



Medical Coverage Policy

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Compression Devices

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Related Coverage Resources

- [Breast Reconstruction Following Mastectomy or Lumpectomy](#)
- [Complex Lymphedema Therapy \(Complete Decongestive Therapy\)](#)
- [Physical Therapy](#)

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will be denied as not covered. Coverage Policies relate exclusively to the administration of health benefit plans. Coverage Policies are not recommendations for treatment and should never be used as treatment guidelines. In certain markets, delegated vendor guidelines may be used to support medical necessity and other coverage determinations.

Overview

This Coverage Policy addresses pneumatic and non-pneumatic compression devices used in the home environment.

Coverage Policy

Coverage for pneumatic compression devices/lymphedema pumps varies across plans. Refer to the customer's benefit plan document for coverage details.

Furthermore, coverage for the treatment of lymphedema, including lymphedema pumps, may be governed by federal and/or state mandates.

Unless excluded from the benefit plan, the following conditions of coverage apply.

Pneumatic Compression Device in the Home Setting

A standard pneumatic compression device (HCPCS code E0650, E0651) and associated appliances (HCPCS code E0655, E0660, E0665-E0669, E0671-E0673) used in the home setting are considered medically necessary for EITHER of the following:

- **for the treatment of intractable lymphedema when there is failure of a four-week trial of conservative medical management including ALL of the following:**
 - home exercise program
 - limb elevation
 - compression bandage or compression garment use
- **for the treatment of chronic venous insufficiency (CVI) with venous stasis ulcer(s) of lower extremities when BOTH of the following criteria are met:**
 - The individual has received medically-supervised treatment of the ulcer(s) for at least 24 weeks using standard wound care treatment, including compression, wound dressings, exercise, and elevation of the limb.
 - Failure of the ulcer(s) to decrease in size or demonstrate improvement despite conventional therapy.

A pneumatic compression device with calibrated gradient pressure (HCPCS code E0652) and associated appliances (HCPCS code E0656-E0657, E0667-E0670) used in the home setting are considered medically necessary when BOTH of the following criteria are met:

- individual meets above criteria for a standard pneumatic compression device
- **EITHER** of the following:
 - documented failure of relief with standard pneumatic compression device
 - individual requires specified pressure to a localized area

Pneumatic compression devices used in the home setting are not covered or reimbursable if the above criteria are not met.

Continuation of Use

Continuation of use of a pneumatic compression device is considered medically necessary when BOTH of the following criteria are met:

- there is adherence with the use of equipment as ordered by the healthcare professional
- clinical documentation from the health care professional confirms clinical improvement (e.g., improvement in venous stasis ulcers, decrease in edema or lymphedema)

EXPERIMENTAL, INVESTIGATIONAL OR UNPROVEN

Non-pneumatic compression controllers and garments (e.g., Dayspring®, Koya Medical, Inc.) (HCPCS codes E0677-E0683) are considered experimental, investigational or unproven for any indication.

NOT COVERED OR REIMBURSABLE

Each of the following is not covered or reimbursable:

- a pneumatic compression device used for arterial insufficiency (HCPCS code E0675)
- an intermittent limb compression device (HCPCS code E0676) utilized in the home setting for ANY indication including but not limited to the prevention of deep vein thrombosis
- a pneumatic compression device with a cooling component (e.g., Game Ready® systems, Avanos Medical, Inc.) utilized in the home setting for ANY indication

Health Equity Considerations

Health equity is the highest level of health for all people; health inequity is the avoidable difference in health status or distribution of health resources due to the social conditions in which people are born, grow, live, work, and age.

Social determinants of health are the conditions in the environment that affect a wide range of health, functioning, and quality of life outcomes and risks. Examples include safe housing, transportation and neighborhoods; racism, discrimination and violence; education, job opportunities and income; access to nutritious foods and physical activity opportunities; access to clean air and water; and language and literacy skills.

Several studies suggest that lymphedema rates after axillary lymph node dissection (ALND) are higher in Black and Hispanic women compared to Asian and white women (Heller, et al., 2024; Montagna, et al., 2022). Heller et al. (2024) reported an overall 2-year lymphedema rate of 20% with differences according to race/ethnicity. Rates of lymphedema were higher in Black (31%) and Hispanic (27%) women, and lower in Asian (15%) and white (17%) women ($p = 0.04$). Subjective arm swelling was more common among Asian (57%), Black (70%), and Hispanic (87%) women compared to white (44%) women ($p < 0.001$). Quality of life (QoL) scores also differed according to race/ethnicity. At 24 months, median QoL scores were 87, 79, and 80 for Asian, Black, and Hispanic women, respectively, compared with 92 for White women ($p = 0.003$). On multivariable analysis, Asian race and Hispanic ethnicity and having Medicaid or Medicare insurance were also independently associated with worse physical QoL (all $p < 0.001$).

General Background

Pneumatic Compression Devices

Pneumatic compression devices typically consist of an inflatable sleeve that is placed on the arm or leg, and an electrical pneumatic pump that fills the sleeve with compressed air. The sleeve is intermittently inflated and deflated with varying cycle times and pressures. The use of a pneumatic compression device in the home environment may be an alternative to other compression therapies (e.g., stockings, bandages, Unna boots) for patients who are unable or refuse to comply with other methods of treatment or are refractory to standard wound care treatment.

There are several types of pneumatic compression devices. Pumps may be classified as single-chambered, multi-chambered with fixed sequential inflation, or multi-chambered with sequential inflation and manually calibrated gradient chamber pressure. Older models include intermittent single-chamber non-segmented pumps that provide even pressure throughout the limb; however, they may allow backflow of lymphatic fluid. This can cause an increase of fluid in the distal limb. Newer devices have multiple segmented chambers and have the ability to provide sequential compression. Multiple-chamber units typically inflate from distal to proximal, producing a wave of pressure that ascends through the extremity, with the same pressure being delivered in each garment section. Proponents contend that this wave brings edema fluid with it, allowing the retained fluid to be brought to functional lymphatics.

Segmental pumps that have a calibrated gradient pressure feature are typically used only in patients who require limited pressure to be applied to a specific area (e.g., significant scars, the presence of contracture or pain caused by the clinical condition).

Pneumatic compression pumps include, but are not limited to, the following:

- **Nonsegmented pneumatic compressor (HCPCS code E0650):** This device has a single outflow port on the compressor. Although there is a single tube, air from this single tube may be transmitted to a sleeve with multiple compartments and would be functionally equivalent to a segmented pneumatic compressor with a segmented sleeve; or the device can be used with a nonsegmented sleeve. An example of this type of pump is the Huntleigh Flowtron® Hydroven 3 Pump (ArjoHuntleigh, Addison IL; 1991).
- **Segmented pneumatic compressor (HCPCS codes E0651, E0652):** This type of device has multiple outflow ports on the compressor that lead to distinct segments on the appliance, which inflates in a sequential manner.
 - HCPCS E0651: A segmented device without calibrated pressure is one in which either (a) the same pressure is present in each segment, or (b) there is a predetermined pressure gradient in successive segments but no ability to individually set or adjust pressures in each of the several segments. The pressure is usually set by a single control on the distal segment. Examples of models include the AIROS 6 Sequential Compression Device (AIROS Medical, Inc., Audubon, PA; 2018), and the Sequential Circulator model SC-2004-DL (Bio Compression, Moonachie, NJ; 2021).
 - HCPCS E0652: A segmented device with calibrated gradient pressure (also known as an advanced pneumatic compression device) is characterized by a manual control on at least three outflow ports that can deliver individually determined pressure to each segmental unit. Examples of models include: AIROS 8 Sequential Compression Device (AIROS Medical, Inc., Audubon, PA; 2018); Flexitouch® Plus System (Tactile Medical,

New Brighton, MN; 2020); Sequential Circulator model SC-3004-DL (Bio Compression, Moonachie, NJ; 2014); and the Lympha Press Optimal™ (Mego Afek, Kfar Sava, Israel; 2008).

U.S. Food and Drug Administration (FDA): There are numerous manufacturers and models of pneumatic compression devices. Pneumatic compression devices are cleared for marketing under the FDA 510(k) premarket notification process as Class II devices, intended for use in prevention of blood pooling in a limb by periodically inflating a sleeve around the limb (product code JOW).

Pneumatic Compression Therapy for the Treatment of Lymphedema

Lymphedema is swelling due to the accumulation of excessive lymph fluid. The build-up of lymph fluid occurs when the normal clearing function of the lymphatic system is impaired, and/or if there is an excess production of lymph fluid. Primary lymphedema is a result of congenital defects of the lymphatic system and is rare. Secondary lymphedema is acquired, and due to an obstruction or interruption in the lymphatic system. In the United States, the most common causes of lymphedema are cancer and treatment related to cancer. Patients undergoing breast cancer surgery which includes node dissection or axillary radiation therapy are at high risk of developing lymphedema. The goals of lymphedema treatment are to decrease the excess volume as much as possible and maintain the limb at its smallest size.

When provided as the sole treatment modality, lymphedema pumps are generally reserved for patients with intractable lymphedema for whom an adequate trial of more conservative medical treatment has failed. Established conservative medical treatments include the use of bandaging and compression garments, limb elevation, and home exercise programs. Segmental pumps that have a calibrated gradient pressure feature are typically used only in patients who require limited pressure to be applied to a specific area (e.g., significant scars or the presence of contracture or pain caused by the clinical condition), and/or for those with edema extending onto the chest, trunk and/or abdomen, which has remained unresponsive to conservative management and to pumps without calibrated pressure (Ridner, et al., 2012; Ridner, et al., 2010; Cannon, 2009; Maul, et al., 2009).

Literature Review: There is no consensus in the scientific literature on optimal pump selection and use. There is some evidence to indicate that using pumps as an adjunct to complex lymphedema treatment (CLT) has beneficial effects on outcomes, and there is some evidence to suggest that sequential multi-chambered pumps are more effective than single-chambered pumps. Randomized controlled studies, prospective cohort studies, and meta-analyses have demonstrated that treatment with pneumatic compression devices for lymphedema has resulted in improved subjectively and objectively measured outcomes (Padberg, et al., 2024; Schiltz, et al., 2024; Wright, et al., 2023; Soran, et al., 2022; Maldonado, et al., 2021; Muluk, et al., 2013; Fife, et al., 2012; Devoogdt, et al., 2010; Ridner, et al., 2010; Cannon, 2009; Maul, et al., 2009; Kerchner, et al., 2008; Szuba, et al., 2002; Harris, 2001; Dini, et al., 1998).

