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Lymphedema & Chronic Edema: Management Strategies for Nursing to Promote Wound Healing

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Definitions - Swelling

- Observable fluid accumulation
- Generalized or localized
- Pitting or Non-pitting
- Increased interstitial fluid - outside the cells & blood vessels
- Lymphatics always involved
- Symptom of a disease process

Lymphedema
- Protein-rich fluid in tissues
- Insufficiency or damage to lymphatic system or chronic overload - lymphedema dependency
- A chronic diagnosis

Lymphatic System

- Lymph nodes & organs
- Lymphatic trunks/ducts
- Venous angle
- Heart
- Arteries
- Interstitial tissue
- Veins
- Lymphatic capillaries
Normal circulation at the capillary level is a balance of fluids transported by the arterioles & reabsorbed by the venules & initial lymphatics.

The lymphatic system functions as a one-way transport system of lymph fluid from the interstitial tissue back to the venous blood circulation where it originated.

Lymph Capillary and Blood Capillary Loop:
1. Arterial side of blood capillary
2. Venous side of blood capillary
3. Lymph capillary
4. Open junction "swinging flap"
5. Fibrocyte
6. Anchoring filaments
7. Interstitial space
Lymphatic Fluid

- Protein Molecules
- Water
- Cellular Components: WBCs, CA cells, bacterial/viral cells and debris from proteolysis/phagocytosis
- Fatty Acids

Reabsorption

- 90% by the venule
- 10% by the lymphatic vessels
- Transport of the lymphatic load depends on tissue pressure, blood capillary pressure and colloid osmotic pressure.
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Interstitial Fluid

- Balance between hydrostatic and oncotic pressures in blood capillaries and interstitial space.
- Lymphatic system protein and fluid exchange
- Diffusion - passive from high to low concentrations
- Transport Capacity

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Transport Capacity

- The lymphatic system can transport 10 times its normal daily load.
- 2.2-4.4 L per day
- This allows the body a safety reserve

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Drainage Possibilities of Lymph Territories

(A) 1. Lymphatic skin area
    2. Pre-collector
    3. Subcutaneous Collector

(B) 3. Subcutaneous collector
    4. Lymphatic skin area
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**Lymphatic Transport**

- **Superficial:**
  - passive
  - initial lymphatics
  - pre-collectors
- **Dermal:**
  - collectors
  - valves
- **Subfascial:**
  - valves
  - active transport
  - lymph angion

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**Lymphatic Network**

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**Lymph Angion Stimulation**

- Pressure of interstitial fluid
- Pulsation of arteries
- Skeletal muscle contraction
- Deep breathing
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Interstitial Fluid Volume

Increases if:
- Decreased venous uptake
- No increased lymphatic uptake

Results in accumulation of plasma proteins, triggering chronic inflammation and fibrosis - edema.

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Venous Return

- Muscle Pump
- Healthy venous system - sufficient valves
- Abdominal breathing
- Suction effect of heart in diastole
- Pulsation of adjacent arteries
- Tissue pressure
PATHOPHYSIOLOGY
VENOUS AND LYMPHATIC FAILURE
SWELLING

Mechanisms of Swelling
Edema vs Lymphedema
- Edema - intact lymphatic system
- Lymphedema - damaged, insufficient, overloaded lymphatic system
- Inflammation - burn, bite
- Trauma - fractures
- Infections/Cellulitis/Wounds

Mechanisms
- Post Operative
- Acute Injuries - sprain, strain
- Neurological - paralysis
- Venous - DVT, CVI
- Medical/Systemic - heart, lungs, liver, kidneys - CHF, CRF, medications
- Lifestyle - obesity, dependent position, sedentary
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Risk Factors

- Lymph vessel destruction secondary to surgical technique
- Obesity
- Insufficient muscle contraction
- Infection or problems with healing
- Trauma
- Prolonged dependency of extremity
- Fibrosis/scarring within the lymph vessel
- Recurrent infections
- Hypertension

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High Volume Edema

- Dynamic insufficiency occurs when lymphatic load exceeds the Transport Capacity of the anatomically and functionally intact lymphatic system.
- Edema is temporary and will gradually improve over time (6-12 weeks).
- Lymph system is Normal.
- Symptom of a medical condition.
- Quick onset.
- Responds to diuretics.
- Local or general.

