Update in Hospital Medicine 2026

Brian Markoff, MD, FACP, SFHM

NYACP Annual Scientific Meeting

Oct 24, 2026

Mount Sinai

Disclosure of Financial Relationships

I have no relationships with financial entities to disclose

Article Selection

- Time frame of publication approximately the last year
- Ann Int Med, NEJM, J Hosp Med, ACP Journal Club, Journal Watch, and “In the Literature” from The Hospitalist
- Criteria are my own

What We Are Going To Talk About?

- ✓ Should I use IV iron in my patient with iron deficiency anemia and an acute infection?
- ✓ Do patients with CAP and a positive viral assay need antibiotics?
- ✓ Did someone change the acute PE categories--again?
- ✓ Do I have to image every cancer patient with possible PE symptoms?
- ✓ What's better—apixaban or rivaroxaban?
- ✓ What's better—more fluids or early pressors?
- ✓ If my septic patient needs pressors, can I use a PIV?
- ✓ Is slower really better when correcting sodium?

Our first patient…

BS is an 84yo F with a h/o HTN and OA. She takes amlodipine, HCTZ, and NSAIDs. She presents with fever, chills, and UTI symptoms.

Her SBP is 85 and HR is 110 in the ED. She is admitted for sepsis secondary to UTI.

On the admission labs her Hgb is 9. Further testing shows iron deficiency anemia. At 24 hours of hospitalization her blood cultures grow GNR.

Is it safe to give her IV iron in the setting of bacteremia? Don't bacteria love iron?



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Regular Article

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RED CELLS, IRON, AND ERYTHROPOIESIS

CME Article

A retrospective, real-world study of IV iron use to treat iron deficiency anemia during acute infection

Haris Sohail,[1] Jennifer E. Collins,[2] Kok Hoe Chan,[1] Mohammad Ahsan Alamgir,[1] and Amir Kamran[1]

[1]Department of Hematology/Oncology and [2]Center for Health Services and Outcomes Research, Charleston Area Medical Center, Charleston, WV

KEY POINTS

- Administration of IV iron therapy during acute infections was associated with improved 14- and 90-day survival.
- IV iron therapy in patients with acute infection was associated with better hemoglobin recovery, no increase in length of stay, and fewer days with transfusion than no IV iron.

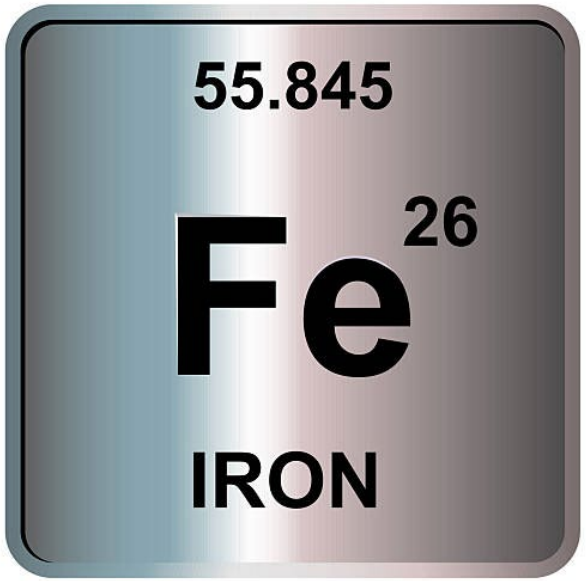
The administration of IV iron to treat anemia during acute infection remains controversial owing to concerns of exacerbating the infection. We conducted a retrospective cohort study using the TriNetX Research Network (2000 to June 2025) to evaluate the safety and efficacy of IV iron administration in adults with iron deficiency anemia and infection (methicillin-resistant *Staphylococcus aureus* [MRSA] bacteremia, pneumonia, urinary tract infection [UTI], colitis, or cellulitis). Patients must have received antibiotic agents within 2 days of infection for inclusion and were stratified by IV iron exposure. Propensity matching (1:1) was performed within each cohort. Survival was significantly higher ($P < .001$ for each infection type) at both 14 and 90 days in patients who received IV iron (MRSA bacteremia, 97.6% vs 95.0% and 88.6% vs 83.8%; pneumonia, 95.7% vs 91.5% and 84.7% vs 78.1%; UTI, 97.6% vs 95.7% and 89.1% vs 85.6%; colitis, 97.6% vs 95.5% and 89.7% vs 83.8%; and cellulitis, 98.5% vs 97.4% and 92.2% vs 89.2%). Hemoglobin recovery 60 to 90 days after infection was significantly greater (all $P < .001$) when IV iron was administered across all subgroups (MRSA bacteremia, +1.3 vs +1.0 g/dL; pneumonia, +1.3 vs +1.0 g/dL; UTI, +1.4 vs +1.0 g/dL; colitis, +1.5 vs +0.7 g/dL; and cellu-

Downloaded from ashpublications.org/blood/article-pdf/147/21/2518/2521232/blo

Sohail, H et al. *Blood* 2026 Jan 27

Background

- Approximately 40% of hospitalized patients are anemic, with iron deficiency anemia (IDA) accounting for about 25% of those cases



- IDA may worsen outcomes in PNA and sepsis

- IV iron is preferred over oral therapy in hospitalized patients, especially in patients with chronic kidney disease, heart failure, inflammatory bowel disease, and pregnancy.