Shao et al. (2014) reported on a systematic review and meta-analysis of randomized controlled trials (RCT) to determine whether the use of an intermittent pneumatic pump (IPC) could manage lymphedema effectively. The review included seven clinical randomized controlled trials with 287 patients, with three RCTs (162 patients) included in meta-analysis. The review included patients with prior history of treatment of breast carcinoma and lymphedema defined as an absolute increase in arm volume of at least 10% or 2 cm between the affected and unaffected arms. The primary outcome was the percent of volume reduction, with secondary outcomes subjective symptoms and joint mobility. The types of intervention were routine management of breast carcinoma and lymphedema BCRL with or without IPC. The results indicated that decongestive lymphatic therapy and intermittent pneumatic compression reduced lymphedema and improved subjective symptoms, and neither of the methods was superior to the other. The studies were

limited by small number of patients, the lack of reported details of randomization in many of the studies, and none of the trials stated if allocated concealment was performed.

Ridner et al. (2012) reported on a randomized, controlled trial to compare the therapeutic benefit of truncal/chest/arm advanced pneumatic compression therapy (experimental group) (n=21) versus arm only pneumatic compression (control group) (n=21) in self-care for arm lymphedema without truncal involvement using the Flexitouch System. The outcomes included self-reported symptoms, function, arm impedance ratios, circumference, volume, and trunk circumference. While the findings indicated a statistically significant reduction in both the number of symptoms and overall symptom burden within each group, there were no statistically significant differences in these outcomes between the two groups. No statistically significant overall change or differential pattern of change between the groups in function was found. A statistically significant reduction in bioelectrical impedance and arm circumference within both of the groups was realized; however, there was no statistically significant difference in reduction between groups. The findings indicate that both treatments appear to be effective, but that there may be no added benefit to advanced pneumatic treatment of the truncal lymphatics prior to arm massage when the trunk is not also affected.

Pneumatic Compression Therapy for the Treatment of Chronic Venous Insufficiency (CVI)

Treatment of CVI is best initiated before the occurrence of venous ulceration. Knee-length heavyweight elastic stockings are recommended. Mild diuretic therapy (e.g., hydrochlorothiazide) may be of some help in persistent edema. The recommended treatment when ulceration occurs is an extended period of bed rest with elevation of the involved extremity well above heart level at all times, combined with moist retentive wound dressings to the ulceration. The patient is encouraged to exercise the calf muscles repeatedly while in bed, ideally against a footboard, to minimize the occurrence of acute DVT (Bologna, et al., 2025; Pascarella and Marston, 2022).

Pressure dressings are an alternative for patients with venous ulcers who are unable to spend extended periods with their legs elevated. The Unna paste venous boot is the standard approach to pressure dressings. Properly applied, this zinc-impregnated gauze pressure bandage can supply good compression and allows the patient to remain ambulatory. The boot is typically changed every 7–10 days and continued for 3–6 months. It is reported that up to 60% of ulcers will heal if continued for one year, with healing occurring in nearly 80% of cases. Once the ulcer is healed, chronic use of a heavyweight elastic stocking is resumed. Surgical referral may be recommended for recurrent or nonhealing ulcerations. Compression pumps have been shown to augment venous return, enhance fibrinolytic activity, and improve microvascular functions (Bologna, et al., 2025; Pascarella and Marston, 2022).

Literature Review: The evidence in the peer-reviewed published medical literature, though limited, lends support for the use of pneumatic compression devices for the treatment of patients chronic venous insufficiency with significant ulceration of the lower extremities who have failed standard therapy (i.e., a compression bandage system or garment, dressings for the wounds, exercise, and elevation of the limb), and the treatment has become the standard of care for this subset of patients (Alvarez, et al., 2020; Nelson, et al., 2014).

Alvarez et al. (2020) conducted a randomized controlled trial to investigate whether intermittent compression (IPC) assisted the healing of venous ulcers in patients with lymphedema who were already receiving standard compression with short stretch or multilayered compression therapy. The study included 52 subjects with chronic venous insufficiency and hard-to-heal lower leg ulceration (>1-year-old and >20-cm² surface area) were treated with either intermittent, gradient, pneumatic compression (n=27) plus standard compression therapy or compression therapy alone (control). The median time to wound closure by nine months was 141 days for the

intermittent pneumatic compression-treated group and 211 days for the control group ($p=0.031$). The rate of healing was 0.8 ± 0.4 mm/d for the control group and 2.1 ± 0.8 mm/d for the group treated with intermittent pneumatic compression ($p<0.05$). When compared with subjects treated with standard care, the group treated with intermittent pneumatic compression reported less pain at each evaluation point for the first six weeks of the trial. At weeks one, two and three, the visual analog pain scores were significantly lower for the intermittent pneumatic compression-treated group ($p<0.05$). The authors concluded that the results suggest that intermittent pneumatic compression is a valuable adjunct to compression therapy in the management of large or painful venous ulcers.

Pneumatic Compression Therapy for the Prevention of Deep Vein Thrombosis (DVT)

DVT is generally treated with the anticoagulants warfarin or heparin or a combination of the two drugs. Heparin acts quickly and is often stopped once warfarin starts working, usually two to three days after it is initiated. Other treatments include vena cava filters, which catch existing blood clots before they travel to the lung, and graduated compression stockings. Stockings fit over the foot up to the knee and are tight at the ankle and looser at the knee, creating a gentle pressure up the leg to prevent blood pooling and clotting. With pneumatic compression devices, the application and release of pressure promotes venous blood flow and may prevent DVT in patients who are at risk of developing this condition. Compression devices may be designed to fit over the patient's leg, calf, or foot (foot pumps).

The use of pneumatic compression devices in the hospital setting for the prevention of VTE in high risk patients may be used as an alternative in medical patients with a high risk of bleeding or in whom anticoagulant drugs are contraindicated (e.g., gastrointestinal bleeding, intracranial hemorrhage) and may be considered standard of care. It is theorized that intermittent pneumatic compression (IPC) prevents DVT in hospitalized patients by enhancing blood flow in the deep veins of the legs, thereby preventing venous stasis (Douketis and Mithoowani, 2024). Pneumatic compression therapy in the home setting for the prevention of VTE including DVT and PE is not considered standard of care in the practicing medical community. The scientific evidence supporting the use of pneumatic compression therapy as a treatment modality in the home setting for the prevention of VTE including DVT is limited. The literature mainly addresses the use of intermittent compression devices for prevention of DVT in the hospital setting until time of discharge.

Textbooks indicate that the best method of prophylaxis for thromboembolism is debatable. Currently in the inpatient setting, mechanical and pharmacologic modalities are used. It is generally agreed that patients should be mobilized as early and as rapidly as their general condition permits and that active exercises of both lower extremities help reduce venous stasis and thrombus formation. External pneumatic compression devices compare favorably with chemical prophylaxis in some randomized studies. Patient dissatisfaction with these devices occurs, and compliance may be a problem, although mobile units may have better acceptance (Harkess and Crockarell, 2021).

The HCPCS code used for pneumatic compression devices that are used for the prevention of DVT is HCPCS code E0676 – Intermittent limb compression device (includes all accessories), not otherwise specified. This device (E0676) delivers pressure and inflation/deflation cycles for the prevention of deep venous thrombosis. HCPCS code E0676 is all-inclusive, (i.e., all product variations in pressures, cycle characteristics, timing, control systems, appliance configurations, etc.).

Literature Review: The published literature for the use of pneumatic pumps for prevention of deep vein thrombosis (DVT) in the home setting is limited. The published literature mainly

addresses the use of pneumatic pumps in the hospital setting, used post-operatively for prevention of DVT.

Dietz et al. (2022) conducted a randomized trial (n=80) to assess treatment compliance and outcomes for aspirin along with a mobile compression pump versus aspirin alone for venous thromboembolism (VTE) prophylaxis in patients undergoing total hip or knee arthroplasty. Forty subjects in the intervention group received aspirin along with a mobile compression pump (ActiveCare SFT) (ASA/MCP group), while 40 subjects in the control group received aspirin alone (ASA group). In the ASA group, 50% (19/38) of subjects underwent knee arthroplasty versus 56% (20/36) of patients in the ASA/MCP group (p=0.65). Aspirin dosage was 325mg daily for six weeks for all participants. The ASA/MCP group was instructed to wear the device 20 hours per day for two weeks post-discharge. Follow-ups were completed at two and six weeks post-discharge. In the ASA/MCP group, ten patients were compliant with an average time use per day of 88% (standard deviation [SD] \pm 5.5), while 26 were noncompliant. Five patients never wore the pumps during the course of the trial. Patients in the ASA group were 94% compliant with aspirin use, and the ASA/MCP group was 97% compliant with their aspirin use (p=0.55). Three patients in the ASA/MCP group were found to have a VTE (two DVTs and one pulmonary embolism [PE]) within 90 days of surgery, while no patients in the ASA group developed VTE (p=0.24). Subjects who were diagnosed with a VTE used the pump an average of 20% of the time. The authors noted the study was not sufficiently powered to detect differences in the rate of VTE. Other study limitations include the short duration of follow-up, relatively small sample size, and reliance on patient-reported outcomes.

Dietz et al. (2020) conducted a prospective cohort study to evaluate outpatient compliance and utilization factors for utilization of portable pneumatic compression pumps in a rural population after elective hip or knee arthroplasty. Utilization for portable pneumatic compression pumps after joint arthroplasty was prospectively recorded in hours with compliance defined as the recommended 20 hours per day. A questionnaire two weeks postoperatively assessed factors that may contribute to noncompliance. Patients were followed up for 90 days postoperatively to record VTE events. Data was collected for 115 joint arthroplasty patients (50 hips, 65 knees). Post-discharge day one had the highest average usage at 13.2 hours/day (66.0%, range 0%-100%), but this number fell to 4.8 hours/day (24.0, range 0%-100%) by day 14. Patient compliance (>20 hours use/day) was highest on post-discharge day one at 40 patients (34.7%). By post-discharge day 14, patient compliance fell to 17 patients (14.8%). Difficulty using the pumps and pump-associated heat were significantly associated with patient compliance. A deep vein thrombosis and nonfatal pulmonary embolism were recorded in two separate patients. The authors concluded that study demonstrated poor outpatient compliance with portable pneumatic compression devices and poor compliance was related to pump heat and difficulty with pump use. The authors note that future randomized controlled trials should monitor outpatient cost, compliance, and efficacy of portable compression devices compared with standard chemoprophylaxis after total joint arthroplasty. The study is limited by the lack of randomization.