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Chronic Venous Insufficiency

Valvular failure of veins causing regurgitation

Recanalization/collaterals:

- proximal blood flow will go through collaterals
- unsuccessful recanalization; distal blood tries to flow through blocked area causing constant reflux and increased blood pressure resulting in passive hyperemia

- ↑ blood volume, ↑ lymph load, ↑ fatigue, ↑ resorption time, ↑ edema
Leaky Veins

Chronic Venous Insufficiency

- Damage to dermal and subcutaneous lymphatic network
- Inflammation with lipodermatosclerosis
- Increased lymph filtration which overloads an impaired transport system
- Increased risk of infection and cellulitis
- Contributes to wound exudate
- May produce fibrosis, hyperkeratosis, and papillomas of subcutaneous tissue
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Stages of CVI

<table>
<thead>
<tr>
<th>Stage</th>
<th>Current Symptoms</th>
<th>Suprafascial Pathophysiology</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Asymptomatic</td>
<td>High Water, Normal Protein, Normal Lymphatics, Sufficiency/Insufficiency</td>
</tr>
<tr>
<td>I</td>
<td>Mild swelling</td>
<td>High Water, Normal Protein, Normal Lymphatics, Sufficiency/Insufficiency</td>
</tr>
<tr>
<td>II</td>
<td>Moderate</td>
<td>Very High Water, Very High Protein, Partially Severely Altered, Extreme Phlebo Lympho Static Insufficiency</td>
</tr>
<tr>
<td>III</td>
<td>Severe Ulcerative changes; Diffusion, Decrease Oxygen, Tissue Death, Necrosis, Ulceration</td>
<td>Very High Water, Very High Protein, Partially Severely Altered, Extreme Phlebo Lympho Static Insufficiency</td>
</tr>
</tbody>
</table>

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Lipodermatosclerosis

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Chronic Inflammation

- Delays wound healing
- Persistent tissue edema
- Damaged or blocked lymph vessels
- Decreased ability to control content and volume of interstitial fluid
- Impaired macromolecule transport of large proteins, cellular by-products, foreign materials, immune cell, T-lymphocytes, macrophages
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**Chronic Edema**
- Increased tissue pressure
- Increased diffusion distance
- Lack of Oxygen
- Impeded transport
- Delayed healing, stress on wound edge
- Impeded supply of basic substances for tissue neoformation
- Irritation of nociceptors
- Scar disturbances: keloids, hypertrophy

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**Tissue Changes Due to Protein Accumulation**
- Increased swelling: hydrophilic
- Proteins denature: chronic inflammation
- Connective tissue cells proliferate
- Collagen fibers are produced
- Fibrotic changes, sclerosis, induration
- Fatty tissue increases

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**Impaired Wound Healing**
- Delays due to upset homeostasis
- Increased volume of interstitial fluid
- Increased congestion
- Decreased Oxygen and nutrient diffusion
- Increased diffusion distance for connective tissue repair
- Interrupted blood supply
- Mechanical stress
- Increased infection risk
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Signs and Symptoms
- Increase in Limb size
- Puffiness
- Heaviness
- Fullness/Tightness
- Bursting sensation
- Aching/Fatigue
- Stiffness
- Hardness
- Weeping or Leaking

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Lymphedema
Lymphedema occurs if the lymphatic load exceeds the maximum transport capacity resulting in an abnormal accumulation of protein rich fluid. The lymphatic system is not able to maintain the tissue homeostasis.

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Lymphedema Classification
- Primary
  - Congenital - at birth
  - Precox - teen years
  - Tarda > 35 years
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**Lymphedema Classification**

**Secondary**

Acquired lymphedema as a result of a disease process or tissue insult.

