meanies"
- Peer visitor support is an incredible opportunity (and underutilized) for many to gain a realistic understanding of what the future holds, minimize fear etc.
- Wheelchair accessibility ensures long-term mobility thereby reducing disability

Summary

- Expectation management is important (preop best)
  - You won't receive a prosthesis prior to going home
    - Average time amp to readiness for prosthetic fitting =126 days (3-4 months).
    - Average prosthetic rehab = 6-8 weeks
    - Average inpatient rehab stay = 42 days
  - You will need to use a wheelchair more than you think
  - Your home should be made wheelchair accessible
  - How well you do with a prosthesis really depends upon your level of amputation and how well you are doing now
  - Despite what *Dancing With the Stars* shows, walking with an above knee prosthesis is really, really hard
- My contact number 223-6426

THANK YOU!!