

**ONLINE SUPPLEMENTARY****APPENDIX S1: LITERATURE SEARCH STRATEGY****Table S1 Literature search strategy for the review of RAMs for VTE in hospital inpatients**

<b>Database searched:</b>	<b>Ovid MEDLINE(R) Epub Ahead of Print, In-Process &amp; Other Non-Indexed Citations, Ovid MEDLINE(R) Daily, Ovid MEDLINE and Versions(R)</b>
<b>Platform or provider used:</b>	<b>Ovid SP</b>
<b>Date of coverage:</b>	<b>1946 to February 2021</b>
<b>Search undertaken:</b>	<b>February 2021</b>

- 1 pulmonary embolism/ or thromboembolism/ or venous thromboembolism/ or venous thrombosis/ or upper extremity deep vein thrombosis/
- 2 (((venous or vein) adj (thrombosis or thromboses or thrombus or thromboembolism)) or (dvt or vte) or ((pulmonary or lung) adj3 (embolism or emboli or embolus or emboliz\* or thromboembolism))).ti,ab.
- 3 1 or 2
- 4 letter/ or editorial/ or news/ or exp historical article/ or anecdotes as topic/ or comment/ or case report/ or (letter or comment).ti.
- 5 randomized controlled trial/ or random\*.ti,ab.
- 6 4 not 5
- 7 animals/ not humans/
- 8 exp animals, laboratory/
- 9 exp animal experimentation/
- 10 exp models, animal/
- 11 exp rodentia/
- 12 (rat or rats or mouse or mice).ti.
- 13 6 or 7 or 8 or 9 or 10 or 11 or 12
- 14 3 not 13
- 15 (risk\* adj2 assess\*).ti,ab.
- 16 ((score\* or scoring) adj2 (tool\* or system\*)).ti,ab.
- 17 ((risk\* or predict\* or prognos\*) adj4 (tool\* or rule\* or index\* or indices or score\* or scoring or scale\* or model\* or system\* or algorithm\* or stratif\* or criteria or calculat\*)).ti,ab.
- 18 (vienna adj5 cats).ti,ab.
- 19 (vienna cancer and thrombosis study).ti,ab.
- 20 trauma embolic scoring.ti,ab.
- 21 tess.ti,ab.
- 22 (roger\* or caprini\* or kucher\* or cohen\* or padua\* or khorana\* or autar).ti,ab.
- 23 (well\* adj2 (score\* or scoring)).ti,ab.
- 24 department of health.ti,ab,au.
- 25 or/15-24
- 26 14 and 25
- 27 limit 26 to yr="2017 -Current"

**Databases searched:** EMBASE  
**Platform or provider used:** Ovid SP  
**Date of coverage:** 1974 to February 2021  
**Search undertaken:** February 2021

1 thromboembolism/ or venous thromboembolism/ or vein thrombosis/ or deep vein thrombosis/ or leg thrombosis/ or lower extremity deep vein thrombosis/ or postoperative thrombosis/ or lung embolism/ or upper extremity deep vein thrombosis/  
2 (((venous or vein) adj (thrombosis or thromboses or thrombus or thromboembolism)) or (dvt or vte) or ((pulmonary or lung) adj3 (embolism or emboli or embolus or emboliz\* or thromboembolism))).ti,ab.  
3 1 or 2  
4 letter.pt. or letter/ or note.pt. or editorial.pt. or case report/ or case study/ or (letter or comment\*).ti.  
5 randomized controlled trial/ or random\*.ti,ab.  
6 4 not 5  
7 animal/ not human/  
8 nonhuman/  
9 exp animal experiment/ or exp experimental animal/  
10 animal model/  
11 exp rodent/  
12 (rat or rats or mouse or mice).ti.  
13 6 or 7 or 8 or 9 or 10 or 11 or 12  
14 3 not 13  
15 (risk\* adj2 assess\*).ti,ab.  
16 ((score\* or scoring) adj2 (tool\* or system\*)).ti,ab.  
17 ((risk\* or predict\* or prognos\*) adj4 (tool\* or rule\* or index\* or indices or score\* or scoring or scale\* or model\* or system\* or algorithm\* or stratif\* or criteria or calculat\*)).ti,ab.  
18 (vienna adj5 cats).ti,ab.  
19 (vienna cancer and thrombosis study).ti,ab.  
20 trauma embolic scoring.ti,ab.  
21 tess.ti,ab.  
22 (roger\* or caprini\* or kucher\* or cohen\* or padua\* or khorana\* or autar).ti,ab.  
23 (well\* adj2 (score\* or scoring)).ti,ab.  
24 department of health.ti,ab,au.  
25 or/15-24  
26 14 and 25  
27 limit 26 to yr="2017 -Current"

