

2025 Endorsement & Maintenance: Hospital Harm – Postoperative Venous Thromboembolism

November 2025

Mathematica Measure Development Team

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Clinical Guidelines

A. American College of Chest Physicians (ACCP/CHEST): 2012 Guidelines for Prevention of VTE in Nonorthopedic Surgical Patients

[Gould, M. K., Garcia, D. A., Wren, S. M., Karanickolas, P. J., Arcelus, J. I., Heit, J. A., & Samama, C. M. \(2012\). 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, 141\(2\), e227S-e277S. <https://doi.org/10.1378/chest.11-2297>](#)

The American College of Chest Physicians (ACCP/CHEST) provide guidance via clinical practice recommendations for the prevention of venous thromboembolism (VTE) in nonorthopedic surgical patients. This guideline is based on a systematic review of the literature. The outcomes assessed include death from any cause, fatal pulmonary embolism (PE); objectively confirmed, nonfatal, symptomatic PE and deep vein thrombosis (DVT); fatal bleeding; bleeding requiring reoperation; and other bleeding.

The methodology for determining strength of recommendations (**Table 1**) and strength of evidence (**Tables 2 and 3**) was adopted from the classification developed by the GRADE (Grading of Recommendations Assessment, Development, and Evaluation) workgroup and is presented below, followed by key guideline recommendation statements that inform the proposed measure (**Table 4**).

Within each recommendation, the strength of recommendation is indicated as strong recommendation (1), or weak/conditional recommendation (2).

Table 1. ACCP/CHEST (2012) Strength of Recommendation Criteria (GRADE)

Recommendation Grading	Meaning	Rationale
1	Strong	The panel is highly confident of the balance between desirable and undesirable consequences.
2	Weak/Conditional	The panel is less confident of the balance between desirable and undesirable consequences

Within each recommendation, the quality of the supporting evidence is shown as high (A), moderate (B), or low/very low (C).

Table 2. ACCP/CHEST (2012) Strength of Evidence Criteria (GRADE)

Evidence Grading	Strength of Evidence	Rationale
A	High	The quality of the body of evidence is rated as 4+ We are very confident that the true effect lies close to that of the estimate of the effect.
B	Moderate	The quality of the body of evidence is rated as 3+ We are moderately confident in the effect estimate: The true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
C	Low	The quality of the body of evidence is rated as 2+

Evidence Grading	Strength of Evidence	Rationale
		Our confidence in the effect estimate is limited: The true effect may be substantially different from the estimate of the effect.
	Very Low	The quality of the body of evidence is rated as 1+ We have very little confidence in the effect of the estimate: The true effect is likely to be substantially different from the estimate of the effect.

Additionally, the level of evidence also indicates the quality of the body of evidence used to inform the recommendations.

Table 3. ACCP/CHEST (2012) Level of Evidence Criteria (GRADE)

Study Design	Initial quality of a body of evidence	Lower if	Higher if
Randomized Trials	High	Risk of bias	Large effect
Observational Studies	Low	-1 serious -2 very serious Inconsistency -1 serious -2 very serious Indirectness -1 serious -2 very serious Imprecision -1 serious -2 very serious Publication bias -1 likely -2 very likely	+1 large +2 very large Dose response +1 Evidence of a gradient All plausible residual confounding +1 would reduce a demonstrated effect +1 would suggest a spurious effect if no effect was observed

Table 4. ACCP/CHEST (2012) Nonorthopedic Surgical Guidelines that Support the Measure

Verbatim Guideline	Strength of Recommendation	Strength of Evidence
Guidelines focused on general surgery, GI surgery, urological surgery, gynecological surgery, bariatric surgery, vascular surgery, and plastic and reconstructive surgery		
3.6.1 For general and abdominal-pelvic surgery patients at very low risk for VTE (<0.5%; Rogers score, <7; Caprini score, 0), we recommend that	1	B
• No specific pharmacologic or	1	B
• or mechanical prophylaxis be used other than early ambulation.	2	C
3.6.2 For general and abdominal-pelvic surgery patients at low risk for VTE (~1.5%; Rogers score, 7-10; Caprini score, 1-2), we suggest mechanical prophylaxis, preferably with intermittent pneumatic compression (IPC), over no prophylaxis.	2	C
3.6.3 For general and abdominal-pelvic surgery patients at moderate risk for VTE (~3.0%; Rogers score, >10; Caprini score, 3-4) who are not at high risk for major bleeding complications, we suggest:	2	B

Verbatim Guideline	Strength of Recommendation	Strength of Evidence
low-molecular-weight heparin (LMWH),		
• low-dose unfractionated heparin (LDUH),	2	B
• or mechanical prophylaxis, preferably with IPC, over no prophylaxis.	2	C
3.6.4 For general and abdominal-pelvic surgery patients at moderate risk for VTE (3.0%; Rogers score, >10; Caprini score, 3-4) who are at high risk for major bleeding complications or those in whom the consequences of bleeding are thought to be particularly severe, we suggest mechanical prophylaxis, preferably with IPC, over no prophylaxis.	2	C
3.6.5 For general and abdominal-pelvic surgery patients at high risk for VTE (~6.0%; Caprini score ≥5) who are not at high risk for major bleeding complications, we recommend pharmacologic prophylaxis with LMWH or LDUH over no prophylaxis.	1	B
We suggest that mechanical prophylaxis with elastic stockings (ES) or IPC should be added to pharmacologic prophylaxis.	2	C
3.6.6 For high-VTE-risk patients undergoing abdominal or pelvic surgery for cancer who are not otherwise at high risk for major bleeding complications, we recommend extended duration pharmacologic prophylaxis (4 weeks) with LMWH over limited-duration prophylaxis.	1	B
3.6.7 For high-VTE-risk general and abdominal pelvic surgery patients who are at high risk for major bleeding complications or those in whom the consequences of bleeding are thought to be particularly severe, we suggest use of mechanical prophylaxis, preferably with IPC, over no prophylaxis until the risk of bleeding diminishes and pharmacologic prophylaxis may be initiated.	2	C
3.6.8 For general and abdominal-pelvic surgery patients at high risk for VTE (6%; Caprini score, ≥5) in whom both LMWH and unfractionated heparin are contraindicated or unavailable and who are not at high risk for major bleeding complications, we suggest low-dose aspirin, fondaparinux, or mechanical prophylaxis, preferably with IPC, over no prophylaxis.	2	C
3.6.9 For general and abdominal-pelvic surgery patients, we suggest that an inferior vena cava (IVC) filter should not be used for primary VTE prevention.	2	C
3.6.10 For general and abdominal-pelvic surgery patients, we suggest that periodic surveillance with venous compression ultrasound (VCU) should not be performed.	2	C
Guidelines focused on Cardiac Surgery		
4.4.1 For cardiac surgery patients with an uncomplicated postoperative course, we suggest use of mechanical prophylaxis, preferably with optimally applied IPC, over either no prophylaxis or pharmacologic prophylaxis.	2	C
4.4.2 For cardiac surgery patients whose hospital course is prolonged by one or more hemorrhagic surgical complications, we suggest adding pharmacologic prophylaxis with LDUH or LMWH to mechanical prophylaxis.	2	C
Guidelines focused on Thoracic Surgery		
5.4.1 For thoracic surgery patients at moderate risk for VTE who are not at high risk for perioperative bleeding, we suggest:	2	B
• LDUH,	2	B
• LMWH,	2	B

Verbatim Guideline	Strength of Recommendation	Strength of Evidence
• or mechanical prophylaxis with optimally applied IPC over no prophylaxis.	2	C
5.4.2 For thoracic surgery patients at high risk for VTE who are not at high risk for perioperative bleeding, we suggest LDUH or LMWH over no prophylaxis.	1	C
In addition, we suggest that mechanical prophylaxis with ES or IPC should be added to pharmacologic prophylaxis.	2	C
5.4.3 For thoracic surgery patients who are at high risk for major bleeding, we suggest use of mechanical prophylaxis, preferably with optimally applied IPC, over no prophylaxis until the risk of bleeding diminishes and pharmacologic prophylaxis may be initiated.	2	C
Guidelines focused on Craniotomy		
6.4.1 For craniotomy patients, we suggest that mechanical prophylaxis, preferably with IPC, be used over no prophylaxis or pharmacologic prophylaxis.	2	C
6.4.2 For craniotomy patients at very high risk for VTE (e.g., those undergoing craniotomy for malignant disease), we suggest adding pharmacologic prophylaxis to mechanical prophylaxis once adequate hemostasis is established and the risk of bleeding decreases.	2	C
Guidelines focused on Spinal Surgery		
7.4.1 For patients undergoing spinal surgery, we suggest mechanical prophylaxis, preferably with IPC, over no prophylaxis, unfractionated heparin, or LMWH.	2	C
7.4.2 For patients undergoing spinal surgery at high risk for VTE (including those with malignant disease or those undergoing surgery with a combined anterior-posterior approach), we suggest adding pharmacologic prophylaxis to mechanical prophylaxis once adequate hemostasis is established and the risk of bleeding decreases.	2	C
Guidelines focused on Patients with Trauma		
8.4.1 For major trauma patients, we suggest use of LDUH, LMWH, or mechanical prophylaxis, preferably with IPC, over no prophylaxis.	2	C
8.4.2 For major trauma patients at high risk for VTE (including those with acute spinal cord injury, traumatic brain injury, and spinal surgery for trauma), we suggest adding mechanical prophylaxis to pharmacologic prophylaxis when not contraindicated by lower extremity injury.	2	C
8.4.3 For major trauma patients in whom LMWH and LDUH are contraindicated, we suggest mechanical prophylaxis, preferably with IPC, over no prophylaxis when not contraindicated by lower-extremity injury. We suggest adding pharmacologic prophylaxis with either LMWH or LDUH when the risk of bleeding diminishes or the contraindication to heparin resolves.	2	C
8.4.4 For major trauma patients, we suggest that an IVC filter should not be used for primary VTE prevention.	2	C
8.4.5 For major trauma patients, we suggest that periodic surveillance with VCU should not be performed.	2	C

B. ACCP/CHEST: 2012 Prevention of VTE in Orthopedic Surgery Patients

[Falck-Ytter, Y., Francis, C. W., Johanson, N. A., Curley, C., Dahl, O. E., Schulman, S., Ortel, T. L., Pauker, S. G., & Colwell, C. W. \(2012\). 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, 141\(2\), e278S-e325S. https://doi.org/10.1378/chest.11-2404](https://doi.org/10.1378/chest.11-2404)

ACCP/CHEST provides guidance via clinical practice recommendations for the prevention of VTE in orthopedic surgical patients. This guideline is based on a systematic review of the literature. The outcomes assessed include fatal and symptomatic PE and symptomatic DVT, and symptomatic bleeding events.

