Limb loss and rehabilitation

Session outline

- Incidence and etiology
- Levels of amputation
- Rehabilitation team
- Rehabilitation goals
- Focus for Client Teaching
- Techniques to shrink and shape
- Residual limb pain, Phantom sensations, Phantom pain,
- Process review & Common nursing diagnosis
Learning objectives

- Demonstrate appropriate knowledge of causes of amputation, goals and treatments r/t amputation, educational topics that needs to be reviewed with client and family
- Explain what is phantom limb pain
- Identify strategies to help client to manage phantom limb pain
- Identify components of a remaining leg assessment
- Discuss nursing interventions to assist client through the grieving process

AMPUTATION

- "Loss of a body part is permanent, leaving the individual with alterations in mobility and body image as well as self-care deficits."
- "Rehabilitation interventions are critical for successful adaptation and reintegration into the community."

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DEFINITION

- **Congenital**
  - (congenital skeletal deficiency): absence of part or all of an extremity at birth

- **Acquired**
  - loss of part or all of an extremity as a direct result of disease, trauma or surgery

INCIDENCE

- Rate increases with age
- Peak incidence: 41 – 71 years; 75% occur in over 65
- Sex: incidence higher in men
- Race: African American and Aboriginal people with diabetes = increased rate
- Type: lower extremity r/t disease (70%)
  - upper extremity r/t trauma (30%)
ETIOLOGY

Disease related amputations
- Diabetes mellitus
- Peripheral vascular disease
- Osteomyelitis
- Gangrene
- Thrombosis

Trauma related amputations
- Results from MVA, gunshot wounds, falls, frostbite, explosions, ward injuries, burns, industrial and farm accidents

Tumor related amputations
- Most common in children 10-20 years of age

Disease Related Amputation

70% of amputations related to vascular disease and infection

DIABETES = 45 – 70% of non-traumatic amputations
50% of these clients have vascular, peripheral nerve, cardiac, respiratory visual and kidney problems
Peripheral Vascular Disease

- PVD in 80% of clients and (75% also have diabetes)
- PVD 2.5 to 3 times more common in people with diabetes
- Client with DM and PVD unable to form collateral circulation
- Amputation rate 15X greater with diabetes
- Contralateral limb amputation in 5 years

Classic signs indicating peripheral vascular disease (PVD)

- Pain
- Pulselessness
- Pallor and trophic changes
- Polar
- Paresthesia
Osteomyelitis

- Pyrogenic infection in bone
- Sx: pain, fever, bone destruction
- Aggravated by PVD and DM

Gangrene and Thrombosis

- **Gangrene**: Death of body tissue, usually associated with loss of vascular supply, may be followed by bacterial invasion. Gangrene may be dry or wet.

- **Thrombosis/acute embolic disease**: results from atherosclerotic event or coagulation disorder
Trauma related Amputation

- 75% of upper and 30% of all amputations
- MVA, gunshot wounds, falls, frostbite, explosions, war injuries, burns and industrial and farm accidents
- More common in men 17 to 55 years

OTHER

- TUMOR
  - 5% of amputations (indicated if margins not clean or resection not possible; less frequent due to advances in limb salvage)
- Sarcomas
- Most common in children 10 – 20 years

- CONGENITAL
  - 3%
  - Birth to 10 years
COMORBIDITIES

- **Cardiopulmonary deconditioning**
  - May be r/t immobility
  - Increases if cardiac/pulmonary history

- **Peripheral Vascular Disease**
  - Determining factor in amputation level and wound healing

- **Diabetes**
  - Affects wound healing
  - High risk for contralateral amputation

Levels of amputation

- **Upper extremity**
  - Transcarpal (partial hand)
  - Wrist disarticulation
  - Trans radial (below elbow)
  - Elbow disarticulation
  - Trans humoral (above elbow)
  - Shoulder disarticulation
  - forequarter
Levels of amputation

**Lower extremity**
- Transmetatarsal
- Ankle disarticulation (Symes)
- Transtibial (below knee)
- Knee disarticulation
- Transfemoral (above knee)
- Hip disarticulation
- Hemipelvectomy

Site of Amputation Surgery

Based on level of viable/vascularized tissue
- (decision often made at time of surgery)
- Preservation of knee joint is preferred for optimal function in lower limb amputation
- Patient expectations, patient’s functional level, reason for amputation and surgeon’s experience all influencing factors.
**SURGERY**

- **Closed procedure** (most common): full-thickness skin flap covers distal end of bone

- **Open procedure** (guillotine): end of residual limb left open
  - Performed when infection present, or likely
  - To preserve length in trauma

**REPLANTATION**

- Success high in **upper extremities**:  
  - Amputation of thumbs, fingers  
  - Amputation in children  
  - Clean amputation at palm, wrist, or forearm  
  - Complex injuries that might benefit from acute microsurgical reconstruction (revascularization, free flap coverage).
REHABILITATION

