MEDICAL POLICY – 1.01.525

Postsurgical Outpatient Use of Limb Compression Devices for Venous Thromboembolism Prophylaxis

BCBSA Ref. Policy: 1.01.28

Effective Date: June 1, 2019
Last Revised: May 7, 2019
Replaces: N/A

RELATED MEDICAL POLICIES:
1.01.10 Continuous Passive Motion in the Home Setting
1.01.26 Cooling Devices Used in the Outpatient Setting

Select a hyperlink below to be directed to that section.

POLICY CRITERIA | DOCUMENTATION REQUIREMENTS | CODING
RELATED INFORMATION | EVIDENCE REVIEW | REFERENCES | HISTORY

∞ Clicking this icon returns you to the hyperlinks menu above.

Introduction

One known risk after surgery is the development of blood clots. Clots can occur in your legs due to decreased blood flow when you are not up and about after surgery. These clots may move to your lungs and cause a pulmonary embolus (blood clot), which can be life threatening. Doctors now have treatments to decrease the risk of forming clots after a surgery. The usual way to prevent blood clots is with medication. Another way to prevent blood clots is with a device that gently squeezes the legs. This is known as a limb compression device. Limb compression devices are commonly used in the hospital setting, especially before people are able to be walking around. Most people are able to ambulate once they are sent home from the hospital. For some people who have a very high risk of getting clots or who are unable to walk after hospital discharge, using a limb compression device at home is considered medically necessary to prevent blood clots after surgery. This policy describes when home compression devices are considered medically necessary and paid for by the health plan.

Note: The Introduction section is for your general knowledge and is not to be taken as policy coverage criteria. The rest of the policy uses specific words and concepts familiar to medical professionals. It is intended for providers. A provider can be a person, such as a doctor, nurse, psychologist, or dentist. A provider also can be a place where medical care is given, like a hospital, clinic, or lab. This policy informs them about when a service may be covered.
### Policy Coverage Criteria

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Medical Necessity</th>
</tr>
</thead>
</table>
| **Outpatient limb compression devices for VTE prophylaxis** | **Postsurgical home use of limb compression devices for venous thromboembolism (VTE) prophylaxis may be considered medically necessary in the following situations when criteria are met:**  
1. After **major orthopedic surgery**, including any of the following:  
   - A total hip arthroplasty (THA/THR)  
   - A total knee arthroplasty (TKA/TKR)  
   - A hip fracture surgery (HFS)  
   **OR**  
2. After a **major non-orthopedic surgery** including any of the following:  
   - Patient had open abdominal or open pelvic surgery, especially for a cancer diagnosis  
   - Patient age is greater than 60  
   - Duration of anesthesia was more than 2 hours  
   - Patient on bed rest more than 4 days  
   - Patient has renal failure  
   - Patient has an infection  
   - Patient had a perioperative heart attack  
   - Patient is pregnant or is recently post-partum  
   - Patient has a prior history of venous thromboembolism  
   **AND the following criteria are met:**  
   - The patient has a contraindication to using standard anticoagulant medication, such as any of the following:  
     - History of prior major bleeding or excessive bleeding during current surgery, or extensive surgical dissection, or revision surgery; **OR**  
     - Advanced liver disease, or renal failure; **OR**  
     - Currently using anti-platelet medications (eg, NSAID, ASA, Plavix, Ticlid, Effient, Brilinta); **OR** |
<table>
<thead>
<tr>
<th>Procedure</th>
<th>Medical Necessity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Known underlying bleeding disorder (eg, hemophilia, Von Willibrands, idiopathic thrombocytopenic purpura [ITP] or others)</td>
</tr>
<tr>
<td>OR</td>
<td>Patient will have a prolonged non-ambulatory state (eg, bed rest or confined to a chair/wheelchair) after hospital discharge</td>
</tr>
</tbody>
</table>

**Postsurgical home use of limb compression devices for venous thromboembolism prophylaxis for periods longer than 30 days is not medically necessary.**

**Postsurgical home use of limb compression devices for venous thromboembolism prophylaxis is considered not medically necessary in all other situations, including, but not limited to:**

- After major orthopedic surgery when the patient has no contraindication to anticoagulant therapy.
- After major non-orthopedic surgery or other orthopedic procedures in patients who have no contraindication to anticoagulant therapy who are at moderate or high risk of venous thromboembolism.
- After major non-orthopedic surgery when the patient has a low-risk of venous thromboembolism.
- All other surgeries

### Documentation Requirements

The patient’s medical records submitted for review should document that medical necessity criteria are met. The record should include the following:

- Clinical documentation of the surgery member has undergone plus the following:
  - The device will only be used for 30 days
  - Member has a condition that prevents member from taking standard blood clot medication
  **OR**
  - Member will be confined to a bed, chair, or wheelchair after surgery