- CVI (#1 worldwide), Surgery (#1 - US), radiation therapy (#2 - US), trauma, infection, malignancy, silica dust, filariasis (#2 - world), iatrogenic or self-induced.

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**Lymphedema Classification**

**Secondary - Oncology**

- Surgery - damages and removes lymphatic structures and tissue, stimulates increased arterial blood flow
- Radiation - scarring and fibrosis of lymph structures and tissue
- Infection - scarring and fibrosis of lymph vessels, immune system compromise

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**LYMPHEDEMA**

**Mechanical insufficiency:**

- Lymphatic mechanism is impaired/damaged
- Transport capacity of the lymph system drops below the lymphatic load
- Lymphatic system is not able to pick up the lymph load
- Protein accumulation (low volume edema)

Compare to Dynamic Insufficiency
Stages of Lymphedema

Stage 0 - Latent / Subclinical
primarily oncology patients at risk

Stage I - Reversible Lymphedema
accumulation of protein-rich edema fluid

Stage II - Spontaneously Irreversible Lymphedema
protein-rich edema fluid
connective & scar tissue

Stage III - Lymphostatic Elephantiasis
protein-rich edema fluid
connective & scar tissue
hardening of dermal tissues
papillomas of the skin
**PREVENTION**

- Extremity care is essential & the best method for prevention & management.
- Leg swelling guidelines.
- Monitoring signs, symptoms, and tissue quality
- Lymphedema education and prevention.

**Monitoring**

- Measurements
- Clothing Fit
- Mobility
- Body Awareness
- Skin and Tissue Quality
- Early detection
- Lifetime

**ASSESSMENT**

Patient History
- PMH / Co-morbidities
- Surgical / XRT
- Injury / Trauma
- Infections / Wounds
- Mobility / Function
- Lymphedema Onset
- Treatment Regimens - prior therapies, compliance
ASSESSMENT

Skin Condition
- Degree / Location of Swelling
- Texture / Turgor
- Temperature / Color
- Wounds
- Stemmer's Sign
- Lymphedema Complications
- Sensation / Pain

Stemmer's Sign

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Complete Decongestive Therapy

- Skin and wound care
- Manual lymphatic drainage
- Compression bandaging
- Compression Garment/Device
- Exercises
- Education in prevention and self care techniques
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Goals

- Reduction of swelling to restore function & cosmetic appearance
- Increase lymph flow from extremity or trunk utilizing remaining vessels & other lymphatic pathways
- Prevent re-accumulation of lymph fluid
- Minimize formation of new lymph fluid
- Eliminate fibrotic tissue
- Prevent & eliminate infections

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Goals - continued

- Can reduce lymphedema volume by 68%
- Excellent repair/good skin coverage
- Promotes softening of tissues, decreasing pitting and induration
- Decrease edema, redness, pain
- Decrease limb circumference
- Decrease wound size

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PRECAUTIONS

- Active untreated cancer
  - Dependent on goals of oncology tx
- Acute inflammation/infection
  - HOLD treatment until pt on ATB >72 and showing signs of improvement
- Thrombosis (blood clots)
  - HOLD compression x 2 weeks once therapeutically anticoagulated
  - HOLD MLD x 6 wks
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**PRECAUTIONS**

- PAD - May need a vascular consult
- Hypercoagulable risk
- May need a vascular consult
- Systemic conditions - heart, lungs, liver, kidneys
  - Are they compensated? Medically stable?

Precautions need to be addressed prior to referral or treatment.

