Revista Cientifica Estudiantil MedEs

MedEst|2026 | Vol.6: e433 | ISSN: 2789-7567 |RNPS: 2524| LETTER TO THE EDITOR

Anticoagulation in the ICU: Balancing prophylaxis and therapy to minimize thrombotic and hemorrhagic risk

Anticoagulación en UCI: Equilibrio entre profilaxis y terapia para minimizar riesgo trombótico y hemorrágico

Richard Marcial Gálvez Vila [1*], Alejandro Moya Linares [2]

[1] University of Medical Sciences of Matanzas. Colón Branch of Medical Sciences "Dr. Eusebio Hernández Pérez". Matanzas, Cuba.

[2] University of Medical Sciences of Sancti Spíritus. Faculty of Medical Sciences Dr. "Faustino Pérez Hernández". Sancti Spíritus, Cuba.

How to cite this article: Gálvez-Vila RM; Moya-Linares A. Anticoagulation in the ICU: Balancing prophylaxis and therapy to minimize thrombotic and hemorrhagic risk. MedEst. [Internet]. 2026 [cited access date]; 6:e433. Available in: https://revmedest.sld.cu/index.php/medest/article/view/433

Keywords: ICU anticoagulation; Thrombotic-hemorrhagic risk; Viscoelastic monitoring; Personalized therapy

Palabras Clave: Anticoagulación en UCI; Riesgo trombótico-hemorrágico; Monitorización viscoelástica; Terapia personalizada.

Corresponding author: richardgalvez163@gmail.com

Received: 25/10/2025

Accepted: 30/12/2025

Editor(s) in charge: Shania Naranjo Lima.

Translator: Lic. Meliza Maura Vázquez Núñez.

Layout designer: Carlos Luis Vinageras Hidalgo

Dear Director:

Prophylactic anticoagulation in the Intensive Care Unit (ICU) focuses on preventing deep vein thrombosis and pulmonary embolism when the clotting risk exceeds the bleeding risk, even in the absence of evidence of a confirmed clot. It is administered with low doses of low molecular weight heparin or subcutaneous heparin, following protocols that consider prolonged immobilization, major surgery, sepsis, cardiac or respiratory failure, and elevated inflammatory markers such as D-dimer and fibrinogen. (1) This strategy is the fundamental basis for the safety of critically ill patients in a thrombotic risk situation.

The World Health Organization (WHO) indicates that viscoelastic coagulation tests (TEG/ROTEM) should be used to decide between prophylaxis and active therapy when the bleeding risk is uncertain. Furthermore, mechanical prophylaxis with intermittent compression is recommended when pharmacological anticoagulation is contraindicated. The extension of prophylaxis is 7-14 days after ICU discharge and is justified with low molecular weight heparin or a direct oral anticoagulant in patients with persistent risk. Dose adjustment is based on renal failure and obesity, with anti-Xa measurements to avoid overdosing or underdosing. (1,2) The adoption of these WHO recommendations, especially the use of advanced monitoring tools, is a necessary step towards more personalized and safer anticoagulation.

To reverse anticoagulation in case of hemorrhage, the use of protamine and prothrombin complex concentrate (PCC) is advised.

MedEst. 2026| Vol. 6: e433
ISSN: 2789-7567 | RNPS: 2524

Special considerations for pregnant women and patients with liver disease are included. The reassessment of thrombotic and hemorrhagic risk should occur every 48-72 hours using the International Multicenter Venous Thromboembolism Risk Assessment (IMPROVE VTE score). [2] The authors emphasize the critical importance of having clear reversal protocols and frequent risk reassessment, as this allows for agile and effective management of the fine line between efficacy and safety.

Therapeutic anticoagulation is reserved when a diagnosis of thromboembolism is confirmed or when hypercoagulability markers, especially an elevated D-dimer, indicate significant thrombotic activity. In these cases, higher doses of heparin or oral and intravenous anticoagulants are used, such as apixaban, rivaroxaban, warfarin, or IV heparin. [2]

In clinical practice, the balance between preventing thrombosis and avoiding hemorrhage is assessed through constant risk-benefit evaluation. This is why critical care society guidelines recommend using clinical scores such as Padua and Wells, which quantify thrombotic and hemorrhagic risk factors; by summing these values, the physician obtains an index that guides the initial decision between prophylaxis or active therapy, a criterion supported by Ferrandis R et al. [3] The authors share the view that the systematic use of these validated scales is indispensable for making objective and well-founded initial decisions.