### Coding
<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>E0650</td>
<td>Pneumatic compression, nonsegmental home model</td>
</tr>
<tr>
<td>E0651</td>
<td>Pneumatic compressor, segmental home model without calibrated gradient pressure</td>
</tr>
<tr>
<td>E0652</td>
<td>Pneumatic compressor, segmental home model with calibrated gradient pressure</td>
</tr>
<tr>
<td>E0656</td>
<td>Segmental pneumatic appliance for use with pneumatic compressor, trunk</td>
</tr>
<tr>
<td>E0660</td>
<td>Nonsegmental pneumatic appliance for use with pneumatic compressor, full leg</td>
</tr>
<tr>
<td>E0666</td>
<td>Nonsegmental pneumatic appliance for use with pneumatic compressor, half leg</td>
</tr>
<tr>
<td>E0667</td>
<td>Segmental pneumatic appliance for use with pneumatic compressor, full leg</td>
</tr>
<tr>
<td>E0669</td>
<td>Segmental pneumatic appliance for use with pneumatic compressor, half leg</td>
</tr>
<tr>
<td>E0670</td>
<td>Segmental pneumatic appliance for use with pneumatic compressor, integrated, 2 full legs and trunk</td>
</tr>
<tr>
<td>E0671</td>
<td>Segmental gradient pressure pneumatic appliance, full leg</td>
</tr>
<tr>
<td>E0673</td>
<td>Segmental gradient pressure pneumatic appliance, half leg</td>
</tr>
<tr>
<td>E0675</td>
<td>Pneumatic compression device, high pressure, rapid inflation/deflation cycle, for arterial insufficiency (unilateral or bilateral system)</td>
</tr>
<tr>
<td>E0676</td>
<td>Intermittent limb compression device (includes all accessories), not otherwise specified</td>
</tr>
</tbody>
</table>

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**Related Information**

**Definition of Terms**

**Increased risk of bleeding (increasing the risk of VTE):** Includes a history of prior excessive bleeding, severe renal failure, advanced liver disease, use of anti-platelet therapy (eg, NSAID, ASA, Plavix, Ticlid), extensive surgical dissection and revision surgery, disorders of coagulation (eg, hemophilia, Von Willebrands, ITP, and others). (See ACCP guidelines and AAOS guidelines in Practice Guidelines and Position Statements.)
**Major orthopedic surgery:** A total hip arthroplasty (THA/THR), total knee arthroplasty (TKA/TKR), or hip fracture surgery (HFS).

**Major non-orthopedic surgery:** Includes open abdominal or open pelvic surgery, especially for a cancer diagnosis, or surgery is considered major due to the patient’s age is greater than 60, or anesthesia time is 2 hours or more.

**Minor orthopedic surgery:** Includes but is not limited to arthroscopic and fracture repair procedures.

**Venous thromboembolism (VTE):** Is the combination of a deep vein thrombosis (DVT) and pulmonary embolism (PE).

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**Summarization of AACP Guidelines on Determining High Risk for Venous Thromboembolism (VTE)\(^1,2\)**

<table>
<thead>
<tr>
<th>Major orthopedic surgeries risks for bleeding</th>
<th>Major non-orthopedic surgeries risks for bleeding</th>
<th>Recommended duration for use of limb compression device</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total hip, total knee and hip fracture</td>
<td>Open abdominal or pelvic surgeries</td>
<td>2 weeks, up to maximum of 30 days</td>
</tr>
<tr>
<td>History of major bleeding in the past</td>
<td>Surgery is for a cancer</td>
<td>2 weeks, up to maximum of 30 days</td>
</tr>
<tr>
<td>Severe renal failure</td>
<td>Age over 60, prior DVT, cancer</td>
<td>2 weeks, up to maximum of 30 days</td>
</tr>
<tr>
<td>Concomitant use of anti-platelet agent (ASA, NSAID, Plavix, Ticlid, Effient, Brilinta)</td>
<td>Age over 60, prior DVT, anesthesia of 2 hours or more, bed rest of 4 days or more</td>
<td>2 weeks, up to maximum of 30 days</td>
</tr>
<tr>
<td>Hard to control bleeding in this surgery, extensive surgery dissection and revision surgery</td>
<td>Renal failure, infection, peri-operative myocardial infarction</td>
<td>2 weeks, up to maximum of 30 days</td>
</tr>
<tr>
<td>Known bleeding disorder (hemophilia)</td>
<td>Pregnancy or postpartum</td>
<td>2 weeks, up to maximum of 30 days</td>
</tr>
<tr>
<td>Advanced liver disease</td>
<td>N/A</td>
<td>2 weeks, up to maximum of 30 days</td>
</tr>
</tbody>
</table>

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**Summarization of ACOG Guidelines to Determine High Risk for VTE in Gynecologic Surgery\(^5\)**

