



## The enduring incidence of venous thromboembolism in medical practice outside and inside the ICU

La persistente incidencia del tromboembolismo venoso en la práctica médica fuera y dentro de la UCI

*A incidência persistente de tromboembolismo venoso na prática médica fora e dentro da UTI*

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A chain of command is a form of organization and information delivery system characteristic of organizations with strong, vertical, and authoritarian hierarchical structures, as in the military, where orders, rewards, and penalties flow from the top of the organizational pyramid to the base, and where it is expected that towards the top of it they return only the required information of the activities and tasks entrusted; hospital medicine, although with less strength than in the old days, has a similar structure, with a clear hierarchical system at the base of which work is divided and prestige and responsibilities are distributed,<sup>1</sup> and which transits in the medical sphere of a Critical Care Service from the head of the ICU, to the undergraduate intern or medical student performing their rotation in this clinical service.<sup>2</sup>

Occasionally, one of these apprentices ask intricate questions maybe due to their naivety and their relative closeness to basic sciences, such as indicating whether the patient may be suffering from a venous thromboembolic disease (VTE), a diagnosis that can represent significant complexity, especially in the critically ill patient, in whom there are undeniable communication barriers, as well as many alternate explanations for the change in physiological variables such as heart or respiratory rate, blood pressure, or gas exchange; in this way a high or intermediate-probability objective clinical assessment implies in general the need for diagnostic work up, but a low-probability objective clinical assessment does not eliminate the diagnosis, so maintenance of a high level of suspicion is essential. Generally the physician's assessment of the probability that a patient has a specific disease is a primary issue in the determination of whether to withhold treatment,

get more data by testing, or treat without exposing the patient to the risks of additional diagnostic work up.

Its differential diagnosis covers multiple conditions as different as pneumonia, exacerbated COPD, pulmonary edema, acute myocardial infarction, pneumothorax, lung metastases, idiopathic pulmonary hypertension, rib fractures and panic/anxiety attacks just to mention a few, and who often have a multitude of risk factors for thromboinflammation simultaneously; from those strongly associated with thrombosis with OR > 10 (polytrauma, spinal cord injury, recent cardiac failure or AF, etc.) to those with odds < 2 (> 72 hours bed rest, obesity, pregnancy, etc.), adding diagnostic difficulty the fact that up to 19% of cases do not present apparent risk factors or predisposing comorbidity for VTE.<sup>3</sup>

Of particular importance in cases of high risk for early mortality are certain markers as right ventricular dysfunction, systemic arterial hypotension, refractory hypoxemia, pulmonary hypertension, thrombus in transit<sup>4</sup> among others; it is therefore that the help a good echocardiogram at the patient's bedside can provide is invaluable.

In general, one of the clinical syndromes of VTE presentation identified in PIOPED II will tend to be identified by the physician: 1) pulmonary hemorrhage or infarction syndrome (with pleural pain or hemoptysis; 41%), 2) isolated dyspnea syndrome (with absence of circulatory collapse, pleural pain, or hemoptysis; 36%) or 3) circulatory collapse syndrome (with syncope or systolic blood pressure  $\leq$  80 mmHg; 8%).<sup>5</sup>

The European guidelines recommend at a very high level (1 A) that the VTE diagnostic strategy be based on the clinical probability evaluated either by clinical judgment or by a validated prediction rule, the utility of which is not always ideal in critically ill patients in the ICU, as it is in non-severe patients of the general wards. That is why clinical judgment is a critical element and is largely based on the *medical gestalt* necessary to correctly infer the pretest probability of VTE (more than or less than 40% depending on the case), understanding this notion as a subjective clinical evaluation carried out using an unstructured estimation, behind which is always the clinical experience that only time and the constant exposure to cases provide.

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The VTE scenario is particularly interesting and complex in critically ill patients, a group that, in addition to the aforementioned, constitutes a unique group with multiple risk factors in about half of the cases, many of them «atypical», multiple central venous lines, prolonged immobility imposed by sedatives and muscle relaxants, mechanical ventilation, severe inflammation and sepsis among others, often faced with a limited or exhausted cardiopulmonary and organic reserve, within a reality of a common underutilization of appropriate prophylactic measures in some ICU's.

