MEDICAL POLICY

Excellus
An independent licensee of the Blue Cross Blue Shield Association

Medical Policy Title	**Limb Pneumatic Compression Devices for Venous Thromboembolism Prophylaxis**
Policy Number	**1.01.51**
Current Effective Date	**September 18, 2025**
Next Review Date	**September 2026**

Our medical policies are based on the assessment of evidence based, peer-reviewed literature, and professional guidelines. Eligibility for reimbursement is based upon the benefits set forth in the member's subscriber contract. (Link to Product Disclaimer)

POLICY STATEMENT(S)

I. Pneumatic compression device(s) are considered **medically appropriate** for venous thromboembolism (VTE) prophylaxis in the home when **ALL** of the following are met:

   A. When used after major surgery, including major orthopedic surgery;

   B. When pharmacological prophylaxis is contraindicated due to an established risk factor documented in the medical records (e.g., risk for bleeding- see Policy Guidelines);

   C. Post-surgical use is up to 30 days.

II. Use of pneumatic compression device for prevention of venous thromboembolism (VTE), other than as described in Policy Statement I., is considered **not medically necessary**.

RELATED POLICIES

Corporate Medical Policy

1.01.17 Powered Compression Devices/Lymphedema Pumps

POLICY GUIDELINE(S)

I. Major orthopedic surgery includes total hip arthroplasty (THA), total knee arthroplasty (TKA), or hip fracture surgery (HFS).

II. The American College of Chest Physicians (ACCP) guidelines on prevention of venous thromboembolism (VTE) in orthopedic surgery patients list the following general risk factors for bleeding (Falck-Ytter et al 2012):

   A. Previous major bleeding (and previous bleeding risk similar to current risk);

   B. Severe renal failure;

   C. Concomitant antiplatelet agent; and

   D. Surgical factors: history of, or difficult-to-control, surgical bleeding during the current operative procedure, extensive surgical dissection, and revision surgery.

DESCRIPTION

Antithrombotic prophylaxis is recommended for surgical patients who are at moderate to high risk of postoperative VTE, which includes deep vein thrombosis (DVT) and pulmonary embolism (PE). Individuals may be classified as being moderate to high risk of VTE based on the surgical procedure and/or individuals characteristics. Mechanical prophylaxis using an intermittent pneumatic compression (IPC) device has been utilized as an adjunct or alternative to anticoagulation in the home setting for individuals in the postoperative period as a method to reduce VTEs.

For certain types of surgery, such as major orthopedic surgery (i.e., total knee arthroplasty, total hip arthroplasty, and hip fracture surgery), there is a particularly high risk of VTE due to the nature of the procedures and the prolonged immobility during and after surgery. Other surgical procedures vary in degree of increased risk of VTE and include abdominal surgery, pelvic surgery, cancer surgery, and surgery for major trauma. Numerous individual-related risk factors, such as increasing age, prior VTE, increasing body mass index (BMI), genetic predisposition, malignancy, pregnancy, and significant comorbidities, can be used in conjunction with the type of surgery to determine risk.

Pharmacologic prophylaxis is effective at reducing postoperative VTE, however, it has risks such as bleeding, allergic reactions, and development of heparin antibodies. Contraindications to pharmacologic prophylaxis include previous intolerance to these agents and increased risk of bleeding.

Pneumatic compression devices for prevention of DVT include various types of wraps for the arms or legs and a programmable control module. The wraps of some of these devices are capable of providing cooling or heating to the extremity. Examples of devices that can be used in the home after discharge include the VascuTherm2 (Thermotek, Inc) and the Triple Play VT (Compression Solutions, Inc).

SUPPORTIVE LITERATURE

Studies involving the use of compression devices post-operatively are limited. The studies are often small and non-randomized, with considerable variation in the comparison studies by type of compression stocking and intermittent compression device used, patient group, DVT detection method, and prophylaxis protocol. Many of the studies are in the setting of the hospital, rather than outpatient; consequently, conclusions from the hospital setting may not be able to be applied to the outpatient setting. In the outpatient setting, there are questions about the degree of compliance with the devices, including the ability to correctly use them in the absence of professional supervision.

Pneumatic Compression

Snyder et al (2017) conducted a randomized control trial that assessed the difference in the rate of deep venous thrombosis (DVT) following total knee arthroplasty (TKA) using aspirin (ASA)-based prophylaxis with or without extended use of mechanical pneumatic compression device (PCD) therapy. One hundred patients undergoing TKA, were placed on ASA for three weeks and were randomized to receive PCD during hospitalization only or extended use at home up to six weeks post-operatively. Lower extremity Duplex venous ultrasonography was used to diagnose DVT at different time intervals. The rate of DVT was significantly lower for patients receiving extended use of PCD at

0% compared to 23.1% for those with inpatient use of PCD ($p < 0.001$).