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**Increased Tissue Pressure**

- Compression bandages
- Compression garments
- Manual Lymphatic Drainage (MLD)
- Underwater

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**Skin & Nail Care Goals**

- Prevent accumulation of bacteria
- Minimize risk of secondary infection
- Provide superficial moisturization to dry skin
- Improves suppleness of skin
- Barrier to infection
Meticulous Skin & Nail Care

- Hygiene: soap and water, gentle exfoliation, tissue movement
- Moisturization: balanced low pH, skin contours/protection, friction (Curel, Eucerin, Nivea, Attractain, 24 hour Sween, Olivamine)
- Wound dressings: no tape on skin
- Nail care
- Proper foot protection/covering

Manual Lymph Drainage (MLD)

- Manual therapy technique
- Subcutaneous tissue is gently stretched to effect lymph vessels
- Begins proximally to decrease resistance to fluid movement
- Minimize formation of new lymph fluid
- Eliminate fibrotic tissue
- Prevent & eliminate infections

Manual Lymphatic Drainage Goals

- Stimulates lymphokinetic activity
- Maximizes drainage, open collaterals
- Clears lymphostasis
- Promotes wound healing
- Decreases volume tension on wound periphery which hinders closing
- Improves local tissue environment, increasing oxygen and nutrients
- Decreases volume and protein composition of edema
- Breaks down hard, fibrotic areas
Thoracic Duct

Lower Extremity Pathways

MLD: Wound Healing Indications
- Compression ineffective reducing edema
- Extensive fibrosis
- Tissue injury
- Traumatic edema
- Surgery
- CVI
- Post-infectious episode
- Chronic wounds
MLD Goals for Wound Healing

- Improve lymphatic vessel activity
- Decreased swelling of traumatized area
- Analgesic effect via
  - gate control
  - suppresses sympathetic activity
  - increased drainage of pain triggering hormones
- Improve vascular inflow (oxygen, nutrients) and outflow (debris, metabolic waste)
- Improved speed and quality of tissue repair
- Sufficient lymphatic flow

Treatment Sequence

- Wound cleansing and debridement
- Manual lymphatic drainage
- Wound dressing
- Compression bandaging
- Exercises

Compression Guidelines

- Complete testing prior to compression
- Rule out DVT, infection, mass
- Vascular consult
- Medically stabilize patient
- Results before lymphedema consult
- DVT - wait 2 weeks after therapeutic anti-coagulation
- Cellulitis/infection - wait 72 hours if stable and improving on effective ATB
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Covering v Constriction v Compression v Containment
- Covering
  - Comperm/Tubigrip - no gradient, unfinished, rolls
  - Wear-Ease - no gradient, unfinished, rolls
- Constriction
  - Ace Wraps - long stretch; high resting pressure, low working pressure; uneven pressure; use only on healthy, normal systems

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Covering v Constriction v Compression v Containment
- Constriction
  - TED HOSE - NOT for swelling; NOT appropriate medical compression socks during the day. Primary use for circulation such as post-op, bedridden or prolong immobilization, anti-embolic or general prevention.
  - "TEDS are for beds"

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Therapeutic Compression
- Compression Bandages - gradient compression
  - short stretch; low resting pressure, high working pressure; restores pressure gradient
- Compression Garments - elastic containment
  - Success equals proper selection
  - Proper donning/doffing
- Compliance
- Velcro Compression Devices - inelastic containment
  - Consider if donning issues, safety, wounds, caregiver, fragile skin, sensitivity, tolerance
Compression Bandaging

- Use of short-stretch multilayered (NOT ACE) bandages
- Short stretch bandages:
  - Low resting pressure - better tolerance
  - High working pressure - less yield
- Compensates for elastic insufficiency of connective tissue
- Increases tissue pressure to assist evacuation of fluid

Short Stretch Bandage Advantages:

- Figure I: Resting pressure
  Pressure provided by applied bandages (while resting or sleeping)

- Figure II: Working Pressure
  Pressure exerted by the contraction of muscles within bandaged limb (while working or exercising)
Compressive Bandaging (Cont.)