Rehabilitation Team

- Orthopedic/vascular surgeon
- Physiatrist
- Nurse
- Physiotherapist
- Occupational Therapist
- Prosthetist
- Social Worker
- Pharmacist
- Psychologist
- Clinician Dietitian
- Vocational Counselor
CLIENT AND FAMILY

- Pre-amputation interventions
- Post amputation expectations
- The Rehabilitation Process

Rehabilitation Goals

- Manage Complications
- Promote healing of wounds
- Manage Pain
- Assist with shaping and conditioning of the residual limb
- Maintenance of range of motion
- Assess and prepare the client for a prosthesis
- Provide client with a prosthesis
Rehabilitation Goals

- Provide gait and endurance training with new prosthesis
- Provide upper extremity strengthening exercises
- Promote independence in self-care and activities of daily living
- Provide education regarding prosthetic fitting and care
- Provide support for the adaptation to the changes

The Interdisciplinary Team

- Interdisciplinary rounds
- Interdisciplinary assessment
- In-patient management
Focus for Client Teaching

- Diabetes, Vascular, Co-morbidities
- Wound Care
- Phantom sensation, phantom limb pain, and residual limb pain
- Prone lying/contractures
- Residual limb wrapping/shrinker
- Skin care
- Care of the remaining leg and residual limb
- Care of prosthesis and prosthetic socks

Presurgical Interventions

- Wound care/management (85% of amputations in patients with DM preceded by non-healing ulcer).
- Revascularization
- Oxygenation (hyperbaric oxygen)
- Pain management (to decrease phantom pain)
**Potential Post Surgical Complications**

- Pressure ulcers and skin breakdown (coccyx, heels)
- Non healing incisions
- Infection, osteomyelitis, gangrene
- Embolism (pulmonary, DVT)
- Falls (fractures, dehiscence of incision)
- Post operative confusion, depression
- Heart attack, stroke, diabetic reaction
- Flexion contracture, deconditioning

**WOUND MANAGEMENT**

**Post operative cast**: monitor for increased edema, drainage, odour, pressure

**Without cast**: monitor for dehiscence, infection, healing status, gangrene, vascular status

**For residual limb edema**: a) use appropriate method for shrinking/shaping (ace wrap – rewrap q 3-4 hrs; shrinker – remove q 3-4 hrs; air splint

  b) discourage client from hanging limb down for extended periods (use limb board)
Pain Management

1. Manage Pain
   - **Surgical pain**: early intervention shown to decrease phantom
   - **Residual Limb Pain**
   - **Phantom limb pain**: knifelike, burning or squeezing sensation (often similar to pre-surgical pain)
   - Occurs to some extent in all amputees
   - Pharmacological and physiological management

Pain Types

- Residual limb pain
- Phantom sensation, phantom pain
**RESIDUAL LIMB PAIN**

- Defined as painful sensations perceived as originating in the residual portion of the limb
- Universal during postoperative period
- Usually described as intermittent
- Less common than phantom limb pain in the months and years after an amputation

**PHANTOM LIMB PAIN/SENSATION**

- Phantom sensation: usually begins immediately and experienced as vivid illusion of limb
- Phantom pain: exaggeration of sensation characterized by four major properties:
  - Persistent
  - Triggered by proximal or remote stimuli
  - More likely to develop if pre-amputation pain present
  - May be temporarily or permanently abolished by transient changes of somatic input
Characteristics of Phantom Pain

- Burning, cramping, sharp-shooting
- Paroxysmal and lancinating in quality
- Referred to missing hand or foot
- Continuous or intermittent
- Triggered by autonomic functions such as urination, ejaculation or other body pains or sensations
- 85% of patients indicate pain mild, infrequent
- Significant problem for 5-10/5

Painful sensations reported

- Tingling
- Sharp/shooting (knifelike) feeling
- A squeezing feeling
- Feeling similar to electric shock
- Sensations of burning, cramping or throbbing
Management of Phantom Pain

- Support and education. 50% report decrease in frequency/intensity over 6 months
- Monitor for noxious stimuli (poor fitting prosthesis)
- Provide peripheral stimulation by wearing prosthesis, massaging/tapping limb, TENS
- Relaxation, coping skills, biofeedback
- Medications (treat as neuropathic pain)
- Other: acupuncture, therapeutic touch, local anaesthetic block

PROSTHETIC FITTING
Candidate for Fitting

- Reasonable cardiovascular reserve
- Adequate healing, skin coverage, range of motion
- Muscle strength
- Motor control
- Learning ability
- Motivation

ENERGY REQUIREMENTS

- Unilateral below knee = 10 to 40% more
- Above knee = 60 to 100% more
- Bilateral below knee less than unilateral above knee
- Patients compensate by slowing walking speed
PREDICTORS OF FUNCTION
Lower Extremity Amputation

