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

#### Procedure

<table>
<thead>
<tr>
<th>Outpatient limb compression devices for VTE prophylaxis</th>
</tr>
</thead>
</table>

#### Medical Necessity

Outpatient home use of limb compression devices for postsurgical 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
   - Patient had surgery for a cancer diagnosis
   - Surgery was done on a patient with age greater than 60
   - Anesthesia time was 2 hours or more
   - Patient was on bed rest more than 4 days in the hospital
   - Patient has renal failure
   - Patient has an infection
   - Patient had a recent heart attack
   - Patient is pregnant or is recently post-partum
   - Patient has a prior history of venous thromboembolism

   **OR**

3. After **minor non-orthopedic surgery**, such as laparoscopic cholecystectomy, appendectomy, mastectomy, or transurethral prostatectomy (TURP)

   **AND the following criteria are met:**
   - The patient has a contraindication to using standard anticoagulant medications, such as any of the following:
     - History of significant bleeding in the past or during this surgery, or extensive dissection and revision surgery
     - Advanced liver disease, or renal failure
     - Currently using anti-platelet medications (eg, NSAID, ASA,
<table>
<thead>
<tr>
<th>Procedure</th>
<th>Medical Necessity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plavix, Ticlid, Effient, Brilinta</td>
<td></td>
</tr>
<tr>
<td>o Known underlying bleeding disorder (eg, hemophilia, Von Willibrands, idiopathic thrombocytopenic purpura [ITP] and others)</td>
<td></td>
</tr>
<tr>
<td>OR</td>
<td></td>
</tr>
<tr>
<td>• Patient is on prolonged bed rest or confined to a chair/wheelchair and not walking around after hospital discharge</td>
<td></td>
</tr>
<tr>
<td>When covered, outpatient use of limb compression devices is limited to 30 days following ANY surgery.</td>
<td></td>
</tr>
</tbody>
</table>

**Outpatient use of limb compression devices is considered not medically necessary for postsurgical venous thromboembolism (VTE) prophylaxis for the following:**

• After major or non-major orthopedic surgery when the patient has no contraindications to anticoagulant therapy.

• After major non-orthopedic surgery when the patient has no contraindications to anticoagulant therapy.

• After major non-orthopedic surgery or non-major orthopedic surgery when the patient is at moderate or high risk of VTE and has no contraindication to anticoagulant therapy (ie, high risk for bleeding; for indications see Related Information).

• After major non-orthopedic surgery or non-major orthopedic surgery when the patient has a low-risk of VTE.

• After all other orthopedic/non-orthopedic surgeries when the patient has no contraindications to anti-coagulant therapy.

**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:

  o The device will only be used for 30 days

  o Member has a condition that prevents member from taking standard blood clot medication

  OR
### Documentation Requirements

- 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>E1399</td>
<td>Durable medical equipment, miscellaneous</td>
</tr>
<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>E0655</td>
<td>Nonsegmental pneumatic appliance for use with pneumatic compressor, half arm</td>
</tr>
<tr>
<td>E0656</td>
<td>Segmental pneumatic appliance for use with pneumatic compressor, trunk</td>
</tr>
<tr>
<td>E0657</td>
<td>Segmental pneumatic appliance for use with pneumatic compressor, chest</td>
</tr>
<tr>
<td>E0660</td>
<td>Nonsegmental pneumatic appliance for use with pneumatic compressor, full leg</td>
</tr>
<tr>
<td>E0665</td>
<td>Nonsegmental pneumatic appliance for use with pneumatic compressor, full arm</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>E0668</td>
<td>Segmental pneumatic appliance for use with pneumatic compressor, full arm</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>E0672</td>
<td>Segmental gradient pressure pneumatic appliance, full arm</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>
Note: CPT codes, descriptions and materials are copyrighted by the American Medical Association (AMA). HCPCS codes, descriptions and materials are copyrighted by Centers for Medicare Services (CMS).

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).