Kim et al. (2019) conducted a retrospective study to assess whether the intermittent pneumatic compression (IPC) device would be an effective prophylaxis for deep vein thrombosis (DVT) following total knee arthroplasty (TKA) in a low incidence population. The study included 1,259 elective primary TKA patients with preoperative diagnosis of primary osteoarthritis in a single institute. They were divided into three groups: those who were managed with chemoprophylaxis (CPX group, 414 cases), with mechanical prophylaxis (IPC group, 425 cases), or without pharmacological and mechanical prophylaxis (control group, 420 cases). All patients underwent preoperative ultrasonography and computed tomographic venography on postoperative day six to assess development of DVT. The incidence of overall, proximal, symptomatic DVT and symptomatic pulmonary embolism (PE) were compared among the groups. Major and minor bleeding complications were also evaluated. The incidence of overall DVT was 14.8% in control

group, 6.3% in CPX group and 11.3% in IPC group respectively and CPX group showed significantly lower incidence than other two groups ($p < 0.001$). The incidence of proximal DVT was 1.9% in control group, 0.7% in CPX group and 0.9% in IPC group respectively ($p > 0.05$). The incidence of symptomatic DVT was 0.7% in control group, 0% in CPX group and 0.7% in IPC group respectively ($p > 0.05$). There was no case of symptomatic PE diagnosed during hospital stay in all patients. The authors concluded that single use of IPC device could not reach significant level of DVT prophylaxis compared to control group and only chemoprophylaxis was shown to significantly reduce the incidence of overall DVT following TKA.

Snyder et al. (2017) reported on a randomized controlled trial that examined whether there is a difference in deep vein thrombosis (DVT) occurrence after a limited tourniquet total knee arthroplasty (TKA) using aspirin-based prophylaxis with or without extended use of mechanical compression device (MCD) therapy in low-risk TKA patients. One hundred patients, whose DVT risk was managed with aspirin 325 mg twice daily for 3 weeks, were randomized to either using an MCD during hospitalization only (inpatient VPULSE group-52) or extended use at home up to 6 weeks (postdischarge VPULSE group-48) postoperatively. Lower extremity duplex venous ultrasonography (LEDVU) was completed on the second postoperative day, 14 days postoperatively, and at 3 months postoperatively to confirm the absence of DVT after treatment. The Cothera VPULSE Compression and Cold Therapy System (Cothera, LLC, Plano, TX) was the device used in the study, which provides both compression and cold therapy. There was early rapid mobilization and all received prophylactic aspirin at 325 mg twice daily for 3 weeks immediately postoperatively. The DVT rate for the postdischarge MCD therapy group was 0% and 23.1% for the inpatient MCD group ($p < 0.001$). All DVTs resolved by 3 months postoperatively. Patient satisfaction was 9.56 (± 0.82) for postdischarge MCD patients vs 8.50 (± 1.46) for inpatient MCD patients ($p < 0.001$). A data chip in the device was collected for recording the total number of hours of MCD usage; however, the chip did not allow the researchers to examine how this usage was spread over the three weeks and patient compliance in the postdischarge VPULSE group may have dropped off significantly following the first several days postdischarge. The authors concluded that although the study demonstrated a lower incidence of DVT in the post hospital group, this did not establish the best VTE prevention protocol. Additional studies of the use of aspirin in conjunction with MCD therapy may reinforce the findings of this study and lead to the creation and subsequent implementation of optimized regimens that offer low incidence of VTE in postoperative TKA patients.

Zhao et al. (2014) reported on a Cochrane review to assess the comparative effectiveness and safety of different intermittent pneumatic pump (IPC) devices with respect to the prevention of venous thromboembolism in patients after total hip replacement (THR). One quasi-randomized controlled study with 121 study participants comparing two types of IPC devices met the inclusion criteria. The study found no cases of symptomatic deep vein thrombosis or pulmonary embolism in either the calf-thigh compression group or the plantar compression group during the first three weeks after the THR. The strength of the evidence in this review was determined to be weak since only one trial was included and was classified as having a high risk of bias. The authors concluded that there is a lack of evidence from randomized controlled trials to make an informed choice of IPC device for preventing venous thromboembolism following total hip replacement.

Colwell, et al (2014) reported on a noninferiority study of the mobile compression device compared to the standard pharmacological prophylaxis, including warfarin, enoxaparin, rivaroxaban, and dabigatran, with symptomatic end points and similar patient demographics. The study included following primary knee arthroplasty (1551 patients) or hip arthroplasty (1509) patients from ten sites. The compression device was used perioperatively and continued for a minimum of ten days. Patients with symptoms of deep venous thrombosis or pulmonary embolism underwent duplex ultrasonography and/or spiral computed tomography. All patients were evaluated at three months postoperatively to document any evidence of deep venous thrombosis

or pulmonary embolism. The authors hypothesized that the mobile compression device would have approximately the same efficacy as pharmacological prophylaxis without the risk of major bleeding. The study adopted a 1.0% margin in the noninferiority study, with the hypothesis that a 1.0% difference in venous thromboembolism rates between the mobile compression device registry cohort and the pharmacological comparators would not constitute a clinically meaningful difference. Twenty-eight (0.92%) of the patients had venous thromboembolism (twenty distal deep venous thrombi, three proximal deep venous thrombi, and five pulmonary emboli). One death occurred, with no autopsy performed. The authors found that symptomatic venous thromboembolic rates observed in patients who had an arthroplasty of a lower-extremity joint using the mobile compression device were noninferior, at a margin of 1.0%, to the rates reported for pharmacological prophylaxis, including warfarin, enoxaparin, rivaroxaban, and dabigatran, except in the knee arthroplasty group, in which the mobile compression device fell short of the rate reported for rivaroxaban by 0.06%. Limitations of the study included the lack of randomization, the registry had a limited data set, and neither bleeding rates nor compliance were documented, compliance was not documented in the study. In addition, the study was not designed to establish conclusions regarding the use or nonuse of aspirin in addition to the mobile compression device- of the twenty-eight patients who had a venous thromboembolic event, 46% were on the aspirin protocol.

Pneumatic Compression Therapy for the Treatment of Peripheral Artery Disease

Peripheral artery disease (PAD) is a circulatory problem that develops when the arteries that supply blood to the extremities (usually the legs) become narrowed or blocked, resulting in an insufficient blood supply, or arterial insufficiency. PAD may be silent or present with a variety of symptoms and signs indicative of extremity ischemia (Berger and Davies, 2024). Clinical manifestations of arterial insufficiency due to a lack of blood flow to the musculature may result in pain in the affected muscle groups. Other signs and symptom include presence of an extremity ulcer, claudication and rest pain. Treatment for PAD focuses on reduction of symptoms and prevention of further progression of the disease. Most individuals with claudication benefit from a comprehensive medical approach that includes risk factor modification, exercise rehabilitation, and use of standard pharmacotherapy for claudication. Critical limb ischemia is considered to be present in patients with lower extremity ischemic rest pain, ulceration, or gangrene. If left untreated, severe PAD could lead to major limb amputation. Minimally invasive treatment or surgery may be needed for patients who do not respond to medical intervention. Arterial ulcers, however, should not be compressed for fear of further arterial compromise (Bologna, et al., 2025; American Heart Association [AHA], 2024).

A proposed alternative for individuals with PAD who are ineligible or who fail medical or surgical therapies is the application of high pressures by compression cuffs placed on the thigh, the calf, and/or the foot. These devices intermittently inflate and deflate with cycle times and pressures that vary between devices. These devices offer higher pressures than offered in the typical pneumatic compression device. An example is the ArtAssist[®] Device (ACI Medical LLC, San Marcos, CA; 2014) a mechanical pneumatic pump consisting of an impulse generator and two plastic inflatable cuffs, applies high pressure in a synchronized manner to the foot and calf. This treatment is usually performed for three hours per day while the patient is sitting upright.

Literature Review: At present, there is insufficient evidence in the published peer-reviewed scientific literature to support the efficacy of intermittent pneumatic compression therapy for the treatment of peripheral artery disease.

Moran et al. (2015) reported on a systematic review of intermittent pneumatic compression for critical limb ischemia. Two controlled before-and-after (CBA) studies and six case series were identified. No randomized controlled trials (RCTs) or non-randomized controlled trials (NRCTs) were identified. One retrospective CBA study involving compression of the calf reported improved

limb salvage and wound healing and one prospective CBA study involving sequential compression of the foot and calf reported statistically significant improvements in claudication distances and SF-36 quality of life scores. There was no difference in all-cause mortality found. Complications included pain associated with compression, as well as skin abrasion and contact rash as a result of the cuff rubbing against the skin. It was noted that all studies had a high risk of bias. The authors concluded that the limited available results suggest that IPC may be associated with improved limb salvage, wound healing and pain management; however, in the absence of additional well-designed analytical studies examining the effect of IPC in critical limb ischemia, the treatment remains unproven.

Abu Dabrh et al (2015) reported on a systematic review that examined evidence about various nonrevascularization-based therapies used to treat patients with severe or critical limb ischemia (CLI) who are not candidates for surgical revascularization. The review included 19 studies (2779 patients) of controlled randomized and nonrandomized studies that compared the effect of medical therapies (prostaglandin E1 and angiogenic growth factors) and devices (pumps and spinal cord stimulators). None of the nonrevascularization-based treatments were associated with a significant effect on mortality. Intermittent pneumatic compression (IPC) use was associated with statistically significant improvements in ulcer healing and amputation, but these results were derived from single small nonrandomized study. The authors note that replication of such results is needed, and the effect needs to be verified in larger randomized controlled trials.

Pneumatic Compression Devices for the Treatment of Other Indications

There is a paucity of randomized controlled or comparative trials in the peer-reviewed medical literature supporting the efficacy of pneumatic compression devices for the treatment of other indications in the home setting, including but not limited to, fracture and soft-tissue healing and restless leg syndrome. No standardization of devices exists with the mode of compression, the flow rate, or the type of sleeve. Many of the studies of compression devices are on small groups of patients using more than a single modality (Faulkner, et al., 2025; Handoll, et al., 2015; Khanna, et al., 2008; Eliasson and Lettieri, 2007; Labropoulos, et al., 2002).

Fracture and Soft-Tissue Healing: In a review of the literature, Khanna et al. (2008) stated that current methods of fracture care use various adjuncts to try and decrease time to fracture union, improve fracture union rates and enhance functional recovery; and one such modality is IPC. A total of nine studies on the use of IPC in fracture and soft-tissue healing (e.g., distal radius, ankle, calcaneal fractures, acute ankle sprains) were identified. These studies demonstrated that IPC facilitates both fracture and soft-tissue healing with rapid functional recovery. The authors reported that IPC appears to be an effective modality to enhance fracture and soft-tissue healing however the number of subjects is small, and adequately powered randomized controlled trials are needed to produce stronger clinically relevant evidence.

