



Evidence-Based Practices for Lymphedema Risk Reduction

Lymphedema is a chronic and progressive condition where the load of the lymphatic system exceeds its transport capacity, leading to accumulation of lymphatic fluid and edema in the area at risk. Lymphedema can progress through stages of increasing severity, which are characterized by progressive swelling, fat deposition, and tissue changes.¹ It should be noted that research into lymphedema risk factors has been conducted primarily in breast cancer-related lymphedema (BCRL). This position statement reflects recommendations surrounding BCRL, unless otherwise noted. The strongest risk factor for BCRL is axillary lymph node dissection;² Other risk factors include regional nodal irradiation,²⁻⁶ elevated body mass index,⁶⁻⁹ low volume swelling,¹⁰ and Black race or Hispanic ethnicity.^{11,12} Other postulated risk factors include anatomic predisposition, cording (axillary web syndrome), taxane-based chemotherapy and targeted therapies.¹³⁻¹⁸

Lymphedema risk reduction education is a central component of patient-centered care that extends beyond physiological management to encompass the psychosocial well-being and overall quality of life of those affected or at risk. The emotional, social, and functional impacts of lymphedema can profoundly influence a person's self-image, independence, and daily activities.^{19,20} Recognizing these psychosocial dimensions underscores the importance of individualized education, empowerment, and shared decision-making between patients and healthcare professionals.²¹ This position paper aims to support evidence-informed practices that not only minimize physical risk but also enhance confidence, resilience, and long-term self-management.

The National Lymphedema Network (NLN) published its Position Statement on lymphedema risk reduction practices in 2012,²² with the main aim of providing information to individuals with or at risk of lymphedema, to drive the best possible and most informed choices about risk reduction practices. Since their inception, the NLN guidelines have been the principal driver of patient education for those

at risk for or with lymphedema. However, contemporary evidence necessitates their revision to ensure alignment with current data and evidence-based standards of care. **A comprehensive review of the evidence base for these recommendations will be available in the peer-reviewed companion manuscript: *National Lymphedema Network Position Statement: Evidence-Based Practices for Lymphedema Risk Reduction*.***

This position statement aims to comprehensively update the NLN risk reduction guidelines through summarizing the evidence base to inform the highest standard of care.

This position statement outlines recommendations for those individuals **at risk** for lymphedema separately from recommendations for individuals with **a confirmed diagnosis** of lymphedema. Individuals at risk of lymphedema are those who have not experienced signs or symptoms of lymphedema but have a known injury to their lymphatic system such as having undergone lymph node removal during cancer surgery. It should be reiterated that evidence is primarily available for breast cancer-related lymphedema; evidence for lymphedema of other etiologies is integrated into this document wherever available.

Finally, every individual who is at risk for, or with, lymphedema should ideally be evaluated and managed by a certified lymphedema therapist or other healthcare professional knowledgeable about lymphedema and the individual's unique situation.

Individuals at risk for lymphedema should consider the following actions and precautions:

Prospective Lymphedema Screening

- Individuals at risk for breast cancer-related lymphedema should receive personalized lymphedema risk factor information from healthcare providers knowledgeable about lymphedema as part of a prospective screening program.
- Individuals at risk for breast cancer-related lymphedema should ideally be regularly and

longitudinally screened for lymphedema starting at preoperative baseline. Screening should include symptoms, objective measurements and patient education, and measurements should follow the recommendations outlined in the National Lymphedema Network's Position Statement on Screening and Measurement for Early Detection of Breast Cancer Related Lymphedema.^{24*}

- Objective measurements may include limb volume as measured by optoelectronic limb volumetry, 3-D camera, or girth measures taken with a tape measure at regular intervals along the length of the arm and converted to volume, and/or bioimpedance spectroscopy. The reader is directed to the 2025 NLN Position Statement on Lymphedema Screening for evidence-based diagnostic thresholds.²⁵⁻²⁷
- Individuals at risk for lymphedema should be educated regarding symptoms which may be indicative of developing lymphedema, including heaviness, a perception of an increase in arm size, or a perception of swelling.²⁸⁻²⁹ The individual should be educated to report these symptoms to their health care provider immediately, as diagnosing and treating lymphedema at the earliest possible time improves outcomes.
- Best practice includes incorporation of objective measurements with symptom report and clinical examination for accurate lymphedema diagnosis, rather than relying on objective measurements alone.³⁰⁻³²
- A prospective screening schedule should be individually risk stratified in conjunction with healthcare providers who are knowledgeable about lymphedema. Individuals at high risk should ideally be screened more often, as frequently as every 3 months for the first two years postoperatively, followed by continued but less frequent screening in postoperative years 3 to 5.³³⁻³⁶ Individuals at low risk may be screened at lower frequencies such as every 6 months, and screening may be done in conjunction with self-monitoring.

