

Pneumatic Compression Devices

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[Instructions for Use](#)

Table of Contents	Page
Coverage Rationale	1
Applicable Codes	1
Description of Services	2
Clinical Evidence	2
U.S. Food and Drug Administration	6
References	6
Policy History/Revision Information	7
Instructions for Use	7

Related Commercial Policy
<ul style="list-style-type: none"> Durable Medical Equipment, Orthotics, Medical Supplies and Repairs/Replacements
Community Plan Policy
<ul style="list-style-type: none"> Pneumatic Compression Devices

Coverage Rationale

Pneumatic compression devices are proven and medically necessary in certain circumstances for the treatment of lymphedema or chronic venous insufficiency with edema and non-healing lower extremity ulcers. For medical necessity clinical coverage criteria, refer to the InterQual® CP: Durable Medical Equipment, Pneumatic Compression Devices.

Click [here](#) to view the InterQual® criteria.

Intermittent limb compression devices are proven and medically necessary in an outpatient setting or upon discharge from an inpatient setting for the prevention of deep venous thrombosis (DVT) when all the following criteria are met:

- Immobility (i.e., not able to get up from a chair/out of bed and walk to the toilet without the help of another person)
- Contraindication to pharmaceutical anti-coagulation
- None of the following contraindications are present:
 - Active infection
 - Pulmonary edema
 - Severe arteriosclerosis
 - Severe congestive heart failure
 - Skin or tissue condition that may be negatively impacted by the use of garments
 - Suspected or known DVT

Note: The InterQual® criteria does not apply to HCPCS code E0652 and E0675. For E0652 and E0675, use available criteria from the CMS.gov website in [LCD L33829](#).

Applicable Codes

The following list(s) of procedure and/or diagnosis codes is provided for reference purposes only and may not be all inclusive. Listing of a code in this policy does not imply that the service described by the code is a covered or non-covered health service. Benefit coverage for health services is determined by the member specific benefit plan document and applicable laws that may require coverage for a specific service. The inclusion of a code does not imply any right to reimbursement or guarantee claim payment. Other Policies and Guidelines may apply.

HCPCS Code	Description
A4600	Sleeve for intermittent limb compression device, replacement only, each
E0650	Pneumatic compressor, nonsegmental home model
E0651	Pneumatic compressor, segmental home model without calibrated gradient pressure
E0652	Pneumatic compressor, segmental home model with calibrated gradient pressure
E0655	Nonsegmental pneumatic appliance for use with pneumatic compressor, half arm
E0660	Nonsegmental pneumatic appliance for use with pneumatic compressor, full leg
E0665	Nonsegmental pneumatic appliance for use with pneumatic compressor, full arm
E0666	Nonsegmental 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, two 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
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

Description of Services

Intermittent pneumatic compression (IPC) includes inflatable sleeves that are wrapped around the legs and secured by Velcro. These sleeves can be applied to the calf or to both the calf and thigh. They are inflated, one side at a time to compress the legs at intervals. Some are inflated sequentially, first distally, then proximally to increase venous flow. IPC is thought to reduce the risk of venous thrombosis by reducing stasis and stimulating the release of intrinsic fibrinolytic factors.

Clinical Evidence

Prevention of Deep Venous Thrombosis (DVT)