In a Cochrane review, Handoll et al. (2015) examined the effects of rehabilitation interventions in adults with conservatively or surgically treated distal radial fractures. Of the fifteen trials one trial included the use of intermittent pneumatic compression. The authors reported that there was not enough evidence available to determine the best form of rehabilitation for people with wrist fractures.

Restless Leg Syndrome (RLS): In a prospective, randomized, double-blinded, sham-controlled trial (n=35), Lettieri and Eliasson (2009) evaluated the effectiveness of pneumatic compression devices (PCDs) as a non-pharmacologic treatment for restless legs syndrome (RLS). Devices were provided to subjects who were enrolled for home use. Subjects wore a therapeutic or sham device prior to the usual onset of symptoms for a minimum of one hour daily. Measures of severity of illness, quality of life, daytime sleepiness, and fatigue were compared at baseline and after one month of therapy. Groups were similar at baseline. Therapeutic PCDs significantly improved all

measured variables more than shams. Restless legs severity score improved from 14.1 +/- 3.9 to 8.4 +/- 3.4 (p=0.006) and Johns Hopkins restless legs scale improved from 2.2 +/- 0.5 to 1.2 +/- 0.7 (p=0.01). All quality of life domains improved more with therapeutic than sham devices (social function 14% versus 1%, respectively; p=0.03; daytime function 21% versus 6%, respectively, p=0.02; sleep quality 16% versus 8%, respectively, p=0.05; emotional well-being 17% versus 10%, respectively, p=0.15). Both Epworth sleepiness scale (6.5 +/- 4.0 versus 11.3 +/- 3.9, respectively, p=0.04) and fatigue (4.1 +/- 2.1 versus 6.9 +/- 2.0, respectively, p=0.01) improved more with therapeutic devices than sham devices. Complete relief occurred in one-third of subjects using therapeutic and in no subjects using sham devices. The authors reported that PCDs resulted in clinically significant improvements in symptoms of RLS in comparison to the use of sham devices and may be an effective adjunctive or alternative therapy for RLS. Moreover, the authors stated that before PCD therapy is ready for more wide-spread use, it will be important to see validating studies in various populations of RLS patients. This study did not report long-term outcomes. Additionally, the authors reported that while effective for RLS treatment, the role of PCDs may be limited. RLS medications are effective, relatively safe, and usually well tolerated. Additionally, medications are obviously easier to use than PCDs, which require patients to remain immobile for one hour each day.

Combined Pneumatic Compression/Cold Therapy Devices

Some devices combine intermittent pneumatic compression with a cooling component (cold therapy; cryotherapy). These devices have been proposed for the relief of knee, shoulder and ankle swelling due to trauma or surgery; and for use on soft tissue injuries such as pulled hamstrings, tendinitis, sprains and inflamed joints. An example of such a device is the Game Ready GRPro® 2.1 (Avanos Medical Inc., Alpharetta, GA).

A 2023 randomized controlled trial by Marinova et al. (n=72) investigated the effectiveness of the cryocompression Game Ready system versus usual care protocol (i.e., regular icing and static compression) on early postoperative recovery following total knee arthroplasty (TKA). All subjects began either usual care or cryocompression with the Game Ready device on postoperative day 0 and were reassessed at postoperative day one, day two, week two, and week six. The Game Ready group had significantly more knee extension range of motion (ROM) than the usual care group at postoperative days one (0.5°; p<0.05) and 14 (1.6°; p<0.01). However, the authors reported this effect was likely due to chance. By week six, there was no significant difference between the groups in knee extension ROM. There were also no significant differences between the groups in reported pain levels, use of opioids for pain control, limb circumference, or knee flexion ROM at any follow-up point. Overall, the Game Ready system was not significantly better than regular icing and standard compression in improving post-TKA pain, swelling, or ROM.

Non-Pneumatic Compression Devices

Non-pneumatic compression pumps have recently been developed that do not utilize pneumatics in the compression mechanism. The Koya Dayspring® (Koya Medical, Oakland CA) is a wearable advanced compression device that consists of a programmable, segmental controller with a sleeve garment that can be sized to fit the individual. The garment contains a shape memory alloy made with nickel/titanium (Ni-Ti) that is programmed by a rechargeable controller to shrink in a cyclic manner, applying active gradient pressure from the distal to proximal end of the limb. This mechanistic action is purportedly similar to the motion of advanced pneumatic compression devices. Up to 14 independently controlled segments can be programmed to deliver 0–100 mmHg of compression pressure, with typical initial settings in a range of 30–40 mmHg. A mobile phone application can be used to program and individualize pressures; to start, stop, and pause therapy; and to track device usage. The device allows for mobility and range of motion during treatment (Rockson, et al., 2022a). According to the vendor website, the device is built on Flexframe2 technology, a patented mobile platform that provides calibrated sequential gradient compression.

The Venowave VW5 (Therma Bright, Massillon, OH) is a battery-operated device containing a series of peristaltic pumps that generate a wave-form motion. The device is worn below the knee and strapped to the calf, resulting in compression of the calf and an increased upward volumetric displacement of venous and lymphatic fluid. The device purportedly improves vascular and lymphatic flow of the lower limbs, and is intended for individuals who are 18 years of age or older.

U.S. Food and Drug Administration (FDA): In April 2021, the Koya Dayspring system obtained FDA approval through the 510(k) premarket notification process as a compressible limb sleeve. The FDA indications for use were as follows:

“The Koya Dayspring system is a prescription only wearable compression system that is intended for use in a clinic or home setting by medical professionals and patients who are under medical supervision to increase lymphatic flow in the treatment of many conditions such as:

- Lymphedema
- Primary lymphedema
- Post mastectomy edema
- Edema following trauma and sports injuries
- Post immobilization edema
- Venous insufficiency
- Reducing wound healing time
- Treatment and assistance in healing stasis dermatitis, venous stasis ulcers, or arterial and diabetic leg ulcers
- Lipedema
- Phlebolympheidema

The Dayspring system is developed on a wearable compression technology platform, which is designed to provide mobility for patients.”

In September 2021, the Dayspring Lite device obtained FDA approval via the 510(k) approval process as a compressible limb sleeve. The FDA indications for use were as follows:

“Dayspring Lite is a prescription only wearable compression system that is intended for use in a clinic or home setting by medical professionals and patients who are under medical supervision, for the treatment of the following conditions:

- Chronic edema
- Lymphedema
- Venous insufficiency
- Wound healing

Dayspring Lite is developed on a wearable compression technology platform, which is designed to provide mobility for patients.” In January 2024, the FDA granted 510(k) premarket notification clearance for an additional garment for abdominal use.

Originally cleared for marketing by the FDA in 2008, the Venowave VW5 received an updated 510(k) in June 2024 for modifications to the contraindications for use, as well as design and other changes. The FDA-cleared indications for use included:

- management of the symptoms of post thrombolytic syndrome (PTS)
- prevention of deep vein thrombosis (DVT)
- prevention of primary thrombosis
- treatment of lymphedema

- diminishing post-operative pain and swelling
- treatment of leg swelling due to vascular insufficiency
- treatment of varicose veins
- treatment of chronic venous insufficiency
- enhancing blood circulation
- treatment of intermittent claudication

The Venowave VW5 contraindications were updated to note that the device "should not be used to treat patients who have open or freshly healed ulcers or other wounds or otherwise fragile skin between the knee and the ankle of the leg to be treated".

Literature Review: Barfield et al. (2024) conducted a randomized crossover trial (n=99) comparing the effectiveness of the Dayspring non-pneumatic compression device (NPCD) and advanced pneumatic compression devices (APCDs, primarily the Flexitouch Plus) in individuals with lower extremity lymphedema. All subjects underwent a 30-day washout period where no compression devices were used. Subjects were then randomized to either the Dayspring (NPCD) group, or the APCD group. Subjects used their assigned device once daily for at least 60 minutes, for 90 days. The subjects then underwent another 30-day washout period, followed by a 90-day treatment period with the alternate device. Subjects were permitted to use conservative care including compression garments throughout the trial. Included in the study were individuals over age 18 with unilateral or bilateral lower extremity lymphedema or phlebolympheidema. The exclusion criteria included a contraindication to compression; conditions preventing safe and effective use of compression (i.e., cellulitis, wounds); lipedema; active or recurrent cancer; acute infection within four weeks; pulmonary embolism or deep vein thrombosis within the previous six months; pulmonary edema; congestive heart failure; chronic kidney disease with renal failure; seizure; poorly controlled asthma; condition where augmented venous/lymphatic return is undesirable; pregnancy; nursing; or participation in a clinical trial in the past 30 days. The outcome measures included change in the affected limb volume between baseline and end of treatment (90 days), change in Lymphedema Quality of Life Questionnaire (LYMQOL) scores, and treatment adherence. Twenty eight subjects (28%) were lost to follow up and not included in the analysis. In the NPCD group, a mean limb volume decrease of 369.9 ± 68.19 mL ($p < 0.05$) and a median of 300.5 mL was achieved versus of 83.1 ± 67.99 mL ($p < 0.05$) and a median of 62.0 mL for the APCD group. The between-group difference was statistically significant, favoring NPCD ($p < 0.05$). There was no significant between-group difference in reduction in foot measurements. The NPCD group achieved significant improvement in QoL; the APCD group did not. Adherence to treatment was reported as $81.0\% \pm 2.9\%$ with a median of 90% for the NPCD group, and $56.0\% \pm 4.2\%$ with a median of 60% for the APCD group ($p < 0.001$). For the subset of subjects with phlebolympheidema, treatment adherence was $8.01\% \pm 6.5\%$ in the NPCD group, and $49.0\% \pm 4.0\%$ in the APCD group. Study limitations include small sample size; 28% loss to follow up including 15 who withdrew during the NPCD phase; unclear impact of concurrent treatments; possible carryover effects; underrepresentation of non-Caucasians; and short-term follow up.

Rockson et al. (2022a) conducted a nonrandomized open-label pilot study in 40 subjects to evaluate the quality of life (QoL) and limb volume maintenance efficacy of a novel wearable compression system (Dayspring) in the treatment of unilateral upper extremity breast cancer-related lymphedema. Subjects were instructed to use the Dayspring device on one arm at least once a day, and could continue any other prescribed self-care procedures, including the use of compression garments. The contralateral (unaffected) limb was used as a control. After 28 days of use, subjects had a statistically significant 18% ($p < 0.001$) improvement in overall QoL as measured by the Lymphedema Quality-of-Life Questionnaire compared with baseline. Individual QoL domains also improved. Limb volume was reduced by an average of 2% ($p = 0.042$). Adherence was 98% over the course of the study; the average daily use was 43.9 minutes. The

study is limited by the small number of patients, lack of randomization and control group, and short follow-up.

