The Role of Physical Therapy in Breast Cancer Management

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Breast Cancer Overview[1]

- Globally the most diagnosed cancer in women
- 12% of women will develop breast cancer over the course of their lives
- ~253,000 to be diagnosed with invasive breast cancer in 2017
- ~63,000 diagnosed with in-situ breast cancer in 2017

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Types of Surgery[1]

- **Breast biopsy**—only a tissue sample is obtained for diagnostic purposes
- **Lumpectomy**—cancerous tissue is removed but surrounding breast tissue is spared
  - "breast-conserving surgery"
- **Mastectomy**—entire breast is removed
- **Lymph node biopsy or dissection**
  - Removal of lymph nodes in axilla to determine if spread of Ca has occurred
- (Reconstruction)—implant, myocutaneous flap

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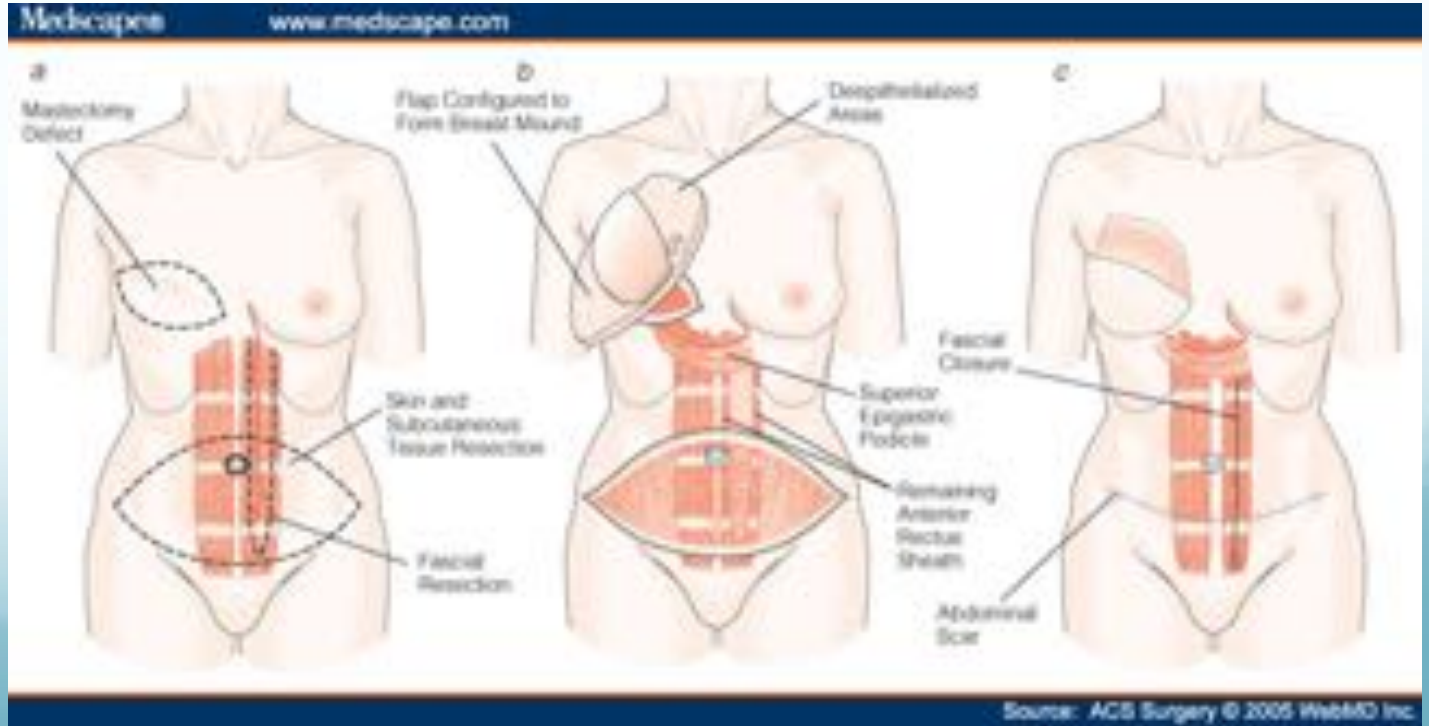
Reconstruction Options

- Myocutaneous
  - TRAM flap
  - DIEP flap
  - Latissimus dorsi flap
- Staged Reconstruction with Implant

TRAM Flap[2,3]