**Summarization of AACP Guidelines on Determining High Risk for Venous Thromboembolism (VTE)**

<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>
</tbody>
</table>
### Major orthopedic surgeries risks for bleeding
- Concomitant use of anti-platelet agent (ASA, NSAID, Plavix, Ticlid, Effient, Brilinta)
- Hard to control bleeding in this surgery, extensive surgery dissection and revision surgery
- Known bleeding disorder (hemophilia)
- Advanced liver disease

### Major non-orthopedic surgeries risks for bleeding
- Age over 60, prior DVT, anesthesia of 2 hours or more, bed rest of 4 days or more
- Renal failure, infection, peri-operative myocardial infarction
- Pregnancy or postpartum
- N/A

### Recommended duration for use of limb compression device
- 2 weeks, up to maximum of 30 days

---

**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>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 (THA), total knee arthroplasty (TKA), or hip fracture surgery (HFS), the American College of Chest Physicians (ACCP) guidelines are consistent with use of intermittent limb compression devices for 10-14 days after surgery.\(^2\) 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 thrombocytosis 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, 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.\(^1\)\(^2\)

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, 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%. 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%.

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, 2012 clinical practice guidelines published by ACCP recommended that one of several pharmacologic agents or mechanical prophylaxis be provided rather than no thromboprophylaxis. 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.

**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.
Nonorthopedic Surgery

Pharmacologic and Limb Compression Prophylaxis

ACCP also issued guidelines (2012) on VTE prophylaxis in nonorthopedic surgery patients. For patients undergoing general or abdominal-pelvic surgery who have a risk of VTE of 3% or higher, ACCP has recommended prophylaxis with pharmacologic agents or intermittent pneumatic compression rather than no prophylaxis. For patients at low risk for VTE (~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. 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. 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><strong>Ongoing</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NCT01317160</td>
<td>Compression Treatment Effects on Complications and Healing of Achilles Tendon Rupture</td>
<td>150</td>
<td>Sep 2017 (ongoing)</td>
</tr>
<tr>
<td>NCT02987946a</td>
<td>Leiden Trial in Prevention of Post-Operative Thromboembolic Events (TIPOTEE)</td>
<td>280</td>
<td>May 2018</td>
</tr>
<tr>
<td>NCT03044574a</td>
<td>Intermittent Pneumatic Compression in Surgical Patients at Extremely High Risk for Venous Thromboembolism (IPCSUPER)</td>
<td>400</td>
<td>Jul 2018</td>
</tr>
</tbody>
</table>

NCT: national clinical trial.

* Denotes industry-sponsored or cosponsored trial.
Practice Guidelines and Position Statements

American College of Chest Physicians

In 2016, the American College of Chest Physicians (ACCP) updated its 2012 evidence-based guideline on antithrombotic therapy and prevention of thrombosis. 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 >75 y
- 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>Anticoagulation 0-3 mo, %</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>Anticoagulation after first 3 mo, %/y</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).

In its updated 2012 guidelines on antithrombotic therapy and prevention of VTE in patients undergoing orthopedic and nonorthopedic surgery, ACCP recommended use of limb compression devices in orthopedic surgical patients:

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).”
For all above recommendations related to pneumatic compression pumps, ACCP recommended only portable, battery-powered devices be used and stated that efforts should be made to ensure devices are worn for 18 hours a day. Guidelines noted that compliance is the biggest challenge with the use of pneumatic compression devices.

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.