<table>
<thead>
<tr>
<th>Risk level</th>
<th>Surgery factors</th>
<th>Patient factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Less than 30 minutes</td>
<td>&lt; 40 years old, with no risk factors</td>
</tr>
<tr>
<td>Risk level</td>
<td>Surgery factors</td>
<td>Patient factors</td>
</tr>
<tr>
<td>------------</td>
<td>----------------</td>
<td>----------------------------------------</td>
</tr>
<tr>
<td>Moderate</td>
<td>Less than 30 minutes</td>
<td>&lt; 40 years old, plus risk factors</td>
</tr>
<tr>
<td>Moderate</td>
<td>Less than 30 minutes</td>
<td>40-60 years old, no risk factors</td>
</tr>
<tr>
<td>Moderate</td>
<td>Major surgery</td>
<td>&lt; 40 years old, no risk factors</td>
</tr>
<tr>
<td>High</td>
<td>Less than 30 minutes</td>
<td>&gt; 60 years old, or plus risk factors</td>
</tr>
<tr>
<td>High</td>
<td>Major surgery</td>
<td>&gt; 40 years old, plus risk factors</td>
</tr>
<tr>
<td>Highest</td>
<td>Major surgery</td>
<td>&gt; 60, plus prior DVT, cancer, or hyper-coagulable state</td>
</tr>
</tbody>
</table>

**Guidance on Duration of Use**

In patients with contraindications to pharmacologic prophylaxis who are undergoing major orthopedic surgery (total hip arthroplasty, total knee arthroplasty, hip fracture surgery), the American College of Chest Physicians (ACCP) guidelines are consistent with use of intermittent limb compression devices for 10-14 days after surgery (Falck-Ytter et al, 2012). The ACCP suggestion on extended prophylaxis (up to 35 days) was a weak recommendation that did not mention limb compression devices as an option.

In the ACCP guideline on VTE prophylaxis in patients undergoing non-orthopedic surgery, the standard duration or “limited duration” of prophylaxis was not defined. However, “extended duration” pharmacologic prophylaxis was defined as 4 weeks; which was recommended only for patients at high risk for VTE undergoing abdominal or pelvic surgery for cancer and not otherwise at high risk for major bleeding complications.

**Contraindications to Anticoagulants**

The main contraindication to anticoagulants is a high risk of bleeding. However, there is no absolute threshold at which anticoagulants cannot be used. Rather, there is a risk-benefit continuum that takes into account benefits of treatment and risks of bleeding. There may also be intolerance to specific agents, although uncommon. Intolerance may result from allergic reactions or adverse events. Finally, when heparin preparations are used, serum antibodies and heparin-induced thrombocytopenia can develop, precluding further use of heparin products.
Evidence Review

Description

Antithrombotic prophylaxis is recommended for surgical patients at moderate-to-high risk of postoperative venous thromboembolism (VTE), including deep vein thrombosis (DVT) and pulmonary embolism (PE), based on the surgical procedure and/or patient characteristics. For some types of surgery (eg, major orthopedic surgery), there is a particularly high risk of VTE due to the nature of the procedure and the prolonged immobility during and after surgery. Common patient risk factors include increasing age, prior VTE, malignancy, pregnancy, and significant comorbidities. Increased risk of bleeding is a contraindication to anticoagulation as are adverse events and allergic reactions. Limb compression devices have been used as an adjunct or alternative to anticoagulation in the home setting for patients in the postoperative period as a method to reduce VTEs.

Background

Risk of Venous Thromboembolism

Orthopedic Surgery

Antithrombotic prophylaxis is recommended for surgical patients at moderate-to-high risk of postoperative venous thromboembolism (VTE), including deep vein thrombosis (DVT) and pulmonary embolism (PE). Patients may be classified as moderate-to-high risk of VTE based on the surgical procedure and/or patient characteristics. For some types of surgery, such as major orthopedic surgery, there is a particularly high risk of VTE due to the nature of the procedure and the prolonged immobility during and after surgery. The specific orthopedic procedures of concern are total knee arthroplasty, total hip arthroplasty, and hip fracture surgery. For these surgeries, all patients undergoing the procedure are considered at high risk for VTE.