The methodology for determining strength of recommendations (**Table 5**) and strength of evidence (**Tables 6 and 7**) was adopted from the classification developed by the GRADE workgroup and is presented below, followed by key guideline recommendation statements that inform the proposed measure (**Table 8**).

Within each recommendation, the strength of recommendation is indicated as strong recommendation (1), or weak/conditional recommendation (2).

Table 5. ACCP/CHEST (2012) Strength of Recommendation Criteria (GRADE)

Recommendation Grading	Meaning	Rationale
1	Strong	The panel is highly confident of the balance between desirable and undesirable consequences.
2	Weak/Conditional	The panel is less confident of the balance between desirable and undesirable consequences

Within each recommendation, the quality of the supporting evidence is shown as high (A), moderate (B), or low/very low (C).

Table 6. ACCP/CHEST (2012) Strength of Evidence Criteria (GRADE)

Evidence Grading	Strength of Evidence	Rationale
A	High	The quality of the body of evidence is rated as 4+ We are very confident that the true effect lies close to that of the estimate of the effect.
B	Moderate	The quality of the body of evidence is rated as 3+ We are moderately confident in the effect estimate: The true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
C	Low	The quality of the body of evidence is rated as 2+ Our confidence in the effect estimate is limited: The true effect may be substantially different from the estimate of the effect.
	Very Low	The quality of the body of evidence is rated as 1+ We have very little confidence in the effect of the estimate: The true effect is likely to be substantially different from the estimate of the effect.

Additionally, the level of evidence also indicates the quality of the body of evidence used to inform the recommendations.

Table 7. ACCP/CHEST (2012) Level of Evidence Criteria (GRADE)

Study Design	Initial quality of a body of evidence	Lower if	Higher if
Randomized Trials	High	Risk of bias	Large effect
Observational Studies	Low	-1 serious -2 very serious Inconsistency -1 serious -2 very serious Indirectness -1 serious -2 very serious Imprecision -1 serious -2 very serious Publication bias -1 likely -2 very likely	+1 large +2 very large Dose response +1 Evidence of a gradient All plausible residual confounding +1 would reduce a demonstrated effect +1 would suggest a spurious effect if no effect was observed

Table 8. ACCP/CHEST (2012) Orthopedic Surgical Guidelines that Support the Measure

Verbatim Guideline	Strength of Recommendation	Strength of Evidence
Guidelines focused on Patients Undergoing Major Orthopedic Surgery: total hip arthroplasty, total knee arthroplasty, hip fracture surgery		
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:	1	B
• LMWH, fondaparinux, apixaban, dabigatran, rivaroxaban, LDUH, adjusted-dose vitamin K antagonist (VKA), aspirin, or	1	B
• an intermittent pneumatic compression device (IPCD).	1	C
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:	1	B
• LMWH, fondaparinux, LDUH, adjusted-dose VKA, aspirin, or	1	B
• an IPCD.	1	C
2.2 For patients undergoing major orthopedic surgery (THA, TKA, HFS) and receiving LMWH as thromboprophylaxis, we recommend starting either 12 h or more preoperatively or 12 h or more postoperatively rather than within 4 h or less preoperatively or 4 h or less postoperatively.	1	B
2.3.1 In patients undergoing THA or TKA, irrespective of the concomitant use of an IPCD or length of treatment, we suggest the use of LMWH in preference to the other agents we have recommended as alternatives:	2	B
• fondaparinux, apixaban, dabigatran, rivaroxaban, LDUH,	2	B
• adjusted-dose VKA, or aspirin.	2	C

Verbatim Guideline	Strength of Recommendation	Strength of Evidence
2.3.2 In patients undergoing HFS, irrespective of the concomitant use of an IPCD or length of treatment, we suggest the use of LMWH in preference to the other agents we have recommended as alternatives:	2	B
• fondaparinux, LDUH,	2	B
• adjusted-dose VKA, or aspirin.	2	C
2.4 For patients undergoing major orthopedic surgery, we suggest extending thromboprophylaxis in the outpatient period for up to 35 days from the day of surgery rather than for only 10 to 14 days.	2	B
2.5 In patients undergoing major orthopedic surgery, we suggest using dual prophylaxis with an antithrombotic agent and an IPCD during the hospital stay.	2	C
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	2	C
2.7 In patients undergoing major orthopedic surgery and who decline or are uncooperative with injections or an IPCD, we recommend using apixaban or dabigatran (alternatively rivaroxaban or adjusted-dose VKA if apixaban or dabigatran are unavailable) rather than alternative forms of prophylaxis.	1	B
2.8 In patients undergoing major orthopedic surgery, we suggest against using IVC filter placement for primary prevention over no thromboprophylaxis in patients with an increased bleeding risk or contraindications to both pharmacologic and mechanical thromboprophylaxis.	2	C
2.9 For asymptomatic patients following major orthopedic surgery, we recommend against Doppler (or duplex) ultrasound (DUS) screening before hospital discharge.	1	B
Guidelines focused on Isolated Lower-Leg Injuries Distal to the Knee		
3.0 We suggest no prophylaxis rather than pharmacologic thromboprophylaxis in patients with isolated lower-leg injuries requiring leg immobilization.	2	C
Guidelines focused on Knee Arthroscopy		
4.0 For patients undergoing knee arthroscopy without a history of prior VTE, we suggest no thromboprophylaxis rather than prophylaxis.	2	B

C. ACCP/CHEST: 2021 Second Update of Antithrombotic Therapy for VTE Disease Guidelines

[Stevens, S. M., Woller, S. C., Kreuziger, L. B., Bounameaux, H., Doerschug, K., Geersing, G. J., Huisman, M. V., Kearon, C., King, C. S., Knighton, A. J., Lake, E., Murin, S., Vintch, J. R. E., Wells, P. S., & Moores, L. K. \(2021\). Antithrombotic Therapy for VTE Disease: Second Update of the CHEST Guideline and Expert Panel Report. *Chest*, 160\(6\), e545–e608. <https://doi.org/10.1016/j.chest.2021.07.055>](https://doi.org/10.1016/j.chest.2021.07.055)

The ACCP/CHEST provides guidance via clinical practice recommendations for the treatment of VTE. The updated guideline is based on a systematic review of evidence and covers aspects of antithrombotic

management of VTE and risk reduction of post-thrombotic syndrome. The target audience includes patients, policymakers, and physicians who treat patients with VTE.

The methodology for determining strength of recommendation (**Table 9**) and strength of evidence, based on the GRADE methodology (**Table 10**) is listed below, followed by key guideline recommendation statements (**Table 11**).

Within each recommendation, the strength of recommendation is indicated as strong recommendation (1), or weak/conditional recommendation (2).

Table 9. CHEST (2021) Strength of Recommendation Criteria (GRADE)

Recommendation Grading	Meaning	Rationale
1	Strong	The panel is highly confident of the balance between desirable and undesirable consequences.
2	Weak/Conditional	The panel is less confident of the balance between desirable and undesirable consequences

Table 10. CHEST (2021) Strength of Evidence Criteria (GRADE)

Strength of Evidence	Rationale
High	The quality of the body of evidence is rated as 4+ We are very confident that the true effect lies close to that of the estimate of the effect.
Moderate	The quality of the body of evidence is rated as 3+ We are moderately confident in the effect estimate: The true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low	The quality of the body of evidence is rated as 2+ Our confidence in the effect estimate is limited: The true effect may be substantially different from the estimate of the effect.
Very Low	The quality of the body of evidence is rated as 1+ We have very little confidence in the effect of the estimate: The true effect is likely to be substantially different from the estimate of the effect.

Table 11. ACCP/CHEST (2021) Antithrombotic Therapy Guidelines that Support the Measure

Verbatim Guideline	Strength of Recommendation	Strength of Evidence
Initial Management		
1. In patients with acute isolated distal DVT of the leg; and (i) without severe symptoms or risk factors for extension, we suggest serial imaging of the deep veins for 2 weeks over anticoagulation or	Weak	Moderate
(ii) with severe symptoms or risk factors for extension, we suggest anticoagulation over serial imaging of the deep veins.	Weak	Low
2. In patients with acute isolated distal DVT of the leg who are treated with serial imaging, we (i) recommend no anticoagulation if the thrombus does not extend,	Strong	Moderate
(ii) suggest anticoagulation if the thrombus extends but remains confined to the distal veins,	Weak	Low