Background

- The use of IV iron during infections remains controversial because many pathogens rely on iron for growth and virulence
- Clinical studies of IV iron use during acute infection have shown mixed results
- Because of the absence of robust, real-world data and lingering concerns about theoretical harm, many clinicians remain reluctant to use IV iron in the setting of acute infection



Study Design

- Large retrospective, observational, propensity-matched analysis of hospitalized adults with acute infection and IDA using deidentified electronic health records from 111 health care organizations—the TriNetX Research Network database



- Infections included:
  - MRSA bacteremia
  - Pneumonia
  - UTI
  - Colitis
  - Cellulitis

- Sorted into 2 groups—received IV iron within 7 days of combined IDA-infection diagnosis or not

Outcomes

- Primary Outcome
  - Survival at 14 and 90 days after the index date

- Secondary Outcomes
  - LOS
  - Antibiotic exposure
  - Respirator use
  - Transfusion of blood or blood products

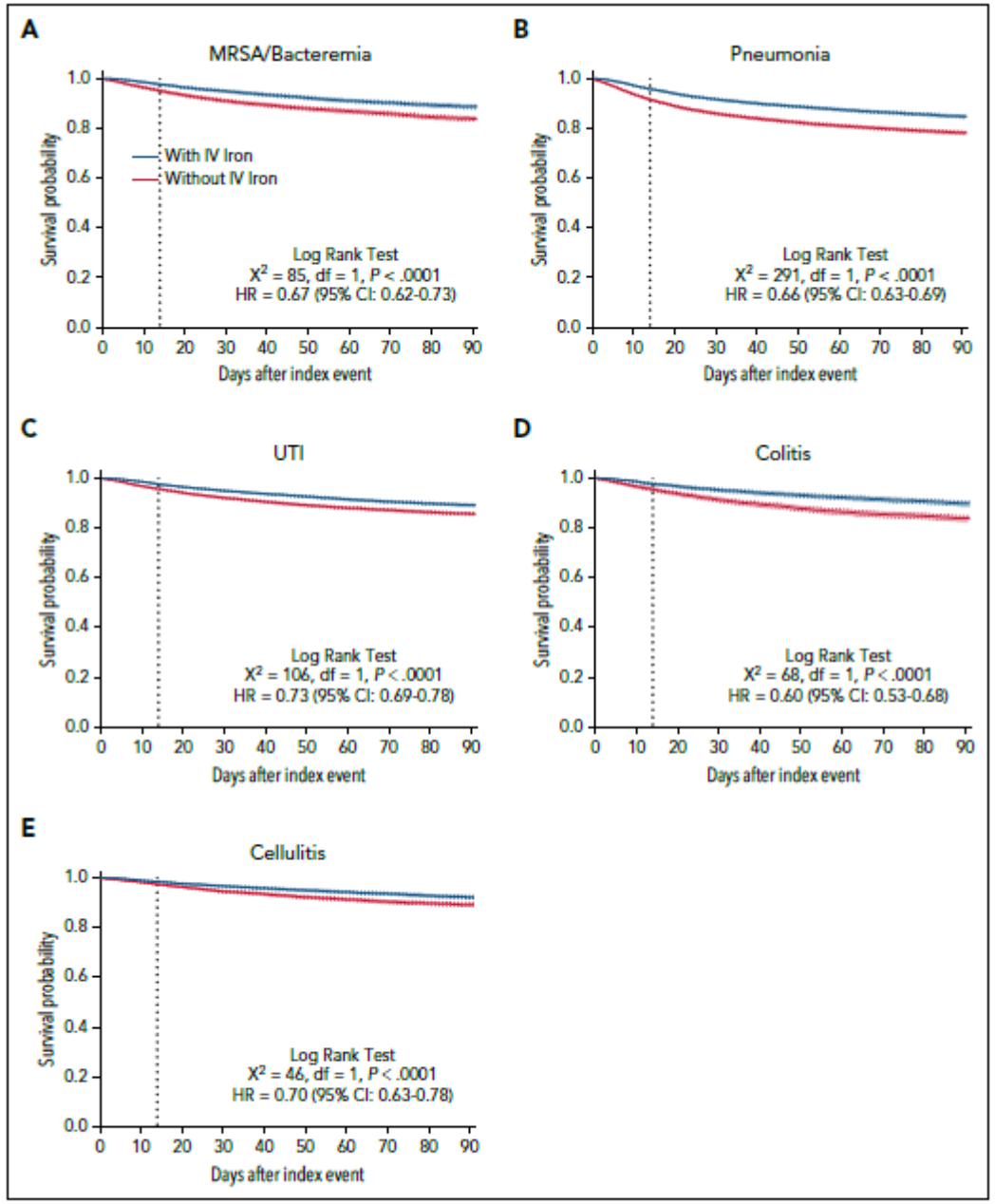


Figure 1. Kaplan-Meier survival curves up to 90 days by infection type, stratified by IV iron exposure. Survival probabilities are shown for patients with MRSA bacteremia (A), pneumonia (B), UTI (C), colitis (D), and cellulitis (E). Blue lines represent patients treated with IV iron, and red lines represent those without IV iron. The dotted horizontal line indicates 14-day survival. HRs and 95% CIs were determined by log-rank test.