Other surgeries with an increased risk of VTE include abdominal surgery, pelvic surgery, cancer surgery, and surgery for major trauma. For these types of surgeries, the risk varies. There are numerous patient-related risk factors such as increasing age, prior VTE, malignancy, pregnancy, and significant comorbidities that can be used in conjunction with the type of surgery to determine risk. There are tools for assessing VTE risk in surgical patients, such as the modified Caprini Risk Assessment Model used in developing the 2012 American College of Chest
Physicians (ACCP) guidelines on VTE prevention. However, in clinical practice, this and similar instruments are not regarded as definitive for assessment of individual patient risk. Pharmacologic prophylaxis is indicated for patients at moderate-to-high risk for VTE. As described in the ACCP guidelines, there are preferred antithrombotic prophylaxis regimens according to procedure and patient risk characteristics.\textsuperscript{1,2}

**Pharmacologic Prophylaxis**

Pharmacologic prophylaxis is effective at reducing postoperative VTE, but also has risks. The main risk is bleeding, although other adverse events such as allergic reactions and development of heparin antibodies can occur. Contraindications to pharmacologic prophylaxis include previous intolerance to these agents and increased risk of bleeding. Most patients undergoing major surgery will not have an increased risk of bleeding precluding the use of anticoagulants, because these patients would also likely have had a contraindication to the surgery itself and, thus, are likely to avoid the procedure. However, there are some cases in which patients with a high bleeding risk will undergo major surgery, such as patients with severe renal failure who require an essential procedure. Other patients may develop contraindications during the episode of care. For example, patients who have excessive bleeding during or after surgery, or patients who develop bleeding complications such as a gastrointestinal bleed, are considered to have a contraindication to anticoagulants. There are a few surgeries for which anticoagulants are contraindicated or avoided, most notably some neurosurgical procedures. Assessment and quantitation of bleeding risk can be performed using instruments such as HAS-BLED scoring system,\textsuperscript{3} although these tools were not developed specifically for the postoperative period.

Major orthopedic surgeries have a high risk of DVT due to venous stasis of the lower limbs as a consequence of immobility during and after surgery. Also, direct venous wall damage associated with the surgical procedure itself may occur. DVTs are frequently asymptomatic and generally resolve when mobility is restored. However, some episodes of acute DVT can be associated with substantial morbidity and mortality. The most serious adverse consequence of acute DVT is PE, which can be fatal. PE occurs when a DVT blood clot detaches and migrates to the lungs. Also, DVT may produce long-term vascular damage that leads to chronic venous insufficiency. Without thromboprophylaxis, the incidence of venographically detected DVT is approximately 42% to 57% after total hip replacement, and the risk of PE is approximately 1% to 28%.\textsuperscript{4} Other surgical patients may be at increased risk of VTE during and after hospitalization. For example, it is estimated that rates of VTE without prophylaxis after gynecologic surgery are 15% to 40%.\textsuperscript{5}

Thus, antithrombotic prophylaxis is recommended for patients undergoing major orthopedic surgery and other surgical procedures who are at increased risk of VTE. For patients undergoing
major orthopedic surgery, clinical practice guidelines published by the ACCP (2012) recommended that one of several pharmacologic agents or mechanical prophylaxis be provided rather than no thromboprophylaxis.\textsuperscript{1} The guidelines further recommended the use of pharmacologic prophylaxis during hospitalization, whether or not patients are using a limb compression device. A minimum of 10 to 14 days of prophylaxis is recommended, a portion of which can be postdischarge home use.

\textbf{Limb Compression Prophylaxis}

The ACCP guidelines have also noted that compliance is a major issue with the home use of limb compression devices for thromboprophylaxis and recommended that, if this prophylactic option is selected, use should be limited to portable, battery-operated devices. Moreover, ACCP recommended that devices be used for 18 hours a day. A 2009 nonrandomized study found that there was better compliance with a portable battery-operated limb compression device than with a nonmobile device when used by patients in the hospital following hip or knee replacement surgery.\textsuperscript{6}

\textbf{Nonorthopedic Surgery}

\textit{Pharmacologic and Limb Compression Prophylaxis}

The ACCP (2012) also issued guidelines on VTE prophylaxis in nonorthopedic surgery patients.\textsuperscript{2} For patients undergoing general or abdominal-pelvic surgery who have a risk of VTE of 3\% or higher, the ACCP has recommended prophylaxis with pharmacologic agents or intermittent pneumatic compression rather than no prophylaxis. For patients at low risk for VTE (\(\approx 1.5\%\)), the guidelines have suggested mechanical prophylaxis. Unlike the guidelines on major orthopedic surgery, which recommend a minimum of 10 to 14 days of VTE prophylaxis, the guidelines on nonorthopedic surgery patients do not include a general timeframe for prophylaxis. They have, however, defined “extended duration” pharmacologic prophylaxis as lasting 4 weeks; the latter is recommended only for patients at high risk for VTE, undergoing abdominal or pelvic surgery for cancer, and who are not otherwise at high risk for major bleeding complications.