Wang et al (2020) aimed to address the controversy whether the use of ICP is a more effective form of thromboprophylaxis than anticoagulants in individuals undergoing neurosurgery. The authors report that direct comparisons are difficult given the sparse and inconsistent studies; therefore, they summarized and compared the efficacy and safety of IPC and anticoagulants for the prevention of VTE in adults. The analysis included 18 trials comprising 2,474 patients. Both IPC and chemical prophylaxis were found to be more efficacious than the placebo in reducing the risk of DVT. Both IPC and chemical prophylaxis reduced the risk of pulmonary embolism (PE) significantly more than the placebo. Based on the available evidence of moderate-to-good quality, IPC is equivalent to anticoagulants for thromboprophylaxis in terms of efficacy. Evidence to support or negate the use of pharmacological prophylaxis in terms of safety is lacking. The results of ongoing and future large randomized clinical trials are needed.

Dietz et al (2022) conducted a randomized trial of aspirin alone (n=40) or aspirin/mobile compression pumps (n=40) after total joint arthroplasty was performed. Each group had greater than 94% compliance with aspirin use, with no difference between groups (P=0.55). Overall pump compliance during the first 14 days after hospital discharge was 51% (SD ± 33), which was significantly worse than aspirin compliance at 99% (SD ± 4.1) (P< 0.0001). Only 10 patients were compliant (>20 hr/d) with recommended pump use throughout the entire recommended period. There was no notable association between aspirin compliance and VTE within 90 days. There was no notable association between pump compliance and VTE at 90 days. However, average pump use compliance was 20% in patients with VTE and 54% in patients without VTE within 90 days. With the numbers available in this compliance study, there was no significant difference (P=0.11). The authors concluded that further study is warranted to define the duration of pump use required for clinical significance. The recommended use of compression pumps should continue to be examined.

Haykal et al (2022) report that critically ill patients (patients treated in a medical or surgical intensive care unit) are at high risk of venous thromboembolism (VTE) development (deep vein thrombosis [DVT] and/or pulmonary embolism). A meta-analysis of 5 RCTs (n=3,133 patients) evaluated the efficacy of intermittent pneumatic compression (IPC) prophylaxis in the lower limb compared with no treatment, anticoagulant use, or their combinations in reducing risk. There was a significant reduction of the incidence of VTE events when no treatment was compared with IPC, anticoagulation alone, or anticoagulation with IPC. In addition, there was a significant reduction in DVT when no treatment was compared with IPC, anticoagulation alone, or anticoagulation with IPC. However, there were no significant differences between other comparisons (IPC vs anticoagulation alone, anticoagulation alone vs anticoagulation with IPC, or anticoagulation with IPC vs IPC alone) regarding VTE or DVT incidence. Among critically ill patients, IPC alone, anticoagulation alone, and IPC with anticoagulation were associated with a significant reduction of VTE and DVT incidence compared with no treatment. However, there was no significant difference between these modalities when compared together. Therefore, further larger studies comparing those different thromboprophylaxis modalities and their combinations are needed to provide more robust results for future clinical recommendations.

Non-Pneumatic Compression Devices

Labropoulous et al (2021) conducted a small (n=20) pilot, single-center, prospective comparative study to determine the potential ability of the Movement and Compression (MAC) System (Recovery Force USA) nonpneumatic compression device to favorably alter venous hemodynamics compared with pneumatic compression devices routinely available in clinical practice and to serve as a prequel to clinical studies evaluating its efficacy in preventing VTE. The researchers measured and compared the common femoral vein peak blood flow velocity, rise time to peak flow, and calculated peak flow velocity compared with baseline for five currently available mechanical compression devices using duplex ultrasonography in a group of subjects with different leg sizes. The peak flow velocity, compared with the baseline measurements, was significantly greater for the MAC System for three of the four comparisons (P<.001). The MAC had a significantly (P< .001) faster rise time to peak flow compared with the comparison devices. It was the only device to achieve the target peak flow velocity over baseline of at least three times in every body mass index group. Finally, the MAC System met the goal of <2.5 centimeters of device movement after ambulation in 100% of the measurements, with 75% of the measurements showing no movement of the device. The study is limited by the study design and lack of follow-up. The authors concluded that the device has promising performance, and the ability for the patient to remain mobile may allow for better compliance. Further studies are warranted.