- "Free" TRAM: complete removal of rectus abdominis
  - Variation using only medial rectus
- "attached" TRAM: larger portion of rectus abdominis is used



DIEP Flap

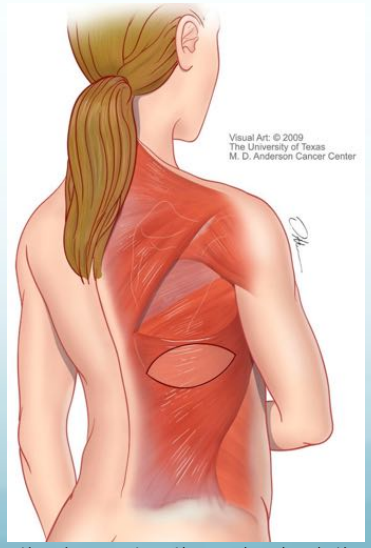
- Deep Inferior Epigastric Perforators
- (No muscle is taken from abdomen—just skin and muscle)

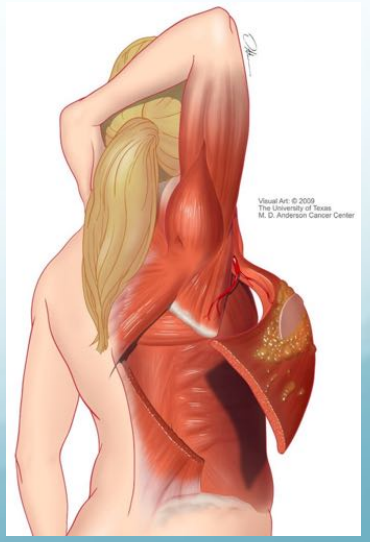
TRAM Flap[2]

- **Is there a loss of core stability?**
  - **YES**
  - Some surgeons proactively place artificial mesh
  - Attached TRAM=higher rates of instability and LBP
- Dunya et al, 2009:
  - Trunk flexion and rotation were most impaired in attached TRAM subjects—oblique function impaired

Latissimus Dorsi Flap[3]

- Less-commonly used
- alternative to TRAM for pts with prior abdominal surgery or insufficient tissue
- “skin paddle” and portion of the latissimus dorsi will be removed and tunneled beneath the axilla onto the chest





https://www.mdanderson.org/treatment-options/breast-reconstruction/reconstruction-using-back-tissue.html

Latissimus Dorsi Flap[3,4,5]

- **What about the absence of a functioning latissimus dorsi muscle?**

→ Latissimus dorsi function: extension, IR, adduction; trunk rotation; shoulder depression & downward rotation of scapula

  - *Smith, 2014: Significant reduction in shoulder joint stability, strength, ROM, & general function
    - **However, synergistic muscles are recruited and "eventually replace" the lost action of the latissimus dorsi within 6-12 mos**
  - Button et al, 2010: higher pre-op DASH=higher post-op DASH---potential role of physical therapy prior to reconstruction

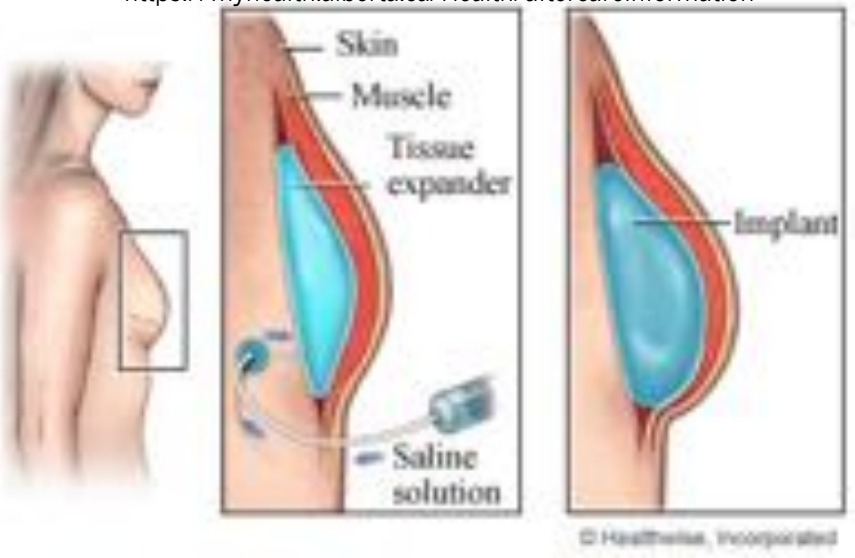
Staged Reconstruction[6]