- LOS was slightly longer among IV iron recipients with MRSA bacteremia (4.39 vs 4.08 days) and UTI (4.06 vs 3.86)
- PNA pts in the IV-iron group required more respiratory-support days than the no-IV-iron group (1.12 vs 1.09 days)
- PNA, UTI, cellulitis pts had slightly longer abx exposure in the IV-iron groups
- All IV iron groups had less transfusions except cellulitis pts

Sohail, H et al. *Blood* 2026

Limitations

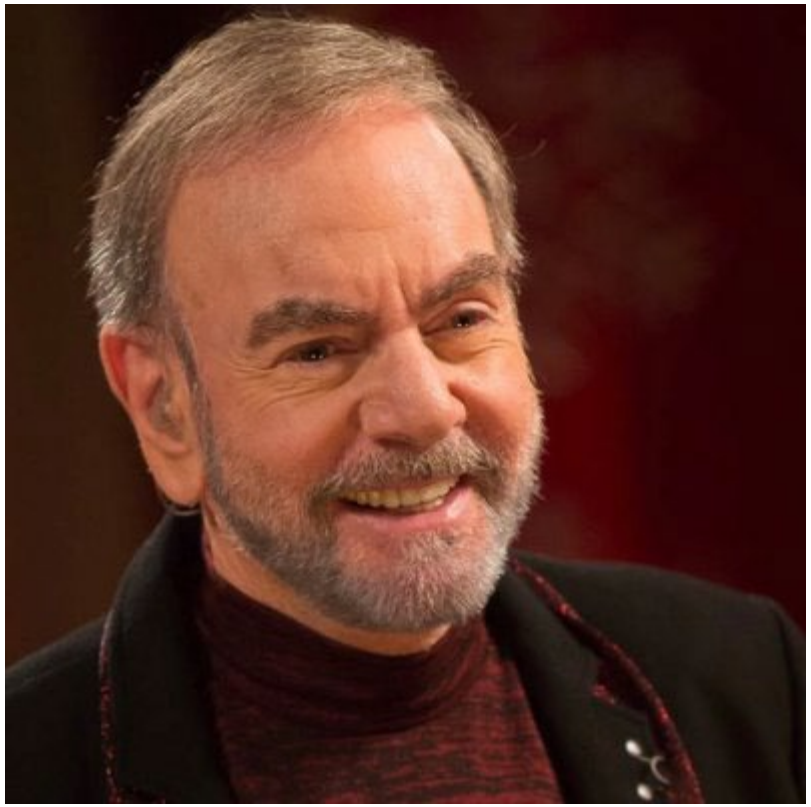
- Retrospective, observational design precludes definitive conclusions regarding causality
- Detailed microbiologic information was limited
- Adverse events, such as hypersensitivity reactions or infusion-related reactions, are not reliably captured in the TriNetX network
- Clinical factors driving the decision to administer or withhold IV iron could not be assessed
- Limited data in immunocompromised patients and ICU pts

Bottom Line

IV iron administration is helpful in hospitalized patients with IDA and acute infection

Our next patient…

ND is an 85yo M with a h/o Parkinson's dz. He presents with fever and a cough and is being admitted for CAP. He requires 2LNC O2 but vitals are otherwise normal. WBC 12, platelets 150. CXR shows hazy opacity in the left lower lobe.



When you look at his labs you notice his respiratory virus panel is positive for parainfluenza virus.

Does this patient need antibiotics?

> Am J Respir Crit Care Med. 2025 Jul 18. doi: 10.1164/rccm.202507-1692ST. Online ahead of print.

Diagnosis and Management of Community-acquired Pneumonia. An Official American Thoracic Society Clinical Practice Guideline

Barbara E Jones [1 2], Julio A Ramirez [3], Eyal Oren [4], Nilam J Soni [5 6], Liam R Sullivan [7], Marcos I Restrepo [8], Daniel M Musher [9], Brian L Erstad [10], Chiagozie Pickens [11], Valerie M Vaughn [12], Scott A Helgeson [13], Kristina Crothers [14], Joshua P Metlay [15], Brittany D Bissell Turpin [16], Bin Cao [17], James D Chalmers [18], Charles S Dela Cruz [19], Inessa Gendlina [20], Leila S Hojat [21], Maryrose Laguio-Vila [22], Stephen Y Liang [23], Grant W Waterer [24], Marilynn Paine [25], Conall Hawkins [26], Kevin Wilson [27 28]

Affiliations + expand

PMID: 40679934 DOI: 10.1164/rccm.202507-1692ST

Jones, B et al. *Am J Respir Crit Care Med.* 2025 Jul 18: 1-119

Recommendations



2. Empiric Antibacterial therapy for CAP with positive respiratory virus testing

For adult inpatients with clinical and imaging evidence of non-severe and severe CAP who test positive for a respiratory virus, we suggest prescribing empiric antibiotics due to concern for bacterial-viral co-infection (conditional recommendation, very low-quality evidence).