Laboratory results such as D-dimer, coagulation tests (PT/INR, aPTT), platelet count, and renal function provide concrete data on thrombotic activity and the body's ability to metabolize anticoagulants. When these parameters change during the ICU stay, the professional adjusts the dose to maintain the therapeutic target without exceeding the safe margin. [3] This serial laboratory monitoring constitutes the pillar of dynamic and adjusted anticoagulation management, allowing adaptation to the changing physiology of the critically ill patient.

Continuous monitoring allows for a reaction to events such as unexpected hemorrhages or a sudden increase in thrombotic markers; thus, the risk of serious complications is minimized and patient survival is optimized. This dynamic strategy constitutes the fundamental pillar of anticoagulation in critically ill patients according to current recommendations.

When prophylaxis is maintained without escalation and combined with a dynamic coagulation assessment, viscoelastic tests and markers such as factor VIII or fibrinogen are used, achieving a more stable

MedEst. 2026| Vol. 6: e433
ISSN: 2789-7567 | RNPS: 2524

balance between thrombotic prevention and hemorrhagic risk than with intensive therapies based solely on high doses.

According to Cuker A et al. [4], in patients with moderate or high hemorrhagic risk, light prophylaxis accompanied by mechanical devices (intermittent compression) offers similar protection with a lower incidence of major hemorrhage. This view complements current recommendations that prioritize clinical safety over pharmacological aggressiveness when treating critically ill patients.

Research on this topic is constantly evolving, as ultimately, the combination of routine prophylaxis with a therapeutic escalation conditioned by the outcome of a personalized risk algorithm redefines clinical practice. Furthermore, the use of dynamic markers such as thrombin generation allows for the detection of sudden changes in the hemostatic balance before thrombotic or hemorrhagic events manifest. However, the final decision must balance this data with clinical judgment and the individual characteristics of the patient to ensure maximum safety and efficacy.

The future of anticoagulation in the critically ill patient lies in the integration of personalized algorithms based on risk and dynamic biomarkers, without forgetting that expert clinical judgment remains irreplaceable for interpreting this information in the unique context of each patient.

BIBLIOGRAPHIC REFERENCES

1. Abdel-Qadir H, Austin PC, Pang A, Fang J, Udell JA, Geerts WH, et al. The association between anticoagulation and adverse outcomes after a positive SARS-CoV-2 test among older outpatients: A populationbased cohort study. Thromb Res. [Internet] 2022 [cited 22/10/2025]; 21(3): 114-122. Available in: http://dx.doi.org/10.1016/j.thromres.2021.12.010.

2. Wills NK, Nair N, Patel K, Sikder O, Adriaanse M, Eikelboom J, et al. Efficacy and safety of intensified versus standard prophylactic anticoagulation therapy in patients with Covid-19: A systematic review and meta-analysis. MedRxiv. [Internet] 2022 [cited 22/10/2025]; 56(2): 234-345. Available in: http://dx.doi.org/10.1101/2022.03.05.22271947,2022.03.05.22271947

3. Ferrandis R, Escontrela B, Ferrando C, Hernández M, Herrera J, Hodalfo F, et al. Eficacia de la tromboprofilaxis con heparina de bajo peso molecular en pacientes críticos con COVID-19: estudio observacional, propectivo y multicéntrico. Rev Esp Anestesiol Reanim.

MedEst. 2026| Vol. 6: e433
ISSN: 2789-7567 | RNPS: 2524

[Internet] 2022 [cited 22/10/2025]; 45(7):102-126. Available in: http://dx.doi.org/10.1016/j.redar.2022.01.014.

4. Cuker A, Tseng EK, Nieuwlaat R, Angchaisuksiri P, Blair C, Dane K, et al. American Society of Hematology living guidelines on the use of anticoagulation for thromboprophylaxis in patients with COVID-19: May 2021 update on the use of intermediate-intensity anticoagulation in critically ill patients. Blood Adv. [Internet] 2021 [cited 22/10/2025]; 13(5):39-45. Available in: http://dx.doi.org/10.1182/bloodadvance.2021005493.

CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest.