

CADTH Reference List

Risk Assessment Tools for Venous Thromboembolism in Patients Undergoing Surgery

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Authors: Lindsay Ritchie, Sharon Bailey

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Key Messages

- One systematic review and 3 non-randomized studies were identified about the clinical utility of risk assessment tools to evaluate venous thromboembolism risk in patients undergoing surgery.
- Four evidence-based guidelines were identified about the use of risk assessment tools to evaluate venous thromboembolism risk in patients undergoing surgery.

Research Questions

1. What is the clinical utility of risk assessment tools to evaluate venous thromboembolism risk in patients undergoing surgery?
2. What are the evidence-based guidelines regarding the use of risk assessment tools to evaluate risk in patients undergoing surgery?

Methods

Literature Search Methods

A limited literature search was conducted by an information specialist on key resources including MEDLINE, the Cochrane Database of Systematic Reviews, the international HTA database, the websites of Canadian and major international health technology agencies, as well as a focused internet search. The search strategy comprised both controlled vocabulary, such as the National Library of Medicine's MeSH (Medical Subject Headings), and keywords. The main search concepts were surgery, venous thromboembolisms, and risk assessment tools. CADTH-developed search filters were applied to limit retrieval to health technology assessments, systematic reviews, meta-analyses, network meta-analyses, randomized controlled trials, controlled clinical trials, observational studies, or guidelines. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 1, 2017 and July 13, 2022. Internet links were provided, where available.

Selection Criteria

One reviewer screened literature search results (titles and abstracts) and selected publications according to the inclusion criteria presented in [Table 1](#). Full texts of study publications were not reviewed. Open access full-text versions of evidence-based guidelines were reviewed when available.

Results

One systematic review¹ and 3 non-randomized studies²⁻⁴ were identified about the clinical utility of risk assessment tools to evaluate venous thromboembolism risk in patients

Table 1: Selection Criteria

Criteria	Description
Population	Patients undergoing any type of surgery
Intervention	Risk assessment tools for VTE (e.g., Caprini 2005, Caprini 2010, American Society of Anesthesiologist's physical status grading system)
Comparator	Q1: No screening for VTE risk, screening for VTE risk without a risk assessment tool (i.e., based on clinician judgment) Q2: Not applicable
Outcomes	Q1: Clinical utility (e.g., time to treatment, VTE incidence, mortality, quality of life) Q2: Recommendations regarding the use of risk assessment tools to evaluate VTE risk in patients undergoing surgery
Study designs	Health technology assessments, systematic reviews, randomized controlled trials, non-randomized studies, evidence-based guidelines

VTE = venous thromboembolism.

undergoing surgery. Four evidence-based guidelines⁵⁻⁸ were identified about the use of risk assessment tools to evaluate venous thromboembolism risk in patients undergoing surgery. No relevant health technology assessments or randomized controlled trials were identified.

Additional references of potential interest that did not meet the inclusion criteria are provided in [Appendix 1](#).

References

Health Technology Assessments

No literature identified.

Systematic Reviews

1. Borab ZM, Lanni MA, Tecce MG, Pannucci CJ, Fischer JP. Use of Computerized Clinical Decision Support Systems to Prevent Venous Thromboembolism in Surgical Patients: A Systematic Review and Meta-analysis. *JAMA Surg.* 2017;152(7):638-645. [PubMed](#)

Randomized Controlled Trials

No literature identified.

Non-Randomized Studies

2. Rastogi R, Lattimore CM, Mehaffey JH, Turrentine FE, Maitland HS, Zaydfudim VM. Electronic health record risk-stratification tool reduces venous thromboembolism events in surgical patients. *Surg Open Sci.* 2022;9:34-40. [PubMed](#)
3. MacNevin W, Padhye K, Alkhalife Y, et al. Optimizing pharmacologic thromboprophylaxis use in pediatric orthopedic surgical patients through implementation of a perioperative venous thromboembolism risk screening tool. *Pediatr Blood Cancer.* 2021;68(2):e28803. [PubMed](#)
4. Sterbling HM, Rosen AK, Hachey KJ, et al. Caprini Risk Model Decreases Venous Thromboembolism Rates in Thoracic Surgery Cancer Patients. *Ann Thorac Surg.* 2018;105(3):879-885. [PubMed](#)

Guidelines and Recommendations

5. American College of Obstetricians and Gynecologists' Committee on Practice Bulletins—Gynecology. Prevention of Venous Thromboembolism in Gynecologic Surgery: ACOG Practice Bulletin, Number 232. *Obstet Gynecol.* 2021;138(1):e1-e15. [PubMed](#)
See: "How are venous thromboembolism risk and the need for thromboprophylaxis assessed in the perioperative period?" on page e3.
6. Fleming F, Gaertner W, Ternent CA, et al. The American Society of Colon and Rectal Surgeons Clinical Practice Guideline for the Prevention of Venous Thromboembolic Disease in Colorectal Surgery. *Dis Colon Rectum.* 2018;61(1):14-20. [PubMed](#)
See: Management Recommendation 1 on page 15
7. National Institute for Health and Care Excellence. Venous thromboembolism in over 16s: reducing the risk of hospital-acquired deep vein thrombosis or pulmonary embolism (*Clinical guideline NG89*) 2018; <https://www.nice.org.uk/guidance/ng89/resources/venous-thromboembolism-in-over-16s-reducing-the-risk-of-hospital-acquired-deep-vein-thrombosis-or-pulmonary-embolism-pdf-1837703092165>. Accessed 2022 July 18.
See: Recommendation 1.1.5 on page 7
8. Association of Paediatric Anaesthetists of Great Britain and Ireland. Prevention of Peri-operative Venous Thromboembolism in Paediatric Patients. 2017; <https://www.apagbi.org.uk/sites/default/files/inline-files/APA%20Thromboprophylaxis%20guidelines%20final.pdf>. Accessed 2022 July 20.
See: Risk Assessment figures on pages 7-8; Sections 4.2.4 on page 15

Appendix 1: References of Potential Interest

Previous CADTH Reports

9. Venous Thromboembolism Prophylaxis for Major General Surgery: A Review of the Clinical Effectiveness and Guidelines. (CADTH Rapid response report: summary with critical appraisal). Ottawa (ON): CADTH; 2011: https://www.cadth.ca/sites/default/files/pdf/htis/june-2011/RC0277_VTE_Prophylaxis_for_Surgery_Final.pdf. Accessed 2022 July 15.