National clinical guidelines have not specifically recommended the use of limb compression devices in the postdischarge home setting. However, given the availability of portable, battery-operated devices, there is interest in the home use of limb compression devices for VTE prevention following discharge from the hospital for major orthopedic and nonorthopedic surgery.
Summary of Evidence

For individuals who have a moderate-to-high postsurgical risk of VTE and no contraindication to pharmacologic prophylaxis who receive home use of a limb compression device as an adjunct to anticoagulation, the evidence includes no RCTs assessing any incremental benefit of home use of a limb compression device, plus pharmacologic agents. The relevant outcomes are overall survival, symptoms, morbid events, and treatment-related morbidity. Four meta-analyses of RCTs have compared medication plus intermittent pneumatic compression with medication alone in surgical patients in the hospital setting. These trials do not permit inferences to the postdischarge home setting. Results of the meta-analyses have suggested that in-hospital addition of limb compression devices to pharmacologic management improves DVT prophylaxis. Limitations are: not distinguishing between asymptomatic and symptomatic DVT; sparse data on pulmonary embolism; and results generally not stratified by patient risk or specific intervention. Moreover, the postdischarge setting differs in important respects from the hospital setting. Discharged patients tend to be healthier than those in the hospital. Factors such as treatment consistency, duration, and application errors in use differ in the home. The evidence is insufficient to determine the effects of the technology on health outcomes.

For individuals who have a moderate-to-high postsurgical risk of VTE and a contraindication to pharmacologic prophylaxis who receive home use of a limb compression device, the evidence includes a meta-analysis of inpatients and a study comparing the use of postdischarge limb compression in the home setting to no prophylaxis. The relevant outcomes are overall survival, symptoms, morbid events, and treatment-related morbidity. The meta-analysis showed significantly fewer incidence of DVT (40 RCTs) and pulmonary embolism (26 RCTs) with limb compression. Despite limitations related to stratification of patient risk and pharmacologic prophylaxis, the meta-analysis showed that limb compression is superior to no prophylaxis. A study of the postdischarge use of a limb compression device combined with home visits showed that home use is feasible. With postdischarge planning and support, home use of limb compression devices in moderate-to-high risk patients who have a contraindication to pharmacologic prophylaxis is likely to improve VTE prevention. The evidence is sufficient to determine that the technology results in a meaningful improvement in the net health outcome.

Ongoing and Unpublished Clinical Trials

Some currently unpublished trials that might influence this review are listed in Table 1.
Table 1. Summary of Key Trials

<table>
<thead>
<tr>
<th>NCT No.</th>
<th>Trial Name</th>
<th>Planned Enrollment</th>
<th>Completion Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ongoing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NCT01317160</td>
<td>Intermittent Pneumatic Compression Effects on Venous Thromboembolism Incidence and Healing of Achilles Tendon Rupture</td>
<td>150</td>
<td>Sep 2018 (completed)</td>
</tr>
<tr>
<td>NCT02987946a</td>
<td>Optimizing Anti Coagulant Therapy in Neurosurgical Interventions in Patients with an Increased Risk for Thrombo-embolic Complications</td>
<td>280</td>
<td>Dec 2019</td>
</tr>
<tr>
<td>NCT03044574a</td>
<td>Trial to Assess the Effectiveness of Intermittent Pneumatic Compression in the Prevention of Postoperative Venous Thromboembolism in Surgical Patients at Extremely High Risk)</td>
<td>407</td>
<td>Dec 2018 (ongoing)</td>
</tr>
</tbody>
</table>

NCT: national clinical trial.

a Denotes industry-sponsored or cosponsored trial.

Practice Guidelines and Position Statements

*American College of Chest Physicians*

The American College of Chest Physicians (ACCP) (2016) updated its 2012 evidence-based guideline\textsuperscript{15} on antithrombotic therapy and prevention of thrombosis.\textsuperscript{16} The 2016 update, which addressed antithrombotic therapy for venous thromboembolism (VTE), outlined risk factors for bleeding with anticoagulant therapy and estimated the risks of major bleeding for patients in various risk categories (see Table 2).

Risk factors include (1 point per factor):

- “Age >65 y
- Age>75y
- Previous bleeding
- Cancer
- Metastatic cancer
- Renal failure
- Liver failure
- Thrombocytopenia
- Previous stroke
- Diabetes
- Anemia
- Antiplatelet therapy
- Poor anticoagulant control
- Comorbidity and reduced functional capacity
- Recent surgery
- Alcohol abuse
- Nonsteroidal anti-inflammatory drug.

Table 2. Guidelines for Risk of Bleeding

<table>
<thead>
<tr>
<th>Risk Factors</th>
<th>Estimated Absolute Risk of Major Bleeding</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low Risk (0 Risk Factors)</td>
</tr>
<tr>
<td><strong>Anticoagulation 0-3 mo, %</strong></td>
<td></td>
</tr>
<tr>
<td>Baseline risk</td>
<td>0.6</td>
</tr>
<tr>
<td>Increased risk</td>
<td>1.0</td>
</tr>
<tr>
<td>Total risk</td>
<td>1.6</td>
</tr>
<tr>
<td><strong>Anticoagulation after first 3 mo, %/y</strong></td>
<td></td>
</tr>
<tr>
<td>Baseline risk</td>
<td>0.3</td>
</tr>
<tr>
<td>Increased risk</td>
<td>0.5</td>
</tr>
<tr>
<td>Total risk</td>
<td>0.8</td>
</tr>
</tbody>
</table>

Adapted from Kearon et al (2016).16
In its updated 2017 guidelines on antithrombotic therapy and prevention of VTE in patients undergoing orthopedic and nonorthopedic surgery, the ACCP recommended use of limb compression devices in orthopedic surgical patients:\textsuperscript{17,1}

2.1.1 "In patients undergoing total hip arthroplasty (THA) or total knee arthroplasty (TKA), we recommend 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)."

2.1.2 "In patients undergoing hip fracture surgery (HFS), we recommend use of one of the following rather than no antithrombotic prophylaxis for a minimum of 10 to 14 days: LMWH, fondaparinux, LDUH, adjusted-dose VKA, aspirin (all Grade 1B), or an IPCD (Grade 1C)."

2.5 "In patients undergoing major orthopedic surgery, we suggest using dual prophylaxis with an antithrombotic agent and an IPCD during the hospital stay (Grade 2C)."

2.6 "In patients undergoing major orthopedic surgery and increased risk of bleeding, we suggest using an IPCD or no prophylaxis rather than pharmacologic treatment (Grade 2C)."

"The efficacy of mobile mechanical compression devices alone has not been compared with any chemoprophylaxis agent in an appropriately powered randomized trial. In addition, concerns have arisen with regard to patient compliance after hospital discharge and the high cost of these devices." The ACCP recommendations on the use of limb compression devices in nonorthopedic general and abdominal-pelvic surgical patients, stratified by patient risk of VTE and risk of bleeding are listed in Table 3.\textsuperscript{2}

### Table 3. Recommendations on Limb Compression Device Use in Nonorthopedic General and Abdominal-Pelvic Surgical Patients

<table>
<thead>
<tr>
<th>Patient Risk Group</th>
<th>Recommendation</th>
<th>GOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very low risk (&lt;0.5%)</td>
<td>&quot;[W]e recommend that no specific pharmacologic or mechanical prophylaxis be used other than early ambulation.&quot;</td>
<td>1B 2C</td>
</tr>
<tr>
<td>Low risk for VTE (≤1.5%)</td>
<td>&quot;[W]e suggest mechanical prophylaxis, preferably with intermittent pneumatic compression (IPC), over no prophylaxis.&quot;</td>
<td>2C</td>
</tr>
<tr>
<td>Patient Risk Group</td>
<td>Recommendation</td>
<td>GOR</td>
</tr>
<tr>
<td>----------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-----</td>
</tr>
<tr>
<td>Moderate risk for VTE (≈3%) and not at high risk of bleeding</td>
<td>&quot;[W]e suggest low-molecular-weight heparin (LMWH), low-dose unfractionated heparin, or mechanical prophylaxis with IPC over no prophylaxis.&quot;</td>
<td>2B</td>
</tr>
<tr>
<td>Moderate risk for VTE (≈3%) and high risk for major bleeding complications or in whom bleeding consequences would be particularly severe</td>
<td>&quot;We suggest mechanical prophylaxis, preferably with IPC, over no prophylaxis.&quot;</td>
<td>2C</td>
</tr>
<tr>
<td>High risk for VTE (≈6.0%) and not at high risk of bleeding</td>
<td>&quot;[W]e recommend pharmacologic prophylaxis with LMWH or low-dose unfractionated heparin over no prophylaxis. In these patients, we suggest adding mechanical prophylaxis with elastic stockings or IPC to pharmacologic prophylaxis.&quot;</td>
<td>1B</td>
</tr>
<tr>
<td>High risk for VTE (≈6.0%) and high risk for major bleeding complications or in whom bleeding consequences would be particularly severe</td>
<td>&quot;[W]e suggest use of mechanical prophylaxis, preferably with IPC, over no prophylaxis until the risk of bleeding diminishes and pharmacologic prophylaxis may be initiated.&quot;</td>
<td>2C</td>
</tr>
<tr>
<td>High risk for VTE, both LMWH and unfractionated heparin contraindicated or unavailable and not at high risk for major bleeding complications:</td>
<td>&quot;[W]e suggest low-dose aspirin, fondaparinux, or mechanical prophylaxis, preferably with IPC, over no prophylaxis.&quot;</td>
<td>2C</td>
</tr>
<tr>
<td>High risk for VTE, undergoing abdominal or pelvic surgery for cancer and not otherwise at high risk for major bleeding complications</td>
<td>&quot;[W]e recommend extended-duration, postoperative, pharmacologic prophylaxis (4 weeks) with LMWH over limited-duration prophylaxis.&quot;</td>
<td>1B</td>
</tr>
</tbody>
</table>

GOR: grade of recommendation VTE: venous thromboembolism

Note that a standard duration of prophylaxis was not defined. An “extended-duration” prophylaxis was defined as lasting 4 weeks.