PROFESSIONAL GUIDELINE(S)

In 2012, the American College of Chest Physicians (ACCP) published several clinical practice guidelines with recommendations on the use of postoperative intermittent pneumatic limb compression.

- Gould and colleagues (2012) recommend the use of limb compression devices in general/non-orthopedic and abdominal-pelvic surgical patients who are at any risk for bleeding, rather than no prophylaxis or in addition to pharmacologic prophylaxis.
- Falck-Ytter and colleagues (2012) recommended ICP for the prevention of VTE in orthopedic surgery patients for a minimum of 10-14 days rather than no antithrombotic prophylaxis (Grade 1C). The suggestion to extend prophylaxis up to 35 days for patient undergoing major orthopedic surgery was a weak recommendation (Grade 2B) and did not specifically mention limb compression devices as a therapy option.
- Kahn and colleagues (2012) suggest against the routine use of thromboprophylaxis in chronically immobilized persons in a home setting.

In 2019, the American Society of Clinical Oncology (ASCO) released updates to the clinical practice guideline on VTE prophylaxis and treatment in individuals with cancer (Key 2019) recommending:

- Mechanical methods may be added to pharmacologic thromboprophylaxis but should not be used as monotherapy for VTE prevention unless pharmacologic methods are contraindicated because of active bleeding or high bleeding risk. (Evidence quality: intermediate; Strength of recommendation: strong).
- A combined regimen of pharmacologic and mechanical prophylaxis may improve efficacy,

especially in the highest-risk individuals. (Evidence quality: intermediate; Strength of recommendation: moderate)

In 2021, the American College of Obstetricians-Gynecologists (ACOG) published an updated practice bulletin on the prevention of VTE in gynecologic surgery, including the following recommendations:

- For gynecologic surgery patients who are at high risk of VTE and average risk of bleeding complications, dual thromboprophylaxis with a combination of mechanical prophylaxis (preferably with intermittent pneumatic compression) and pharmacologic prophylaxis. (Level A evidence)
- For gynecologic surgery patients at low risk of VTE, mechanical thromboprophylaxis (preferably with intermittent pneumatic compression) is recommended. Graduated compression stockings are a reasonable alternative if intermittent pneumatic compression is not available or is not preferred by the patient. Mechanical prophylaxis devices should be placed before initiation of surgery and continued until the patient is fully ambulatory. (Level B evidence)
- For gynecologic surgery patients who are at moderate risk of VTE and high risk of major bleeding complications, mechanical prophylaxis (preferably with intermittent pneumatic compression) is recommended. (Level B evidence)
- For gynecologic surgery patients at high risk of VTE for whom both LMWH and low-dose unfractionated heparin are contraindicated, or not available, mechanical prophylaxis alone (preferably with intermittent pneumatic compression) is recommended until the risk of bleeding diminishes. (Level B evidence)

In 2022, the International Consensus Meeting (ICM) brought together over 600 experts spanning a range countries and medical professional to conduct a comprehensive review of the literature and to generate practical recommendations for VTE prophylaxis across all type of orthopedic procedures. Published recommendations include:

- ICM-VTE general practice guidelines (2022a), 95% of the expert panel agreed that intermittent compression devices (ICD) provide protection against VTE development following orthopedic surgery. Utilizing these devices has been shown to be an effective prophylactic measure. The guideline did not address duration of use postoperatively. Noting that although portable IPC has shown effective mechanical prophylaxis for VTE after THA and TKA, the evidence is limited due to confounding variables.
- ICM-VTE hip and knee guidelines (2022b), 92% of the expert panel agreed that mechanical compressive devices can be used routinely in patients undergoing total hip arthroplasty (THA) or total knee arthroplasty (TKA) as venous thromboembolism (VTE) prophylaxis. However, further research should aim to clarify the most appropriate devices, duration of use, as well as synergistic relationship with pharmacological agents. Furthermore, 82% of the expert panel agree that it appears that coadministration of aspirin (ASA) with pneumatic compression devices (PCD) may be more effective than ASA alone in prevention of venous

thromboembolism (VTE) following total joint arthroplasty (TJA).