Verbatim Guideline	Strength of Recommendation	Strength of Evidence
(iii) recommend anticoagulation if the thrombus extends into the proximal veins.	Strong	Moderate
3. In patients with subsegmental pulmonary embolism (PE) (no involvement of more proximal pulmonary arteries) and no proximal DVT in the legs who have a (i) low risk for recurrent VTE, we suggest clinical surveillance over anticoagulation or	Weak	Low
(ii) high risk for recurrent VTE, we suggest anticoagulation over clinical surveillance.	Weak	Low
4. In patients who are incidentally found to have asymptomatic PE, we suggest the same initiation and treatment phase anticoagulation as for comparable patients with symptomatic PE.	Weak	Moderate
5. In patients with cerebral vein/venous sinus thrombosis, we recommend anticoagulation therapy for at least the treatment phase (first 3 months) over no anticoagulant therapy.	Strong	Low
6. In patients with acute DVT of the leg we suggest anticoagulant therapy alone over interventional (thrombolytic, mechanical, or pharmacomechanical) therapy.	Weak	Moderate
7. In patients with acute PE associated with hypotension (e.g., systolic BP < 90 mm Hg) who do not have a high bleeding risk, we suggest systemically administered thrombolytic therapy over no such therapy.	Weak	Low
8. In most patients with acute PE not associated with hypotension, we recommend against systemically administered thrombolytic therapy.	Strong	Low
9. In selected patients with acute PE who deteriorate after starting anticoagulant therapy but have yet to develop hypotension and who have an acceptable bleeding risk, we suggest systemically administered thrombolytic therapy over no such therapy.	Weak	Low
10. In patients with acute PE who are treated with a thrombolytic agent, we suggest systemic thrombolytic therapy using a peripheral vein over catheter-directed thrombolysis (CDT).	Weak	Low
11. In patients with acute PE associated with hypotension who also have (i) a high bleeding risk, (ii) failed systemic thrombolysis, or (iii) shock that is likely to cause death before systemic thrombolysis can take effect (e.g., within hours), if appropriate expertise and resources are available, we suggest catheter-assisted thrombus removal over no such intervention.	Weak	Low
12. In patients with acute DVT of the leg, we recommend against the use of an IVC filter in addition to anticoagulants.	Strong	Moderate
13. In patients with acute proximal DVT of the leg and a contraindication to anticoagulation, we recommend the use of an IVC filter.	Strong	Moderate
14. In patients with low-risk PE we recommend outpatient treatment over hospitalization provided access to medications, ability to access outpatient care, and home circumstances are adequate.	Strong	Low
15. In patients with VTE (DVT of the leg or PE) we recommend apixaban, dabigatran, edoxaban, or rivaroxaban over VKA as treatment-phase (first 3 months) anticoagulant therapy.	Strong	Moderate
16. In patients with acute VTE in the setting of cancer (cancer-associated thrombosis) we recommend an oral Xa inhibitor (apixaban, edoxaban, rivaroxaban) over LMWH for the initiation and treatment phases of therapy.	Strong	Moderate

Verbatim Guideline	Strength of Recommendation	Strength of Evidence
17. In patients with confirmed antiphospholipid syndrome being treated with anticoagulant therapy, we suggest adjusted dose VKA (target INR 2.5) over direct oral anticoagulant (DOAC) therapy during the treatment phase.	Weak	Low
18. In patients with superficial venous thrombosis (SVT) of the lower limb at increased risk of clot progression to DVT or PE, we suggest the use of anticoagulation for 45 days over no anticoagulation.	Weak	Moderate
19. In patients with SVT who are treated with anticoagulation, we suggest fondaparinux 2.5 mg daily over other anticoagulant treatment regimens such as (prophylactic or therapeutic dose) LMWH.	Weak	Low
20. In patients with SVT who refuse or are unable to use parenteral anticoagulation, we suggest rivaroxaban 10 mg daily as a reasonable alternative for fondaparinux 2.5 mg daily.	Weak	Low
Duration of Treatment Phase of Anticoagulation		
21. In patients with acute VTE who do not have a contraindication we recommend a 3-month treatment phase of anticoagulation.	Strong	Moderate
Extended-Phase Therapy		
22. In patients with VTE diagnosed in the setting of a major transient risk factor, we recommend against offering extended-phase anticoagulation.	Strong	Moderate
23. In patients with VTE diagnosed in the setting of a minor transient risk factor, we suggest against offering extended-phase anticoagulation.	Weak	Moderate
24. In patients with VTE diagnosed in the absence of transient provocation (unprovoked VTE or provoked by persistent risk factor), we recommend offering extended-phase anticoagulation with a DOAC.	Strong	Moderate
25. In patients with VTE diagnosed in the absence of transient risk factor (unprovoked VTE or provoked by a persistent risk factor) who cannot receive a DOAC, we suggest offering extended-phase anticoagulation with a VKA.	Weak	Moderate
26. In patients offered extended-phase anticoagulation, we suggest the use of reduced-dose apixaban or rivaroxaban over full-dose apixaban or rivaroxaban.	Weak	Very Low
27. In patients offered extended-phase anticoagulation, we recommend reduced-dose DOAC over aspirin or no therapy (strong recommendation, low-certainty evidence) and suggest rivaroxaban over aspirin.	Weak	Moderate
28. In patients with an unprovoked proximal DVT or PE who are stopping anticoagulant therapy and do not have a contraindication to aspirin, we suggest aspirin over no aspirin to prevent recurrent VTE.	Weak	Low
Complications of VTE		
29. In patients with acute DVT of the leg, we suggest against using compression stockings routinely to prevent post-thrombotic syndrome (PTS).	Weak	Low

D. American Society of Hematology: 2019

[Anderson, D. R., Morgano, G. P., Bennett, C., Dentali, F., Francis, C. W., Garcia, D. A., ... Dahm, P. \(2019\). American Society of Hematology 2019 guidelines for management of venous thromboembolism: Prevention of venous thromboembolism in surgical hospitalized patients. Blood Advances, 3\(23\), 3898–3944. https://doi.org/10.1182/bloodadvances.2019000975](https://doi.org/10.1182/bloodadvances.2019000975)

The American Society of Hematology (ASH) provides guidance via clinical practice recommendations for the prevention of venous thromboembolism in surgical hospitalized patients. The guideline is based on updated and original systematic reviews of evidence conducted by researchers and developed under the direction of the McMaster University GRADE Centre with international collaborators. The target audience includes patients, surgeons, intensivists, internists, hematologists, general practitioners, hospitalists, other clinicians, pharmacists, and decision makers. The primary target population is patients hospitalized for major surgical procedures that carry a risk for postoperative VTE. The guideline panel's work was coordinated with nine other guideline panels by ASH and the McMaster GRADE Centre. The panel included surgeons with subspecialty representation, hematologists, internists, and a pharmacist, all of whom had clinical and research expertise on the guideline topic. The panel also included methodologists with expertise in evidence appraisal and guideline development and two patient representatives.

The methodology for determining strength of recommendations (**Table 12**) and strength of evidence (**Tables 13 and 14**) is based on the GRADE approach and presented below, followed by key guideline recommendation statements that inform the proposed measure (**Table 15**).

Within each recommendation, the strength of recommendation is indicated as strong recommendation or conditional recommendation.

Table 12. ASH (2019) Strength of Recommendation Criteria (GRADE)

Meaning	Rationale
Strong	The panel is highly confident of the balance between desirable and undesirable consequences.
Conditional	The panel is less confident of the balance between desirable and undesirable consequences

Within each recommendation, the quality of the supporting evidence is shown as high (+++), moderate (+++), low (++), or very low (+).

Table 13. ASH (2019) Strength of Evidence Criteria (GRADE)

Evidence Grading	Strength of Evidence	Rationale
++++	High	The quality of the body of evidence is rated as 4+ We are very confident that the true effect lies close to that of the estimate of the effect.
+++	Moderate	The quality of the body of evidence is rated as 3+ We are moderately confident in the effect estimate: The true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
++	Low	The quality of the body of evidence is rated as 2+ Our confidence in the effect estimate is limited: The true effect may be substantially different from the estimate of the effect.
+	Very Low	The quality of the body of evidence is rated as 1+ We have very little confidence in the effect of the estimate: The true effect is likely to be substantially different from the estimate of the effect.

Additionally, the level of evidence also indicates the quality of the body of evidence used to inform the recommendations.

Table 14. ASH (2019) Level of Evidence Criteria (GRADE)

Study Design	Initial quality of a body of evidence	Lower if	Higher if
Randomized Trials	High	Risk of bias	Large effect
Observational Studies	Low	-1 serious -2 very serious Inconsistency -1 serious -2 very serious Indirectness -1 serious -2 very serious Imprecision -1 serious -2 very serious Publication bias -1 likely -2 very likely	+1 large +2 very large Dose response +1 Evidence of a gradient All plausible residual confounding +1 would reduce a demonstrated effect +1 would suggest a spurious effect if no effect was observed

Table 15. ASH (2019) Surgical Guidelines that Support the Measure

Verbatim Guideline	Strength of Recommendation	Strength of Evidence
Guidelines focused on Perioperative VTE Prophylaxis in Major Surgery in General		
1. For patients undergoing major surgery, the ASH guideline panel suggests using pharmacological prophylaxis or mechanical prophylaxis.	Conditional Recommendation	++
2. For patients undergoing major surgery who do not receive pharmacologic prophylaxis, the ASH guideline panel suggests using mechanical prophylaxis over no mechanical prophylaxis.	Conditional Recommendation	+
3. For patients undergoing major surgery who receive mechanical prophylaxis, the ASH guideline panel suggests using intermittent compression devices over graduated compression stockings.	Conditional Recommendation	+
4. For patients undergoing major surgery who receive pharmacologic prophylaxis, the ASH guideline panel suggests using combined prophylaxis with mechanical and pharmacological methods over prophylaxis with pharmacological agents alone.	Conditional Recommendation	+
5. For patients undergoing major surgery, the ASH guideline panel suggests depending on the risk of VTE and bleeding based on the individual patient and the type of surgical procedure, using combined prophylaxis or mechanical prophylaxis alone	Conditional Recommendation	+
6. For patients undergoing major surgery, the ASH guideline panel suggests against using IVC filters for prophylaxis of VTE.	Conditional Recommendation	+
7. For patients undergoing major surgery, the ASH guideline panel suggests using extended antithrombotic prophylaxis over short-term antithrombotic prophylaxis.	Conditional Recommendation	+
8. For patients undergoing major surgery, ASH guideline panel suggests using early or delayed antithrombotic prophylaxis.	Conditional Recommendation	+