**American Academy of Orthopaedic Surgeons**

The American Academy of Orthopaedic Surgeons (AAOS) (2011) updated its guidelines on prevention of venous thromboembolism in patients undergoing elective hip and knee arthroplasty. The guidelines included the following recommendations relevant to this policy:

- The work group suggests the use of pharmacologic agents and/or mechanical compressive devices for the prevention of venous thromboembolism in patients undergoing elective hip or knee arthroplasty, and who are not at elevated risk beyond that of the surgery itself for
venous thromboembolism or bleeding. (Grade of Recommendation: Moderate) Current evidence is unclear about which prophylactic strategy (or strategies) is/are optimal or suboptimal. Therefore, the work group is unable to recommend for or against specific prophylactics in these patients. (Grade of Recommendation: Inconclusive) In the absence of reliable evidence about how long to employ these prophylactic strategies, it is the opinion of this work group that patients and physicians discuss the duration of prophylaxis. (Grade of Recommendation: Consensus)

- In the absence of reliable evidence, it is the opinion of this work group that patients undergoing elective hip or knee arthroplasty, and who have also had a previous venous thromboembolism, receive pharmacologic prophylaxis and mechanical compressive devices. (Grade of Recommendation: Consensus)

- In the absence of reliable evidence, it is the opinion of this work group that patients undergoing elective hip or knee arthroplasty, and who also have a known bleeding disorder (eg, hemophilia) and/or active liver disease, use mechanical compressive devices for preventing venous thromboembolism. (Grade of Recommendation: Consensus)

**American College of Obstetricians and Gynecologists**

The American College of Obstetricians and Gynecologists (ACOG) (2007; reaffirmed 2012) updated its practice bulletin on prevention of deep vein thrombosis and pulmonary embolism after gynecologic surgery. As with the ACCP recommendations, described above, prophylaxis recommendations varied by patient risk level. For patients at moderate and high risk of deep vein thrombosis, intermittent pneumatic compression was one of the recommended options for deep vein thrombosis prophylaxis. For patients at highest risk (ie, older than 60 years plus prior VTE, cancer or molecular hypercoagulable state), intermittent pneumatic compression or graduated compression stockings plus low-dose unfractionated heparin (LDUH) or low-molecular-weight heparin (LMWH) were recommended as prophylactic options. For all but the highest risk patients, the practice bulletin stated that, when intermittent pneumatic compression (IPC) devices were used, “the devices should be used continuously until ambulation and discontinued only at the time of hospital discharge.” For the highest risk patients, the bulletin stated that continuing prophylaxis for two to four weeks after discharge should be considered.
**American Orthopaedic Foot and Ankle Society**

The American Orthopaedic Foot and Ankle Society (2013) published a position statement on VTE prophylaxis after foot and ankle surgery. It stated the following: "There is currently insufficient data for the American Orthopaedic Foot & Ankle Society (AOFAS) to recommend for or against routine VTE prophylaxis for patients undergoing foot and ankle surgery. Further research in this field is necessary and is encouraged."\(^{19}\)

**European Society of Anesthesiology**

The European Society of Anesthesiology (2018) published a series of guidelines on the prevention of VTE, with specific recommendations as listed in **Table 4**.

**Table 4. Recommendations on Prevention of VTE**

<table>
<thead>
<tr>
<th>Patient Risk Group</th>
<th>Recommendation</th>
<th>GOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical prophylaxis(^{20})</td>
<td>In patients with contraindications to pharmacologic thromboprophylaxis, IPC is recommended. In patients not at high risk for VTE, IPC is not recommended.</td>
<td>1B</td>
</tr>
<tr>
<td>Elderly patients(^{21})</td>
<td>Multifaceted interventions (pneumatic compression devices and oral anticoagulants) are recommended after knee and hip replacement</td>
<td>1C</td>
</tr>
<tr>
<td>Cardiovascular and thoracic surgery(^{22})</td>
<td>For patients undergoing coronary artery bypass graft and bioprosthetic aortic valve implantation, IPC is recommended. For low-risk patients undergoing thoracic surgery, IPC is recommended. For high-risk patients undergoing thoracic surgery, pharmacologic prophylaxis plus IPC are recommended.</td>
<td>2C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2B</td>
</tr>
<tr>
<td>Neurosurgery(^{23})</td>
<td>Patients undergoing craniotomy or with nontraumatic intracranial hemorrhage, IPC is recommended on admission. In patients with spinal cord injury or significant motor impairment, thromboprophylaxis extended into rehabilitation is suggested.</td>
<td>1C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2C</td>
</tr>
<tr>
<td>Obese patients(^{24})</td>
<td>For patients undergoing bariatric surgery, IPC or anticoagulants recommended for low-risk patients, and IPC plus anticoagulants recommended for high-risk patients.</td>
<td>2C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1C</td>
</tr>
</tbody>
</table>

GOR: grade of recommendation; IPC: intermittent pneumatic compression; VTE: venous thromboembolism.