### 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>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 2B 2C</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>
</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**

In 2011, the American Academy of Orthopaedic Surgeons (AAOS) 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-Gynecologists**

In 2007 (reaffirmed in 2012), the American College of Obstetricians-Gynecologists (ACOG) updated its practice bulletin on prevention of DVT and PE after gynecologic surgery. As with the ACCP recommendations, described above, prophylaxis recommendations varied according to patient risk level. For patients at moderate and high risk of DVT, intermittent pneumatic compression was one of the recommended options for DVT prophylaxis. For patients at highest risk (ie, older than 60 years plus prior VTE, cancer or molecular hypercoaguable state), IPC or graduated compression stockings plus LDUH or LMWH were recommended as prophylactic options. For all but the highest risk patients, the practice bulletin stated that, when 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 2-4 weeks after discharge should be considered.
**American Orthopaedic Foot and Ankle Society**

In 2013, the American Orthopaedic Foot and Ankle Society published a position statement on VTE prophylaxis after foot and ankle surgery which 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.”

**European Society of Anesthesiology**

In 2018, the European Society of Anesthesiology 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&lt;sup&gt;20&lt;/sup&gt;</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&lt;sup&gt;21&lt;/sup&gt;</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&lt;sup&gt;22&lt;/sup&gt;</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 2C 2B</td>
</tr>
<tr>
<td>Neurosurgery&lt;sup&gt;23&lt;/sup&gt;</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 2C</td>
</tr>
<tr>
<td>Obese patients&lt;sup&gt;24&lt;/sup&gt;</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 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 (NCD). In the absence of an NCD, coverage decisions are left to the discretion of local Medicare carriers.

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 Inc.; Stouffville, Ontario, Canada): The device is a peristaltic pump that is strapped to the leg below the knee. It is powered using a single NiMH (nickel metal hydride) AA size battery.

- **ActiveCare+SFT® System** (Medical Compression Systems LTD, Or Akiva, Israel): 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 use of a 3-celled cuff sleeve.

- **Restep® DVT System** (Stortford Medical LLC, West Windsor, NJ): This lightweight device uses single chamber pressure cuffs attached to the patient’s lower legs.

- **Kendall SCD™ 700 Sequential Compression System** (Covidien, Mansfield, MA): 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


### History

<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>06/01/17</td>
<td>Annual Review, approved May 16, 2017. Policy statement unchanged, however</td>
</tr>
<tr>
<td>Date</td>
<td>Comments</td>
</tr>
<tr>
<td>--------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</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 non-orthopedic surgery. Added Effient and Brilinta to antiplatelet medication examples; otherwise policy statements unchanged.</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). ©2018 Premera All Rights Reserved.

**Scope:** Medical policies are systematically developed guidelines that serve as a resource for Company staff when determining coverage for specific medical procedures, drugs or devices. Coverage for medical services is subject to the limits and conditions of the member benefit plan. Members and their providers should consult the member benefit booklet or contact a customer service representative to determine whether there are any benefit limitations applicable to this service or supply. This medical policy does not apply to Medicare Advantage.
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  • Qualified sign language interpreters
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• Provides free language services to people whose primary language is not English, such as:
  • Qualified interpreters
  • Information written in other languages

If you need these services, contact the Civil Rights Coordinator.

If you believe that Premera has failed to provide these services or discriminated in another way on the basis of race, color, national origin, age, disability, or sex, you can file a grievance with:
Civil Rights Coordinator - Complaints and Appeals
PO Box 91102, Seattle, WA 98111
Toll free 855-332-4535, Fax 425-918-5592, TTY 800-842-5357
Email AppealsDepartmentInquiries@Premera.com

You can file a grievance in person or by mail, fax, or email. If you need help filing a grievance, the Civil Rights Coordinator is available to help you.

You can also file a civil rights complaint with the U.S. Department of Health and Human Services, Office for Civil Rights, electronically through the Office for Civil Rights Complaint Portal, available at https://ocrportal.hhs.gov/ocr/portal/lobby.jsf, or by mail or phone at:
U.S. Department of Health and Human Services
200 Independence Avenue SW, Room S09F, HHH Building
Washington, D.C. 20201, 1-800-368-1019, 800-537-7697 (TDD)

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800-722-1471 (TTY: 800-842-5357).

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Lakkoofsa bilbilaa 800-722-1471 (TTY: 800-842-5357) tii bilbilaa.

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