Verbatim Guideline	Strength of Recommendation	Strength of Evidence
Guidelines focused on Orthopedic Surgery: Total Hip and Knee Arthroplasty		
9. For patients undergoing total hip arthroplasty or total knee arthroplasty, the ASH guideline panel suggests using aspirin (ASA) or anticoagulants.	Conditional Recommendation	+
10. For patients undergoing total hip arthroplasty or total knee arthroplasty, when anticoagulants are used, the panel suggests using DOACs over LMWH.	Conditional Recommendation	+++
11. For patients undergoing total hip arthroplasty or total knee arthroplasty, the panel suggests using any of the DOACs approved for use.	Conditional Recommendation	++
12. For patients undergoing total hip arthroplasty or total knee arthroplasty, if a DOAC is not used, the panel suggests using LMWH rather than warfarin.	Conditional Recommendation	+
13. For patients undergoing total hip arthroplasty or total knee arthroplasty, if a DOAC is not used, the panel suggests LMWH rather than unfractionated heparin (UFH).	Strong Recommendation	+++
Guidelines focused on Orthopedic Surgery: Hip Fracture Repair		
14. For patients undergoing hip fracture repair, the ASH guideline panel suggests using pharmacological prophylaxis over no pharmacological prophylaxis.	Conditional Recommendation	+
15. For patients undergoing hip fracture repair, the ASH guideline panel suggests using LMWH or UFH.	Conditional Recommendation	+
Guidelines Focused on Major General Surgery		
16. For patients undergoing major general surgery, the ASH guideline panel suggests using pharmacological prophylaxis over no pharmacological prophylaxis.	Conditional Recommendation	++
17. For patients undergoing major general surgery, the ASH guideline panel suggests using LMWH or UFH.	Conditional Recommendation	+
Guidelines Focused on Laparoscopic Cholecystectomy		
18. For patients undergoing laparoscopic cholecystectomy, the ASH guideline panel suggests against using pharmacological prophylaxis.	Conditional Recommendation	+
Guidelines Focused on Major Neurosurgical Procedures		
19. For patients undergoing major neurosurgical procedures, the ASH guideline panel suggests against using pharmacological prophylaxis.	Conditional Recommendation	+
20. For the subset of patients undergoing major neurosurgical procedures for whom pharmacological prophylaxis is used, the ASH guideline panel suggests using LMWH over UFH.	Conditional Recommendation	+
Guidelines Focused on TURP		
21. For patients undergoing transurethral resection of the prostate (TURP), the ASH guideline panel suggests against using pharmacological prophylaxis.	Conditional Recommendation	+
22. For the subset of patients undergoing TURP for whom pharmacological prophylaxis is used, the ASH guideline panel suggests using LMWH or UFH.	Conditional Recommendation	+
Guidelines Focused on Radical Prostatectomy		
23. For patients undergoing radical prostatectomy, the ASH guideline panel suggests against using pharmacological prophylaxis.	Conditional Recommendation	+
24. For patients undergoing radical prostatectomy in whom pharmacological prophylaxis is used, the ASH guideline panel suggests using LMWH or UFH.	Conditional Recommendation	+

Verbatim Guideline	Strength of Recommendation	Strength of Evidence
Guidelines Focused on Major Cardiac or Major Vascular Surgery		
25. For patients undergoing cardiac or major vascular surgery, the ASH guideline panel suggests using pharmacological prophylaxis or no pharmacological prophylaxis.	Conditional Recommendation	+
26. For patients undergoing cardiac or major vascular surgery, when pharmacological prophylaxis is used, the panel suggests using LMWH or UFH.	Conditional Recommendation	+
Guidelines Focused on Major Trauma		
27a. For patients experiencing major trauma and who are at low to moderate risk for bleeding, the ASH guideline panel suggests using pharmacological prophylaxis over no pharmacological prophylaxis.	Conditional Recommendation	+
27b. For patients experiencing major trauma and who are at high risk for bleeding, the ASH guideline panel suggests against pharmacological prophylaxis.	Conditional Recommendation	+
28. For patients experiencing major trauma in whom pharmacological prophylaxis is used, the ASH guideline panel suggests using LMWH or UFH.	Conditional Recommendation	++
Guidelines Focused on Gynecological Surgery		
29. For patients undergoing major gynecological surgery, the ASH guideline panel suggests using pharmacological prophylaxis over no pharmacological prophylaxis.	Conditional Recommendation	+
30. For patients undergoing major gynecological surgery, the ASH guideline panel suggests using LMWH or UFH.	Conditional Recommendation	+

E. European Society of Anaesthesiology: 2018

[Samama, C. M., & Afshari, A. \(2018\). European guidelines on perioperative venous thromboembolism prophylaxis. *European Journal of Anaesthesiology*, 35\(2\), 73–76. <https://doi.org/10.1097/EJA.0000000000000702>](https://doi.org/10.1097/EJA.0000000000000702)

The European Society of Anaesthesiology (ESA) provides guidance via a series of clinical practice guidelines for perioperative venous thromboembolism prophylaxis. A task force was developed with seven ESA representatives and eight representatives from other European and international societies. There are twelve distinct chapters of this guideline, each focusing on a different patient population or clinical practice. Two of these chapters were excluded from this attachment as they do not pertain to the target population for this measure (pregnancy and postpartum and day and fast track surgery chapters). The guideline is based on an update to the literature search conducted for the 2012 ACCP guidelines, and for those clinical questions that were not covered by the ACCP or other recently published guidelines with the same level of scientific robustness, separate search strategies were utilized covering citations of relevance published during the last 10 years. The primary target population varies by chapter, but in its entirety includes all surgical patients. The first update on the ESA 2018 guidelines was published in 2024 to emphasize a more rigorous methodology and implement modifications to several chapters within the 2018 guideline.

The methodology for determining strength of recommendations (**Table 16**) and strength of evidence (**Tables 17 and 18**) is based on the GRADE approach and presented below. The AGREE II tool (**Tables 19**

and 20) was additionally used to address the issue of variability and to evaluate the process of the guideline development and quality reporting. All chapters adhered to the GRADE approach, with the exception of the chapter on thoracic surgery in cancer patients, which is extracted from the Joint 2022 European Society of Thoracic Surgeons and the American Association for Thoracic Surgery guidelines. Following the methodology, a short summary of each chapter followed by key recommendations from each chapter that inform the proposed measure are included below (Sections 1.4.1 to 1.4.10). The key recommendations incorporate recommendations from the 2018 guidelines and, where applicable, updates from the 2024 guidelines.

Within each recommendation, the strength of recommendation is indicated as strong recommendation (1), or weak/conditional recommendation (2).

Table 16. ESA (2018) Strength of Recommendation Criteria (GRADE)

Recommendation Grading	Meaning	Rationale
1	Strong	The panel is highly confident of the balance between desirable and undesirable consequences.
2	Weak/Conditional	The panel is less confident of the balance between desirable and undesirable consequences

Within each recommendation, the quality of the supporting evidence is shown as high (A), moderate (B), or low/very low (C).

Table 17. ESA (2018) Strength of Evidence Criteria (GRADE)

Evidence Grading	Strength of Evidence	Rationale
A	High	The quality of the body of evidence is rated as 4+ We are very confident that the true effect lies close to that of the estimate of the effect.
B	Moderate	The quality of the body of evidence is rated as 3+ We are moderately confident in the effect estimate: The true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
C	Low	The quality of the body of evidence is rated as 2+ Our confidence in the effect estimate is limited: The true effect may be substantially different from the estimate of the effect.
	Very Low	The quality of the body of evidence is rated as 1+ We have very little confidence in the effect of the estimate: The true effect is likely to be substantially different from the estimate of the effect.

Additionally, the level of evidence also indicates the quality of the body of evidence used to inform the recommendations.

Table 18. ESA (2018) Level of Evidence Criteria (GRADE)

Study Design	Initial quality of a body of evidence	Lower if	Higher if
Randomized Trials	High	Risk of bias -1 serious -2 very serious Inconsistency -1 serious -2 very serious	Large effect +1 large +2 very large Dose response +1 Evidence of a gradient
Observational Studies	Low	Indirectness -1 serious -2 very serious Imprecision -1 serious -2 very serious Publication bias -1 likely -2 very likely	All plausible residual confounding +1 would reduce a demonstrated effect +1 would suggest a spurious effect if no effect was observed

The AGREE II tool was also utilized to assess overall guideline quality. The AGREE II tool has 23 questions within 6 domains that are rated on a scale of 1 (strongly disagree) to 7 (strongly agree). The quality of the overall guideline is then determined using this scale where 1 indicates the lowest possible quality and 7 indicates the highest possible quality.

Table 19. ESA (2018) Guideline Quality Assessment (AGREE II)

Domain	Item
Scope and Purpose	The overall objective(s) is (are) specifically described
	The health questions(s) covered by the guideline is (are) specifically described
	The population (patients, public, etc.) to whom the guideline is meant to apply is specifically described
Stakeholder Involvement	The guideline development group includes individuals from all the relevant professional groups
	The views and preferences of the target population (patients, public, etc.) have been sought
	The target users of the guideline are clearly defined
Rigor of Development	Systematic methods were used to search for evidence
	The criteria for selecting the evidence are clearly described
	The strengths and limitations of the body of evidence are clearly described
	The methods for formulating the recommendations are clearly described
	The health benefits, side effects, and risks have been considered in formulating the recommendations
	There is an explicit link between the recommendations and the supporting evidence
	The guideline has been externally reviewed by experts prior to its publication
	A procedure for updating the guideline is provided
	The recommendations are specific and unambiguous

Domain	Item
Clarity of Presentation	The different options for management of the condition or health issue are clearly presented
	Key recommendations are easily identifiable
Applicability	The guideline describes facilitators and barriers to its application
	The guideline provides advice and/or tools on how the recommendations can be put into practice
	The potential resource implications of applying the recommendations have been considered
	The guideline presents monitoring and/or auditing criteria
Editorial Independence	The views of the funding body have not influenced the content of the guideline
	Competing interests of guideline development group members have been recorded and addressed

1. ESA: Surgery in the obese patient

Venclauskas, L., Maleckas, A., & Arcelus, J. I. (2018). European guidelines on perioperative venous thromboembolism prophylaxis: Surgery in the obese patient. *European Journal of Anaesthesiology*, 35(2), 147–153. <https://doi.org/10.1097/EJA.0000000000000703>

Key guideline recommendations for obese patients undergoing surgery are included in **Table 20** below.