None of the guidelines specified use of compression devices in the home setting.
Medicare National Coverage

There is no national coverage determination.

Regulatory Status

A large number of pneumatic and peristaltic limb compression devices have been cleared for marketing by the U.S. Food and Drug Administration through the 510(k) process for indications including prevention of DVT. Portable devices cleared by the Food and Drug Administration include (Food and Drug Administration product code: JOW):

- **VenaPro™ Vascular Therapy System** (InnovaMed Health): This device is battery-powered.
- **Venowave™ VW5** (Venowave): The device is battery-powered and strapped to the leg below the knee.
- **ActiveCare®+S.F.T. System** (Medical Compression Systems): The device applies sequential pneumatic compression to the lower limb; it has the option of being battery-operated. Foot compression is achieved with use of a single-celled foot sleeve. Calf and thigh compression requires the use of a 3-celled cuff sleeve.
- **Restep® DVT System** (Stortford Medical): This lightweight device uses single chamber pressure cuffs attached to the patient’s lower legs.
- **Kendall SCD™ 700 Sequential Compression System** (Covidien): This pneumatic compression device can be used in the clinic or at-home. It has a battery-powered option.
- **PlasmaFlow™** (ManaMed): This system is portable, to be used at home or in a clinical setting.

References


<table>
<thead>
<tr>
<th>Date</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>03/11/13</td>
<td>New policy. New policy created with literature search through November 2012. Outpatient use of limb pneumatic compression devices after major orthopedic surgery is considered medically necessary in patients with a contraindication to pharmacological agents i.e., at high-risk for bleeding. Outpatient use is considered medically necessary after major non-orthopedic surgery in patients who are at moderate or high risk of venous thromboembolism with a contraindication to pharmacological agents. Other outpatient uses are investigational and outpatient use beyond 30 days post-surgery is not medically necessary.</td>
</tr>
<tr>
<td>02/10/14</td>
<td>Replace policy. Title changed to include the word “Postsurgical” and delete the word “Pneumatic” in the title and policy statements. Policy statement for investigational indications changed to not medically necessary indications for outpatient use of limb compression devices to prevent VTE. Policy and policy guidelines reformatted for usability. Added definition of nonmajor orthopedic surgery to Policy Guidelines. Policy updated with literature search through November 2013. Kendall SCD device added to Regulatory Status. Reference 8 added; others renumbered. Policy statements changed as noted. ICD-9 and ICD-10 codes removed; they were provided for informational purposes only.</td>
</tr>
<tr>
<td>02/10/15</td>
<td>Annual Review. No change to policy statement.</td>
</tr>
<tr>
<td>06/01/16</td>
<td>Annual Review, approved May 10, 2016. No change to policy statement. Added references 15 and 17.</td>
</tr>
<tr>
<td>03/01/17</td>
<td>Policy moved to new format. No change to policy statement.</td>
</tr>
<tr>
<td>05/01/18</td>
<td>Annual Review, approved April 18, 2018. Policy updated with literature review through January 2018; references 20-24 added. Added the following to medical necessity criteria: prior history of VTE for major non-orthopedic surgery, and TURP to minor</td>
</tr>
<tr>
<td>Date</td>
<td>Comments</td>
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<td>------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>06/01/19</td>
<td>Annual Review, approved May 7, 2019. Policy updated with literature review through January 2019; one reference added. Minor edits to policy statements for greater clarity. Removed policy statement for minor non-orthopedic surgery. Removed HCPCS codes E1399, E0655, E0665, E0668, E0672 as only lower limbs are referenced in policy.</td>
</tr>
</tbody>
</table>

**Disclaimer:** This medical policy is a guide in evaluating the medical necessity of a particular service or treatment. The Company adopts policies after careful review of published peer-reviewed scientific literature, national guidelines and local standards of practice. Since medical technology is constantly changing, the Company reserves the right to review and update policies as appropriate. Member contracts differ in their benefits. Always consult the member benefit booklet or contact a member service representative to determine coverage for a specific medical service or supply. CPT codes, descriptions and materials are copyrighted by the American Medical Association (AMA). ©2019 Premera All Rights Reserved.

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  - Information written in other languages

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200 Independence Avenue SW, Room S09F, HHH Building
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Premera Blue Cross

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Call us at 800-722-1471 (TTY: 800-842-5357).