Jones, B *et al. Am J Respir Crit Care Med.* 2025

Clinical Infectious Diseases

VIEWPOINTS

Infectious Diseases Society of America (IDSA) Position Statement: Why IDSA Did Not Endorse the Community-Acquired Pneumonia Guidelines 2025 Update

Michael Klompas,[1,2] Majdi Al-Hasan,[3,4] Mayar Al Mohajer,[5,6] Robert Colgrove,[7,8] Shira Doron,[9] Thomas File,[10,11] Natasha N. Pettit,[12] Michael Pulia,[13] and Sharon Weissman[3,4]

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The American Thoracic Society recently released updated community-acquired pneumonia (CAP) guidelines. The Infectious Diseases Society of America (IDSA) agreed with 8 of the 10 recommendations in the guidelines but declined to endorse the guidelines because they include recommendations for use of antibiotics in outpatients with comorbidities and inpatients with nonsevere CAP who test positive for respiratory viruses. It is noted in the guidelines that bacterial coinfections are common and that delaying antibiotics may be harmful. IDSA notes, however, that nondiscriminatory use of antibiotics for patients with CAP and positive viral assays confers more risks than benefits. Most patients do not have bacterial coinfections, and briefly withholding antibiotics for patients with nonsevere illness to clarify the diagnosis is safe. In this era of precision medicine, IDSA instead recommends individualized, dynamic decision-making that takes into account each patient's evolving trajectory, severity of illness and balance of clinical features for and against coinfection.

Keywords. community-acquired pneumonia; guidelines; viral assays; antibiotic stewardship.

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Clinical Infectious Diseases

MAJOR ARTICLE

Associations Between Antibiotic Use and Outcomes in Patients Hospitalized With Community-Acquired Pneumonia and Positive Respiratory Viral Assays

Brett Biebelberg,[1] Tom Chen,[2] Cara McKenna,[2] Sanjat Kanjilal,[3] Claire Shappell,[4] Chanu Rhee,[2,4] and Michael Klompas[2,4]

[1]Department of Medicine, University of Pennsylvania, Philadelphia, Pennsylvania, USA; [2]Department of Population Medicine, Harvard Medical School and Harvard Pilgrim Health Care Institute, Boston, Massachusetts, USA; [3]Department of Medical Microbiology, Amsterdam University Medical Center, Amsterdam, The Netherlands; and [4]Department of Medicine, Brigham and Women's Hospital, Boston, Massachusetts, USA

Background. Newly released community-acquired pneumonia (CAP) guidelines include a conditional recommendation to treat all hospitalized patients with positive respiratory virus assays with antibacterials. We assessed the frequency, duration, and outcomes of antibacterial prescribing in this population.

Methods. We retrospectively identified all hospitalized patients with possible CAP and a positive respiratory virus test at 5 hospitals, June 2015–December 2024. We used detailed clinical data to propensity-weight patients treated with 0–2 versus 5–7 days of antibacterials and compared outcomes overall and for different viruses.

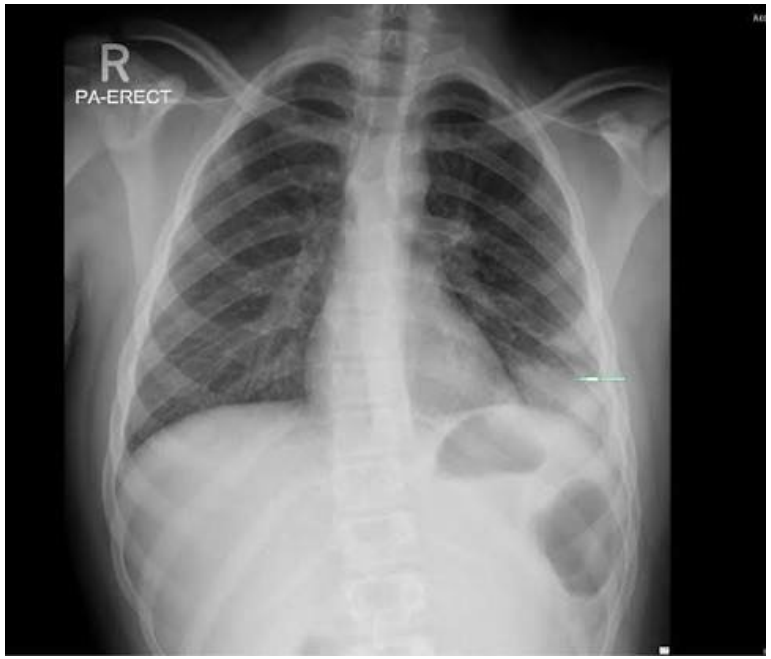
Results. Among 6779 patients with possible CAP and a respiratory virus, 3269 were treated with 0–2 days and 1560 with 5–7 days of antibacterials. After propensity-weighting 2614 patients (1720 treated 0–2 days, 894 treated 5–7 days), there were no significant differences in hospital length of stay (11.7 days vs 11.1 days; OR 1.05, 95% CI .97–1.15), ICU admission after 48 hours (28.3% vs 28.2%; OR 1.01, 95% CI .86–1.18), in-hospital mortality (9.5% vs 9.8%; OR 0.97, 95% CI .74–1.27), or 30-day hospital-free days (16.9 days vs 17.0 days; OR 0.99, 95% CI .95–1.03). Results were consistent when restricted to non-SARS-CoV-2 viruses and to influenza alone, when comparing 0 versus 5–7 days of antibacterials, and when restricting to patients with ICD-10 codes for pneumonia present on admission.

