Letter to the Editors-in-Chief

Title

Is clinical pre-test probability assessment for venous thromboembolism underused?

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In patients with suspected venous thromboembolism (VTE), clinical probability assessment is a crucial initial step that guides further diagnostic evaluation. Both empirical clinical judgment and clinical prediction rules are valid approaches in establishing the clinical pretest probability of VTE (1). While unstructured empirical clinical assessment may be preferred by some physicians (2), clinical prediction rules have the advantage of greater standardization and reproducibility. Currently, several validated clinical prediction rules for deep vein thrombosis (DVT) and pulmonary embolism (PE) are available, including the original and simplified versions of the Wells rule and the revised Geneva score (1).

Evidence suggests that the incorporation of clinical probability assessment into diagnostic algorithms for VTE leads to an improved quality of care (3). Current guidelines recommend clinical probability assessment, either by empirical clinical judgment or a validated clinical prediction rule, in patients with suspected VTE (4, 5). However, little is known about whether clinical probability assessment for VTE is used in clinical practice and what type of probability assessment, empirical clinical judgment or use of clinical prediction rules, is preferred by clinicians. To fill this gap of knowledge, we examined the frequency of clinical probability assessment in patients diagnosed with acute symptomatic VTE. We further assessed whether clinical probability was assessed empirically or by using a clinical prediction rule, such as the Wells rules or the revised Geneva scores. We hypothesized that clinical probability assessment would be rather underused.

We analyzed data from 990 patients included in the SWISS venous Thromboembolism COhort (SWITCO65+), a prospective multicenter cohort study that enrolled in- and outpatients aged ≥ 65 years with acute, symptomatic, objectively confirmed VTE from all five university and four high-volume non-university hospitals in Switzerland from 09/2009-12/2013. Patients were managed by residents who were

supervised by attending physicians. A detailed description of the methodology can be found elsewhere (6). In a preplanned subproject, trained study nurses reviewed patients' medical charts to ascertain whether clinical pre-test probability of VTE was assessed. The chart abstraction process was guided by a written data abstraction manual and findings were recorded using standardized data collection forms. The study nurses were blinded to our study hypothesis. We considered that clinical probability assessment had been performed when the terms "high, moderate, or low probability of DVT/PE" or "DVT/PE likely/probable or unlikely/improbable" were documented or a specific diagnostic prediction rule for VTE was mentioned in the patient chart. In patients with documented clinical probability assessment without mention of a specific diagnostic prediction rule, we assumed that clinical probability had been assessed empirically. If neither the aforementioned terms nor a specific prediction rule were recorded in the chart, we assumed that clinical probability had not been assessed.

Overall, clinical probability assessment was documented in 361 of 990 (36%) patients. As shown in the Table 1, clinical probability assessment did not differ by age, sex, localization of VTE (PE±DVT vs. DVT only), and initial site of patient presentation.

The majority (245/361 [68%]) of clinical probability assessments were done empirically, clinical prediction rules were used only in 116 of 361 (32%) patients. Among patients with documented use of clinical prediction rules, use did not vary across age or sex. Patients with DVT only were more likely to undergo clinical probability assessment by clinical prediction rule use than patients with PE±DVT (16% vs. 10%; $P<0.001$) (Table 1). Also, outpatients diagnosed with acute VTE were more likely to have rule use than inpatients (19% vs. 10%; $P<0.001$).

Despite strong recommendations, our results indicate that clinical probability assessment is performed in about one third of patients with acute VTE only and that the majority of physicians prefer empirical clinical judgment over prediction rules. According to self-reports, reasons for the under-use of clinical prediction rules include the preference of one's own clinical assessment, unfamiliarity with rules, and perceived lack of utility (7).