Table 20. ESA (2018) Guidelines focused on surgery in the obese patient

Verbatim Guideline	Strength of Recommendation	Strength of Evidence
Bariatric surgery		
Laparoscopic bariatric procedures for obese patients have a lower risk of VTE than open procedures.	N/A	N/A
We suggest using only anticoagulants or IPC for obese patients with a low risk of VTE during and after bariatric procedures.	2	C
We recommend using anticoagulants and IPC together for obese patients with a high risk of VTE (age >55 years, BMI >55 kgm ⁻² , history of VTE, venous disease, sleep apnea, hypercoagulability or pulmonary hypertension) during and after bariatric procedures.	1	C
We recommend the use of LMWH over LDUH.	1	C
We suggest a dose of LMWH (3000 to 4000 anti-Xa IU 12 h ⁻¹ subcutaneously) depending on BMI as acceptable for obese patients with a lower risk of VTE.	2	B
We suggest the use of a higher dose of LMWH (4000 to 6000 anti-Xa IU 12 h ⁻¹ subcutaneously) as acceptable for obese patients with a higher risk of VTE.	2	B
We recommend extended prophylaxis for patients with a high risk of VTE during the postdischarge period for 10 to 15 days.	1	C
Nonbariatric surgery		
We suggest that in surgery with an indication for VTE prophylaxis, a higher prophylactic dose of LMWH (3000 to 4000 anti-Xa IU 12 h ⁻¹ subcutaneously) should be considered for obese patients with a BMI more than 40 kgm ⁻² undergoing nonbariatric surgery.	2	C
For additional and general recommendations, we refer to the section on 'VTE prophylaxis for obese patients in bariatric surgery'.	N/A	N/A

4.1.1. ESA: First update of surgery in obese patient

[Samama, C. M., Afshari, A., Lars Grønlykke, Madsen, M. H., Wiberg, S., & Romero, C. S. \(2024\). European guidelines on peri-operative venous thromboembolism prophylaxis: first update. *European Journal of Anaesthesiology*, 41\(8\), 561–569. <https://doi.org/10.1097/eja.0000000000002025>](#)

Updated guideline recommendations for obese patients undergoing surgery are included in **Table 21** below.

Table 21. ESA (2024) First update of surgery in obese patient guidelines

Verbatim Guideline	Strength of Recommendation	Strength of Evidence
Bariatric surgery		
We recommend VTE prophylaxis with LMWH, UFH or fondaparinux over no prophylaxis in patients with high VTE risk and low risk for bleeding.	1	B
We suggest VTE prophylaxis with LMWH over UFH or DOAC (rivaroxaban or apixaban).	2	C
We suggest prophylaxis with higher doses of LMWH, UFH or fondaparinux over standard doses, particularly in patients with BMI greater than 40 or weight greater than 150 kg (Grade 2B). We suggest against routine monitoring of anti-Xa levels in patients receiving LMWH, UFH or fondaparinux (Grade 2C).	2 2	B C
We suggest mechanical methods of prophylaxis over no prophylaxis in patients with high VTE risk and high risk of bleeding.	2	C
We suggest combined prophylaxis with LMWH and mechanical methods (intermittent pneumatic compression) over mechanical methods alone.	2	A
We recommend extending pharmacological prophylaxis with LMWH, UFH or fondaparinux for at least 10 days over prophylaxis limited to hospital stay in patients with high VTE risk.	1	C
Nonbariatric surgery		
We suggest higher doses of LMWH in obese patients (BMI >40 kg m ⁻²) at high risk of VTE and low risk for bleeding undergoing non-bariatric major surgery.	2	C

2. ESA: Surgery in the elderly

[Kozek-Langenecker, S., Fenger-Eriksen, C., Thienpont, E., & Barauskas, G. \(2018\). European guidelines on perioperative venous thromboembolism prophylaxis: Surgery in the elderly. *European Journal of Anaesthesiology*, 35\(2\), 116-122. <https://doi.org/10.1097/EJA.0000000000000705>](#)

Key guideline recommendations for elderly patients undergoing surgery are included in **Table 22** below.

Table 22. ESA (2018) Guidelines focused on elderly patients undergoing surgery

Verbatim Guideline	Strength of Recommendation	Strength of Evidence
Surgery in the elderly		
Age over 70 years is a risk factor for postoperative VTE.	N/A	B
In elderly patients, we suggest identification of comorbidities increasing the risk for VTE (e.g. congestive heart failure, pulmonary circulation disorder, renal failure, lymphoma, metastatic cancer, obesity, arthritis, post-menopausal estrogen therapy) and correction if present (e.g. anemia, coagulopathy).	2	C
We suggest against bilateral knee replacement in elderly and frail patients.	2	C
We suggest timing and dosing of pharmacological VTE prophylaxis as in the non-aged population.	2	C
In elderly patients with renal failure, low-dose unfractionated heparin may be used or weight-adjusted dosing of LMWH.	2	C
In the elderly, we recommend careful prescription of postoperative VTE prophylaxis and early postoperative mobilisation.	1	C
We recommend multi-faceted interventions for VTE prophylaxis in elderly and frail patients, including pneumatic compression devices, LMWH (and/or direct oral anti-coagulants after knee or hip replacement).	1	C

3. ESA: Intensive care

[Duranteau, J., Taccone, F. S., Verhamme, P., & Ageno, W. \(2018\). European guidelines on perioperative venous thromboembolism prophylaxis: Intensive care. *European Journal of Anaesthesiology*, 35\(2\), 142–146. <https://doi.org/10.1097/EJA.0000000000000707>.](https://doi.org/10.1097/EJA.0000000000000707)

Key guideline recommendations for intensive care patients undergoing surgery are included in **Table 23** below.

23. ESA (2018) Guidelines focused on intensive care

Verbatim Guideline	Strength of Recommendation	Strength of Evidence
Intensive Care		
In critically ill patients, we recommend against the routine use of compression DUS screening of DVT.	1	B
We recommend an institution-wide protocol for the prevention of VTE that includes the use of mechanical thromboprophylaxis, that is IPC.	1	B
For critically ill patients, we recommend using thromboprophylaxis with LMWH or LDUH and	1	B
we recommend LMWH over LDUH. (principal)	1	B
For VTE prophylaxis in critically ill patients with severe renal insufficiency, we suggest the use of LDUH,	2	C
• dalteparin or	2	B
• reduced doses of enoxaparin.	2	C
Monitoring of anti-Xa activity may be considered when LMWH is used in these patients.	2	C

Verbatim Guideline	Strength of Recommendation	Strength of Evidence
The use of pharmacological prophylaxis in patients with severe liver dysfunction should be carefully balanced against the risk of bleeding. If a treatment is administered, the use of LDUH or LMWH is suggested.	2	C
We suggest no prophylaxis or the use of IPC in patients with a platelet count less than 50000mm^{-3} and a high risk of bleeding.	2	C
For critically ill patients, we recommend against the routine use of IVC filters (IVCFs) for the primary prevention of VTE.	1	C
We suggest the use of IVCF in patients who can neither receive pharmacological prophylaxis nor IPC.	2	C
In critically ill patients with a suspected or confirmed diagnosis of heparin-induced thrombocytopenia (HIT), all forms of heparin must be discontinued.	1	B
In these patients, immediate anticoagulation with a nonheparin anticoagulant rather than discontinuation of heparin alone is recommended, unless there is a strong contraindication to anticoagulation.	1	C
The selection of nonheparin anticoagulants should be based on patient characteristics: argatroban is the first choice in patients with renal insufficiency, and bivalirudin in patients undergoing or after cardiac surgery.	2	C
The use of fondaparinux can also be considered in these patients.	2	C

a. ESA: First update of intensive care

[Samama, C. M., Afshari, A., Lars Grønlykke, Madsen, M. H., Wiberg, S., & Romero, C. S. \(2024\). European guidelines on peri-operative venous thromboembolism prophylaxis: first update. European Journal of Anaesthesiology, 41\(8\), 561–569. https://doi.org/10.1097/eja.0000000000002025](https://doi.org/10.1097/eja.0000000000002025)

Updated guideline recommendations for intensive care patients are included in **Table 24** below.

Table 24. ESA (2024) First update of intensive care guideline

Verbatim Guideline	Strength of Recommendation	Strength of Evidence
Intensive care		
We recommend the use of mechanical prophylaxis over no prophylaxis in surgical critically ill patients with contraindications to pharmacological thromboprophylaxis.	1	C
We suggest the use of mechanical prophylaxis over no prophylaxis in medical critically ill patients with contraindications to pharmacological thromboprophylaxis.	2	B
We recommend the use of pharmacological prophylaxis over mechanical prophylaxis in ICU patients without contraindications to pharmacological thromboprophylaxis.	1	C
We recommend pharmacological thromboprophylaxis with LMWH over pharmacological thromboprophylaxis with UFH to prevent VTE in ICU patients.	1	B
We suggest using pharmacological thromboprophylaxis with UFH or dalteparin over other LMWH in ICU patients with severe renal dysfunction.	2	C

Verbatim Guideline	Strength of Recommendation	Strength of Evidence
We recommend pharmacological thromboprophylaxis with argatroban as first-line option in ICU patients with heparin-induced thrombocytopenia.	1	C
We suggest using IPC over GCS in ICU patients receiving mechanical thromboprophylaxis.	2	B
We suggest using combined mechanical and pharmacological thromboprophylaxis in selected patients at very high risk for VTE, particularly critically ill surgical patients.	2	B
We suggest the use of IPC rather than GCS in addition to pharmacological thromboprophylaxis in selected critically ill patients at very high risk.	2	B
We suggest using an intermediate dose of LMWH over a low dose in ICU patients receiving pharmacological thromboprophylaxis following an individualized risk/benefit analysis.	2	B
We suggest not to apply routine monitoring of aFXa levels in patients admitted to the ICU receiving LMWH as thromboprophylaxis.	2	C
We suggest aFXa levels monitoring in selected cases of patients admitted to the ICU receiving LMWH as thromboprophylaxis, that is, those with renal impairment or morbidly obese patients.	2	C
We suggest using an aFXa level dose-adjustment protocol for ICU patients with renal impairment or morbid obesity receiving pharmacological thromboprophylaxis	2	C

4. ESA: Cardiovascular and thoracic surgery

Ahmed, A. B., Koster, A., Lance, M., & Faraoni, D. (2018). European guidelines on perioperative venous thromboembolism prophylaxis: Cardiovascular and thoracic surgery. *European Journal of Anaesthesiology*, 35(2), 84–89. <https://doi.org/10.1097/EJA.0000000000000708>

Key guideline recommendations for patients undergoing cardiovascular and thoracic surgery are included in **Table 25** below.