- Provides resistance to prevent re-accumulation of lymph fluid – reduced filtration, increased reabsorption
- Break up deposits of accumulated scar or hardened tissue
- Restores compression gradient of limb
- Enhanced lymphatic drainage over high stretch
- Less yielding nature during activity
- With exercise, it provides a counterforce by creating a muscle pump

Thigh High Compression Bandage

Modifed Compression Bandage

- Surepress or Rosidal with padding
- Leg hygiene and wound care
- Liner
- Padding
- Compression bandage: even, gradient pressure
distal to proximal
multiple layers
proper bandage width
Modified Compression Bandage
- overlap layers
- cover foot and entire limb segment
- use fresh washed bandages
- change frequently, minimize slippage/bunching
  ▶ Monitor skin for any irritation/pressure areas
  ▶ Neurocirculation checks: sensation, pain, color, T
  ▶ Assess effectiveness for:
    - slippage/bunching
    - tension
    - tolerance
    - pressure points

Law of Laplace

Compression Gradient
Bandage pressure is greatest in the distal areas of the extremity and least in the proximal areas.
Compression Bandage Guidelines and Precautions

- Bandages will feel secure and snug. Leg movement maybe somewhat limited. Continue to participate in regular daily activities as tolerated as long as the bandages are not causing any irritation or discomfort.
- Wear bandages day and night until ready to progress to the next stage of therapy (i.e., compression garment or device.)
- Elevate legs when sitting or lying down.
- Perform exercises - ankle pumps, walking.
- If itching occurs, pat the bandages or place a dry cold pack on the outer bandage. Do NOT stick anything down the bandages as this may tear the skin.

Nursing Considerations

- Short stretch gradient compression bandage
- Padding
- Elevation
- Exercise - activate ms pump
- Positioning

With sustained short stretch compression the basic wound dressing becomes a dynamic wound dressing.

Short stretch does the work.
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**Exercise/Activity in Compression**

- Increase in lymph flow & a dilation of lymph vessels
- Improves lymph circulation & lymph vessel activity
- Causes a suction effect, negative pressure gradient, and muscle pump

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**Muscle Pump**

Muscle activity decompresses both the venous & lymphatic systems. Figure II shows contracted muscles, figure III shows relaxed muscle.

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**Compression Garment Goals**

- Provide long term preservation of reduced limb circumferences
- Prevent re-accumulation of lymph fluid in the interstitium by controlling hydrostatic pressure
- Provides support for tissues that have lost their elasticity
- Provide extracellular tissue pressures to facilitate lymph fluid uptake and continued softening of fibrotic tissues
Compression Garments

- Fit after limb volume reduction
- Garments are the container
- Garment worn during the day, possibly at night
- Nighttime management to be determined by tissue response and therapist assessment
- Assess for effectiveness
- Donn/Doff with adaptive equipment
- Replacement schedule - every 4-6 months

Compression Garment Success

Must be the correct:
- Time
- Fit / measurements / size
- Compression level
- Fabric
- Features
- Application
- Wearing schedules
Other options: compression Velcro devices

Compression garments

SELECTION CRITERIA

- Correct Size: Leg circumference (ankle and calf) and leg length, size verified with a measuring chart. May need to consider custom.
- Correct Style: Knee high/Thigh high/Panty hose, Open/Closed toe, Silicone band, Off the shelf/Custom
- Correct Fabric: Sheer/Transparent, Thick/Heavy, Circular knit, Flat knit. Bridging and garment fatigue. Don't base selection on cosmesis or cost.
- Correct Timing: Compression stockings are used to maintain not reduce swelling. Compression bandages required to reduce leg swelling before wearing compression garments.
Compression garments

- Correct Compression Level:
  - < 15-18 mmHg - Heavy, tight, aching legs
  - 20-30 mmHg - Mild swelling
  - 30-40 mmHg - Moderate swelling
  - 40-50 mmHg - Difficult to control swelling

- Correct Wearing Schedule:
  Wear compression every day, lifetime.
  Apply first thing in the morning before legs swell.