Arabi et al. (2019) conducted a multi-site randomized controlled trial that evaluated whether adjunctive intermittent pneumatic compression in critically ill patients receiving pharmacologic thromboprophylaxis with unfractionated heparin or low-molecular-weight heparin would result in a lower incidence of proximal lower-limb deep-vein thrombosis than pharmacologic thromboprophylaxis alone. Patients who were considered adults according to the local standards at the participating sites (≥ 14 , ≥ 16 , or ≥ 18 years of age), were randomly assigned within 48 hours after admission to an intensive care unit (ICU) to receive either intermittent pneumatic compression for at least 18 hours each day in addition to pharmacologic thromboprophylaxis with unfractionated or low-molecular-weight heparin (pneumatic compression group) or pharmacologic thromboprophylaxis alone (control group). The primary outcome was an episode of proximal lower-limb deep-vein thrombosis, as detected on twice-weekly lower-limb ultrasound after the third calendar day since randomization until ICU discharge, death, achievement of full mobility, or trial day 28, whichever occurred first. There was a total of 2003 patients underwent randomization, 991 were assigned to the pneumatic compression group and 1012 to the control group. Intermittent pneumatic compression was applied for a median of 22 hours daily for a median of 7 days. The primary outcome occurred in 37 of 957 patients (3.9%) in the pneumatic compression group and in 41 of 985 patients (4.2%) in the control group (relative risk, 0.93; 95% confidence interval [CI], 0.60 to 1.44; $P = 0.74$). Venous thromboembolism (pulmonary embolism or any lower-limb deep-vein thrombosis) occurred in 103 of 991 patients (10.4%) in the pneumatic compression group and in 95 of 1012 patients (9.4%) in the control group (relative risk, 1.11; 95% CI, 0.85 to 1.44), and death from any cause at 90 days occurred in 258 of 990 patients (26.1%) and 270 of 1011 patients (26.7%), respectively (relative risk, 0.98; 95% CI, 0.84 to 1.13). Authors found no benefit with the use of adjunctive pneumatic compression in the prevention of DVT in critically ill patients receiving pharmacologic prophylaxis.

Zhang et al. (2018) in a systematic review and meta-analysis examined the effect of intermittent pneumatic compression (IPC) on the risk of DVT's, PE and mortality compared with no IPC prophylaxis after a stroke. Databases were searched including Medline, EMBASE, Cochrane Library, Wanfang, CNKI, and CBM, from inception to June 2, 2017. Randomized controlled trials comparing IPC with no IPC in patients with stroke were included. The rates of PE, DVT, and mortality were compared. The results were pooled using a fixed effects model to evaluate the differences between the IPC and control groups. If there was significant heterogeneity in the pooled result, a random effect model was used. There were seven randomized controlled trials identified that included 3,551 participants. Overall, IPC significantly reduced the incidence of DVT (risk ratio [RR] = 0.50; 95% confidence interval [CI 0.27, 0.94]). These findings were similar among subgroup of participants for whom IPC was started more than 72 hours after the stroke and for those who did not receive pharmacological anticoagulation. However, IPC increased IPC-related adverse events (RR = 5.71; 95% CI [3.40, 9.58]). Though IPC was associated with a significant increase in survival by 4.5 days during 6 months of follow-up (148 - 152 days; 95% CI [-0.2, 9.1]), there was a mean gain of only 0.9 days (26.7 - 27.6 days; 95% CI [2.1, 3.9]) in quality-adjusted survival during the 6-month follow-up. Sensitivity analyses did not alter these findings. Limitations of the study included the small number of trials, moderate heterogeneity in the DVT prevention outcome and there were moderate quality studies included. The authors conclude that this study indicates that there is clear evidence that IPC significantly reduces the risk of DVT and significantly improves survival in a wide variety of patients who are immobile after stroke. However, IPC does not significantly improve quality-adjusted survival.

O'Connell et al. (2016) conducted a systematic review and meta-analysis was to carry out an up-to-date evaluation on the use of compression devices (with or without pharmacological anticoagulation) as deep vein thrombosis (DVT) prophylaxis methods in orthopedic and neurological patients, as compared to pharmacological anticoagulation alone. There were nine RCTs that were included in the review and meta-analysis for a total of 3,347 patients. The IPC group had a combined total of 1,667 patients and the pharmacological anticoagulation alone group 1,667 patients. The main outcome measures were the development of DVT and/or PE. In all nine studies, the rate of DVT significantly occurred in the pharmacological anticoagulation group (89/1667) than in the IPC group (38/1680) (P = 0.04). Sensitivity testing did not change this finding. A sensitivity test that looked at IPC alone without additional chemoprophylaxis, showed no significant difference in the rate of DVT between IPC and the control group. A further test to assess if differences were related to the protocol differences and not necessarily related to IPC by using data from 7 studies using only low molecular weight heparin show the differences between the group to slightly favor the IPC group, although not significant. The main limitation was lack of binding in all studies and the heterogeneity of both the intervention and control group in the meta-analysis. Some intervention groups included IPC alone while others included IPC and pharmacological treatment. The authors concluded that the use of an intermittent pneumatic compression device alone is neither superior nor inferior to chemoprophylaxis.