Conclusions. Antibacterial use for patients with possible CAP and respiratory viruses is highly variable but outcomes are similar with 0–2 versus 5–7 days of antibacterials. This suggests antibiotics are not beneficial in most CAP patients who test positive for respiratory viruses.

Keywords. community-acquired pneumonia; respiratory viral infections; antibiotic stewardship; influenza.

Background

- 740,000 patients are hospitalized for pneumonia each year in the U.S.
- Two-thirds of patients with identifiable pathogens test positive for respiratory viruses, not bacteria
- Bacterial co-infection is present in only a minority of patients with respiratory viruses
- Limited data on the association between antibiotic use and outcomes in patients with possible pneumonia and positive respiratory viral assays
- For patients with non-severe CAP, there is little risk associated with waiting to start antibiotics after clarifying if the pt has bacterial co-infection



Study Design

- Retrospective, cohort study of all adults admitted to the wards at 5 Massachusetts hospitals 2015-2024
- Included pts had a clinical diagnosis of CAP and had a positive viral assay within 48 hrs of admission
- Compared outcomes among patients treated with very short courses (0–2 days) versus those treated with conventional CAP courses (5–7 days)

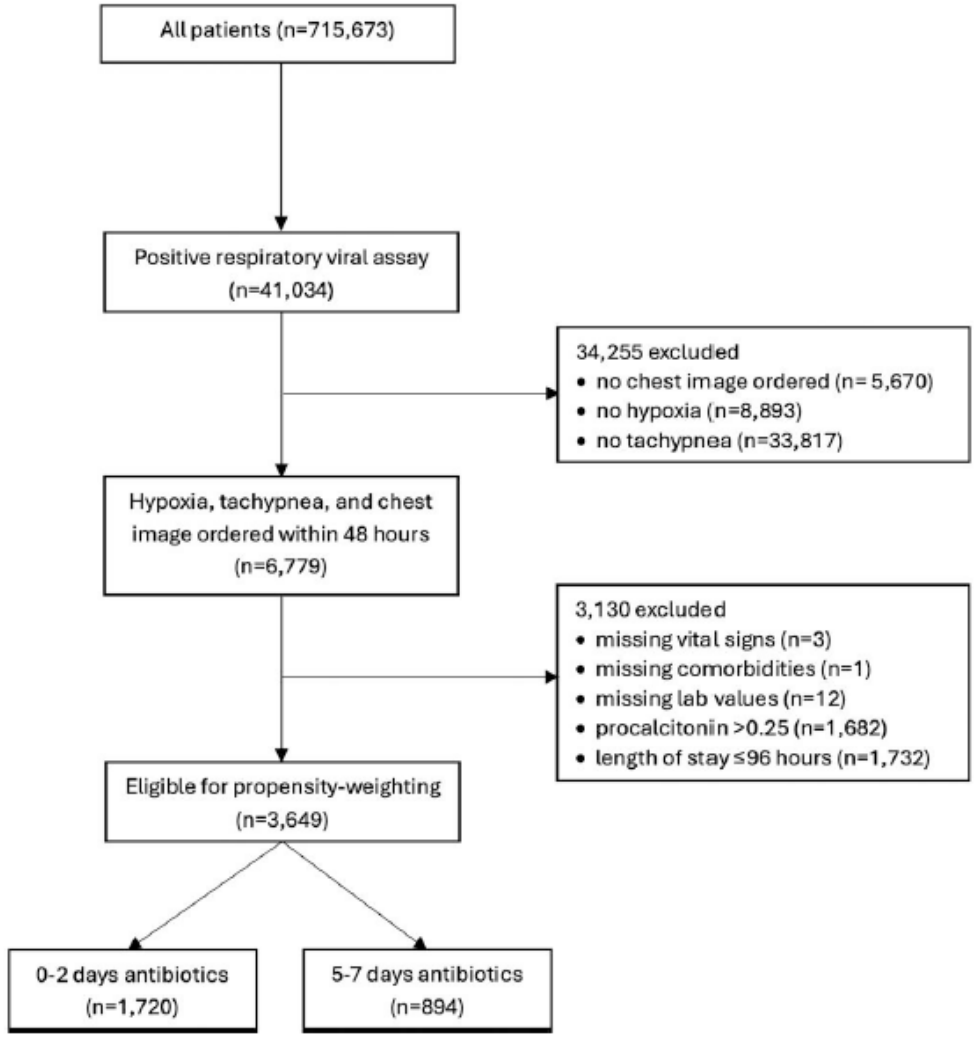


Figure 1. Patient inclusion criteria.