Rockson et al. (2022b) completed a nonrandomized, open-label, 12-week pilot study to evaluate the safety and effectiveness of the Dayspring compression device in the treatment of lower extremity lymphedema (LEL). Subjects were directed to wear the device for up to one hour per day, and could continue ongoing maintenance care (bandaging, compression garments, massage). Outcome measures included quality of life (QOL) using the Lymphedema Quality of Life Questionnaire (LYMQOL), and change in lower limb volume. The contralateral (unaffected) limb was used for comparison. Twenty four subjects were enrolled; 18 completed the study. Overall QOL scores improved by 8% to 16% (mean 12%; $p=0.02$). The mean change in edema was -427.1 cm^3 ($p<0.001$, 95% confidence interval [CI] = $-677, -178$), for an average reduction of 39.4%. Treatment adherence data was not collected. Limitations of the study include the small sample size, lack of randomization and control group, and short duration of follow-up.

Rockson et al. (2022c) conducted a randomized crossover noninferiority trial ($n=52$) to evaluate the efficacy of the Dayspring compression device versus an advanced pneumatic compression device (Flexitouch Plus) in treating breast cancer-related lymphedema. Subjects in the intervention and control groups were instructed to use the assigned device once a day for at least one hour, for 28 days. Then all subjects had a four week "washout" period, without any use of an active compression device. Subjects then crossed over to the alternate compression device for the following 28 days. Subjects could also continue the use of compression sleeves and/or manual lymph drainage procedures. Outcome measures included reduction in limb volume (treatment response was defined as a $>2\%$ reduction in edema volume); quality of life (QOL) using the Lymphedema Quality of Life Questionnaire (LYMQOL); adherence; and adverse or safety events. Two patients were lost to follow up. The intervention group had a mean reduction in edema of 64.6% (95% confidence interval [CI], 31.71-97.58), versus 27.7% (95% CI, 4.80-60.14) in the control group ($p<0.05$), for an overall response rate of 88% versus 42% ($p<0.05$), respectively. Adherence was $95.6\% \pm 7\%$ in the intervention group versus $49.8\% \pm 26\%$ in the control group ($p<0.01$). Overall QOL scores were significantly improved in the intervention group (2.44 points; $p<0.05$), while no significant change was seen in the control group. The study is limited by the small sample size, short follow-up time period, and potential risk of carryover effects.

Professional Societies/Organizations

American Academy of Neurology (AAN): AAN published a practice guideline for treatment of restless legs syndrome (RLS) in adults (Winkelman, et al., 2022). The guideline noted that pneumatic compression is likely effective in the treatment of patients with primary moderate to severe RLS (based on one Class I study). The recommendations note when nonpharmacologic approaches are desired, clinicians should consider prescribing pneumatic compression before usual symptom onset (Level B, moderate evidence).

American College of Cardiology (ACC)/American Heart Association (AHA)/American Association of Cardiovascular and Pulmonary Rehabilitation (AACVPR)/American Podiatric Medical Association (APMA)/Association of Black Cardiologists (ABC)/Society for Cardiovascular Angiography and Interventions (SCAI)/Society for Vascular Medicine (SVM)/Society for Vascular Nursing (SVN)/Society for Vascular Surgery (SVS)/Society of Interventional Radiology (SIR)/Vascular & Endovascular Surgery Society (VESS): In 2024, these organizations published updated clinical practice guidelines on the management of patients with lower extremity peripheral artery disease (Gornik, et al., 2024). The recommendations note that, "In patients with chronic limb-threatening ischemia (CLTI) for whom revascularization is not an option, arterial intermittent pneumatic compression devices may be considered to augment wound healing or ameliorate ischemic rest pain."

Class (strength) of recommendation (COR): IIb

Level of evidence (LOE): B-NR

Recommendation system:

- (COR) Class (strength) of recommendation:
 - I Ib: weak
- (LOE) Level (quality) of evidence B-NR:
 - moderate quality evidence from one or more well-designed well-executed nonrandomized studies, observational studies or registry studies
 - meta-analyses of such studies

American College of Chest Physicians: This organization published clinical practice guidelines for prevention of VTE in orthopedic surgery patients (Falck-Ytter, et al., 2012). The guidelines recommend for patients undergoing major orthopedic surgery: total hip arthroplasty (THA), total knee arthroplasty (TKA), hip fracture surgery (HFS):

Thromboprophylaxis Compared with No Prophylaxis: In patients undergoing THA or TKA, the panel recommends use of one of the following for a minimum of 10 to 14 days rather than no antithrombotic prophylaxis: low-molecular-weight heparin (LMWH), fondaparinux, apixaban, dabigatran, rivaroxaban, low-dose unfractionated heparin (LDUH), adjusted-dose vitamin K antagonist (VKA), aspirin (all Grade 1B), or an intermittent pneumatic compression device (IPCD) (Grade 1C).

The expert panel recommends the use of only portable, battery-powered IPCDs capable of recording and reporting proper wear time on a daily basis for inpatients and outpatients. Efforts should be made to achieve 18 hours of daily compliance.

Grade 1C: Strong recommendation, low- or very-low-quality evidence

American Venous Forum (AVF)/American Vein and Lymphatic Society (AVLS)/Society for Vascular Medicine (SVM): In 2022, the AVF, AVLS, and the SVM published expert opinion consensus statement on the diagnosis and treatment of lymphedema. Among the statements regarding treatment, there were differing levels of agreement regarding pneumatic compression:

- Sequential pneumatic compression should be recommended for lymphedema patients (92% of the panel agreed with the statement, with 34% strongly agreeing.)
- Sequential pneumatic compression should be used for treatment of early stages of lymphedema. (There was less agreement with this statement, about 62% of respondents, which was below 70% threshold for meeting consensus. The remaining 38% of panelists disagreed with this statement, and 2% strongly disagreed.)

Consensus was reached that all patients with edema due to chronic venous insufficiency should be considered for treatment similar to lymphedema patients (Lurie, et al., 2022).

National Comprehensive Cancer Network (NCCN): The 2025 NCCN guidelines for the management of cancer-associated venous thromboembolic disease recommend the use of intermittent pneumatic compression (IPC) for the prevention of venous thromboembolism (VTE) in all patients with cancer during inpatient hospitalization. For VTE prophylaxis following discharge and for at-risk ambulatory patients with cancer, oral and subcutaneous anticoagulant medications were recommended for a subset of individuals; the recommendations do not mention the use of IPC for VTE prophylaxis in the outpatient setting.

The 2024 NCCN guidelines on cancer survivorship recommend educating survivors at risk for lymphedema in self-care management, skin care, and self-bandaging. The guidelines also

recommended referral to a certified lymphedema therapist for consideration of manual lymphatic drainage, progressive resistance training, and compressive therapy including the use of pneumatic compression for ongoing home management.

Society for Vascular Surgery (SVS)/American Venous Forum (AVF): These organizations published clinical practice guidelines for management of venous leg ulcers. The guidelines recommend the use of intermittent pneumatic compression when other compression options are not available, cannot be used, or have failed to aid in venous leg ulcer healing after prolonged compression therapy (O'Donnell, et al., 2014).

Medicare Coverage Determinations

	Contractor	Determination Name/Number	Revision Effective Date
NCD	National	Pneumatic Compression Devices (280.6)	1/14/2002
LCD		No Determination found	

Note: Please review the current Medicare Policy for the most up-to-date information. (NCD = National Coverage Determination; LCD = Local Coverage Determination)

Coding Information

Notes:

1. This list of codes may not be all-inclusive since the American Medical Association (AMA) and Centers for Medicare & Medicaid Services (CMS) code updates may occur more frequently than policy updates
2. Deleted codes and codes which are not effective at the time the service is rendered may not be eligible for reimbursement.

Considered Medically Necessary when criteria in the applicable policy statements listed above are met:

HCPCS Codes	Description
E0650	Pneumatic compressor, non-segmental home model
E0651	Pneumatic compressor, segmental home model without calibrated gradient pressure
E0652	Pneumatic compressor, segmental home model with calibrated gradient pressure
E0655	Non-segmental pneumatic appliance for use with pneumatic compressor, half arm
E0656	Segmental pneumatic appliance for use with pneumatic compressor, trunk
E0657	Segmental pneumatic appliance for use with pneumatic compressor, chest
E0660	Non-segmental pneumatic appliance for use with pneumatic compressor, full leg
E0665	Non-segmental pneumatic appliance for use with pneumatic compressor, full arm
E0666	Non-segmental pneumatic appliance for use with pneumatic compressor, half leg
E0667	Segmental pneumatic appliance for use with pneumatic compressor, full leg
E0668	Segmental pneumatic appliance for use with pneumatic compressor, full arm
E0669	Segmental pneumatic appliance for use with pneumatic compressor, half leg
E0670	Segmental pneumatic appliance for use with pneumatic compressor, integrated, 2 full legs and trunk
E0671	Segmental gradient pressure pneumatic appliance, full leg
E0672	Segmental gradient pressure pneumatic appliance, full arm
E0673	Segmental gradient pressure pneumatic appliance, half leg

ICD-10-CM Diagnosis Codes	Description
I83.001- I83.029	Varicose veins of lower extremity with ulcer
I83.201- I83.229	Varicose veins of lower extremity with both ulcer and inflammation
I87.2	Venous insufficiency (chronic) (peripheral)
I89.0	Lymphedema, not elsewhere classified
I89.1	Lymphangitis
I97.2	Postmastectomy lymphedema syndrome
L97.101- L97.929	Non-pressure chronic ulcer of lower extremity
Q82.0	Hereditary lymphedema

Not Covered or Reimbursable:

ICD-10-CM Diagnosis Codes	Description
	All other codes

Considered Experimental/Investigational/Unproven:

HCPCS Codes	Description
E0677	Non-pneumatic sequential compression garment, trunk
E0678	Non-pneumatic sequential compression garment, full leg
E0679	Non-pneumatic sequential compression garment, half leg
E0680	Non-pneumatic compression controller with sequential calibrated gradient pressure
E0681	Non-pneumatic compression controller without calibrated gradient pressure
E0682	Non-pneumatic sequential compression garment, full arm
E0683	Non-pneumatic, non-sequential, peristaltic wave compression pump
E1399	Durable medical equipment, miscellaneous