Garment Donning/Doffing Aids

- Slippee/footies
- Donning Gloves
- Donning Frames
- Gripper Pads
- Don-n-Doffer
- Easy Slide, Magride, Juzo Gator, etc
- Long handled shoe horns
- Reacher
- Silicone Fitting Lotions
- Consider ease of use, durability, mobility, cost

Proper Fit of Garments

- Do not gather or pull on bands - massage fabric
- Use rubber gloves and donning tools
- Wear on clean skin
- Clean garment every day
- Neck position
- Toe and knee band
- Fabric distribution
- No wrinkling or rolling
- Adjust fit throughout the day
Garment Care

- Wash daily to regain elasticity.
- Hand wash, air dry (some exceptions will allow machine wash/dry using permanent press cycle).
- Do NOT use bleach, fabric softener, dish soap, or detergent.
- Lotion will break down the elastic fibers, thus the pressure will be not adequate to control swelling.
- Skin prep: Cutimed, Compression Assist Lotion
- Replace compression garments every 4-6 months.

Velcro Compression Devices

- Limited ability to don/doff compression garment
- Safety - unreliable use or care of garment
- Wounds
- Fragile Skin
- Hypereractive skin
- Compression tolerance
- Limp shape - garment unable to bridge over tissue crevice between folds
- Prolonged wearing
- Limited caregiver resources
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Long Term Effectiveness

- Ambulatory vs Non Ambulatory
- Skin integrity / Wounds
- Tolerance for compression
- Compliance
- Ease of use, donn/doff
- Pt goals
- Co-morbidities
- Night time compression needs
- Cost

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Long Term Effectiveness

- Compression garment - failure, not appropriate
- Chronic wound dressings
- Mobility
- Function
- Need for 24 hr compression
- Vasopneumatic compression device - preservation
- Sustainability

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Long Term Effects of CDP

<table>
<thead>
<tr>
<th></th>
<th>Non Compliant</th>
<th>Compliant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limb Reduction UE</td>
<td>300 Patients</td>
<td>Maintained 9 Months</td>
</tr>
<tr>
<td>Limb Reduction LE</td>
<td>67.7%</td>
<td>86% compliant - maintained 90%*</td>
</tr>
<tr>
<td>Decreased Infections</td>
<td>0.65 per pt/ye</td>
<td>1.1 per pt/yr</td>
</tr>
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</table>

*Non-compliant patients lost 33% of initial reduction
Reduction sustained over the next 36 months
Complementary Strategies

- Positioning / Elevation
- Exercise
- Nutrition
- Weight Loss
- Diuretics
- Vasopneumatic Pumps

Pneumatic Compression Pumps

- Target venous water based fluid - not lymph
- Immobile
- May cause genital swelling
- Does not facilitate protein uptake
- May traumatize functioning lymphatics
- Settings may be inaccurate – avoid high pressures
- Still needs to stimulate proximal lymph system
- Still requires continuous compression after use
- Use to sustain/preserve outcomes of other modalities and to continued use of compression garment/device.

Leg Swelling Guidelines

- Elevation - at least 6”, legs straight, trunk reclined
- Position - change hourly; avoid prolonged sit/stand
- Exercise - ankle pumps, walking
- Healthy Body Weight - well-balanced diet, 10-12 glasses water, avoid salt and caffeine
- Don’t smoke
- No constrictive clothing
- No casts or braces
- Monitor legs for infection
- Prevent if indicated
- Daily skin care
- Wear recommended compression as prescribed
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<table>
<thead>
<tr>
<th>Interventions</th>
<th>Why They Don’t Work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diuretics</td>
<td>Leave the protein behind - which are hydrophilic</td>
</tr>
<tr>
<td>TED hose</td>
<td>Only for post op or bed rest patients; not enough for swelling management</td>
</tr>
<tr>
<td>Ace Wraps</td>
<td>Long stretch, high resting pressures, low working pressure, uncomfortable, constrict, reduce circulation, extensible, no resistance to muscle contraction</td>
</tr>
<tr>
<td>Elevation</td>
<td>Not functional, difficult to achieve, not enough for lymph fluid, doesn’t respond as well to elevation</td>
</tr>
<tr>
<td>Compression Pumps</td>
<td>Need to follow up with compression, not all pumps are the same, be aware of co-morbidities, passive/immobile, may cause genital swelling, no protein uptake, may traumatize functioning lymphatics, settings may be inaccurate</td>
</tr>
<tr>
<td>UNNA Boots</td>
<td>Often over compressive; need follow up lymphedema treatment once tissue integrity is improved</td>
</tr>
<tr>
<td>KT Tape</td>
<td>Skin sensitivity/irritation, intact skin only, follow up with compression</td>
</tr>
</tbody>
</table>