Pavon et al. (2016) in a systematic review examined the results of 14 eligible randomized controlled trials and three eligible observational studies evaluating the effectiveness of intermittent pneumatic compression devices for venous thromboembolism prophylaxis in postoperative surgical patients. The authors looked at the comparative effectiveness of IPCDs for selected outcomes (mortality, venous thromboembolism [VTE], symptomatic or asymptomatic deep vein thrombosis, major bleeding, ease of use, and adherence) in postoperative surgical patients. Intermittent pneumatic compression devices were comparable to anticoagulation for major clinical outcomes (VTE: risk ratio, 1.39; 95% confidence interval, 0.73 - 2.64). Limited data suggest that concurrent use of anticoagulation with IPCD may lower VTE risk compared with anticoagulation alone, and that IPCD compared with anticoagulation may lower major bleeding risk. Subgroup analyses did not show significant differences by device location, mode of inflation, or risk of bias elements. The authors concluded that intermittent pneumatic compression devices do not show clear differences in clinical outcomes although they may decrease the risk of VTE and should be used in accordance with current clinical guidelines. The current evidence base to guide selection of a specific device or type of device is limited and comparative studies are needed.

Dennis et al. (2015) in a health technology assessment based on the CLOTS 3 trial (2013) looked at whether or not the application of IPC to the legs of immobile patients after stroke reduced their risk of deep vein thrombosis (DVT). CLOTS 3 was a multicenter, parallel group, randomized controlled trial which allocated patients via a central randomization system to IPC or no IPC. A technician blinded to treatment allocation performed compression duplex ultrasound (CDU) of both legs at 7 - 10 days and 25 - 30 days after enrolment. Participants were followed for 6 months to determine survival and later symptomatic VTE. There were 2,876 patients enrolled in 94 UK hospitals between 8 December 2008 and 6 September 2012. Inclusion criteria included patients admitted to hospital within 3 days of acute stroke and who were immobile (not able to get up from a chair / out of bed and walk to the toilet without the help of another person) on the day of admission (day 0) to day 3. Patients were excluded for any of the following: age < 16 years; subarachnoid hemorrhage; and contra-indications to IPC including dermatitis, leg ulcers, severe oedema, severe peripheral vascular disease and congestive cardiac failure. Participants were allocated to

routine care or routine care plus IPC for 30 days, until earlier discharge from the hospital or participating rehabilitation unit, or until walking independently, whichever happened first. Mean duration of ICP use was about 11 days with about one in four participants using ICP for three weeks or more. Most participants also received anti-platelet therapy and about half received pharmacological anticoagulation. The primary outcome occurred in 122 (8.5%) of 1438 patients allocated to IPC and 174 (12.1%) of 1438 patients allocated to no IPC, giving an absolute reduction in risk of 3.6% [95% confidence interval (CI) 1.4% to 5.8%] and a relative risk reduction of 0.69 (95% CI 0.55 to 0.86). After excluding 323 patients who died prior to any primary outcome and 41 who had no screening CDU, the primary outcome occurred in 122 of 1267 IPC participants compared with 174 of 1245 no-IPC participants, giving an adjusted odds ratio of 0.65 (95% CI 0.51 to 0.84; $p = 0.001$). Secondary outcomes in IPC compared with no-IPC participants were death in the treatment period in 156 (10.8%) versus 189 (13.1%) ($p = 0.058$); skin breaks in 44 (3.1%) versus 20 (1.4%) ($p = 0.002$); and falls with injury in 33 (2.3%) versus 24 (1.7%) ($p = 0.221$). Among patients treated with IPC, there was a statistically significant improvement in survival to 6 months (hazard ratio 0.86, 95% CI 0.73 to 0.99; $p = 0.042$), but no improvement in disability. The authors determined that IPC is an effective method of reducing the risk of DVT and improving survival in immobile patients after a stroke.