**Databases searched:** Cochrane CENTRAL Register of Randomised Controlled Trials & Cochrane Database of Systematic Reviews

**Platform or provider used:** [www.thecochranelibrary.com](http://www.thecochranelibrary.com)

**Date of coverage:** Inception to February 2021

**Search undertaken:** February 2021

- #1. MeSH descriptor: [venous thromboembolism] this term only
- #2. MeSH descriptor: [pulmonary embolism] this term only
- #3. MeSH descriptor: [venous thrombosis] this term only
- #4. MeSH descriptor: [thromboembolism] this term only
- #5. MeSH descriptor: [upper extremity deep vein thrombosis] this term only
- #6. ((\*venous or \*vein) next (thrombosis or thromboses or thrombus or thromboembolism) or dvt or vte or (pulmonary or lung) near/3 (embolism or emboli or embolus or emboliz\* or thromboembolism)):ti,ab
- #7. #1 or #2 or #3 or #4 or #6
- #8. (risk\* near/2 assess\*):ti,ab
- #9. ((score\* or scoring) near/2 (tool\* or system\*)):ti,ab
- #10. ((risk\* or predict\* or prognos\*) near/4 (tool\* or rule\* or index\* or indices or score\* or scoring or scale\* or model\* or system\* or algorithm\* or stratif\* or criteria or calculat\*)):ti,ab
- #11. (vienna near/5 cats):ti,ab
- #12. (vienna cancer and thrombosis study):ti,ab
- #13. trauma embolic scoring:ti,ab
- #14. tess:ti,ab
- #15. (roger\* or caprini\* or kucher\* or cohen\* or padua\* or khorana\* or autar):ti,ab
- #16. (well\* near/2 (score\* or scoring)):ti,ab
- #17. (department of health):ti,ab
- #18. (or #8-#17)
- #19. #7 and #18 with Publication Year from 2017 to 21

**APPENDIX S2: LIST OF EXCLUDED STUDIES WITH RATIONALE**

	<b>Authors, year</b>	<b>Reason for exclusion</b>
1.	Alikhan et al., 2004 <sup>1</sup>	Derivation only
2.	Alper et al., 2018 <sup>2</sup>	Not a RAM for predicting the risk of developing VTE in hospital inpatients
3.	Arcelus et al., 1991 <sup>3</sup>	No relevant/useable outcome data
4.	Arpaia et al., 2020 <sup>4</sup>	Not a RAM for predicting the risk of developing VTE in hospital inpatients
5.	Bagot et al., 2010 <sup>5</sup>	No relevant/useable outcome data
6.	Bellizzi et al., 2018 <sup>6</sup>	No relevant/useable outcome data
7.	Blondon et al., 2020 <sup>7</sup>	Duplicate of included study (Blondon et al., 2019a)
8.	Blondon et al., 2017 <sup>8</sup>	Abstract of an included full-text study
9.	Caprini et al., 2001 <sup>9</sup>	Review
10.	Chen et al., 2018 <sup>10</sup>	Not available (foreign language)
11.	Chopard et al., 2006 <sup>11</sup>	No relevant/useable outcome data
12.	Coelho et al., 2020 <sup>12</sup>	Not a RAM for predicting the risk of developing VTE in hospital inpatients
13.	Dang et al., 2019 <sup>13</sup>	Derivation only
14.	Davis and Intagliata, 2018 <sup>14</sup>	No relevant/useable outcome data
15.	Depietri et al., 2018 <sup>15</sup>	No relevant/useable outcome data
16.	Ellis et al., 2019 <sup>16</sup>	No relevant/useable outcome data
17.	Fadoi Foundation, 2020 <sup>17</sup>	Trial protocol (no results)
18.	Ferreira et al., 2018 <sup>18</sup>	No relevant/useable outcome data
19.	Ferreira et al., 2017 <sup>19</sup>	No relevant/useable outcome data
20.	Fritz et al., 2021 <sup>20</sup>	No relevant/useable outcome data
21.	Gibson et al., 2017 <sup>21</sup>	RAM involves diagnostic testing
22.	Girardi et al., 2018 <sup>22</sup>	Not a RAM for predicting the risk of developing VTE in hospital inpatients
23.	Grzelak et al., 2019 <sup>23</sup>	Not a RAM for predicting the risk of developing VTE in hospital inpatients
24.	Hostler et al., 2016 <sup>24</sup>	No relevant/useable outcome data
25.	Hu, 2018 <sup>25</sup>	No relevant/useable outcome data
26.	Koren et al., 2017 <sup>26</sup>	Not a RAM for predicting the risk of developing VTE in hospital inpatients
27.	Kucher et al., 2005 <sup>27</sup>	No relevant/useable outcome data
28.	Lecumberri et al., 2008 <sup>28</sup>	No relevant/useable outcome data
29.	Luo and Zhang, 2017 <sup>29</sup>	Not available (foreign language)
30.	Maynard et al., 2010 <sup>30</sup>	No relevant/useable outcome data
31.	McCaffrey et al., 2007 <sup>31</sup>	No relevant/useable outcome data