- Common for women undergoing radiation therapy
- Insertion of tissue expander will be implanted after mastectomy to maintain skin integrity throughout radiation—later implant reconstruction will be utilized

→ Prevents fibrosis and contracture during radiation

60% of patients experience soft tissue contracture and complication with an implant when placed prior to and during radiation

https://myhealth.alberta.ca/Health/aftercareinformation



PT Considerations for Expander & Implant[6,7,8]

- Impaired ROM and recovery period much longer than immediate reconstruction
- Tissue contracture around implant
- **Under versus Over pectoralis major?**
  - de Haan et al, 2007: subpectoral placement resulted in diminished muscle function compared to non-operative side
  - Beals et al, 2003: loss of strength is not statistically significant and does not produce any long-term UE functional deficits

Patient Presentation in an Outpatient Setting

- Impaired ROM—abduction, extension
- Fibrosis, tissue contracture around axilla
- Surgical incisions around axilla and chest
  - Potential impaired healing d/t chemotherapy & radiation treatment
- Plastic tissue expander—avoid prone exercise
  - Generally painful and restrictive

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PT Intervention: Post-acute Overview[9,10,11]

→*Surgery in combination with radiation therapy is considered the main contributor to UE dysfunction in women with breast Ca*

→No evidence for increased risk of lymphedema from exercise after axillary dissection for breast CA

→ Structured exercise program should be implemented immediately following surgery, *within the limits of post-op precautions*

Exercise: Chemo-Induced Fatigue[12,13]

- Van Vulpen et al, 2014:
  - Statistically significant improvement in general and physical fatigue across studies incorporating **resisted and aerobic exercise** in breast cancer patients
  - No effects on cognitive and affective fatigue

- Schwartz et al, 2001:
  - **As duration of exercise increased, levels of fatigue significantly decreased**

- Schmidt et al, 2015:[14]
  - ***Does exercise in isolation benefit cancer-related fatigue and QoL, versus the psychosocial benefits associated with group exercise?***
  - Intervention group received group exercise training
  - Control group received group relaxation activity with no physical exercise, eliminating the confounding psychosocial benefits of an intervention-only group setting
  - Exercise group significantly improved in realm of physical fatigue

Exercise: Function[10,11]

- Kilbreath et al, 2012:
  - progressive resistance training s/p reconstruction results in **improved shoulder abduction and flexion ROM, abduction strength[5]**

- Galentino et al, 2013: physical therapy intervention **improves post-op shoulder AROM and** function both immediately post-op and at 6 mos

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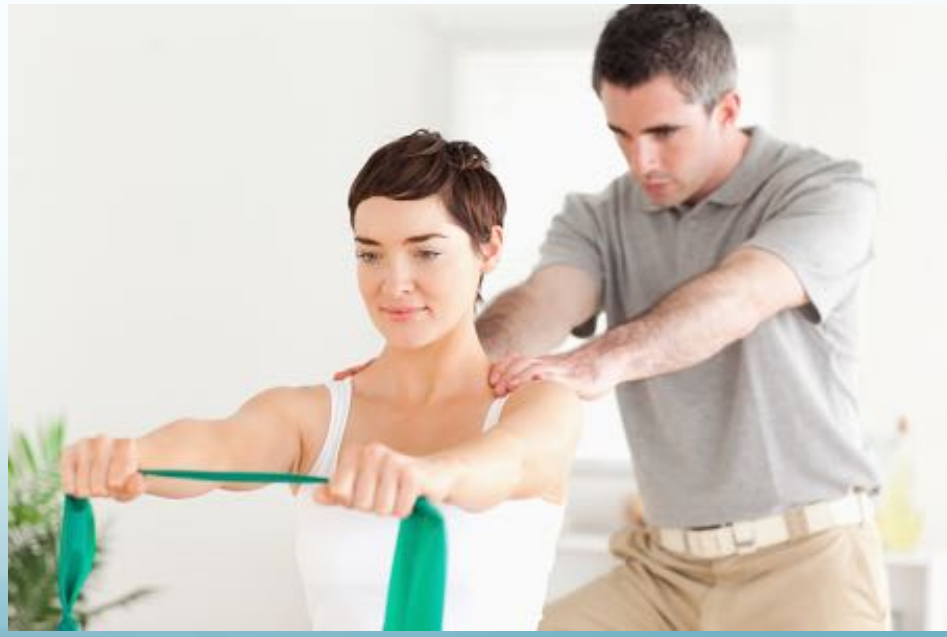
- General guidelines for shoulder function s/p breast surgery[11,16]
  - PROM/AAROM/AROM
  - Soft-tissue scar mobilization
  - **PNF exercise for scapular rhythm & stabilization**
  - **Progressive resistance exercise**
  - Aerobic exercise