Domeij - Arverud et al. (2015) in a randomized controlled trial investigated at the use of intermittent pneumatic compression therapy and the prevention of deep vein thrombosis in outpatients who had undergone surgical repair of acute ruptures of the Achilles tendon, were immobilized, and did not receive pharmacological anticoagulation. A total of 150 patients who had undergone surgical repair of the Achilles tendon were randomized to either treatment with IPC for six hours per day for two weeks ($n = 74$) under an orthosis or treatment as usual ($n = 74$) in a plaster cast without IPC. At two weeks post-operatively, the incidence of deep vein thrombosis was assessed using blinded, double-reported compression duplex ultrasound. At this point, IPC was discontinued, and all patients were immobilized in an orthosis for a further four weeks. At six weeks post-operatively, a second compression duplex ultrasound scan was performed. At two weeks, the incidence of deep vein thrombosis was 21% in the treated group and 37% in the control group ($p = 0.042$). Age over 39 years was found to be a strong risk factor for deep vein thrombosis (odds ratio (OR) = 4.84, 95% confidence interval (CI) 2.14 to 10.96). Treatment with IPC, corrected for age differences between groups, reduced the risk of deep vein thrombosis at the two-week point (OR = 2.60; 95% CI 1.15 to 5.91; $p = 0.022$). At six weeks, that is four weeks after the end of the IPC intervention, the incidence of deep vein thrombosis was 52% in the treated group and 48% in the control group (OR 0.94, 95% CI 0.49 to 1.83). The authors concluded that IPC appears to be an effective method of reducing the risk of deep vein thrombosis in the early stages of post-operative immobile outpatients. Additional research is necessary to clarify whether it could result in similar benefits over longer periods of immobilization and in a more heterogeneous group of patients.

Arabi et al. (2013) in a single center observational study examined the association between the use of mechanical thromboprophylaxis with intermittent pneumatic compression (IPC) or graduated compression stockings (GCS) and the risk of VTE and hospital mortality among critically ill medical-surgical patients. They study was conducted in an adult medical surgical ICU between July 2006 and January 2008, they used multiple propensity scores adjustment to examine the association of IPC and GCS with VTE. The primary outcome was occurrence of VTE, including DVT and pulmonary embolism. The following information was collected: patient demographics, admission physiologic data, VTE risk factors, pharmacologic thromboprophylaxis, and mechanical thromboprophylaxis. Among 798 patients enrolled in the study, incident VTE occurred in 57 (7.1%). The use of IPC was associated with a significantly lower VTE incidence compared with no mechanical thromboprophylaxis (propensity scores adjusted hazard ratio, 0.45; 95% CI, 0.22-0.95; $P = .04$). GCS were not associated with decreased VTE incidence. No significant interaction was found between the mechanical thromboprophylaxis group, and the type of prophylactic heparin used ($P = .99$), recent trauma ($P = .66$), or recent surgery ($P = .07$) on VTE risk. While this study had strengths, it had the limitation of not being an RCT. The use of IPC was associated with a significantly lower VTE risk irrespective of pharmacologic thromboprophylaxis, but the use of GCS did not show the same result. This association was also consistent regardless of the type of prophylactic heparin used and was not modified by trauma or surgical admission.