32.	Meizoso et al., 2017 <sup>32</sup>	Derivation only
33.	Monti et al., 2019 <sup>33</sup>	Abstract of included full text paper
34.	Mull et al., 2017 <sup>34</sup>	Review
35.	Nafee et al., 2018 <sup>35</sup>	Abstract of included full text paper
36.	Nnadi et al., 2017 <sup>36</sup>	No relevant/useable outcome data
37.	Obi et al., 2015 <sup>37</sup>	Critical care patients
38.	Pannucci et al., 2017 <sup>38</sup>	Review
39.	Rafizadeh et al., 2016 <sup>39</sup>	No relevant/useable outcome data
40.	Rastogi et al., 2020 <sup>40</sup>	No relevant/useable outcome data
41.	Razak et al., 2019 <sup>41</sup>	Not a RAM for predicting the risk of developing VTE in hospital inpatients
42.	Robert-Ebadi et al., 2017 <sup>42</sup>	Not a RAM for predicting the risk of developing VTE in hospital inpatients
43.	Salim et al., 2018 <sup>43</sup>	No relevant/useable outcome data
44.	Samama et al., 2006 <sup>44</sup>	Expert opinion
45.	Shrotriya et al., 2018 <sup>45</sup>	Not a RAM for predicting the risk of developing VTE in hospital inpatients
46.	Smilg Nicolas et al., 2018 <sup>46</sup>	No relevant/useable outcome data
47.	Spirk et al., 2017 <sup>47</sup>	No relevant/useable outcome data
48.	Spyropoulos et al., 2020 <sup>48</sup>	RAM involves diagnostic testing
49.	Spyropoulos et al., 2011 <sup>49</sup>	Derivation only
50.	Stuck et al., 2017 <sup>50</sup>	Review
51.	Tadesse et al., 2020 <sup>51</sup>	No relevant/useable outcome data
52.	Taha et al., 2020 <sup>52</sup>	No relevant/useable outcome data
53.	Tung et al., 2020 <sup>53</sup>	No relevant/useable outcome data
54.	Veith et al., 2019 <sup>54</sup>	No relevant/useable outcome data
55.	Winoker et al., 2017 <sup>55</sup>	Abstract of an included full-text study
56.	Yale et al., 2005 <sup>56</sup>	Derivation only
57.	Ye et al., 2017 <sup>57</sup>	Review
58.	Zakai et al., 2013 <sup>58</sup>	Derivation only
59.	Zambelli et al., 2020 <sup>59</sup>	Not a RAM for predicting the risk of developing VTE in hospital inpatients
60.	Zhou et al., 2012 <sup>60</sup>	Not a RAM for predicting the risk of developing VTE in hospital inpatients

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**APPENDIX S3: WIDELY EVALUATED GENERIC RAMS, THEIR ASSOCIATED CHARACTERISTICS AND COMPOSITE CLINICAL VARIABLES**