- Previous level of function
- Ability to hop with walker/crutches
- Ability to stand on sound leg (with aid)
- Has cardiopulmonary reserve
- Has energy

Goals of Pre-prosthetic Management

- Healing of incision
- Preparation of limb for prosthetic fitting
- Maintenance of Range of Motion
- Promote independent mobility, self-care and activities of daily living
- Provide education regarding prosthetic fitting and care
- Provide support for adaptation/change
**THERAPY MODALITIES**

**Transfer training:**
- standing pivot, sliding board

**Ambulation training**
- parallel bars, balance (sitting, standing)

**Pre-prosthetic training**
- wheelchair function, conditioning/ROM,
  conditioning/shaping of residual limb

**Prosthetic evaluation and fitting**

**Functional activity training**
- donning/doffing, sock adjustment, ambulation

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**PREVENT CONTRACTURES**

Prevent contractures

- **Prone lying:** stretches hip into extension
  - done 3 – 4 times/day for 20 minutes
  - improves mobility and decreases chair dependency

- **Knee extension:** may be facilitated by post surgical cast, splint or limb board

- **Above Knee residual limb:** keep adducted while in bed

- **Elbow extension:** custom made splint
Methods to ‘shape’ and ‘shrink’

- Post surgical cast
- Bandaging (figure 8)
- Shrinkers

Remaining Limb Assessment

- Skin
- Vascular Assessment
- Protective Sensation
- Pain
- Foot Wear
- Co-Morbidities
- Knowledge/Self Care Deficits
PROSTHETIC MANAGEMENT

Develop wearing schedule – two hours on, two hours off once or twice/day
Frequent skin checks
Build up tolerance
Usually needs several sockets during first year and may need specialty prostheses
Provide education for prosthetic wear and care

TYPES OF PROSTHESES

May be functional or cosmetic

Lower Extremity prosthesis
  – More uniform, less complex
  – Gait training usually begins between parallel bars and progresses to walker, crutches/cane

Upper Extremity prosthesis
  attempts to replace complex appendage
  may be body-powered (cable) or myoelectric
GERIATRIC CONSIDERATIONS

- Over age 65 – will affect rehab potential
- Often dual diagnoses: cardiopulmonary; poor neuromuscular coordination; visual impairment, weakened muscles, limited ROM (arthritis).
- Other co-morbidities: DM, CRF, Stroke, Parkinson’s, previous amputation

Process Review and Evaluation
**Review - Pathway for Amputee Clients receiving a prosthesis**

- Admission with interdisciplinary assessment and clients goals
- Determination of discharge environment (family/ community resources)
- Monitoring of status of skin/ physical activity
- Shrinker obtained
- Airsplint
- Casting and fitting
- Prosthetic socks and verify socket - ongoing evaluation

**Pathway for Amputee Clients receiving a prosthesis (continuation)**

- Estimated date of discharge is determined
- Evaluation of need for other equipment resources
- Weekend at home
- Ongoing teaching on all of the above
- Discharge plan in place
- Discharge with prosthesis and necessary equipment
- Ongoing outpatient follow-up to finalize fitting and discharge goals
COMMON NURSING DIAGNOSES

- Impaired Physical Mobility
- Alteration in comfort: pain
- Alteration in skin integrity
- Knowledge deficit
- Self Care deficit
- Grieving
- Alteration in family process
- Potential for injury/Fall Risk
- Noncompliance
- Social isolation

PSYCHOLOGICAL SUPPORT

Psychological support
  - allow client to grieve at own pace
Watch for signs of disturbance:
  - refusal to look at or touch residual limb
  - unwillingness to discuss predicted limitations or use of prosthesis
  - refusal to participate in self care
  - social withdrawal
  (psychological distress major reason for nonuse of prosthesis)
GRIEVING

- Client may show a wide variety of behaviors
- Can express many different feelings as they are coping with the loss and working through their grieving.
- Role of nurse – to acknowledge loss and to listen and support client and family

Supporting adaptation to body image disruption

The reimagining process

- Body image disruption
- Wishing for restoration
- Reimagining the self

Source: Norris J., Stockard, S., Supporting Adaptation to Body Image Disruption, Rehabilitation Nursing, 27 (1) Jan/Feb 2002
Common Nursing Interventions

- Promote independence in activities of daily living and support self-management
- Promote activity tolerance
- Manage pain
- Provide education related to amputation, skin care, complications, devices, safety, community resources, psychosocial support
- Educate and provide support/resources for family

Some Expected Outcomes

- Client demonstrates optimal independence in mobility skills
- Client monitors skin, prevents contractures
- Client understands principles of prosthetic management as appropriate
- Client aware of risk factors for amputation and manages co-morbidities
- Client integrates amputation/prosthesis into lifestyle
Concepts for Care of Client with Amputation

Understand the factors associated with amputation

Understand the implication of the level of amputation on the care of the client

Select rehabilitation nursing interventions to optimize the function of the client

Support Interdisciplinary model of care