Not Covered or Reimbursable:

HCPCS Codes	Description
E0675	Pneumatic compression device, high pressure, rapid inflation/deflation cycle, for arterial insufficiency (unilateral or bilateral system)
E0676	Intermittent limb compression device (includes all accessories), not otherwise specified

ICD-10-CM Diagnosis Codes	Description
	All codes

References

1. ACI Medical, Inc. ArtAssist® The Arterial Assist Device®. © 2017. Accessed Mar 5, 2025. Available at URL address: <https://www.acimedical.com/products/artassist/>
2. Abu Dabrh AM, Steffen MW, Asi N, Undavalli C, Wang Z, Elamin MB, et al. Nonrevascularization-based treatments in patients with severe or critical limb ischemia. *J Vasc Surg*. 2015 Nov;62(5):1330-9.e13.
3. Alvarez OM, Wendelken ME, Markowitz L, Comfort C. Effect of High-pressure, Intermittent Pneumatic Compression for the Treatment of Peripheral Arterial Disease and Critical Limb Ischemia in Patients Without a Surgical Option. *Wounds*. 2015 Nov;27(11):293-301.
4. Alvarez OM, Markowitz L, Parker R, Wendelken ME. Faster Healing and a Lower Rate of Recurrence of Venous Ulcers Treated With Intermittent Pneumatic Compression: Results of a Randomized Controlled Trial. *Eplasty*. 2020 Jun 5;20:e6.
5. American Heart Association (AHA). Prevention and treatment of peripheral artery disease. Last Reviewed: Oct 15, 2024. Accessed Mar 5, 2025. Available at URL address: <https://www.heart.org/en/health-topics/peripheral-artery-disease/prevention-and-treatment-of-pad>
6. Armstrong DG, Meyr AJ. Compression therapy for the treatment of chronic venous insufficiency. In: *UpToDate*, Collins KA (Ed). Jul 18, 2023. *UpToDate*, Waltham, MA. Accessed Mar 5, 2025.
7. Avanos Medical, Inc. Game Ready® GRPro 2.1 Cold & Compression Therapy Unit. Accessed Mar 5, 2025. Available at URL address: <https://gameready.com/gr-pro-cold-therapy-unit/>
8. Barfield M, Winokur R, Berland T, Davis S, Ralph V, Chatham N, Rockson S, Maldonado TS. Results from a comparative study to evaluate the treatment effectiveness of a nonpneumatic compression device vs an advanced pneumatic compression device for lower extremity lymphedema swelling (TEAYS study). *J Vasc Surg Venous Lymphat Disord*. 2025 Jan;13(1):101965. Epub 2024 Sep 1.
9. Berger JS, Davies MG. Overview of lower extremity peripheral artery disease. In: *UpToDate*, Collins KA (Ed). Nov 18, 2024. *UpToDate*, Waltham, MA. Accessed Mar 5, 2025.
10. Bolognia JL, Schaffer JV, Cerroni L. Ulcers. In: *Bolognia JL, Schaffer JV, Cerroni L. Dermatology*. 5th ed. Elsevier Ltd.; 2025. Ch. 105. 1844-1863.
11. Brennan MJ, Miller LT. Overview of treatment options and review of the current role and use of compression garments, intermittent pumps, and exercise in the management of lymphedema. *Cancer*. 1998 Dec 15;83(12 Suppl American):2821-7.
12. Cannon S. Pneumatic compression devices for in-home management of lymphedema: two case reports. *Cases J*. 2009 Mar 23;2:6625.

13. Centers for Medicare & Medicaid Services (CMS). Local Coverage Determinations (LCDs) alphabetical index. Accessed Mar 3, 2025. Available at URL address: <https://www.cms.gov/medicare-coverage-database/reports/local-coverage-proposed-lcds-alphabetical-report.aspx?proposedStatus=A&sortBy=title>
14. Centers for Medicare & Medicaid Services (CMS). National Coverage Determinations (NCDs) alphabetical index. Accessed Mar 3, 2025. Available at URL address: <https://www.cms.gov/medicare-coverage-database/reports/national-coverage-ncd-report.aspx?chapter=all&sortBy=title>
15. Centers for Medicare & Medicaid Services (CMS). National Coverage Determination (NCD) for Pneumatic Compression Devices, 280.6. Accessed Mar 3, 2025. Available at URL address: <https://www.cms.gov/medicare-coverage-database/view/ncd.aspx?ncdid=225>
16. Colwell CW Jr, Froimson MI, Anseth SD, Giori NJ, Hamilton WG, Barrack RL, et al. A mobile compression device for thrombosis prevention in hip and knee arthroplasty. *J Bone Joint Surg Am.* 2014 Feb 5;96(3):177-83.
17. Cormier JN, Askew RL, Mungovan KS, Xing Y, Ross MI, Armer JM. Lymphedema beyond breast cancer: a systematic review and meta-analysis of cancer-related secondary lymphedema. *Cancer.* 2010 Nov 15;116(22):5138-49.
18. Crawford DA, Andrews RL, Morris MJ, Hurst JM, Lombardi AV Jr, Berend KR. Ambulatory Portable Pneumatic Compression Device as Part of a Multimodal Aspirin-Based Approach in Prevention of Venous Thromboembolism in Outpatient Total Knee Arthroplasty. *Arthroplast Today.* 2020 Jun 16;6(3):378-380.
19. de Haro J, Acin F, Florez A, Bleda S, Fernandez JL. A prospective randomized controlled study with intermittent mechanical compression of the calf in patients with claudication. *J Vasc Surg.* 2010 Apr;51(4):857-62.
20. De Maeseneer MG, Kakkos SK, Aherne T, Baekgaard N, Black S, Blomgren L, Giannoukas A, Gohel M, de Graaf R, Hamel-Desnos C, Jawien A, Jaworucka-Kaczorowska A, Lattimer CR, Mosti G, Noppeney T, van Rijn MJ, Stansby G, Esvs Guidelines Committee, Kolh P, Bastos Goncalves F, Chakfé N, Coscas R, de Borst GJ, Dias NV, Hinchliffe RJ, Koncar IB, Lindholt JS, Trimarchi S, Tulamo R, Twine CP, Vermassen F, Wanhainen A, Document Reviewers, Björck M, Labropoulos N, Lurie F, Mansilha A, Nyamekye IK, Ramirez Ortega M, Ulloa JH, Urbanek T, van Rij AM, Vuylsteke ME. Editor's Choice - European Society for Vascular Surgery (ESVS) 2022 Clinical Practice Guidelines on the Management of Chronic Venous Disease of the Lower Limbs. *Eur J Vasc Endovasc Surg.* 2022 Feb;63(2):184-267. Erratum in: *Eur J Vasc Endovasc Surg.* 2022 Aug-Sep;64(2-3):284-285.
21. Devoogdt N, Van Kampen M, Geraerts I, Coremans T, Christiaens MR. Different physical treatment modalities for lymphoedema developing after axillary lymph node dissection for breast cancer: a review. *Eur J Obstet Gynecol Reprod Biol.* 2010 Mar;149(1):3-9.
22. Dietz MJ, Moushmouth O, Frye BM, Lindsey BA, Murphy TR, Klein AE. Randomized Trial of Postoperative Venous Thromboembolism Prophylactic Compliance: Aspirin and Mobile Compression Pumps. *J Am Acad Orthop Surg.* 2022 Oct 15;30(20):e1319-e1326.
23. Dietz MJ, Ray JJ, Witten BG, Frye BM, Klein AE, Lindsey BA. Portable compression devices in total joint arthroplasty: poor outpatient compliance. *Arthroplast Today.* 2020 Mar 6;6(1):118-122.

24. Dini D, Del Mastro L, Gozza A, Lionetto R, Garrone O, Forno G, et al. The role of pneumatic compression pumps in the treatment of postmastectomy lymphedema. A randomized phase III study. *Ann Oncol* 1998 Feb;9(2):187-90.
25. Dolibog P, Franek A, Taradaj J, Polak A, Dolibog P, Blaszczyk E, et al. A randomized, controlled clinical pilot study comparing three types of compression therapy to treat venous leg ulcers in patients with superficial and/or segmental deep venous reflux. *Ostomy Wound Manage*. 2013 Aug;59(8):22-30.
26. Douketis JD, Mithoowani S. Prevention of venous thromboembolic disease in acutely ill hospitalized medical adults. In: *UpToDate*, Finlay G (Ed). Jun 28, 2024. UpToDate, Waltham, MA. Accessed Mar 5, 2025.
27. Eberhardt RT, Raffetto JD. Chronic venous insufficiency. *Circulation*. 2014 Jul 22;130(4):333-46.
28. Eliasson AH, Lettieri CJ. Sequential compression devices for treatment of restless legs syndrome. *Medicine (Baltimore)*. 2007 Nov;86(6):317-23.
29. Executive Committee of the International Society of Lymphology. The diagnosis and treatment of peripheral lymphedema: 2020 Consensus Document of the International Society of Lymphology. *Lymphology*. 2020;53(1):3-19.
30. Falck-Ytter Y, Francis CW, Johanson NA, Curley C, Dahl OE, Schulman S, et al. Prevention of VTE in orthopedic surgery patients: Antithrombotic Therapy and Prevention of Thrombosis, 9th ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines. *Chest*. 2012 Feb;141(2 Suppl):e278S-e325S.
31. Faulkner J, Paine E, Hudson N, Hannah S, Dennis-Jones A, Martinelli L, Hobbs H. Effect of using home-based dynamic intermittent pneumatic compression therapy during periods of physical activity on functional and vascular health outcomes in chronic stroke: A randomized controlled clinical trial. *PLoS One*. 2025 Feb 18;20(2):e0318942.
32. Feldman JL, Stout NL, Wanchai A, Stewart BR, Cormier JN, Armer JM. Intermittent pneumatic compression therapy: a systematic review. *Lymphology*. 2012 Mar;45(1):13-25.
33. Fife CE, Davey S, Maus EA, Guilliod R, Mayrovitz HN. A randomized controlled trial comparing two types of pneumatic compression for breast cancer-related lymphedema treatment in the home. *Support Care Cancer*. 2012 Dec;20(12):3279-86.
34. Garcia-Borreguero D, Ferini-Strambi L, Kohonen R, O'Keefe S, Trenkwalder C, Högl B, et al.; European Federation of Neurological Societies; European Neurological Society; European Sleep Research Society. European guidelines on management of restless legs syndrome: report of a joint task force by the European Federation of Neurological Societies, the European Neurological Society and the European Sleep Research Society. *Eur J Neurol*. 2012 Nov;19(11):1385-96.
35. Gebruers N, Verbelen H, De Vrieze T, Vos L, Devoogdt N, Fias L, Tjalma W. Current and future perspectives on the evaluation, prevention and conservative management of breast cancer related lymphoedema: A best practice guideline. *Eur J Obstet Gynecol Reprod Biol*. 2017 Sep;216:245-253.