Characteristics	Name of VTE risk assessment model					
	Caprini Score	Padua Prediction Score	IMPROVE Predictive score	IMPROVE Associative score	Geneva Risk Score	Kucher Score
<b>General</b>						
Author, year	Caprini 2005 <sup>1</sup>	Barbar 2010 <sup>2</sup>	Tapson 2007 <sup>3</sup>	Spyropoulos 2011 <sup>4</sup>	Chopard 2006 <sup>5</sup>	Kucher 2005 <sup>6</sup>
Applicable cohort	Surgical and medical	Medical	Medical	Medical	Medical	Surgical and medical
Design	Ordinal with cumulative score	Dichotomous variables with cumulative score	Dichotomous variables with VTE probability estimate	Dichotomous variables with VTE probability estimate	Dichotomous variables with cumulative score	Dichotomous variables with cumulative score
Number of VTE risk variables	31	11	4	7	19	8
C-statistic (range) across medical, surgical and trauma cohorts	0.53 - 0.87 (12 studies)	0.594 - 0.756 (7 studies)	0.57 - 0.65 (2 studies)	0.63 - 0.7731 (4 studies)	0.61 (1 study)	0.563-0.756 (4 studies)
When is pharmacological thromboprophylaxis recommended?	Score $\geq 5$	Score $\geq 4$	No specific threshold Identified	No specific threshold identified	Score $\geq 3$	Score $\geq 4$
<b>Clinical Variables</b>						
Patient related						
Active cancer	Yes	Yes	Yes	Yes	Yes	Yes (Major risk)
Age	Yes	Yes ( $\geq 70$ )	Yes ( $\geq 60$ )	Yes ( $\geq 60$ )	Yes ( $\geq 60$ )	Yes ( $\geq 70$ Minor risk)
Dehydration	No	No	No	No	Yes	No
Thrombophilia	Yes (generic and named conditions)	Yes (generic)	Yes (generic)	Yes (generic)	Yes (generic)	Yes (Major risk)
Obesity	Yes ( $\geq 25\text{kg/m}^2$ )	Yes ( $\geq 30\text{kg/m}^2$ )	No	No	Yes ( $\geq 30\text{kg/m}^2$ )	Yes ( $\geq 30\text{kg/m}^2$ Minor risk)
Comorbidity	Yes (1 to 5 points for individual comorbidities)	Yes (1 point each for several individual comorbidities)	No	No	Yes (2 points each for several individual comorbidities)	No
Prior VTE	Yes	Yes	Yes	Yes	Yes	Yes (Major risk)
Family history of VTE	Yes	No	No	No	No	No
Use of HRT	Yes	Yes	No	No	Yes	Yes (Minor risk)
Use of oestrogen containing contraceptive therapy	Yes	Yes	No	No	Yes	Yes (Minor risk)
Varicose veins	Yes	No	No	No	No	No
Pregnancy or postpartum period	No	No	No	No	Yes	No
Unexplained stillbirth or spontaneous abortions	Yes ( $\geq 3$ spontaneous abortions)	No	No	No	No	No
Current swollen legs	Yes	No	No	No	Yes	No
Current central venous access	Yes	No	No	No	No	No
Recent major surgery	Yes (<1 month)	Yes (<1 month)	No	No	No	No
Recent use of plaster cast immobilisation	Yes (<1 month)	No	No	No	No	No

Lower limb paralysis	Yes	No	No	Yes	No	No
Travel related	No	No	No	No	Yes (>6hours)	No
Admission related						
Reduced mobility	Yes (variable points)	Yes	No	Yes (≥7days)	Yes (≥3 days)	Yes (Minor risk)
Arthroplasty surgery	Yes	No	No	No	No	No
Hip fracture	Yes	No	No	No	No	No
Pelvic or lower limb surgery	Yes (arthroscopic)	No	No	No	No	No
Total anaesthetic and surgical time	Yes (≥45mins)	No	No	No	No	Yes (≥60mins intermediate risk)
Acute surgical admission	No	No	No	No	No	No
Acute infection	No	Yes	No	No	Yes	No
Acute rheumatologic disorder	No	Yes	No	No	Yes	No
Critical care admission	No	No	No	Yes	No	No
Surgery leading to reduced mobility	Yes	No	No	No	No	No
Other						
'Other risk factors'	Yes	No	No	No	No	No