Table 25. ESA (2018) Guidelines focused on cardiovascular and thoracic surgery

Verbatim Guideline	Strength of Recommendation	Strength of Evidence
Cardiac and Vascular Surgery		
In the absence of risk factors, we suggest considering the risk of VTE as moderate in patients undergoing coronary artery by-pass graft (CABG) and bioprosthetic aortic valve implantation surgery.	2	C
If the risk of bleeding is to be considered high, we suggest the use of mechanical prophylaxis using IPC.	2	C
The presence of one or more risk factors [age above 70 years, transfusion of more than four units of RBC concentrate/fresh frozen plasma/cryoprecipitate/fibrinogen concentrate, mechanical ventilation more than 24 h, postoperative complication (e.g. acute kidney injury, infection/sepsis, neurological complication)] should place the cardiac population at high risk for VTE. In this context, we suggest the use of pharmacological prophylaxis as soon as satisfactory haemostasis has been achieved, in addition to IPC.	2	C

Verbatim Guideline	Strength of Recommendation	Strength of Evidence
Patients undergoing other valve surgery and those with atrial fibrillation should be considered a specific entity at high risk of VTE, as they will mostly require postoperative therapeutic medical 'bridging' prior to long-term anti-coagulation.	N/A	N/A
Patients undergoing peripheral vascular surgery are considered to have a low risk of VTE and low risk of bleeding. Stringent medical prophylaxis appears to reduce the event rate significantly. In this population, we suggest medical therapy.	2	C
In patients undergoing AAA repair, particularly when an open surgical approach is used, the risk of VTE is higher with a high bleeding risk. These patients should be considered as having a moderate risk. Patients with additional risk factors including BMI at least 30 kgm ⁻² , preoperative dyspnoea, chronic steroid usage, ruptured aneurysm, open surgery, operative duration at least 5 h, transfusion of at least 5 U, postoperative mechanical ventilation more than 48 h, postoperative complication (acute kidney injury, infection/sepsis) and re-operation, should be considered as moderate-to-high risk. In this context, we suggest the use of pharmacological prophylaxis as soon as satisfactory haemostasis is achieved.	2	C
We suggest that low-dose aspirin could be used to decrease the incidence of VTE in cardiac and vascular patients but should not be considered as the sole agent in high-risk patients.	2	C
UFH is associated with the highest risk of developing the pro-thrombotic condition of HIT. Therefore, in an attempt to minimise the risk of HIT, we suggest that UFH should be used as briefly as possible and replaced by LMWH as soon as the bleeding risk decreases.	2	C
In patients with severely impaired renal function (creatinine clearance <30 ml min ⁻¹) and a high risk of haemorrhagic complications, we suggest close monitoring of the administration of therapeutic UFH and LMWH and adaptation of the dosage.	2	C
Thoracic surgery		
Based on the current literature, patients undergoing thoracic surgery in the absence of cancer could be considered at low risk of VTE. However, as the vast majority of patients undergoing thoracic surgery have a diagnosis of primary or metastatic cancer, they should be considered at high risk for VTE with an equally high bleeding risk.	N/A	N/A
In the absence of evidence regarding patients undergoing minimally invasive procedure, the same risk stratification should be applied as described above.	N/A	N/A
In low-risk patients, we suggest the use of mechanical prophylaxis using IPC.	2	C
In high-risk patients, we suggest the use of pharmacological prophylaxis in addition to IPC.	2	B

a. ESA: First update of cardiovascular and thoracic surgery

[Samama, C. M., Afshari, A., Lars Grønlykke, Madsen, M. H., Wiberg, S., & Romero, C. S. \(2024\). European guidelines on peri-operative venous thromboembolism prophylaxis: first update. European Journal of Anaesthesiology, 41\(8\), 561–569. https://doi.org/10.1097/eja.0000000000002025](https://doi.org/10.1097/eja.0000000000002025)

Updated guideline recommendations for patients undergoing cardiovascular and thoracic surgery are included in **Table 26** below.

Table 26. ESA (2024) First update of cardiovascular and thoracic surgery

Verbatim Guideline	Strength of Recommendation	Strength of Evidence
Cardiac surgery		
We recommend early initiation (between 6 and 24 h) postsurgery of pharmacological VTE prophylaxis in the absence of significant bleeding risk	1	C
Vascular surgery		
We suggest early initiation (<24 h) of pharmacological VTE prophylaxis should be considered in patients with an increased procedural risk, such as open TAAA, AAA repair and TEVAR, and in patients with increased VTE risk factors (Grade 2C). (91% Agreement)	2	C
We suggest LMWH should be considered as a first-line therapy over UFH in view of the increased risk of HIT in cardiac and vascular surgery	2	B

5. ESA: Neurosurgery

[Faraoni, D., Comes, R. F., Geerts, W., & Wiles, M. D. \(2018\). European guidelines on perioperative venous thromboembolism prophylaxis: Neurosurgery. *European Journal of Anaesthesiology*, 35\(2\), 90–95. <https://doi.org/10.1097/EJA.0000000000000710>](https://doi.org/10.1097/EJA.0000000000000710)

Key guideline recommendations for patients undergoing neurosurgery are included in **Table 27** below.

Table 27. ESA (2018) Guidelines that support neurosurgery

Verbatim Guideline	Strength of Recommendation	Strength of Evidence
Patients undergoing craniotomy		
We recommend that if IPC is used, it should be applied before the surgical procedure or on admission, used continuously (except when the patient is actually walking) and monitored frequently to optimise compliance.	1	C
If LMWH or low-dose unfractionated heparin (LDUH) are used, we suggest delayed initiation until at least 24 h after surgery.	2	C
In craniotomy patients at particularly high risk of VTE (additional risk factors including malignancy, motor impairment, prolonged operative time), we suggest considering the initiation of mechanical thromboprophylaxis with IPC preoperatively with addition of LMWH or LDUH postoperatively when the risk of bleeding is presumed to be decreased.	2	C
We suggest that thromboprophylaxis should be continued until discharge.	2	C
Patients with non-traumatic intracranial haemorrhage		
We suggest thromboprophylaxis with IPC.	2	C
We recommend the application of IPC on admission, used continuously (except when the patient is actually walking) and monitored frequently to optimise compliance.	1	C
For patients who have had non-traumatic ICH, we suggest giving consideration to commencement of LMWH or LDUH when the risk of bleeding is presumed to be low.	2	C
We suggest continuing thromboprophylaxis until full mobilisation of the patient.	2	C

Verbatim Guideline	Strength of Recommendation	Strength of Evidence
Spinal surgery		
For patients with no additional risk factors, we suggest no active thromboprophylaxis intervention apart from early mobilisation.	2	C
For patients undergoing spinal surgery with additional risk factors (limited mobility, active cancer, complex surgical procedure), we recommend starting mechanical thromboprophylaxis with IPC preoperatively	1	C
and we suggest the addition of LMWH postoperatively when the risk of bleeding is presumed to be decreased.	2	C
If LMWH is used, we recommend delayed initiation at least until 24 h after surgery and only when haemostasis occurs.	1	C
We suggest continued thromboprophylaxis until discharge in high-risk patients.	2	C
In patients with spinal cord injury or significant motor impairment, we suggest extending the thromboprophylaxis into the rehabilitation phase of hospital care.	2	C

a. ESA: First update of neurosurgery guidelines

[Samama, C. M., Afshari, A., Lars Grønlykke, Madsen, M. H., Wiberg, S., & Romero, C. S. \(2024\). European guidelines on peri-operative venous thromboembolism prophylaxis: first update. *European Journal of Anaesthesiology*, 41\(8\), 561–569. <https://doi.org/10.1097/eja.0000000000002025>](#)

Updated guideline recommendations for patients undergoing neurosurgery are included in **Table 28** below.

Table 28. ESA (2024) First update of neurosurgery guidelines

Verbatim Guideline	Strength of Recommendation	Strength of Evidence
Patients undergoing neurosurgery		
We recommend the peri-operative use of IPC from the beginning of surgery, in patients undergoing moderate-to-high complexity spine procedures, craniotomy, and in patients at risk of bleeding complications.	1	C
In patients at high thrombotic risk, a combination of mechanical and pharmacological prophylaxis is suggested, starting LMWH or UFH in the first 24 h postoperatively and no later than 72 h, provided that the risk of bleeding is ruled out and haemostasis is correct.	2	B
After nontraumatic intracerebral haemorrhage, provided the volume of intracranial blood is not expanding and haemostasis is correct, we suggest starting pharmacological prophylaxis 2 to 4 days after the bleeding.	2	C

6. ESA: Chronic treatments with anti-platelet agents

[Llau, J. v., Kamphuisen, P., & Albaladejo, P. \(2018\). European guidelines on perioperative venous thromboembolism prophylaxis: Chronic treatments with antiplatelet agents. *European Journal of Anaesthesiology*, 35\(2\), 139–141. <https://doi.org/10.1097/EJA.0000000000000716>](#)

Key guideline recommendations for patients with chronic treatments with antiplatelet agents undergoing surgery are included in **Table 29** below.