- If pt has had myocutaneous reconstruction, *rehab must focus on donor site as well*, following specific surgical precautions



Axillary Web Syndrome[16,17]

- Palpable “cord” of subcutaneous tissue from the axilla down the medial arm and over lateral border of pectoralis major
- Pathophysiology:
  - Likely result of exposure to thrombokinase—inflammatory response
  - Sclerosed veins & fibrosed lymphatic vessels

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Risk factors: lower BMI, young age, *greater number of lymph nodes removed*

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- Functional implications: Decreased abduction, extension, flexion, overhead activity[18]

- Physical Therapy Implications:
  - Manual techniques—myofascial release, soft tissue mobilization, scar release, stretching[16]
  - **Release of cord is audible**

- Spontaneous resolution of symptoms commonly occurs within 2-3 mos

Lymphedema vs Edema[19,20]

- Lymphedema: impaired drainage of lymph fluids due to **damage or blockage of lymphatic system**, leading to accumulation of lymph interstitial spaces

→ irreversible, chronic

- Edema: accumulation of excess interstitial fluids d/t inflammatory response

→reversible

Staging and Classification[21]

- Stage 0: (latent lymphedema)—reduced capacity, no apparent edema
- Stage 1: reversible pitting edema with elevation
- Stage 2: irreversible non-pitting edema, possible presence of fibrosis
- Stage 3: (lymphostatic elephantaiasis)—significant increase in connective & scar tissues, severe non-pitting edema, hardening of dermal tissue

- Stemmer's Sign: pinch and lift skin at base of 2nd toe or finger
  - (-) able to pinch and lift
  - (+) unable to pinch and lift

Negative Stemmer's Sign

Lymphedema in Breast Cancer[19,22]

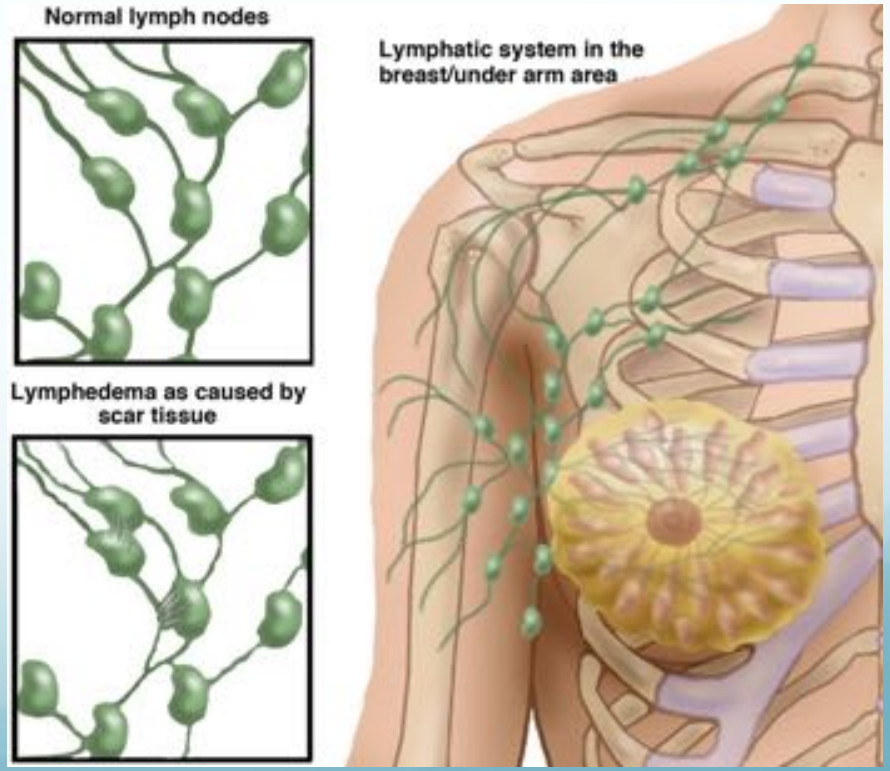
- Risk increases with removal of significant number of lymph nodes during surgery
  - Higher risk associated with axillary lymph node dissection vs sentinel lymph node biopsy