36. Gornik HL, Aronow HD, Goodney PP, Arya S, Brewster LP, Byrd L, Chandra V, Drachman DE, Eaves JM, Ehrman JK, Evans JN, Getchius TSD, Gutiérrez JA, Hawkins BM, Hess CN, Ho KJ, Jones WS, Kim ESH, Kinlay S, Kirksey L, Kohlman-Trigoboff D, Long CA, Pollak AW, Sabri SS, Sadwin LB, Secemsky EA, Serhal M, Shishehbor MH, Treat-Jacobson D, Wilkins LR; Peer Review Committee Members. 2024 ACC/AHA/AACVPR/APMA/ABC/SCAI/SVM/SVN/SVS/SIR/VESSE Guideline for the Management of Lower Extremity Peripheral Artery Disease: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. 2024 Jun 11;149(24):e1313-e1410.
37. Hammond T. Can truncal edema be treated with pneumatic compression? *National Lymphedema Network*. Apr-Jun 2009.
38. Handoll HH, Elliott J. Rehabilitation for distal radial fractures in adults. *Cochrane Database Syst Rev*. 2015 Sep 25;(9):CD003324.
39. Hardwick ME, Pulido PA, Colwell CW Jr. A mobile compression device compared with low-molecular-weight heparin for prevention of venous thromboembolism in total hip arthroplasty. *Orthop Nurs*. 2011 Sep-Oct;30(5):312-6.
40. Harkess JW, Crockarell JR. Arthroplasty of the Hip. In: Azar FM, Beatty JH. *Campbell's Operative Orthopaedics* 14th ed. Philadelphia, PA: Elsevier; 2021. 178-333.e16
41. Harris SR. Clinical practice guidelines for the care and treatment of breast cancer: 11. Lymphedema. *CMAJ*. 2001 Jan 23;164(2):191-9.
42. Heller DR, Axelrod B, Sevilimedu V, Morrow M, Mehrara BJ, Barrio AV. Quality of Life After Axillary Lymph Node Dissection Among Racial and Ethnic Minority Women. *JAMA Surg*. 2024 Mar 27:e240118.
43. Hess CN, Bonaca MP. Investigational therapies for treating symptoms of lower extremity peripheral artery disease. In: *UpToDate*, Collins KA (Ed). Apr 17, 2024. *UpToDate*, Waltham, MA. Accessed May 6, 2024.
44. Kahn SR, Lim W, Dunn AS, Cushman M, Dentali F, Akl EA, Cook DJ, Balekian AA, et al. Prevention of VTE in nonsurgical patients: antithrombotic therapy and prevention of thrombosis, 9th ed: American College of Chest Physicians evidence-based clinical practice guidelines. *Chest* 2012 Feb;141(2 Suppl):e195S-226S.
45. Kakkos S, Kirkilesis G, Caprini JA, Geroulakos G, Nicolaides A, Stansby G, Reddy DJ. Combined intermittent pneumatic leg compression and pharmacological prophylaxis for prevention of venous thromboembolism. *Cochrane Database Syst Rev*. 2022 Jan 28;1(1):CD005258.
46. Karaca-Mandic P, Hirsch AT, Rockson SG, Ridner SH. The Cutaneous, Net Clinical, and Health Economic Benefits of Advanced Pneumatic Compression Devices in Patients With Lymphedema. *JAMA Dermatol*. 2015 Nov;151(11):1187-93.
47. Kavros SJ, Delis KT, Turner NS, Voll AE, Liedl DA, Gloviczki P, Rooke TW. Improving limb salvage in critical ischemia with intermittent pneumatic compression: a controlled study with 18-month follow-up. *J Vasc Surg*. 2008 Mar;47(3):543-9.

48. Keeley V, Riches K, Ward L, Franks PJ. A Prospective Preliminary Study Examining the Physiological Impact of Pneumatic Compression Dosing in the Treatment of Lower Extremity Lymphedema. *Lymphat Res Biol*. 2023 Oct;21(5):456-462.
49. Kerchner K, Fleischer A, Yosipovitch G. Lower extremity lymphedema update: pathophysiology, diagnosis, and treatment guidelines. *J Am Acad Dermatol*. 2008 Aug;59(2):324-31.
50. Khan M, Phillips SA, Mathew P, Venkateswaran V, Haverstock J, Dagher D, Yardley D, Dick D, Bhandari M. Cryo-Pneumatic Compression Results in a Significant Decrease in Opioid Consumption After Shoulder Surgery: A Multicenter Randomized Controlled Trial. *Am J Sports Med*. 2024 Sep;52(11):2860-2865.
51. Khanna A, Gougoulas N, Maffulli N. Intermittent pneumatic compression in fracture and soft-tissue injuries healing. *Br Med Bull*. 2008;88(1):147-156.
52. Kim KI, Kim DK, Song SJ, Hong SJ, Bae DK. Pneumatic compression device does not show effective thromboprophylaxis following total knee arthroplasty in a low incidence population. *Orthop Traumatol Surg Res*. 2019;105(1):71-75.
53. Kligman L, Wong RK, Johnston M, Laetsch NS. The treatment of lymphedema related to breast cancer: a systematic review and evidence summary. *Support Care Cancer*. 2004 Jun;12(6):421-31.
54. Koya Medical. Dayspring®. © 2025. Accessed Mar 5, 2025. Available at URL address: <https://www.koyamedical.com/>
55. Labropoulos N, Wierks C, Suffoletto B. Intermittent pneumatic compression for the treatment of lower extremity arterial disease: a systematic review. *Vasc Med*. 2002 May;7(2):141-8.
56. Lettieri CJ, Eliasson AH. Pneumatic compression devices are an effective therapy for restless legs syndrome: a prospective, randomized, double-blinded, sham-controlled trial. *Chest*. 2009 Jan;135(1):74-80.
57. Liu P, Liu J, Chen L, Xia K, Wu X. Intermittent pneumatic compression devices combined with anticoagulants for prevention of symptomatic deep vein thrombosis after total knee arthroplasty: a pilot study. *Ther Clin Risk Manag*. 2017 Feb 14;13:179-183.
58. Louridas G, Saadia R, Spelay J, Abdoh A, Weighell W, Arneja AS, et al. The ArtAssist Device in chronic lower limb ischemia. A pilot study. *Int Angiol*. 2002 Mar;21(1):28-35.
59. Lurie F, Malgor RD, Carman T, Dean SM, Iafrati MD, Khilnani NM, Labropoulos N, Maldonado TS, Mortimer P, O'Donnell TF Jr, Raffetto JD, Rockson SG, Gasparis AP. The American Venous Forum, American Vein and Lymphatic Society and the Society for Vascular Medicine expert opinion consensus on lymphedema diagnosis and treatment. *Phlebology*. 2022 May;37(4):252-266.
60. Maldonado TS, Rokosh RS, Padberg F, Rotella V, Miller H, Nassiri N, et al. Assessment of quality of life changes in patients with lower extremity lymphedema using an advanced pneumatic compression device at home. *J Vasc Surg Venous Lymphat Disord*. 2021 May;9(3):745-752.

61. Mani R, Vowden K, Nelson EA. Intermittent pneumatic compression for treating venous leg ulcers Cochrane Database Syst Rev. 2001;(4): CD001899.
62. Marinova M, Sundaram A, Holtham K, Ebert JR, Wysocki D, Meyerkort D, Radic R. The role of a cryocompression device following total knee arthroplasty to assist in recovery: a randomised controlled trial. *Knee Surg Sports Traumatol Arthrosc.* 2023 Oct;31(10):4422-4429.
63. Maul SM, Devine JA, Wincer CR. Development of a framework for pneumatic device selection for lymphedema treatment. *Medical Devices: Evidence and Research* 2009 (2): 57-65.
64. Mayrovitz HN. Interface pressures produced by two different types of lymphedema therapy devices. *Phys Ther.* 2007 Oct;87(10):1379-88.
65. Mayrovitz HN, Brown-Cross D, Mayrovitz BL., Humble-Golla A. Lymphedema: Role of Truncal Clearance as a Therapy Component. *Home Health Care Management Practice* 2009 0: 1084822309331484.
66. Mayrovitz HN. The standard of care for lymphedema: current concepts and physiological considerations. *Lymphat Res Biol.* 2009;7(2):101-8.
67. Mehrara B, Chang EI, Ashinoff RL. Management of peripheral lymphedema. In: UpToDate, Collins KA (Ed). Jan 3, 2025. UpToDate, Waltham, MA. Accessed Mar 5, 2025.
68. Montagna G, Zhang J, Sevilimedu V, Charyn J, Abbate K, Gomez EA, Mehrara B, Morrow M, Barrio AV. Risk Factors and Racial and Ethnic Disparities in Patients With Breast Cancer-Related Lymphedema. *JAMA Oncol.* 2022 Aug 1;8(8):1195-1200.
69. Moran PS, Teljeur C, Harrington P, Ryan M. A systematic review of intermittent pneumatic compression for critical limb ischaemia. *Vasc Med.* 2015 Feb;20(1):41-50.
70. Moseley A, Carati C, Piller N. A systematic review of common conservative therapies for arm lymphoedema secondary to breast cancer treatment. *Ann Oncol.* 2007 Apr;18(4):639-46.
71. Muluk SC, Hirsch AT, Taffe EC. Pneumatic compression device treatment of lower extremity lymphedema elicits improved limb volume and patient-reported outcomes. *Eur J Vasc Endovasc Surg.* 2013 Oct;46(4):480-7.
72. National Cancer Institute (NCI). Lymphedema [Physician Data Query (PDQ®)]. Updated Dec 18, 2024. Accessed Mar 5, 2025. Available at URL address: <https://www.cancer.gov/about-cancer/treatment/side-effects/lymphedema/lymphedema-hp-pdq>
73. National Comprehensive Cancer Network (NCCN). NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®). Cancer-Associated Venous Thromboembolic Disease. Version 1.2025 — Feb 27, 2025. Accessed Mar 5, 2025. Available at URL address: <https://www.nccn.org/guidelines/>
74. National Comprehensive Cancer Network (NCCN). NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®). Survivorship. Version 2.2024 — Dec 9, 2024. Accessed Mar 5, 2025. Available at URL address: <https://www.nccn.org/guidelines/>