In 2023, the American Society of Clinical Oncology (ASCO) released an updated clinical practice guideline on VTE prophylaxis and treatment in patients with cancer (Key et al., 2023). The guideline makes the following recommendations for thromboprophylaxis in this population:

- All patients with malignant disease undergoing major surgical intervention should be offered pharmacologic thromboprophylaxis unless contraindicated.
- Pharmacologic thromboprophylaxis for patients undergoing major surgery for cancer should be continued for at least 7-10 days.
- Extended pharmacologic thromboprophylaxis for up to 4 weeks postoperatively should be offered to patient undergoing major open or laparoscopic abdominal or pelvic surgery for cancer who have high-risk features, such as restricted mobility, obesity, history of VTE, or with additional risk factors. In lower-risk surgical settings, the decision on appropriate duration of thromboprophylaxis should be made on a case-by-case basis.
- Mechanical methods may be added to pharmacologic thromboprophylaxis but should not be used as monotherapy for VTE prevention unless pharmacologic methods are contraindicated because of active bleeding or high bleeding risk (Type: evidence based; Evidence quality: intermediate; Strength of recommendation: strong).

In 2024, the American Pediatric Surgical Association Outcomes and Evidence-Based Practice Committee conducted a systematic review to describe the epidemiology of venous thromboembolism (VTE) in pediatric surgical and trauma patients and develop recommendations for screening and prophylaxis (Kelley-Quon 2024). Twenty-four manuscripts addressed mechanical prophylaxis of VTE in children.

- Recommendations for use are mostly extrapolated from adult data that support the use of sequential compression devices (SCDs) for reducing the risk of lower limb DVT; however, there is no evidence that antiembolism stockings decrease the risk of VTE in adult medical inpatients.
- For adolescents who have undergone major surgery, healthcare providers should consider SCDs in children at-risk for VTE when non-mobile only if an appropriately sized device is available.

According to the 2025 National Comprehensive Cancer Network (NCCN) guidelines for supportive care in cancer-associated venous thromboembolic (VTE) disease, hospitalized cancer patients should receive VTE prophylaxis with mechanical intermittent pneumatic compression (IPC) when anticoagulation is contraindicated. IPC for VTE prophylaxis following discharge or for at-risk ambulatory patients with cancer is not addressed in the guidelines.

REGULATORY STATUS

Many pneumatic, peristaltic limb, and non-pneumatic compression devices have been cleared for marketing by the U.S. Food & Drug Administration (FDA) through the 510(k) process for indications

including prevention of DVT. FDA product code: JOW.

CODE(S)

- Codes may not be covered under all circumstances.
- Code list may not be all inclusive (AMA and CMS code updates may occur more frequently than policy updates).
- (E/I)=Experimental/Investigational
- (NMN)=Not medically necessary/appropriate

CPT Codes

Code	Description
Not Applicable	

HCPCS Codes

Code	Description
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
E0660	Nonsegmental pneumatic appliance for use with pneumatic compressor, full leg
E0666	Nonsegmental pneumatic appliance for use with pneumatic compressor, half leg
E0667	Segmental pneumatic appliance for use with pneumatic compressor, full leg
E0669	Segmental pneumatic appliance for use with pneumatic compressor, half leg
E0671	Segmental gradient pressure pneumatic appliance, full leg
E0673	Segmental gradient pressure pneumatic appliance, half leg
E0676	Intermittent limb compression device (includes all accessories), not otherwise specified

ICD10 Codes

Code	Description
Multiple Codes	

REFERENCES

American College of Obstetricians and Gynecologists (ACOG) Committee on Practice Bulletins. Prevention of venous thromboembolism in gynecologic surgery: ACOG practice bulletin, number 232. Obstet Gynecol. 2021 Jul 1;138(1):e1-e15. PMID: 34259490

Badireddy M, et al. StatPearls [Internet]. Deep venous thrombosis prophylaxis. StatPearls Publishing. 2023 May 7 [accessed 2025 Aug 5]. Available from: https://www.ncbi.nlm.nih.gov/books/NBK534865/

Crawford DA, et al. Ambulatory portable pneumatic compression device as part of a multimodal aspirin-based approach in prevention of venous thromboembolism in outpatient total knee arthroplasty. Arthroplast Toda.y 2020 Jun 16;6(3):378-380.

Dietz MJ, et al. 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.

Falck-Ytter Y, 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;141(2):278 325.

Gould MK, et al. Prevention of VTE in nonorthopedic surgical 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): e227S-e277S. PMID 22315263

Guyatt GH, et al. American College of Chest Physicians Antithrombotic therapy and Prevention of Thrombosis Panel. Executive summary: Antithrombotic Therapy and Prevention of Thrombosis, 9th ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines. Chest. 2012;141(2 Suppl):7S-47S.

Haykal T, et al. Meta-analysis of the role of intermittent pneumatic compression of the lower limbs to prevent venous thromboembolism in critically ill patients. Int J Low Extrem Wounds. 2022 Mar;21(1):31-40. Epub 2020 Jun 11.