HRT, hormone replacement therapy; VTE, venous thromboembolism

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**APPENDIX S4: SUMMARY OF PREDICTIVE PERFORMANCE FOR STUDIES INVOLVING HOSPITAL INPATIENTS WHO REQUIRED CARE FOR CANCER, STROKE, BURN INJURIES AND SEPSIS OR WERE A MIXED MEDICAL/SURGICAL COHORT**

Data source	Endpoint	Incidence	Risk assessment model	Threshold or cut-off	Predictive performance		
					C-statistic (95% CI)	Sensitivity (95% CI)	Specificity (95% CI)
<b>MIXED INPATIENTS</b>							
Autar, 2003 <sup>22</sup>	DVT	18.9%	•Novel (Autar, 2003)	Risk score $\leq 6$	NR	100% (NR)	100% (NR)
			•Novel (Autar, 2003)	Risk score 7-10	NR	86.0% (NR)	68.0% (NR)
			•Novel (Autar, 2003)	Risk score 11-14	NR	68.0% (NR)	31.0% (NR)
			•Novel (Autar, 2003)	Risk score $\geq 15$	NR	25.0% (NR)	10.0% (NR)
Elias, 2017 <sup>34</sup>	VTE	0.8%	•Padua (automated)	Risk score $\geq 5$	0.81 (0.79, 0.83)	85.4% (NR)	53.3% (NR)
Chen, 2018 <sup>30</sup>	DVT	NA	•Caprini	Risk score $\geq 4$	NR	73.8% (NR)	64.7% (NR)
			•Caprini	Risk score $\geq 5$	NR	62.8% (NR)	82.6% (NR)
			•Padua	Risk score $\geq 3$	NR	53.5% (NR)	82.1% (NR)
			•Padua	Risk score $\geq 4$	NR	42.1% (NR)	92.5% (NR)
Bo, 2020 <sup>29</sup>	DVT	0.9%	•Caprini	Risk score $\geq 3.5$	0.74 (0.71, 0.77)	75.0% (NR)	62.0% (NR)
<b>CANCER INPATIENTS</b>							
Abdel-Razeq, 2010 <sup>21</sup>	VTE	3.5%	•Caprini (modified)	Risk score $\geq 3$	NR	100% (NR)	9.2% (NR)
			•Caprini (modified)	Risk score $\geq 5$	NR	57.1% (NR)	53.2% (NR)
Patell, 2017 <sup>34</sup>	VTE	3.8%	•Khorana	Risk score $\geq 3$	NR	18.9% (NR)	87.2% (NR)
Hu, 2020 <sup>42</sup>	VTE	NA	•Caprini	Risk score $\geq 5$	0.71 (0.66, 0.75)	82.4% (NR)	46.2% (NR)
			•Khorana	Risk score $\geq 2$	0.58 (0.53, 0.63)	35.3% (NR)	78.7% (NR)
Shang, 2020 <sup>60</sup>	VTE	NA	•Caprini 2009	Risk score $\geq 3$	0.72 (0.70, 0.74)	83.5% (NR)	52.7% (NR)
			•Caprini 2013	Risk score $\geq 5$	0.80 (0.78, 0.82)	80.9% (NR)	65.9% (NR)
<b>BURNS INPATIENTS</b>							
Pannucci, 2012 <sup>53</sup>	VTE	1.0%	•Novel (Pannucci 2012)	NR	0.75	NR	NR
<b>POST-STROKE INPATIENTS</b>							
Liu, 2014 <sup>44</sup>	DVT	10.5%	•Post-stroke DVT Prediction System	NR	0.65 (0.59, 0.70)	NR	NR
<b>SEPSIS INPATIENTS</b>							
Vardi, 2013 <sup>64</sup>	VTE	1.3%	•Padua	NR	•All patients 0.58 (0.43, 0.73)	•All patients NR	•All patients NR
			•Padua	NR	•No prophylaxis 0.54 (0.37, 0.71)	•No prophylaxis NR	•No prophylaxis NR

CI, confidence interval; DVT, deep vein thrombosis; NA, not applicable; NR, not reported; VTE, venous thromboembolism