Table 29. ESA (2018) Guidelines that support chronic treatment with anti-platelet agents

Verbatim Guideline	Strength of Recommendation	Strength of Evidence
Chronic treatments with antiplatelet agents		
In patients receiving APA chronically, we recommend thromboprophylaxis in cases of moderate/high VTE risk, whilst assessing the risk of perioperative bleeding.	1	B
In patients receiving APA chronically, if the risk of VTE outweighs the risk of bleeding, we suggest pharmacological (anticoagulant) prophylaxis (LMWH, direct oral anticoagulants, fondaparinux depending on the indication).	2	C
In patients treated with dual antiplatelet therapy (recent coronary stent implantation) undergoing a procedure associated with a high risk of VTE, we suggest resuming APA shortly after the procedure, prioritising over pharmacological VTE prevention.	2	C
If an anticoagulant is associated with an APA, we suggest the administration of the lowest approved dose.	2	C
If the risk of bleeding of a combination of an APA and an anticoagulant outweighs the risk of VTE, we suggest considering intermittent pneumatic compression over anticoagulant prophylaxis, without discontinuing the APA.	2	C
Patients in whom neuraxial anaesthesia is planned, although the administration of aspirin alone does not increase the incidence of spinal haematoma, a higher rate of complications could appear if pharmacological thromboprophylaxis is administered concurrently. In these cases, postoperative thromboprophylaxis initiation should be suggested.	2	C
After surgery, the first dose of aspirin should be given as soon as possible, once haemostasis is considered adequate (in general, the day after surgery).	2	B
In the case of clopidogrel, the main recommendation is to give the drug without any loading dose between 24 and 48 h after surgery.	2	C
Monitoring for clinical signs of bleeding or unexplained anaemia is recommended during concomitant administration of an anticoagulant for thromboprophylaxis (LMWH, unfractionated heparin, fondaparinux, warfarin or any other) and an APA throughout the postoperative period.	1	C
Nonsteroidal anti-inflammatory drugs should be avoided in patients treated with APA.	2	C

7. ESA: Patients with pre-existing coagulation disorders and after severe perioperative bleeding

Ahmed, A., Kozek-Langenecker, S., Mullier, F., Pavord, S., & Hermans, C. (2018). European guidelines on perioperative venous thromboembolism prophylaxis: Patients with preexisting coagulation disorders and after severe perioperative bleeding. *European Journal of Anaesthesiology*, 35(2), 96–107. <https://doi.org/10.1097/EJA.0000000000000725>

Key guideline recommendations for patients with pre-existing coagulation disorders or severe perioperative bleeding undergoing surgery are included in **Table 30** below.

Table 30. ESA (2018) Guidelines that support pre-existing coagulation disorders and after severe perioperative bleeding

Verbatim Guideline	Strength of Recommendation	Strength of Evidence
Patients with preexisting coagulation disorders and after severe perioperative bleeding		
In patients with inherited bleeding disorders undergoing surgery, we recommend assessment of individual risk of VTE, taking into account the nature of the surgery and anaesthetic, type and severity of haemophilia, age, BMI, history of thrombosis and the presence of malignancy and other high-risk comorbidities. VTE risk should be balanced against the increased bleeding risk associated with anticoagulant use in patients with haemophilia.	1	C
For the perioperative management of patients with inherited bleeding disorders, we suggest liaison with haematologists to guide treatment.	2	C
We suggest that, if factor replacement therapy is required for perioperative haemostasis, excess use should be avoided and factor levels carefully monitored.	2	C
In patients with inherited bleeding disorders undergoing major surgery, we suggest mechanical thromboprophylaxis,	2	C
especially in factor VII deficiency.	1	C
In patients with inherited bleeding disorders undergoing major surgery, we recommend against routine postoperative use of pharmacological thromboprophylaxis, especially for patients with haemophilia A or B.	1	B
If the balance of risks favours pharmacological thromboprophylaxis, we suggest that low molecular weight heparin should be administered as for patients without haemophilia undergoing the same surgery, and factor VIII/IX levels should be maintained at 0.6 to 1.0 IU ml ⁻¹ .	2	C
In haemophilia patients with inhibitors, we suggest against the use of pharmacological thromboprophylaxis.	2	C
We recommend that patients with haemophilia who require perioperative factor concentrate are monitored with daily factor levels for the first 3 to 5 days to guide treatment and avoid wide fluctuations in factor levels.	1	C
We recommend that, for major surgery, factor levels of 0.8 to 1.0 IU ml ⁻¹ should be aimed for and not be allowed to fall below 0.5 IU ml ⁻¹ or rise above 1.5 IU ml ⁻¹ in the postoperative period.	1	B
In general, we recommend against routine thrombophilia screening for patients with haemophilia undergoing surgery.	1	C
We recommend that patients treated with factor concentrate in the perioperative and postoperative period should have both factor VIII and von Willebrand factor levels monitored to avoid an excessive rise in factor levels and accumulation of factor VIII. We recommend checking levels 12-hourly for the first 24 h after major surgery and daily thereafter.	1	B

Verbatim Guideline	Strength of Recommendation	Strength of Evidence
We recommend that the use of factor concentrate with the highest ratio between vWF:RCo and factor VIII:C should be considered, to minimise risk of factor VIII accumulation.	1	C
We recommend that the use of factor XI concentrate is kept to a minimum to avoid increasing the thrombotic risk.	1	C
We recommend that all patients receiving factor XI concentrate have mechanical thromboprophylactic measures and	1	C
suggest that they are considered for pharmacological thromboprophylaxis.	2	C
We suggest that tranexamic acid alone is useful for patients with mild factor XI deficiency but should not be given as haemostatic prophylaxis to patients receiving factor XI concentrate.	2	C
In patients with factor VII deficiency, we suggest that they are considered for pharmacological thromboprophylaxis if they have associated risk factors.	2	C
We suggest that for major surgery, fibrinogen levels should be closely monitored aiming to maintain levels 1 to 1.5 g l ⁻¹ for 10 to 14 days postoperatively.	2	C
Perioperative management may require simultaneous use of fibrinogen concentrate and low molecular weight heparin, depending on the clinical phenotype.	2	C
Glomerular filtration rate (eGFR) should be assessed before any direct oral anticoagulant (DOAC) is initiated, and at least once yearly or more frequently as needed, such as postoperatively before the resumption of therapeutic DOAC administration, when it is suspected that renal function could decline or deteriorate.	1	C
The use of the Cockcroft–Gault method to evaluate renal function of patients with DOAC is suggested.	2	C
We suggest that anti-Xa levels may be measured in cases of severe bleeding in patients with renal impairment receiving low molecular weight heparin.	1	C
Clinical exclusion of signs of postoperative bleeding is more relevant for postponing the commencement of VTE prophylaxis rather than relying on any specific laboratory tests.	2	C
We suggest against the systematic use of standard laboratory tests to exclude persistence of acquired perioperative coagulopathy before VTE prophylaxis.	2	2
Reduced dosages of low molecular weight heparins may be used relatively safely during transient severe (<50 x 10 ⁹ l ⁻¹) thrombocytopaenia.	2	C
Monitoring anti-Xa level may be used to adjust the doses of low molecular weight heparin in patients with moderate or severe thrombocytopaenia.	2	C
In cancer patients or patients with haematological disorders and mild thrombocytopaenia (platelet count >80 x 10 ⁹ l ⁻¹), pharmacological prophylaxis may be used; if the platelet count is below 80 x 10 ⁹ l ⁻¹ , pharmacological prophylaxis may only be considered on a case-by-case basis and careful monitoring is recommended.	2	C
Patients with a high thrombotic risk (e.g. mechanical heart valves) may benefit from resuming warfarin therapy despite ongoing risk for recurrent gastrointestinal bleeding.	2	C

Verbatim Guideline	Strength of Recommendation	Strength of Evidence
Patients with a HAS-BLED score lower than the CHADS ₂ score may benefit from earlier resumption.	2	C
The delay between major gastrointestinal bleeding and warfarin resumption should be at least 7 days.	2	C
We suggest international normalised ratio (INR) at the time of bleeding may also be considered to resume anticoagulation.	2	C
We suggest resuming anticoagulant therapy 12 h after removal of drains in cases of cardiac tamponade.	N/A	C
When the risk of bleeding diminishes, pharmacological VTE prophylaxis may be initiated depending on thrombotic risk factors.	2	C
We recommend that when the risk of postoperative bleeding is higher than the risk of thromboembolic event, full-dose anticoagulation may be resumed 48 or 72 h after the procedure.	2	B
For patients at a high risk of thromboembolism and with a high bleeding risk after surgery, we consider that administering a reduced dose of DOAC on the evening after surgery and on the following day (first postoperative day) after surgery is good practice.	2	B

8. ESA: Inferior vena cava filters

Comes, R. F., Mismetti, P., & Afshari, A. (2018). European guidelines on perioperative venous thromboembolism prophylaxis: Inferior vena cava filters. *European Journal of Anaesthesiology*, 35(2), 108–111. <https://doi.org/10.1097/EJA.0000000000000730>

Key guideline recommendations for venous thromboembolism prophylaxis using inferior vena cava filters in patients undergoing surgery are included in **Table 31** below.

Table 31. ESA (2018) Guidelines that support inferior vena cava filters

Verbatim Guideline	Strength of Recommendation	Strength of Evidence
Inferior vena cava filters		
There is currently no clear evidence on the efficacy and safety of IVCs in patients with a contra-indication to pharmacological and mechanical thromboprophylaxis undergoing high thrombotic risk surgery or procedures.	N/A	B
IVCF-associated complications often seem to outweigh any potential benefit.	N/A	B
We suggest considering temporary IVCF placement in patients at high VTE risk when pharmacological and mechanical thromboprophylaxis are fully contraindicated.	2	C
We suggest considering temporary IVCF placement in patients with documented recent DVT, and with an absolute contra-indication for full anticoagulation and planned non-deferrable major surgery.	2	C
We suggest not systematically using IVCs to prevent pulmonary embolism in the perioperative setting.	2	B

9. ESA. Nonambulatory orthopaedic surgery

Key guideline recommendations for nonambulatory orthopedic surgery patients are included in **Table 32** below.