Medical Procedures on the Limb at Risk for Lymphedema

- Isolated blood pressure measurements, injections and venipuncture have not been associated with increased limb swelling in prospective studies of individuals at risk for breast cancer-related lymphedema.³⁷⁻³⁹

- When indicated, blood pressure measurements, injections and venipuncture may be done on the limb at risk for lymphedema.
- Individuals at risk for lymphedema should be active participants in making decisions about their medical procedures, and whether or not they choose to have blood pressure measurements, injections or blood draws on their limb at risk of lymphedema.
- Ideally, medical procedures on the at-risk limb should be conducted from within the context of a prospective lymphedema screening program.
- If swelling occurs in an area of impaired lymphatic drainage, the healthcare provider should refer the individual at risk for lymphedema evaluation and treatment.
- Important considerations:
 - These guidelines reflect ambulatory blood pressure measurements in the upper arm. To the committee's knowledge, there are no studies on repeatedly cycling automatic blood pressure cuff machines (as in the operating room), blood pressure measurement on the wrist or blood flow restriction therapy and limited evidence for infusions in the limb at-risk.
 - Studies have been conducted in individuals at risk of lymphedema after axillary node removal for breast cancer; lymphedema risk of other etiologies has not been studied.

Elective Surgery

Individuals at risk for lymphedema may experience medical conditions causing discomfort or impaired function, such that surgery on the limb at risk for lymphedema may need to be considered. Examples of such conditions may include rotator cuff injuries, carpal tunnel syndrome, severe arthritis or fracture resulting in recommended joint replacement, or soft tissue tumors on the limb at risk for or with lymphedema. Anyone at risk for lymphedema, no matter how much time has passed since lymph node removal occurred, should consider these recommendations.

- Ideally, surgeons treating individuals at risk for lymphedema should be aware of the condition and closely collaborate with the individual's lymphedema provider.
- A careful risk-benefit analysis should be considered by the multidisciplinary team and in conjunction with the individual at risk, with the understanding that limb function and movement is important in the presence of lymphedema risk or lymphedema.

- Patient education regarding potential postoperative complications following elective upper and lower extremity or groin surgery and recovery times are important.
- Adopting a multidisciplinary approach including surgeons, and preoperative and postoperative preventive and early lymphedema interventions should be utilized. This approach may involve close prospective screening for individuals at risk, and either resuming previous lymphedema care or modifying lymphedema care as needed for those with lymphedema.

Infection & Skin Care

Cellulitis (skin infection) in the limb at risk for lymphedema significantly increases risk of lymphedema development by causing further lymphatic damage.^{38,40}

- Practice meticulous skin hygiene and maintain skin integrity through daily cleansing with mild, pH-balanced products and regular moisturization to prevent dryness and cracking.
- Individuals at risk should receive education regarding signs and symptoms of infection, including recognition of redness, warmth, pain, swelling, fever, and chills.⁴¹
- Treat any suspected infection in the limb at risk or with lymphedema as an urgent medical event;⁴¹ prompt initiation of antibiotic therapy is essential to limit infection and prevent lymphedema onset or progression.
- Attention to skin care and infection prevention should be integrated into long-term risk reduction strategies, as these measures are critical to minimizing complications and preserving lymphatic health.

Temperature (environment, hot tubs, saunas)

- Weather temperature variations have not been shown to significantly change limb volume in individuals at risk of developing lymphedema.^{5,39,42}
- Studies support a risk of transient (temporary) increases in arm volume, extracellular fluid of self-reported swelling after hot weather temperatures.⁴³
- It is recommended for those at risk for lymphedema to avoid saunas.³⁹
- Individuals at risk for lymphedema are advised to exercise caution when at risk for thermal exposure that may cause skin injury or breakdown, creating a portal of entry for bacteria and infection, such as sunburns or other types of burns.