Clinical Practice Guidelines

European Guidelines Perioperative Venous Thromboembolism Prophylaxis

Afshari et al. (2018, reaffirmed 2020) in a review of the European guidelines on perioperative venous thromboembolism prophylaxis. The authors note that the use of graduated compression stockings (GCS) and intermittent pneumatic compression (IPC) strongly differs between institutions. As a result, no robust recommendations can be made based on any current high-level evidence. Although different clinical practices can be supported, such approaches should be part of an institutional

strategy to reduce the problem of venous thromboembolism (VTE). They made the following recommendations and suggestions in regard to mechanical prophylaxis:

- An institution-wide protocol for the prevention of VTE that integrates early ambulation, pharmacological thromboprophylaxis with anticoagulants and mechanical thromboprophylaxis (Grade 1B).
- Against the routine use of graduated compression stockings (GCS) without pharmacological thromboprophylaxis to prevent VTE in patients at intermediate and high risk (Grade 1B)
- In patients with contra-indications to pharmacological thromboprophylaxis, we recommend the use of mechanical prophylaxis with IPC or GCS (Grade 1B) and suggest the use of IPC over GCS (Grade 2B).
- In patients with contra-indications for pharmacological thromboprophylaxis who are not at high risk for VTE, we suggest no prophylaxis over GCS alone (Grade 2C).
- In patients receiving pharmacological thromboprophylaxis who are not at very high risk for VTE, we recommend against the routine use of mechanical thromboprophylaxis with GCS or IPC (Grade 1B).
- Suggest combined mechanical and pharmacological prophylaxis in selected patients at very high risk for VTE (grade 2B).
- We suggest the use of IPC rather than GCS in selected high-risk patients in addition to pharmacological thromboprophylaxis (Grade 2B)

American Association of Plastic Surgeons

Pannucci et al. (2016) authored a clinical practice guideline based on a systematic review and meta-analysis sponsored by the American Association of Plastic Surgeons that examined both the benefits and risks of venous thromboembolism prophylaxis in plastic surgery patients. The authors found that meta-analyses of surgical patients (but not necessarily plastic surgery patients) have shown significant deep venous thrombosis risk reduction for intermittent pneumatic compression compared with placebo. Meta-analysis has also shown that intermittent pneumatic compression is superior to elastic compression stockings for deep venous thrombosis risk reduction (OR, 0.61; 95 percent CI, 0.39 to 0.93). The following statement were made:

- Recommend using intermittent pneumatic compression to prevent perioperative venous thromboembolism events in plastic surgery patients. In the absence of rigorous publications in plastic surgery, this recommendation was derived largely from meta-analyses in other specialties (Fig. 4) (GRADE 1B).
- Elastic compression stockings are associated with a decreased risk for perioperative venous thromboembolism in other surgical specialties. In the absence of rigorous publications in plastic surgery, this recommendation was derived largely from meta-analysis in other specialties (Fig. 5) (GRADE 1B).
- Intermittent pneumatic compression is superior to elastic compression stockings for venous thromboembolism prevention in other surgical specialties. In the absence of rigorous publications in plastic surgery, this recommendation was derived largely from meta-analysis in other specialties (Fig. 6) (GRADE 1B).

American College of Chest Physicians Society

Falck-Ytter Y et al. (2012), reaffirmed 2020) summarizes the recommendations from the American College of Chest Physicians Society on the optimal strategies for thromboprophylaxis after major orthopedic surgery include pharmacologic and mechanical approaches. The authors stated that mechanical approaches to perioperative thromboprophylaxis with pneumatic compression devices have the potential benefit of reducing the occurrence of VTE but without the risk for increased bleeding. An intermittent pneumatic device (IPCD) can also be used in the other leg even during surgery and the immediate postoperative period. Seven RCTs that included > 900 patients undergoing arthroplasty or HFS compared mechanical compression to no thromboprophylaxis. 31,66,76-79 Six used an IPCD, and one a venous foot pump (VFP).⁷⁷ The risk of bias varied. It was unclear in most trials whether allocation was concealed. Blinding of patients and caregivers is not likely in such studies, and not all provided blinded VTE adjudication. Variation in design and performance of the devices as well as information about compliance, which was rarely reported in older trials, introduce uncertainty in how to apply the evidence. Although the study is somewhat of a low quality, a relative risk reduction of > 50% was observed for both DVT and PE in THA, TKA, and HFS (PE RR, 0.4; 95% CI, 0.17 - 0.92; DVT RR, 0.46; 95% CI, 0.35 - 30.61). The corresponding estimated absolute risk difference is 16 fewer symptomatic VTE per 1,000. The results failed to demonstrate or to exclude a beneficial effect on mortality. As a result, in patients undergoing major orthopedic surgery, the authors recommend, among other things, the use of one of the following rather than no antithrombotic prophylaxis: low-molecular-weight heparin; fondaparinux; dabigatran, apixaban, rivaroxaban (total hip arthroplasty or total knee arthroplasty but not hip fracture surgery); low-dose unfractionated heparin; adjusted-dose vitamin K antagonist; aspirin (all Grade 1B); or an intermittent pneumatic compression device (IPCD) (Grade 1C) for a minimum of 10 to 14 days. The recommendation regarding intermittent pneumatic compression devices can help clinicians make evidence-based treatment decisions related to prevention of venous thromboembolism in orthopedic surgery patients.