ICM-VTE General Delegates. Recommendations from the ICM-VTE: general. J Bone Jt Surg. 2022a Mar 16;104(Suppl 1):4-162.

ICM-VTE Hip & Knee Delegates. Recommendations from the ICM-VTE: hip & knee. J Bone Jt Surg. 2022b Mar 16;104(Suppl 1):180-231.

Kahn SR, 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)Supplement, E195S-E226S.

Kelley-Quon LI, et al. Screening and prophylaxis for venous thromboembolism in pediatric surgery: a systematic review. J Pediatr Surg. 2024 Oct;59(10):161585.

Key NS, et al. Venous thromboembolism prophylaxis and treatment in patients with cancer: ASCO guideline update. J Clin Onco.l 2023 Jun 01;41(16):3063-3071. PMID 37075273

Labropoulos N, et al. Comparison of a nonpneumatic device to four currently available intermittent pneumatic compression devices on common femoral blood flow dynamics. J Vasc Surg Venous Lymphat Disord. 2021 Sep;9(5):1241-1247.

Li B, et al. Effects of continuous graduated pneumatic compression and intermittent pneumatic compression on lower limb hemodynamics for VTE prophylaxis in arthroplasty. Orthop Surg. 2025 Apr;17(4):1095-1104.

National Comprehensive Cancer Network (NCCN) [Internet]. Clinical practice guidelines in oncology. Cancer-Associated Venous Thromboembolic Disease. Version 2.2025 – May 22, 2025 [accessed 2025 July 2]. Available from: https://www.nccn.org/professionals/physician_gls/pdf/vte.pdf

Snyder MA, et al. Efficacy in deep vein thrombosis prevention with extended mechanical compression device therapy and prophylactic aspirin following total knee arthroplasty: a randomized control trial. J Arthroplasty. 2017 May;32(5):1478-1482. Epub 2016 Dec 23.

Stevens SM, et al. Antithrombotic therapy for VTE Disease: Second update of the CHEST guideline and expert panel report. Chest. 2021 Dec;160(6):e545-e608. PMID 34352278. Epub 2021 Aug.

Tang A, et al. Discontinued use of outpatient portable intermittent pneumatic compression devices may be safe for venous thromboembolism prophylaxis in primary total knee arthroplasty using low-dose aspirin. J Knee Surg. 2022 Jul;35(8):909-915. Epub 2020 Nov 25.

Torrejon TR, et al. A comparative cost-effectiveness analysis of mechanical and pharmacological VTE prophylaxis after lower limb arthroplasty in Australia. J Orthop Surg Res. 2019 Apr 2;14(1):93.

U.S. Food & Drug Administration [Internet]. 510(k) Premarket notification. Medical devices. Databases. 2025 Jun 02. Available from: https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfPMN/pmn.cfm [accessed 2025 Jun 2]

Wang X, et al. Comparative efficacy and safety of pharmacological prophylaxis and intermittent pneumatic compression for prevention of venous thromboembolism in adult undergoing neurosurgery: a systematic review and network meta-analysis. Neurosurg Rev. 2021 Apr;44(2):721-729. doi: 10.1007/s10143-020-01297-0. Epub 2020 Apr 16.

SEARCH TERMS

Not Applicable

CENTERS FOR MEDICARE AND MEDICAID SERVICES (CMS)

Pneumatic Compression Devices (NCD 280.6) [accessed 2025 Jun 2]

PRODUCT DISCLAIMER

- Services are contract dependent; if a product does not cover a service, medical policy criteria do

not apply.

- If a commercial product (including an Essential Plan or Child Health Plus product) covers a specific service, medical policy criteria apply to the benefit.
- If a Medicaid product covers a specific service, and there are no New York State Medicaid guidelines (eMedNY) criteria, medical policy criteria apply to the benefit.
- If a Medicare product (including Medicare HMO-Dual Special Needs Program (DSNP) product) covers a specific service, and there is no national or local Medicare coverage decision for the service, medical policy criteria apply to the benefit.
- If a Medicare HMO-Dual Special Needs Program (DSNP) product DOES NOT cover a specific service, please refer to the Medicaid Product coverage line.

POLICY HISTORY/REVISION	
Committee Approval Dates	
06/27/13, 06/26/14, 10/15/15, 06/16/16, 07/20/17, 07/19/18, 07/18/19, 08/20/20, 08/19/21, 08/18/22, 09/21/23, 09/19/24, 09/18/25	
Date	**Summary of Changes**
09/18/25	• Annual review, policy intent unchanged.
01/01/25	• Summary of changes tracking implemented.
06/27/13	• Original effective date