Biebelberg, B et al. *CID* 2026:82

Outcomes

- LOS
- In-hospital mortality
- Transfer to ICU >48 hours after admission
- 30-day hospital-free days
- AKI within 14 days
- *Clostridioides difficile* infection within 90 days

Table 3. Outcomes Associated With 0–2 versus 5–7 Days of Antibiotics in Patients With Possible Community-Acquired Pneumonia Who Test Positive for a Respiratory Virus

		Unadjusted Population			Propensity-Weighted Population		
Outcome	Measure of association	0–2 d antibiotics (n = 1720)	5–7 d antibiotics (n = 894)	0–2 versus 5–7 d (95% CI)	0–2 d antibiotics (n = 1720)	5–7 d antibiotics (n = 894)	0–2 versus 5–7 d (95% CI)
All viruses (N = 2614)							
Hospital length of stay (d)	Ratio of means	11.1	12.4	0.90 (.82–.98)	11.7	11.1	1.05 (.97–1.15)
In-hospital mortality	Odds ratio	7.9%	14.8%	0.50 (.38–.64)	9.5%	9.8%	0.97 (.74–1.27)
ICU admission after 48 h	Odds ratio	24.1%	39.6%	0.48 (.41–.58)	28.3%	28.2%	1.01 (.86–1.18)
30-d hospital-free days	Ratio of means	17.6	15.1	1.17 (1.11–1.22)	16.9	17.0	0.99 (.95–1.03)
C. difficile infection (90 d)	Odds ratio	0.4%	0.6%	0.73 (.23–2.30)	0.4%	0.4%	0.96 (.29–3.16)
Acute kidney injury (14 d)	Odds ratio	8.6%	14.1%	0.59 (.46–.76)	10.0%	11.6%	0.85 (.63–1.14)
All non-SARS-CoV-2 viruses (n = 878)							
Hospital length of stay (d)	Ratio of means	9.2	9.5	0.97 (.81–1.15)	9.4	8.9	1.06 (.91–1.24)
In-hospital mortality	Odds ratio	3.2%	9.1%	0.34 (.18–.62)	4.5%	6.2%	0.71 (.34–1.48)
ICU admission after 48 h	Odds ratio	15.0%	31.4%	0.39 (.28–.54)	23.3%	21.9%	1.08 (.73–1.59)
30-d hospital-free days	Ratio of means	19.8	18.3	1.08 (1.03–1.14)	19.2	19.2	1.00 (.94–1.06)
C. difficile infection (90 d)	Odds ratio	0.2%	0.5%	0.39 (.04–4.31)	0.2%	0.3%	0.76 (.06–6.84)
Acute kidney injury (14 d)	Odds ratio	8.9%	10.9%	0.80 (.51–1.25)	10.7%	9.3%	1.18 (.69–2.02)

Abbreviation: ICU, intensive care unit.

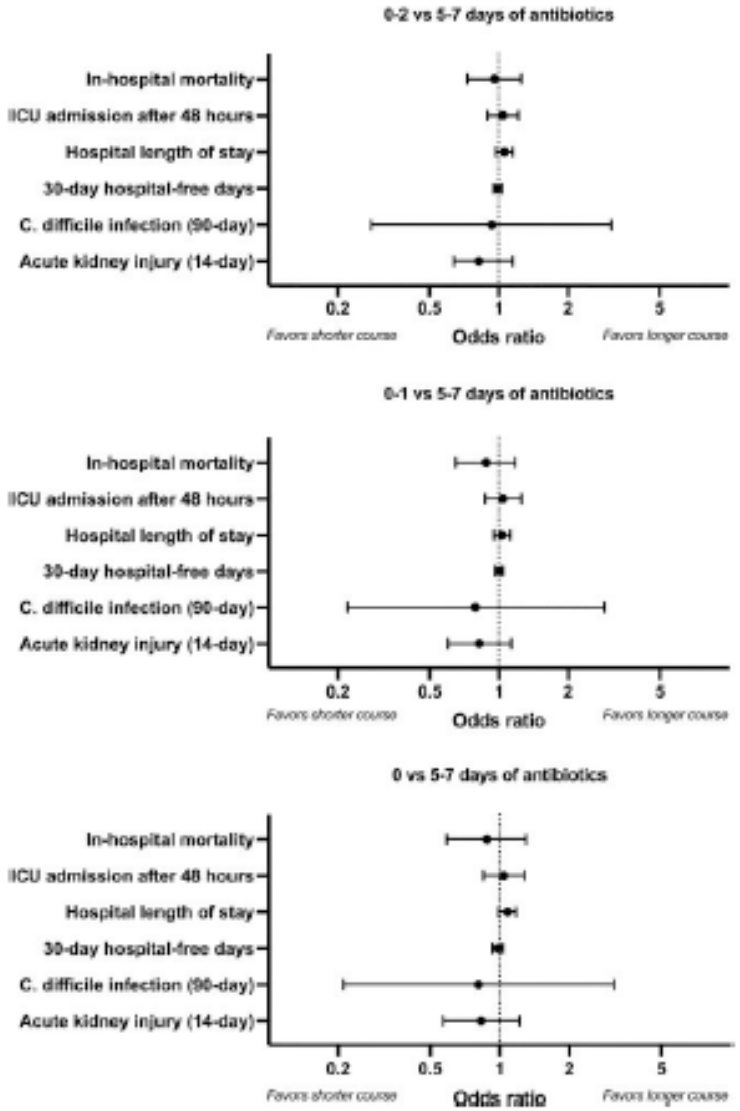


Figure 2. Propensity-weighted outcomes in patients with suspected pneumonia and a positive respiratory viral assay treated with shorter versus longer antibacterial courses.

Limitations

- Retrospective cohort design not definitive
- Short-course of abx sufficient to treat bacterial PNA?
- Massachusetts only

Bottom Line

For patients with non-severe CAP and a positive viral assay, withholding antibiotics is safe

The day continues…

Your next patient is DM, a 44yo M with a h/o Type 2 DM, heart failure and obesity. He presents to the ED with SOB and CP after flying from London to New York. You see him in the ED and suspect his symptoms might be from a PE.