Air Travel

- Studies have not shown air travel to be a risk factor for lymphedema in those at risk.^{39,44-46}
- Prophylactic compression garments are not routinely recommended for air travel. In individuals at high risk of lymphedema (after lymph node dissection), who have been prescribed compression as postoperative lymphedema prophylaxis, this may be continued during air travel as part of their routine management.
- Any compression garments used during air travel should ideally be fitted by a certified lymphedema therapist, as ill-fitting garments have the potential to cause harm.
- It should be noted that these studies were conducted in individuals at risk for breast cancer-related lymphedema.

Body Weight

- Obesity is a significant risk factor for the development of lymphedema.⁴⁷⁻⁵⁰
- Maintenance of a healthy body weight is recommended for individuals at risk for lymphedema. It is recommended that individuals at risk for lymphedema seek professional help to lose weight if their weight is above standard recommended guidelines.
- Comorbid conditions and/or cancer treatments may impede weight loss. A supportive multidisciplinary approach is recommended in which appropriate referrals are mobilized, which may include weight management, endocrinology, and physical therapy for individualized exercise prescription and/or nutritional services, for example.

Exercise

- Individualized, appropriately prescribed progressive exercise programs, with supervision as needed, do not incite lymphedema for individuals at risk for breast cancer-related lymphedema.^{51,52}

Compression Garments (sleeves) for Lymphedema Prevention in Individuals at High Risk of Breast Cancer-Related Lymphedema

- Prophylactic compression sleeves may decrease or delay lymphedema onset for individuals at high risk.⁵³
- High risk is defined as having undergone axillary lymph node dissection during breast cancer surgery.

- If utilizing garments prophylactically, the practical approach is to provide a low (class 1) or mild pressure (class 2) compression sleeve, be applied as soon after surgery as possible, worn during waking hours, at least 8 hours a day, until 3 months after adjuvant treatment or as long as feasible.⁵³ This may also be considered for patients at risk of lower extremity lymphedema after inguinal or pelvic lymph node dissection.
- As there are several different compression garments for prevention and control of lymphedema, the manufacturer's care recommendations should be followed.
- The generally recommended time for replacement for compression garments is every 6 months with daily wear, however, individual manufacturer recommendations should be followed.
- For individuals at high risk using compression garments for lymphedema prophylaxis, wearing compression garments during exercise and repetitive arm motion is recommended.
- Retrospective studies and those with limited follow up have shown that cumulative incidence of arm lymphedema was higher in those undergoing lymph node dissection and regional lymph node radiation versus in those undergoing axillary lymph node dissection, regional lymph node radiation and immediate lymphatic reconstruction.
- An early body of research indicates that immediate lymphatic reconstruction reduces incidence of lymphedema after lower extremity surgeries. Further studies are indicated.
- As some patients may still develop lymphedema after immediate lymphatic reconstruction, best practice is for individuals who undergo prospective lymphedema screening after immediate lymphatic reconstruction to allow for early diagnosis and treatment.

Individuals with a confirmed diagnosis of lymphedema should consider the following actions and precautions:

Prospective Lymphedema Screening

- Individuals with a confirmed diagnosis of lymphedema should have access to regular follow-ups by professionals with training in lymphedema. These follow-ups may include symptom monitoring, objective measurements and patient education. The follow up schedule should be based on the individual's clinical situation and determined in collaboration between the patient and lymphedema care provider.
- Whenever possible, preoperative baseline measures should be used in comparison with follow up measurements for monitoring. If these are not available, it is helpful to incorporate objective measurements with symptoms and clinical examination to monitor treatment progress or identify changes.
- Individuals with lymphedema should be educated regarding symptoms and signs of progressive lymphedema, including increased limb size, heaviness, fullness, clothing fitting more tightly over the limb than normal, progressively pitting edema in early stages, or progressively non-pitting edema in later stages. The individual should be educated to report these symptoms to their health care provider immediately, as diagnosing and treating lymphedema at the earliest possible time improves outcomes.
- Individuals with lymphedema should have access to regular follow-ups for medical grade