Table 32. ESA (2024) Guidelines that support nonambulatory orthopaedic surgery

Verbatim Guideline	Strength of Recommendation	Strength of Evidence
Nonambulatory orthopaedic surgery: preoperative period		
We suggest routine patient-specific over population-based preoperative evaluation of the risk of VTE and bleeding according to the type of procedure and the planned postoperative course (fast-track or standard postoperative procedure).	2	B
Nonambulatory orthopaedic surgery: postoperative period		
We recommend routine fast-track procedures including early ambulation and joint mobilisation over timing of procedures based on convenience.	1	B
Low VTE risk surgery: no patient-related risk factor: We suggest no pharmacological VTE prophylaxis for procedures with low VTE risk for a patient without high personal risk of VTE.	2	B
Additional patient-related risk factor for VTE and no high risk of bleeding: We suggest pharmacological VTE prophylaxis with either LMWH or DOACs over no VTE prophylaxis for procedures with low VTE risk for a patient with high personal risk of VTE. We are unable to propose a recommendation in favour or against the use of aspirin.	2	B
Additional patient-related risk factor for VTE with high risk of bleeding: We suggest mechanical prophylaxis over no VTE prophylaxis for procedures with low VTE risk for a patient with high personal risk of VTE.	2	C
High VTE risk surgery and no high risk of bleeding: We suggest VTE prophylaxis with either LMWH or DOACs over no VTE prophylaxis for procedures with high VTE risk without high risk of bleeding (Grade 2B). We are unable to propose a recommendation in favour or against the use of aspirin.	2	B
High VTE risk surgery and high risk of bleeding: We suggest mechanical VTE prophylaxis over pharmacological prophylaxis for procedures with high VTE risk with high risk of bleeding.	2	C
We recommend pharmacological VTE prophylaxis over no prophylaxis after THA, TKA and hip fractures.	1	A
We recommend pharmacological VTE prophylaxis with either LMWH or DOACs over no prophylaxis after fast-track THA, TKA or hip fracture.	1	B
We recommend pharmacological VTE prophylaxis with aspirin over no prophylaxis after fast-track THA and TKA.	1	C
We recommend pharmacological VTE prophylaxis with either LMWH or DOACs over no prophylaxis after THA, TKA and hip fractures.	1	A
We recommend pharmacological VTE prophylaxis with LMWH (Grade 1B), DOACs (Grade 1B) or aspirin (Grade 1C) over no prophylaxis after fast-track THA or TKA.	1 1	B C

F. American Society of Clinical Oncology: 2023 Guideline Update

[Key, N. S., Khorana, A. A., Kuderer, N. M., Bohlke, K., Lee, A. Y. Y., Arcelus, J. I., Wong, S. L., Balaban, E. P., Flowers, C. R., Gates, L. E., Kakkar, A. K., Tempero, M. A., Gupta, S., Lyman, G. H., & Falanga, A. \(2023\). Venous Thromboembolism Prophylaxis and Treatment in Patients With Cancer: ASCO Guideline Update. *Journal of clinical oncology: official journal of the American Society of Clinical Oncology*, 41\(16\), 3063–3071. <https://doi.org/10.1200/JCO.23.00294>](#)

The American Society of Clinical Oncology (ASCO) provide guidance via clinical practice recommendations for the prevention and treatment of VTE in patients with cancer. This guideline is based on a review of clinical trials and an updated systematic review around perioperative thromboprophylaxis and treatment of VTE. The outcomes assessed include VTE occurrence after surgery for cancer patients.

The methodology for determining strength of recommendations and strength of evidence (**Table 33**) were created using the Guidelines Into Decision Support methodology and reviewed for guideline implementability.

Within each recommendation, the strength of recommendation is indicated as either a (1) strong, (2) moderate, or (3) weak recommendation.

Key guideline recommendations that support the measure are included in **Table 34** below.

Table 33. ASCO (2023) Strength of Recommendation Criteria

Term	Definitions
Quality of evidence	
High	High confidence that the available evidence reflects the true magnitude and direction of the net effect (e.g., balance of benefits versus harms) and further research is very unlikely to change either the magnitude or direction of this net effect.
Intermediate	Intermediate confidence that the available evidence reflects the true magnitude and direction of the net effect. Further research is unlikely to alter the direction of the net effect; however, it might alter the magnitude of the net effect.
Low	Low confidence that the available evidence reflects the true magnitude and direction of the net effect. Further research may change the magnitude and/or direction of this net effect.
Insufficient	Evidence is insufficient to discern the true magnitude and direction of the net effect. Further research may better inform the topic. Reliance on consensus opinion of experts may be reasonable to provide guidance on the topic until better evidence is available.
Strength of recommendation	
Strong	There is high confidence that the recommendation reflects best practice. This is based on: (a) strong evidence for a true net effect (e.g., benefits exceed harms); (b) consistent results, with no or minor exceptions; (c) minor or no concerns about study quality; and/or (d) the extent of panelists' agreement. Other compelling considerations (discussed in the guideline's literature review and analyses) may also warrant a strong recommendation.

Term	Definitions
Moderate	There is moderate confidence that the recommendation reflects best practice. This is based on: (a) good evidence for a true net effect (e.g., benefits exceed harms); (b) consistent results with minor and/or few exceptions; (c) minor and/or few concerns about study quality; and/or (d) the extent of panelists' agreement. Other compelling considerations (discussed in the guideline's literature review and analyses) may also warrant a moderate recommendation.
Weak	There is some confidence that the recommendation offers the best current guidance for practice. This is based on: (a) limited evidence for a true net effect (e.g., benefits exceed harms); (b) consistent results, but with important exceptions; (c) concerns about study quality; and/or (d) the extent of panelists' agreement. Other considerations (discussed in the guideline's literature review and analyses) may also warrant a weak recommendation.

Table 34. ASCO (2023) Guidelines that Support the Measure

Verbatim Guideline	Strength of Recommendation	Evidence Quality
Guidelines focused on cancer patients		
1.1. Hospitalized patients who have active malignancy and acute medical illness or reduced mobility should be offered pharmacologic thromboprophylaxis in the absence of bleeding or other contraindications	Moderate	Intermediate
1.2. Hospitalized patients who have active malignancy without additional risk factors may be offered pharmacologic thromboprophylaxis in the absence of bleeding or other contraindications	Moderate	Low
1.3 Routine pharmacologic thromboprophylaxis should not be offered to patients admitted for the sole purpose of minor procedures or chemotherapy infusion nor to patients undergoing stem-cell/bone marrow transplantation	Moderate	Insufficient
3.1. All patients with malignant disease undergoing major surgical intervention should be offered pharmacologic thromboprophylaxis with either UFH or LMWH unless contraindicated because of active bleeding, high bleeding risk, or other contraindications	Strong	High
3.2. Prophylaxis with UFH or LMWH should be commenced preoperatively	Moderate	Intermediate
3.3. 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	Strong	Intermediate
3.4. A combined regimen of pharmacologic and mechanical prophylaxis may improve efficacy, especially in the highest-risk patients	Moderate	Intermediate
3.5. Pharmacologic thromboprophylaxis for patients undergoing major surgery for cancer should be continued for at least 7-10 days	Moderate to Strong	High

Verbatim Guideline	Strength of Recommendation	Evidence Quality
3.6. Extended pharmacologic thromboprophylaxis for up to 4 weeks postoperatively should be offered to patients 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	Moderate to Strong	High
3.7 (Updated) Patients who are candidates for extended pharmacologic thromboprophylaxis after surgery may be offered prophylactic doses of LMWH	Strong	High
Alternatively, patients may be offered prophylactic doses of rivaroxaban or apixaban after an initial period of LMWH or UFH T	Weak	Low
4.1. (Updated) Initial anticoagulation may involve LMWH, UFH, fondaparinux, rivaroxaban, or apixaban. For patients initiating treatment with parenteral anticoagulation, LMWH is preferred over UFH for the initial 5-10 days of anticoagulation for the patient with cancer with newly diagnosed VTE who does not have severe renal impairment (defined as creatinine clearance,30 mL/min)	Strong	High
4.2. (Updated) For long-term anticoagulation, LMWH, edoxaban, rivaroxaban, or apixaban for at least 6 months are preferred over VKAs because of improved efficacy. VKAs may be used if LMWH or direct factor Xa inhibitors are not accessible. There is reduction in recurrent thrombosis but an increase in clinically relevant nonmajor bleeding risk with direct factor Xa inhibitors compared with LMWH. Caution with direct factor Xa inhibitors is warranted in GI and genitourinary malignancies and other settings with high risk for mucosal bleeding. Drug-drug interaction should be checked before using a direct factor Xa inhibitor	Strong	High
4.3. Anticoagulation with LMWH, direct factor Xa inhibitors, or VKAs beyond the initial 6 months should be offered to select patients with active cancer, such as those with metastatic disease or those receiving chemotherapy. Anticoagulation beyond 6 months needs to be assessed on an intermittent basis to ensure a continued favorable risk-benefit profile	Weak to Moderate	Low to Intermediate
4.4. On the basis of opinion in the absence of randomized trial data, uncertain short-term benefit, and mounting evidence of longterm harm from filters, the insertion of a vena cava filter should not be offered to patients with established or chronic thrombosis (VTE diagnosis more than 4 weeks ago), nor to patients with temporary contraindications to anticoagulant therapy (eg, surgery). There also is no role for filter insertion for primary prevention or prophylaxis of PE or DVT because of its long-term harm concerns. It may be offered to patients with absolute contraindications to anticoagulant therapy in the acute treatment setting (VTE diagnosis within the past 4 weeks) if the thrombus burden was considered life-threatening. Further research is needed.	Moderate	Low to Intermediate

Verbatim Guideline	Strength of Recommendation	Evidence Quality
4.5. The insertion of a vena cava filter may be offered as an adjunct to anticoagulation in patients with progression of thrombosis (recurrent VTE or extension of existing thrombus) despite optimal anticoagulant therapy. This is based on the panel's expert opinion given the absence of a survival improvement, a limited short-term benefit, but mounting evidence of the long-term increased risk for VTE.	Weak	Low to Intermediate
4.6. For patients with primary or metastatic central nervous system malignancies and established VTE, anticoagulation as described for other patients with cancer should be offered, although uncertainties remain about choice of agents and selection of patients most likely to benefit.	Moderate	Low
4.7. Incidental PE and DVT should be treated in the same manner as symptomatic VTE, given their similar clinical outcomes compared with patients with cancer with symptomatic events	Moderate	Low
4.8. Treatment of isolated subsegmental PE or splanchnic or visceral vein thrombi diagnosed incidentally should be offered on a case-by-case basis, considering potential benefits and risks of anticoagulation	Moderate	Insufficient
5. Anticoagulant use is not recommended to improve survival in patients with cancer without VTE	Strong	High

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