His BP is normal but is HR is 115bpm and his O2 Sat is 89% on RA.

The ED obtained labs, including a high-sensitivity troponin and a D-dimer, and both are elevated.

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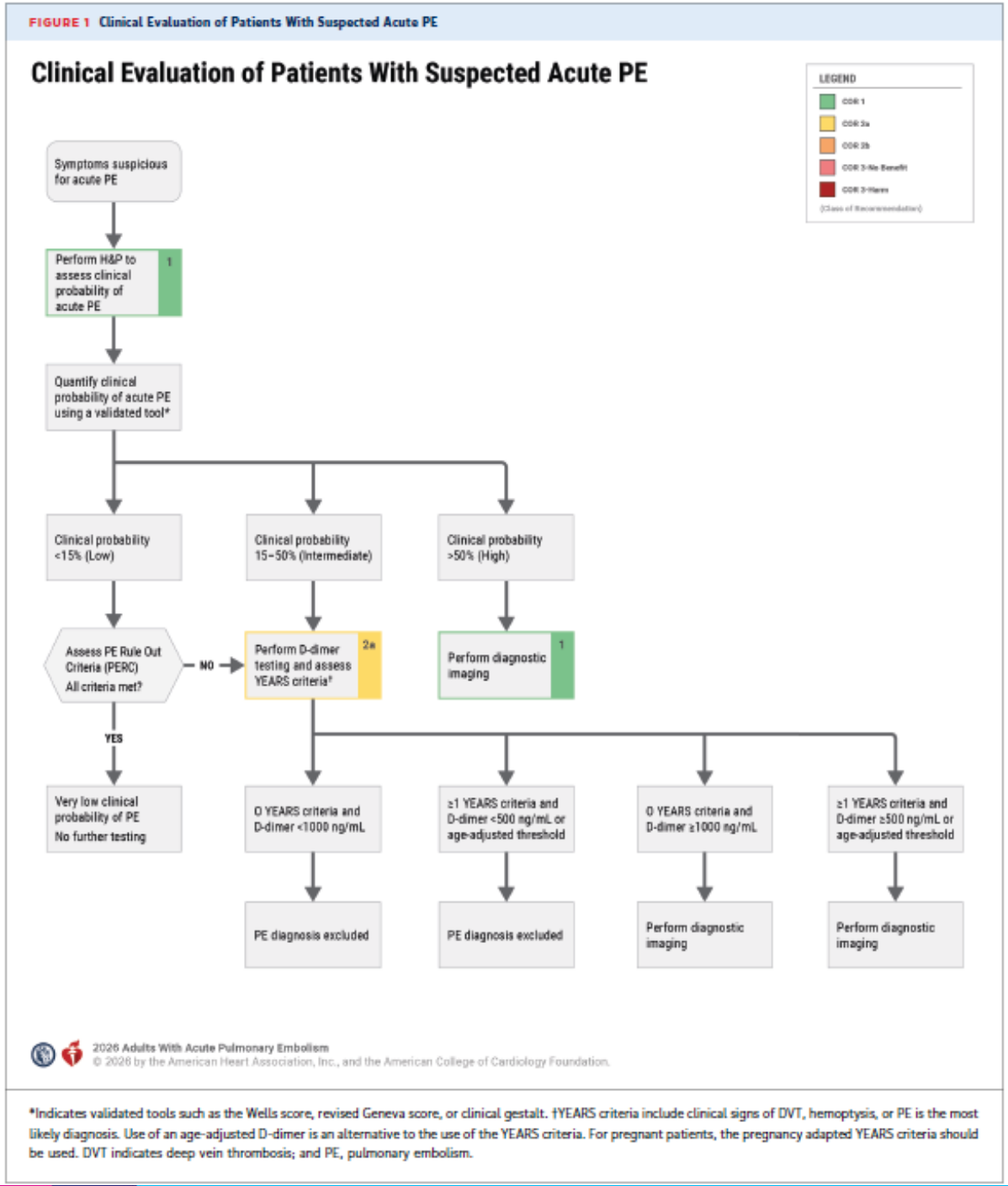
CLINICAL PRACTICE GUIDELINE

2026 AHA/ACC/ACCP/ACEP/CHEST/SCAI/SHM/SIR/SVM/SVN Guideline for the Evaluation and Management of Acute Pulmonary Embolism in Adults

A Report of the American College of Cardiology/American Heart Association
Joint Committee on Clinical Practice Guidelines

Developed in Collaboration With and Endorsed by the American College of Clinical Pharmacy, American College of Emergency Physicians, American College of Chest Physicians, Society for Cardiovascular Angiography & Interventions, Society of Hospital Medicine, Society of Interventional Radiology, Society for Vascular Medicine, and the Society of Vascular Nursing

Creager, M et al. *JACC* 87(13) 2026 Apr 7



Clinical probability tools:

- Wells score
- Geneva score
- clinical gestalt

PE rule out criteria (PERC):