In prospective studies, an incidence of deep vein thrombosis (DVT) in critically ill patients of up to 33% (95% CI: 24-43%) has been reported through serial compression duplex ultrasonography of the lower extremities, half of them proximal and at higher risk of embolism and other 15% in the upper limbs associated with central catheters, despite prophylaxis in 61% of them.<sup>6</sup> More recent trials have shown that despite the correct use of universal thromboprophylaxis, critically ill nonsurgical patients still exhibited high percentages of DVT (14%),<sup>7</sup> and a recent meta-analysis which integrated a total of 42 different studies including 27,344 patients found a pooled prevalence of VTE of 10.0% (95% CI: 7.0-14.0%); a subgroup and metaregression analyses found that thromboprophylaxis strategy, simplified acute physiology score (SAPS II), age, study quality, sample size, malignancy, sex, spinal cord injury and injury severity score (ISS) modulated the prevalence of VTE in ICU patients.<sup>8</sup>

In an autopsy series the occurrence of pulmonary embolism in 617 patients admitted to a respiratory ICU was 27%, in half of them VTE was not diagnosed before death.<sup>9</sup>

Thus, VTE is and will continue to be a very current aspect in clinical medicine, its high frequency inside and outside the ICU, high mortality, frequent recurrence, economic impact on health systems, risk of long-term sequelae both in the venous territory of the lower limbs

as well as in the pulmonary vascular bed and a low diagnostic clinical suspicion in general guarantee this.

Probably future algorithms based on artificial intelligence (AI) may be able to facilitate diagnosis and improve the radiological images assessment and differentiate, for example, between acute and chronic pulmonary vascular findings, allowing for early detection of chronic thromboembolic pulmonary hypertension a rare but disastrous late complication of VTE.

## REFERENCES

1. Villanueva M, Castro R. Sistemas de jerarquización del campo médico en México: un análisis sociológico. *Temas LIVRES • Cienc Saúde Coletiva*. 2020;25(6):2377-2386. Disponible en: <https://doi.org/10.1590/1413-81232020256.28142019>
2. Elizalde-González JJ. La importancia de la medicina crítica en el internado de pregrado. *Med Crit*. 2018;32(3):120.
3. Goldhaber SZ, Visani L, de Rosa M. International cooperative pulmonary embolism registry (ICOPER). *Lancet*. 1999;353(9162):1386-1389. doi: 10.1016/s0140-6736(98)07534.
4. Jerjes SC, Gutiérrez FP, Ramírez RA, Vargas BJ, Espinosa ZN, Elizalde J. Pulmonary embolism and thrombus in transit: Mexican multicenter trial. *Chest*. 2000;118:262S.
5. Stein PD, Beemath A, Matta F, et al. Clinical characteristics of patients with acute pulmonary embolism: data from PIOPED II. *Am J Med*. 2007;120(10):871-879. doi: 10.1016/j.amjmed.2007.03.024.
6. Hirsch DR, Ingenito EP, Goldhaber SZ. Prevalence of deep venous thrombosis among patients in medical intensive care. *JAMA*. 1995;274(4):335-337. doi: 10.1001/jama.1995.03530040063042.
7. Gibson ChD, Colvin MO, Park MJ, et al. Prevalence and predictors of deep vein thrombosis in critically ill medical patients who underwent diagnostic duplex ultrasonography. *J Intensive Care Med*. 2020;35(10):1062-1066. doi: 10.1177/0885066618813300.
8. Gao X, Zeng L, Wang H, et al. Prevalence of venous thromboembolism in intensive care units: a meta-analysis. *J Clin Med*. 2022;11(22):6691. doi: 10.3390/jcm11226691.
9. Neuhaus A, Bentz RR, Weg JG. Pulmonary embolism in respiratory failure. *Chest*. 1978;73(4):460-465. doi: 10.1378/chest.73.4.460.

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