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- Usually PT or OT
- Certified Lymphedema Therapist, LANA preferred (CLT-LANA)
- CDT Treatment Protocol
- Dedicated provider / facility
- Insurance Coverage / Resources

### Slide 111

**Referral Process**

JSCC Lymphedema Clinic
UnityPoint - Des Moines Iowa Methodist
1200 Pleasant St, Suite 450
Des Moines, Iowa 50309
P: 515-241-6839
F: 515-241-8918

Once pt is therapeutically ready:
- Phone / FAX
- Send Demographics
- Send H&P and last office visit notes
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OBJECTIVES - LAB

- Demonstrate proper application of modified edema compression bandage.
- Identify precautions for compression application and guidelines for transition to successful home management.
- Demonstrate adaptive techniques and devices used to assist with application of compression garments.
- Demonstrate ability to compare and contrast complementary edema management strategies.

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Lab - Let’s practice

- Surepress/Short Stretch Edema compression
- Toes, padding, bandage
- Compression Garments Features
- Compression Garment Donning/Doffing
- Velcro Compression Devices
- Accessing Suppliers/Vendors

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HYGIENE

Wash leg thoroughly with an antibacterial soap then dry well. Apply lotion to intact skin. Lotions low in pH are recommended, e.g. Curel, Eucerin, and Nivea.

Complete wound care (If needed)

STOCKINET

Apply clean stockinet over the leg. When making a new piece of stockinet, cut it twice the length of the leg from the toes to knee.

WHITE FOAM

Start at the end of the foot near the toes. Make a circular turn around the foot then proceed around the ankle and spiral up the calf. Use mild tension when applying the foam. The heel is left uncovered. Do NOT apply tape directly on white foam. May use white fluff for added padding to foot/ankle or to even out tissue shape, pressure areas.

SURE PRESS BANDAGE

Begin the bandage at the foot. Make 1-3 circles around the foot near the toes, then 1-2 circles around the mid foot (arch). Use even firm tension, smoothing bandage at each turn. Proceed to the ankle (heel will be open) and then up the calf with the remaining bandage using firm tension with gentle tugs on the sides. Be sure to overlap each layer by about 1/2 as you spiral up the calf. End the bandage just below knee crease and tape in place. Paper tape is recommended. The bandage and padding should cover the foot and lower leg.

PRESSURE GRADIENT

Be sure to apply more layers of Surepress bandage at the foot to create a pressure gradient. By providing higher pressure (more layers) at the foot and less pressure (layers) at the calf you will help ‘push’ the fluid upward and out of the leg.

OPTION #2

– ROSIDAL

1. 8 cm to foot and ankle as above
2. 1-3 layers at ball of foot
1-2 layers at arch
Proceed to ankle then up leg
2. Begin at ankle and then proceed up leg, overlapping 50% with gentle tugs on the sides. Finish just below the knee. Tape down.

OTHER SWELLING REDUCTION STRATEGIES

• Elevate legs
• Perform ankle pumps

EDEMA BANDAGING FOR THE LOWER EXTREMITY

- EDEMA BANDAGING FOR THE LOWER EXTREMITY

- EDEMA BANDAGING FOR THE LOWER EXTREMITY

- EDEMA BANDAGING FOR THE LOWER EXTREMITY
WEARING SCHEDULE

- Wear bandages during the day.
- Wear bandages during the night.
- Change the bandages every ____ days.
- If slippage or discomfort occurs, change the bandages more frequently.