Lansberg et al. (2012, reaffirmed 2020) summarizes the recommendations from the American College of Chest Physicians Society on the use of antithrombotic therapy in patients with stroke or transient ischemic attack (TIA). They generated treatment recommendations (Grade 1) and suggestions (Grade 2) based on high (A), moderate (B), and low (C) quality evidence. In patients with acute stroke and restricted mobility, they suggest the use of prophylactic-dose heparin or intermittent pneumatic compression devices (Grade 2B) and suggest against the use of elastic compression stockings (Grade 2B). Among other suggestions and recommendation, the authors stated that pharmacologic and mechanical prophylaxis should be initiated as early as possible and should be continued throughout the hospital stay or until the patient has regained mobility. Mechanical devices should be temporarily removed as often as needed to allow for early mobilization and screening for skin complications. These recommendations were based on indirect but higher-quality evidence from other populations, such as postoperative patients. The trials that compared intermittent pneumatic compression devices to no treatment have shown an approximate 50% reduction in DVT detected by testing such as a venogram. The recommendations regarding intermittent pneumatic compression devices can help clinicians make evidence-based treatment decisions with their patients who have had strokes.

U.S. Food and Drug Administration (FDA)

This section is to be used for informational purposes only. FDA approval alone is not a basis for coverage.

Devices and systems to perform pneumatic compression are regulated by the FDA as Class II devices. See the following website for more information (use product code JOW):

<http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfPMN/pmn.cfm>. (Accessed November 02, 2021)

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[Pneumatic Compression Devices \(L33829\)](#); DME MAC; CGS Administrators, LLC - 17013 (J-B) and 18003 (J-C); Noridian Healthcare Solutions, LLC - 16013 (J-A) and 19003 (J-D). Accessed January 13, 2022.

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Policy History/Revision Information

Date	Summary of Changes
06/01/2022	Coverage Rationale <ul style="list-style-type: none">Removed reference to specific InterQual® release date; refer to the most current InterQual® criteria Supporting Information <ul style="list-style-type: none">Archived previous policy version 2022T0563N

Instructions for Use

This Medical Policy provides assistance in interpreting UnitedHealthcare standard benefit plans. When deciding coverage, the member specific benefit plan document must be referenced as the terms of the member specific benefit plan may differ from the standard plan. In the event of a conflict, the member specific benefit plan document governs. Before using this policy, please check the member specific benefit plan document and any applicable federal or state mandates. UnitedHealthcare reserves the right to modify its Policies and Guidelines as necessary. This Medical Policy is provided for informational purposes. It does not constitute medical advice.

This Medical Policy may also be applied to Medicare Advantage plans in certain instances. In the absence of a Medicare National Coverage Determination (NCD), Local Coverage Determination (LCD), or other Medicare coverage guidance, CMS allows a Medicare Advantage Organization (MAO) to create its own coverage determinations, using objective evidence-based rationale relying on authoritative evidence ([Medicare IOM Pub. No. 100-16, Ch. 4, §90.5](#)).

UnitedHealthcare may also use tools developed by third parties, such as the InterQual® criteria, to assist us in administering health benefits. UnitedHealthcare Medical Policies are intended to be used in connection with the independent professional medical judgment of a qualified health care provider and do not constitute the practice of medicine or medical advice.