75. National Institute of Neurological Disorders and Stroke (NINDS). Restless Legs Syndrome. Jan 6, 2025. Accessed Mar 5, 2025. Available at URL address: <https://www.ninds.nih.gov/health-information/disorders/restless-legs-syndrome>
76. Neschis DG, Golden MA. Lower extremity peripheral artery disease: Clinical features and diagnosis. In: UpToDate, Collins KA (Ed). Sep 9, 2024. UpToDate, Waltham, MA. Accessed Mar 5, 2025.
77. Nelson EA, Hillman A, Thomas K. Intermittent pneumatic compression for treating venous leg ulcers. *Cochrane Database Syst Rev*. 2014 May 12;5:CD001899.
78. Nicolaidis A, Kakkos S, Eklof B, Perrin M, Nelzen O, Neglen P, Partsch H, Rybak Z. Management of chronic venous disorders of the lower limbs – guidelines according to scientific evidence. *Int Angiol*. 2014 Apr;33(2):87-208.
79. O'Donnell TF Jr, Passman MA. Clinical practice guidelines of the Society for Vascular Surgery (SVS) and the American Venous Forum (AVF)--Management of venous leg ulcers. Introduction. *J Vasc Surg*. 2014 Aug;60(2 Suppl):1S-2S.
80. Oremus M, Dayes I, Walker K, Raina P. Systematic review: conservative treatments for secondary lymphedema. *BMC Cancer*. 2012 Jan 4;12:6.
81. Padberg FT Jr, Ucuzian A, Dosluoglu H, Jacobowitz G, O'Donnell TF. Longitudinal Assessment of Health-Related Quality of Life and Clinical Outcomes with At Home Advanced Pneumatic Compression Treatment of Lower Extremity Lymphedema. *J Vasc Surg Venous Lymphat Disord*. 2024 Apr 16:101892.
82. Pascarella L, Marston W. Venous Disease. In: Townsend CM, Beauchamp RD, Evers BM, Mattox KL. *Sabiston Textbook of Surgery*. 21st Ed. St. Louis, MO: Elsevier; 2022. 1812-1833.e1.
83. Pawlaczyk K, Gabriel M, Urbanek T, Dzieciuchowicz Ł, Krasiński Z, Gabriel Z, et al. Effects of Intermittent Pneumatic Compression on Reduction of Postoperative Lower Extremity Edema and Normalization of Foot Microcirculation Flow in Patients Undergoing Arterial Revascularization. *Med Sci Monit*. 2015 Dec 21;21:3986-92.
84. Pranata R, Deka H, Yonas E, et al. The use of intermittent pneumatic compression to prevent venous thromboembolism in neurosurgical patients-A systematic review and meta-analysis [published online ahead of print, 2020 Jan 23]. *Clin Neurol Neurosurg*. 2020;191:105694.
85. Ridner SH, McMahon E, Dietrich MS, Hoy S. Home-based lymphedema treatment in patients with cancer-related lymphedema or noncancer-related lymphedema. *Oncol Nurs Forum*. 2008 Jul;35(4):671-80.
86. Ridner SH, Murphy B, Deng J, Kidd N, Galford E, Bonner C, Bond SM, Dietrich MS. A randomized clinical trial comparing advanced pneumatic truncal, chest, and arm treatment to arm treatment only in self-care of arm lymphedema. *Breast Cancer Res Treat*. 2012 Jan;131(1):147-58.

87. Ridner SH, Murphy B, Deng J, Kidd N, Galford E, Dietrich MS. Advanced pneumatic therapy in self-care of chronic lymphedema of the trunk. *Lymphat Res Biol*. 2010 Dec;8(4):209-15.
88. Rockson SG, Karaca-Mandic P, Nguyen M, Shadduck K, Gingerich P, Campione E, Hetrick H. A non-randomized, open-label study of the safety and effectiveness of a novel non-pneumatic compression device (NPCD) for lower limb lymphedema. *Sci Rep*. 2022b Aug 17;12(1):14005.
89. Rockson SG, Karaca-Mandic P, Skoracki R, Hock K, Nguyen M, Shadduck K, Gingerich P, Campione E, Leifer A, Armer J. Clinical Evaluation of a Novel Wearable Compression Technology in the Treatment of Lymphedema, an Open-Label Controlled Study. *Lymphat Res Biol*. 2022a Apr;20(2):125-132.
90. Rockson SG, Skoracki R. Effectiveness of a Nonpneumatic Active Compression Device in Older Adults with Breast Cancer-Related Lymphedema: A Subanalysis of a Randomized Crossover Trial. *Lymphat Res Biol*. 2023 Dec;21(6):581-584.
91. Rockson SG, Whitworth PW, Cooper A, Kania S, Karnofel H, Nguyen M, Shadduck K, Gingerich P, Armer J. Safety and effectiveness of a novel nonpneumatic active compression device for treating breast cancer-related lymphedema: A multicenter randomized, crossover trial (NILE). *J Vasc Surg Venous Lymphat Disord*. 2022c Nov;10(6):1359-1366.e1.
92. Schiltz D, Eibl D, Mueller K, Biermann N, Prantl L, Taeger CD. Therapist versus Machine-Immediate Effects of Manual versus Mechanical Lymphatic Drainage in Patients with Secondary Lymphedema. *J Clin Med*. 2024 Feb 23;13(5):1277.
93. Shao Y, Qi K, Zhou QH, Zhong DS. Intermittent pneumatic compression pump for breast cancer-related lymphedema: a systematic review and meta-analysis of randomized controlled trials. *Oncol Res Treat*. 2014;37(4):170-4.
94. Soran A, Toktas O, Grassi A, Sezgin E. Adding Pneumatic Compression Therapy in Lower Extremity Lymphedema Increases Compliance of Treatment, While Decreasing the Infection Rate. *Lymphat Res Biol*. 2022 Jun;20(3):315-318.
95. Szuba A, Achalu R, Rockson SG. Decongestive lymphatic therapy for patients with breast carcinoma-associated lymphedema. A randomized, prospective study of a role for adjunctive intermittent pneumatic compression. *Cancer*. 2002 Dec 1;95(11):2260-7.
96. Tactile Medical®. Clinicians. Accessed Mar 5, 2025. Available at URL address: <https://tactilemedical.com/clinicians/>
97. Tran K, Argáez C. Intermittent Pneumatic Compression Devices for the Management of Lymphedema: A Review of Clinical Effectiveness and Guidelines [Internet]. Ottawa (ON): Canadian Agency for Drugs and Technologies in Health; 2017 May 12.
98. U.S. Food and Drug Administration (FDA). Center for Devices and Radiological Health. 510(k) Premarket Notification database. Accessed Mar 5, 2025. Available at URL address: <https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpmn/pmn.cfm>
99. U.S. Food and Drug Administration (FDA). Center for Devices and Radiological Health. 510(k) summary. K210885. Dayspring. Apr 23, 2021. Accessed Mar 5, 2025. Available at

URL address:

<https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpmn/pmn.cfm?ID=K210885>

100. U.S. Food and Drug Administration (FDA). Center for Devices and Radiological Health. 510(k) summary. K212287. Dayspring Lite. Sep 21, 2021. Accessed Mar 5, 2025. Available at URL address:
<https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpmn/pmn.cfm?ID=K212287>
101. U.S. Food and Drug Administration (FDA). Center for Devices and Radiological Health. 510(k) summary. K223228. Dayspring Lite. Jan 4, 2024. Accessed Mar 5, 2025. Available at URL address:
<https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpmn/pmn.cfm?ID=K223228>
102. U.S. Food and Drug Administration (FDA). Center for Devices and Radiological Health. 510(k) summary. K232640. Venowave VW5. Jun 25, 2024. Accessed Mar 5, 2025. Available at URL address:
<https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpmn/pmn.cfm?ID=K232640>
103. Uzkeser H, Karatay S, Erdemci B, Koc M, Senel K. Efficacy of manual lymphatic drainage and intermittent pneumatic compression pump use in the treatment of lymphedema after mastectomy: a randomized controlled trial. *Breast Cancer*. 2015 May;22(3):300-7.
104. Wang D, Bao F, Li Q, Teng Y, Li J. Semiautomatic intermittent pneumatic compression device applied to deep vein thrombosis in major orthopedic surgery. *Biomed Eng Online*. 2018 Jun 15;17(1):78.
105. Wilburn O, Wilburn P, Rockson SG. A pilot, prospective evaluation of a novel alternative for maintenance therapy of breast cancer-associated lymphedema [ISRCTN76522412]. *BMC Cancer*. 2006 Mar 29;6:84.
106. Winkelman JW, Armstrong MJ, Allen RP, et al. Practice guideline summary: Treatment of restless legs syndrome in adults: Report of the Guideline Development, Dissemination, and Implementation Subcommittee of the American Academy of Neurology. *Neurology*. 2016;87(24):2585–2593. (Reaffirmed Oct 22, 2022)
107. Wright T, Scarfino CD, O'Malley EM. Effect of pneumatic compression device and stocking use on symptoms and quality of life in women with lipedema: A proof-in-principle randomized trial. *Phlebology*. 2023 Feb;38(1):51-61.
108. Zaleska M, Olszewski WL, Durlík M. The effectiveness of intermittent pneumatic compression in long-term therapy of lymphedema of lower limbs. *Lymphat Res Biol*. 2014 Jun;12(2):103-9.
109. Zaleska MT, Olszewski WL, Ross J. The long-term arterial assist intermittent pneumatic compression generating venous flow obstruction is responsible for improvement of arterial flow in ischemic legs. *PLoS One*. 2019;14(12):e0225950. Published 2019 Dec 11.
110. Zhao JM, He ML, Xiao ZM, Li TS, Wu H, Jiang H. Different types of intermittent pneumatic compression devices for preventing venous thromboembolism in patients after total hip replacement. *Cochrane Database Syst Rev*. 2014 Dec 22;12:CD009543.

Revision Details

Type of Revision	Summary of Changes	Date
Annual Review	<ul style="list-style-type: none"> No clinical policy statement changes. 	4/15/2025
Focused Review	<ul style="list-style-type: none"> No clinical policy statement changes. 	11/15/2024
Annual Review	<ul style="list-style-type: none"> Removed noncoverage policy statement for chest and/or trunk pneumatic appliances. 	6/15/2024
Focused Review	<ul style="list-style-type: none"> Revised policy statements. 	12/3/2023

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