Systematic Reviews

Unclear Comparator

10. White AJ, Kanapathy M, Nikkhah D, Akhavan M. Systematic review of the venous thromboembolism risk assessment models used in aesthetic plastic surgery. *JPRAS Open*. 2021;30:116-127. [PubMed](#)

Alternative Outcomes

11. Pandor A, Tonkins M, Goodacre S, et al. Risk assessment models for venous thromboembolism in hospitalised adult patients: a systematic review. *BMJ Open*. 2021;11:e045672. [PubMed](#)
12. Kunutsor SK, Beswick AD, Whitehouse MR, Blom AW. Systematic review of risk prediction scores for venous thromboembolism following joint replacement. *Thromb Res*. 2018;168:148-155. [PubMed](#)

Non-Randomized Studies

Unclear Intervention

13. Yun R, Sciubba DM, Lewin JJ, 3rd, et al. Defects in Processes of Care for Pharmacologic Prophylaxis Are Common Among Neurosurgery Patients Who Develop In-Hospital Postoperative Venous Thromboembolism. *World Neurosurg*. 2020;134:e664-e671. [PubMed](#)

Alternative Comparator

14. Guo T, Li M, Sang CQ, et al. Validation of two risk assessment models for venous thromboembolism in patients undergoing gynecologic surgery. *Ann Transl Med*. 2022;10(1):18. [PubMed](#)
15. Tham T, Costantino P. Comparison of venous thromboembolism risk stratification models in a high risk otolaryngology patient cohort. *J Perioper Pract*. 2019;29(5):129-134. [PubMed](#)
16. Tian B, Li H, Cui S, Song C, Li T, Hu B. A novel risk assessment model for venous thromboembolism after major thoracic surgery: a Chinese single-center study. *J Thorac Dis*. 2019;11(5):1903-1910. [PubMed](#)

Alternative Outcomes

17. Krauss ES, Segal A, Cronin M, et al. Implementation and Validation of the 2013 Caprini Score for Risk Stratification of Arthroplasty Patients in the Prevention of Venous Thrombosis. *Clin Appl Thromb Hemost*. 2019;25:1076029619838066. [PubMed](#)

No Comparator

18. Akamine A, Takahira N, Kuroiwa M, Tomizawa A, Atsuda K. Internal Validation of a Risk Scoring System for Venous Thromboembolism After Total hip or Knee Arthroplasty. *Clin Appl Thromb Hemost*. 2022;28:10760296221103868. [PubMed](#)
19. Gu ZC, Zhang C, Yang Y, Wang MG, Li HY, Zhang GY. Prediction Model of in-Hospital Venous Thromboembolism in Chinese Adult Patients after Hernia Surgery: The CHAT Score. *Clin Appl Thromb Hemost*. 2021;27:10760296211051704. [PubMed](#)
20. Cui S, Chen S, Li H, et al. Risk factors for venous thromboembolism and evaluation of the modified Caprini score in patients undergoing lung resection. *J Thorac Dis*. 2020;12(9):4805-4816. [PubMed](#)
21. Kim NE, Conway-Pearson L, Kavanah M, et al. Standardized Risk Assessment and Risk-Stratified Venous Thromboembolism Prophylaxis for Patients Undergoing Breast Operation. *J Am Coll Surg*. 2020;230(6):947-955. [PubMed](#)
22. Wang M, Zhang G, Chen J, et al. Current prevalence of perioperative early venous thromboembolism and risk factors in Chinese adult patients with inguinal hernia (CHAT-1). *Sci Rep*. 2020;10(1):12667. [PubMed](#)
23. Laws A, Anderson K, Hu J, et al. Implementation of a Venous Thromboembolism Prophylaxis Protocol Using the Caprini Risk Assessment Model in Patients Undergoing Mastectomy. *Ann Surg Oncol*. 2018;25(12):3548-3555. [PubMed](#)
24. Macht R, Gardner I, Talutis S, Rosenkranz P, Doherty G, McAneny D. Evaluation of a Standardized Risk-Based Venous Thromboembolism Prophylaxis Protocol in the Setting of Thyroid and Parathyroid Surgery. *J Am Coll Surg*. 2017;224(6):1029-1035. [PubMed](#)
25. Sturlese E, Triolo O, Grasso R, et al. Thromboembolism prophylaxis in laparoscopic surgery for gynecologic benign diseases. Results of a single center experience in 922 procedures. *Ann Ital Chir*. 2017;88:342-347. [PubMed](#)

Guidelines and Recommendations

Unclear Methodology

26. State of Queensland (Queensland Health). Guideline for the prevention of Venous Thromboembolism (VTE) in adult hospitalised patients. 2018; https://www.health.qld.gov.au/_data/assets/pdf_file/0031/812938/vte-prevention-guideline.pdf. Accessed 2022 July 18.
See: Section 1.3 on pages 12