→primary lymphedema

- idiopathic

→secondary lymphedema**

- acquired



Complete Decongestive Therapy (CDT)[23]

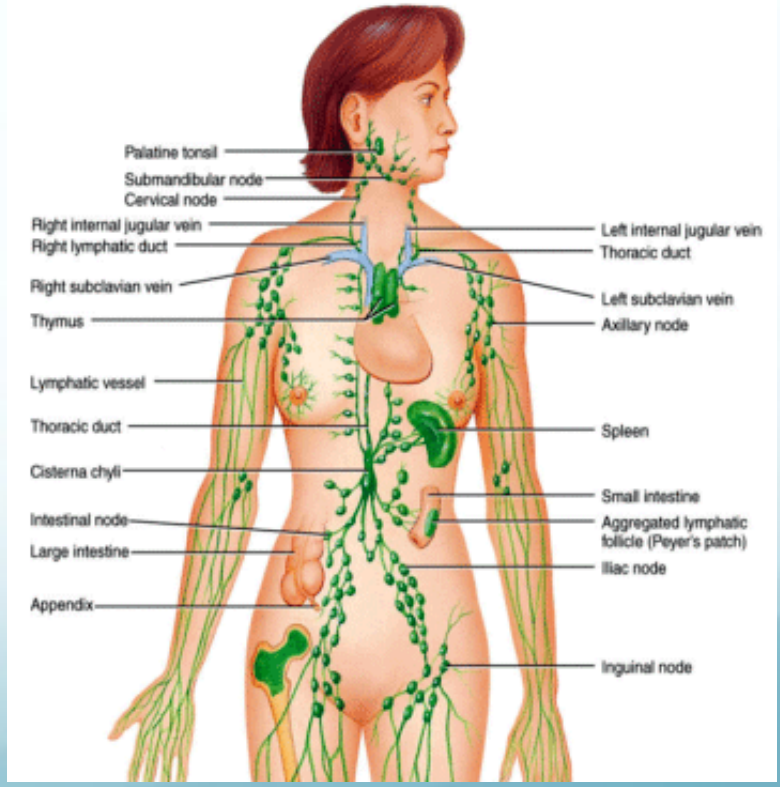
- Incorporates multiple treatment approaches for reduction of lymphedema in the affected limb, including:
  - Manual lymphatic drainage
  - wrapping
  - Compression garments
  - Patient education & self-care
- ***CDT is considered the gold-standard for >stage 1 lymphedema**
- Phase I: Reductive CDT
- Phase II: Maintenance CDT

Manual Lymphatic Drainage[24]

- Used throughout phase I of CLD and as needed for management
- ***Gentle*** "massage" promoting flow of lymph fluid in damaged structures
  - Creates vacuum effect, directing flow toward central structures for drainage into venous system

Manual Lymphatic Drainage[23,24]

- *Proximal always decongested before distal*
- *no manual lymph wrapping for pts with active CA or inflammation in surgical region



Evidence: CDT & MLD[25,26,27]

- Stuiver et al, 2015:
  - **Exercise does not increase risk of lymphedema!**
  - **Improved ROM and shoulder function**
- Devoogdt et al, 2010:
  - combined physical therapy with CDT/MLD had statistically greater reductions in UE edema and impairment versus pts with exercise or MLD alone
- Tambour et al, 2014: regular lymphedema management with cont'd exercise prevents "feed-forward chronic upper extremity impairment"

Physical Activity & Lymphedema (PAL) Trial[28]

- 3 yr RTC, 154 breast Ca pts *without* lymphedema
- Intervention group received progressive UE & LE strength training
  - 35% less incidence of lymphedema development
  - **In pts with 5 or more lymph nodes removed, impact even greater→70% reduction in development of lymphedema**
- Machine & Free-Weights

Wrapping vs Compression Garments[24]

- Compression bandages (wrapping) applied immediately after MLD to prevent reaccumulation of lymph fluid
- Circumferential measurement is indication of progress with CDT—a plateau in these measurements indicates progression to use of compression garment