Preventative Lymphatic Surgery

The current approach to reducing cancer-related lymphedema is to begin with careful treatment planning, including de-escalation of lymph node surgery for cancer staging. Although decreasingly extensive lymph node surgeries have been adopted in surgical practice, some individuals still require lymph node dissection. In these cases, surgeons have an opportunity to adapt a preventive lymphatic surgical approach. This may include axillary reverse mapping (ARM), to identify, separate and preserve arm lymphatics during lymph node dissection, which has been shown to lower the risk of arm lymphedema from 27% to 6% after breast cancer.⁵⁴⁻⁶¹ Although ARM reduces BCRL risk, there is a low risk of crossover metastatic involvement of ARM nodes in node-positive patients.^{62,63} Immediate lymphatic reconstruction (also known as the Lymphatic Microsurgical Preventative Healing Approach, or LYMPHA) may also be used, in which the purpose is to prevent lymphedema following axillary lymph node dissections. Some patients may not be eligible for immediate lymphatic reconstruction based on anatomy, or due to logistics, including availability of surgeons or facilities who perform these procedures.

- When axillary lymph node dissection is indicated during breast cancer surgery, patients may seek information from their surgical oncologist and/or plastic surgeon regarding considerations for lymphatic mapping to preserve arm lymphatics during surgery.

compression garment replacement, ideally every 6 months for day garments and every 12 months for night garments, or per manufacturer instructions. As compression garments lose their efficacy over time, regular replacement is imperative for ongoing lymphedema maintenance. These follow-ups should ideally be conducted by a healthcare professional trained in lymphedema.

Medical Procedures on the Limb with Lymphedema

- There is a paucity of research regarding the safety of blood pressure measurements, injections and venipuncture in the limb with lymphedema among individuals with clinically diagnosed lymphedema.
- It is recommended that medical procedures, including blood pressure measurements, injections and venipuncture are avoided in the limb with lymphedema.
- In a medical emergency or when there is no uninvolved limb, health care facilities should address the medical priority, taking reasonable precautions to avoid repetitive trauma with venipuncture and blood pressure measurements as much as possible. When medically stabilized, referral should be made for lymphedema evaluation and treatment with a certified lymphedema therapist.

Elective Surgery in the Limb with Lymphedema

Individuals with lymphedema may experience medical conditions causing discomfort or impaired function, such that surgery on the limb with lymphedema may need to be considered. Examples of such conditions may include rotator cuff injuries, carpal tunnel syndrome, severe arthritis or fracture resulting in recommended joint replacement, or soft tissue tumors on the limb with lymphedema.

- Ideally, surgeons treating individuals with lymphedema should be aware of the condition and closely collaborate with the patient's lymphedema provider.
- A careful risk-benefit analysis should be considered by the multidisciplinary team and in conjunction with the individual with lymphedema, with the understanding that limb function and movement is important in the presence of lymphedema.
- Patient education regarding potential postoperative complications following elective upper and lower extremity or groin surgery and recovery times are important.

- Adopting a multidisciplinary approach including surgeons, and preoperative and postoperative preventive and early lymphedema interventions should be utilized. This approach may involve either resuming previous lymphedema care or modifying lymphedema care as needed for individuals with lymphedema.

Infection & Skin Care in the Limb with Lymphedema

Cellulitis (skin infection) in the limb significantly increases risk of lymphedema progression by causing further lymphatic damage.^{38,40} Individuals with lymphedema are at significantly increased risk for skin infections, particularly cellulitis, which can accelerate condition progression and lead to serious complications.⁶⁴⁻⁶⁶

- Practice meticulous skin hygiene and maintain skin integrity through daily cleansing with mild, pH-balanced products and regular moisturization to prevent dryness and cracking.
- Individuals should receive education regarding signs and symptoms of infection, including recognition of redness, warmth, pain, swelling, fever, and chills.⁴¹
- Treat any suspected infection in the limb with lymphedema as an urgent medical event;⁴¹ prompt initiation of antibiotic therapy is essential to limit infection and prevent lymphedema onset or progression. Attention to skin care and infection prevention should be integrated into long-term risk reduction strategies, as these measures are critical to minimizing complications and preserving lymphatic health.
- When wearing compression garments, review manufacturer guidance about which lotions are safe to use, since some products can damage the fibers or alter garment function.⁴¹
- For individuals experiencing recurrent cellulitis (e.g., more than 3-4 episodes per year), consider prophylactic antibiotics after optimizing risk factors.⁶⁷⁻⁷⁰

Temperature (environment, hot tubs, saunas)

- Weather temperature variations have not been shown to cause lymphedema progression (significantly change limb volume) in individuals with lymphedema.^{5,39,42}
- There may be a risk of transient (temporary) increases in arm volume, extracellular fluid or self-reported swelling after hot weather temperatures.⁴³
- It is recommended for those with lymphedema to avoid saunas.³⁹

- Individuals with lymphedema are advised to exercise caution when at risk for thermal exposure that may cause skin injury or breakdown, creating a portal of entry for bacteria and infection, such as sunburns or other types of burns.