We observed a higher use of clinical prediction rules in outpatients. This finding is consistent with the fact that clinical prediction rules are better validated in the outpatient setting than in the hospital (8). Similarly, because the use of diagnostic clinical prediction rules was first described in patients with suspected DVT, prediction rules may be more established in patients with suspected DVT than in those with PE (9). Our findings are in stark contrast to results from physician surveys that reported a much higher use of clinical probability assessment. In a survey among 128 Italian VTE experts, almost all physicians declared that they would use clinical probability assessment and 45-55% indicated that they would always or often use clinical prediction rules (9). In another survey among 555 clinicians from the USA and the United Kingdom, 34% reported rule use and 57% indicated use of empirical clinical judgment in >50% of cases with suspected PE (2). While studies based on self-reported data tend to overestimate the use of clinical prediction rules (10), studies based on chart review, such as ours, may have the opposite effect. As clinicians may have determined but failed to document clinical probability in the medical chart, our results could be explained, at least partially, by under-documentation rather than underuse of clinical probability assessment.

In conclusion, our results indicate that clinical pre-test probability assessment is done in approximately one third of patients with acute VTE only and that most physicians prefer using subjective clinical judgment rather than more objective

108 prediction rules. Educational measures may be needed to increase the use of clinical
109 pre-test probability assessment in patients with suspected VTE.
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References

1. Lucassen W, Geersing GJ, Erkens PM, et al. Clinical decision rules for excluding pulmonary embolism: a meta-analysis. *Ann Intern Med* 2011; 155(7): 448-60.
2. Runyon MS, Richman PB, Kline JA. Emergency medicine practitioner knowledge and use of decision rules for the evaluation of patients with suspected pulmonary embolism: variations by practice setting and training level. *Acad Emerg Med* 2007; 14(1): 53-7.
3. Roy PM, Meyer G, Vielle B, et al. Appropriateness of diagnostic management and outcomes of suspected pulmonary embolism. *Ann Intern Med* 2006; 144(3): 157-64.
4. Konstantinides SV, Torbicki A, Agnelli G, et al. 2014 ESC guidelines on the diagnosis and management of acute pulmonary embolism. *Eur Heart J* 2014; 35(43): 3033-69, 69a-69k.
5. Bates SM, Jaeschke R, Stevens SM, et al. Diagnosis of DVT: Antithrombotic Therapy and Prevention of Thrombosis, 9th ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines. *Chest* 2012; 141(2 Suppl): e351S-418S.
6. Mean M, Righini M, Jaeger K, et al. The Swiss cohort of elderly patients with venous thromboembolism (SWITCO65+): rationale and methodology. *J Thromb Thrombolysis* 2013; 36(4): 475-83.
7. Pluddemann A, Wallace E, Bankhead C, et al. Clinical prediction rules in practice: review of clinical guidelines and survey of GPs. *Br J Gen Pract* 2014; 64(621): e233-42.

- 140 8. Ceriani E, Combescure C, Le Gal G, et al. Clinical prediction rules for
141 pulmonary embolism: a systematic review and meta-analysis. *J Thromb Haemost*
142 2010; 8(5): 957-70.
- 143 9. Squizzato A, Micieli E, Galli M, et al. Diagnosis and management of venous
144 thromboembolism: Results of a survey on current clinical practice. *Thromb Res* 2010;
145 125(2): 134-6.
- 146 10. Adams AS, Soumerai SB, Lomas J, et al. Evidence of self-report bias in
147 assessing adherence to guidelines. *Int J Qual Health Care* 1999; 11(3): 187-92.
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149 **Table 1. Clinical probability assessment by patient characteristics**

Characteristics	Clinical probability assessed n/N (%)	P- value	Use of clinical prediction rule n/N (%)	P- value
All	361/990 (36)		116/990 (12)	
Age category, yrs		0.19		0.93
65-69	98/251 (39)		31/251 (12)	
70-74	75/229 (33)		22/229 (10)	
75-79	69/211 (33)		23/211 (11)	
≥80	119/299 (40)		40/299 (13)	
Sex		0.74		0.83
Women	171/462 (37)		54/462 (12)	
Men	190/528 (36)		62/528 (12)	
Localization of index VTE		0.40		<0.001
DVT only	105/304 (35)		50/304 (16)	
PE±DVT	256/686 (37)		66/686 (10)	
Initial site of presentation		0.41		<0.001
Inpatient	298/804 (37)		81/804 (10)	
Outpatient	63/186 (34)		35/186 (19)	

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151 Abbreviations: VTE= venous thromboembolism; DVT= deep vein thrombosis; PE=
152 pulmonary embolism.