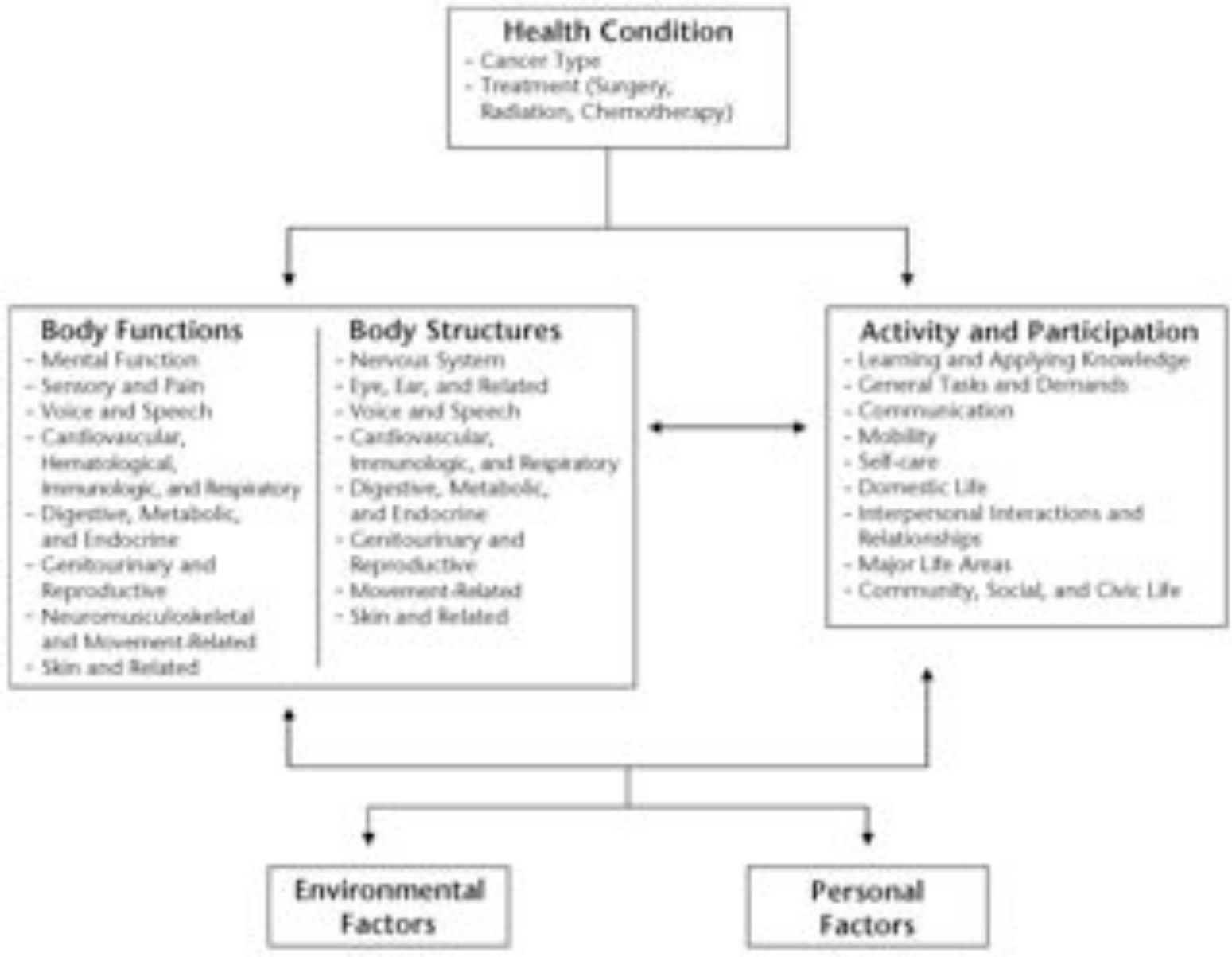
Wrapping vs Compression Garments[24]

- Compression garment worn to maintain progress made with MLD and compressive bandages—supports flow of lymph in the right direction *but does not decongest the limb*

Other Considerations: Lymphedema

- Skin hygiene
  - Bandages & garments can be taken off to shower
  - Should be worn 23/24 hours per day
  - Lymphatic skin is highly alkaline—apply low pH lotions like Eucerin
  - Increased risk of infection with open surgical wounds and lymphedema
- ***Patient Education***

Other Considerations[29]



Outcome Measures[29,30]

- Shoulder-specific Tests
  - DASH
  - Penn Shoulder Score
- Breast Cancer-specific Measures:
  - LLIS-Lymphedema Life Impact Scale
  - FACT-B (Functional Assessment of Cancer Therapy-Breast)

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