WASHING INSTRUCTIONS

- Hand wash in warm soapy water and rinse well.
- Squeeze (not wring) bandage/stockinet to remove excess moisture.
- Air dry.
- Keep bandages away from direct heat sources when drying.

- Sure press and short stretch compression bandages: needs to be washed at least every 4 days, more frequent if soiled or stretched out.
- Stockinet: Apply a clean stockinet each day. Hand wash and reuse the stockinet.
- White Foam/Fluff: This product does not need to be washed routinely. It can be washed if soiling occurs. See instructions above.

REPLACEMENT SUPPLIES

1. TG Stockinet: Size: _____
2. White Foam Rosidol Soft: Size: _____
3. Sure Press Bandage OR Short Stretch 8cm and 10 cm
4. Optional: White fluff 10 cm (Artiflex / Cellona)

Bandaging Tolerance

- Bandages should not increase any baseline symptoms. Monitor for any new or increasing symptoms:
  - Pains and needles: abnormal sensation of the toes
  - Pins and Needles: abnormal sensation of the toes
  - Numbness and Tingling: abnormal sensation of the toes
  - Pain: In leg or foot
  - Discoloration of the toes: toes bluish or pale color
  - Temperature: toes cool

- Interventions if problems develop with bandages:
  - Elevation: Elevate legs on pillows
  - Exercise: Perform ankle pumps, walk
  - Remove the bandages
  - Modify padding or layers with next bandage

Compression Garment Success

- Must be the correct:
  - Time
  - Fit / measurements / size
  - Compression level
  - Fabric
  - Features
  - Application
  - Wearing schedules
- Other options: compression Velcro devices
Compression garments

**SELECTION CRITERIA**
- Correct Size: Leg circumference (ankle and calf) and leg length, size verified with a measuring chart. May need to consider custom.
- Correct Style: Knee high/Thigh high, Open/Closed toe, Silicone band, Off-the-shelf/Custon
- Correct Fabric: Sheer/Transparent, Thick/Heavy, Circular Knit, Flat Knit. Bridging and garment fatigue. Don’t base selection on cosmesis or cost.
- Correct Timing: Compression stockings are used to maintain not reduce swelling. Compression bandages required to reduce leg swelling before wearing compression garments.

**Correct Compression Level:**
- < 15-18 mmHg – Heavy, tight, aching legs
- 20-30 mmHg – Mild swelling
- 30-40 mmHg – Moderate swelling
- 40-50 mmHg – Difficult to control swelling

**Correct Wearing Schedule:** Wear compression every day, lifetime. Apply first thing in the morning before legs swell.

Garment Donning/Doffing Aids
- Slippee/footies
- Donning Gloves
- Donning Frames
- Gripper Pads
- Don-n-Doffer
- Easy Slide, Magride, Juzo Gator, etc.
- Long handled shoe horns
- Reacher
- Silicone Fitting Lotions
- Consider ease of use, durability, mobility, cost.
Velcro Compression Devices

- Limited ability to don/doff compression garment.
- Safety - unreliable use or care of garment.
- Wounds
- Fragile Skin
- Hypersensitive skin
- Compression tolerance
- Limp shape - garment unable to bridge over tissue crevice between folds
- Prolonged wearing
- Limited caregiver resources

Compression Garments/Devices

Local Providers

- CHLADEK ORTHOTIC & PROSTHETIC, INC.
- FITTINGS UNLIMITED, INC.
- HANGER CLINIC: PROSTHETICS & ORTHOTICS
- NUCARA
- UNITY POINT HOME STORE

Lymphedema Compression Product Resources

- Academy of Lymphatic Studies
- Bandages Plus, Inc.
- Prism Medical Products
- SunMed Medical Solutions
- Lohman & Rauscher/Solaris
- BSN Medical/Farrow
- North America Rehabilitation
- BrightLife Direct, inc.
- Academy of Lymphatic Studies

All provide bandages, garments and devices.
* will verify insurance benefits