Air Travel

- There is scant evidence available regarding the effect of air travel on lymphedema amongst individuals with lymphedema.
- For individuals with lymphedema who are prescribed and routinely wear a compression garment as part of their lymphedema maintenance treatment, it is recommended that they wear their compression garments for air travel. Garments should ideally be prescribed by a certified lymphedema therapist, as part of lymphedema maintenance treatment, as ill-fitting garments have the potential to cause harm.
- If, while wearing a garment on an airplane, the swelling increases or the garment constricts, the garment should be removed immediately.
- Common sense recommendations as per healthy adults apply during air travel, such as frequently moving around the plane during the flight, frequently moving the limb at risk during the flight (ankle pumps or knee flexion/extension for the lower extremity, and hand opening/closing and arm pumping for the upper extremity, as able), maintaining good hydration during air travel and limb elevation as able.

Body Weight and Lymphedema

- Obesity worsens outcomes for individuals with cancer-related lymphedema.^{71,72}
- Maintenance of a healthy body weight is recommended for individuals with lymphedema. It is recommended that individuals with lymphedema seek professional help to lose weight if their weight is above standard recommended guidelines.
- Comorbid conditions and/or cancer treatments may impede weight loss. A supportive multidisciplinary approach is recommended in which appropriate referrals are mobilized, which may include weight management, endocrinology, and physical therapy for individualized exercise prescription and/or nutritional services, for example.

Exercise

- Individualized, appropriately prescribed progressive exercise programs, with supervision as needed, is beneficial for individuals with breast cancer-related and lower limb lymphedema.^{73,74} Exercise prescription is ideally done by a certified lymphedema therapist or other healthcare professional knowledgeable of lymphedema.

Phlebolymphe~~ma~~

Lymphedema can often be related to venous etiology called phlebolymphe~~ma~~, which is an under-recognized disease in medicine. Chronic venous insufficiency (CVI) is considered the main cause of non-cancer-related lower extremity lymphedema in the United States, and estimation of phlebolymphe~~ma~~ prevalence is 16 million. Incidence of CVI-induced lymphedema is estimated at 41.8%, followed by cancer-related lymphedema at 33.9%.⁷⁵

The proposed mode of phlebolymphe~~ma~~ starts with inflammation that leads to chronic venous insufficiency and resultant lower extremity venous hypertension. This process, in turn, causes lymphatic system overload, culminating in dual system dysfunction and progressive soft tissue edema. Phlebolymphe~~ma~~ develops with secondary dysfunction of the lymphatic pump and dermal lymphatic backflow.⁷⁶

- A multidisciplinary approach is recommended, including close collaboration between vascular specialists and lymphatic therapists.
- Treatments may include wound care, medicines, compression garments, manual lymphatic drainage, skin care, and intermittent pneumatic compression pumps.
- Patient education should emphasize the importance of consistent and meticulous skin and wound care, infection prevention, and progressive self-management of this chronic condition, including ongoing replacement of compression garments to avoid flares.

Arterial Disease and Lymphedema

- Individuals with arterial insufficiency are sometimes referred for lymphedema management, even though it is different from lymphedema.
- Individuals with arterial insufficiency typically have a history of pain in leg muscles during

ambulation, or claudication, which is evidence of ischemia during activity. They may also experience ulceration and leg edema.

- The primary intervention for lower-extremity wounds with a significant ischemic component is to restore adequate arterial flow with both endovascular and open surgical techniques and care of ischemic wounds.
- Compression garments are contraindicated and not well tolerated by individuals with significant peripheral artery disease.

In summary, this position statement aims to comprehensively update the NLN risk reduction guidelines through summarizing the evidence base to inform the highest standard of care. Ideally, every individual who is at risk for, or with, lymphedema should be evaluated and managed by a certified lymphedema therapist or other healthcare professional knowledgeable about lymphedema and the individual's unique situation.

**This document is currently being updated, and the reference will be updated when available*

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