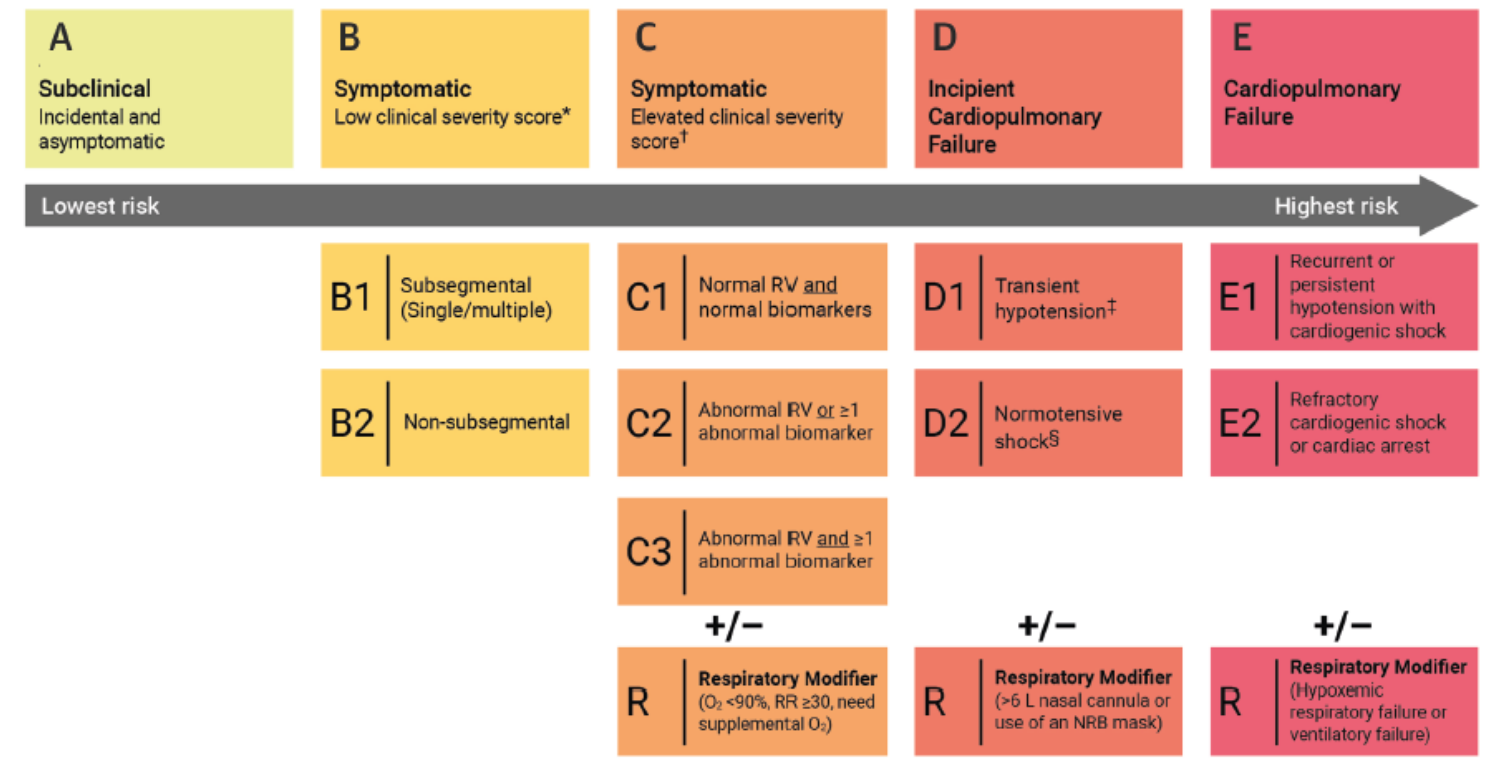
- Age ≥ 50
- Heart rate ≥ 100
- Oxygen saturation < 95% on RA
- Unilateral leg swelling
- Hemoptysis
- Hormone use
- Prior DVT or PE
- Surgery or trauma requiring hospitalization within the past 4 months

YEARS algorithm criteria:

- Signs of DVT
- Hemoptysis
- PE most likely diagnosis

Creager, M et al. *JACC* 87(13) 2026

FIGURE 2 AHA/ACC Acute PE Clinical Categories



2026 Adults With Acute Pulmonary Embolism
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When patients meet the respiratory modifier status criteria, then add "R" to the category description (eg, C3R, D2R). *Low Clinical Severity Score includes PESI ≤85 or sPESI =0 or Bova ≤ 4. †Elevated Clinical Severity Score includes PESI >85 or sPESI ≥1 or Bova > 4. ‡Systolic blood pressure <90 or decrease >40 mm Hg lasting <15 min or responding to IV fluids. §Any: Lactate >2 mmol/L, acute kidney injury, urine output <0.5 mL/kg/hr, mental status change, cardiac index <2.2 L/min/m^2, mean arterial pressure <60 mm Hg, increased shock score/stage (SCAI stage, CPES score). ACC indicates American College of Cardiology; AHA, American Heart Association; CPES, Composite Pulmonary Embolism Shock; IV, intravenous; NC, nasal cannula; NRB, nonrebreather; O_2, oxygen; PE, pulmonary embolism; PESI, Pulmonary Embolism Severity Index; RR, respiratory rate; RV, right ventricle; and sPESI, simplified PESI.

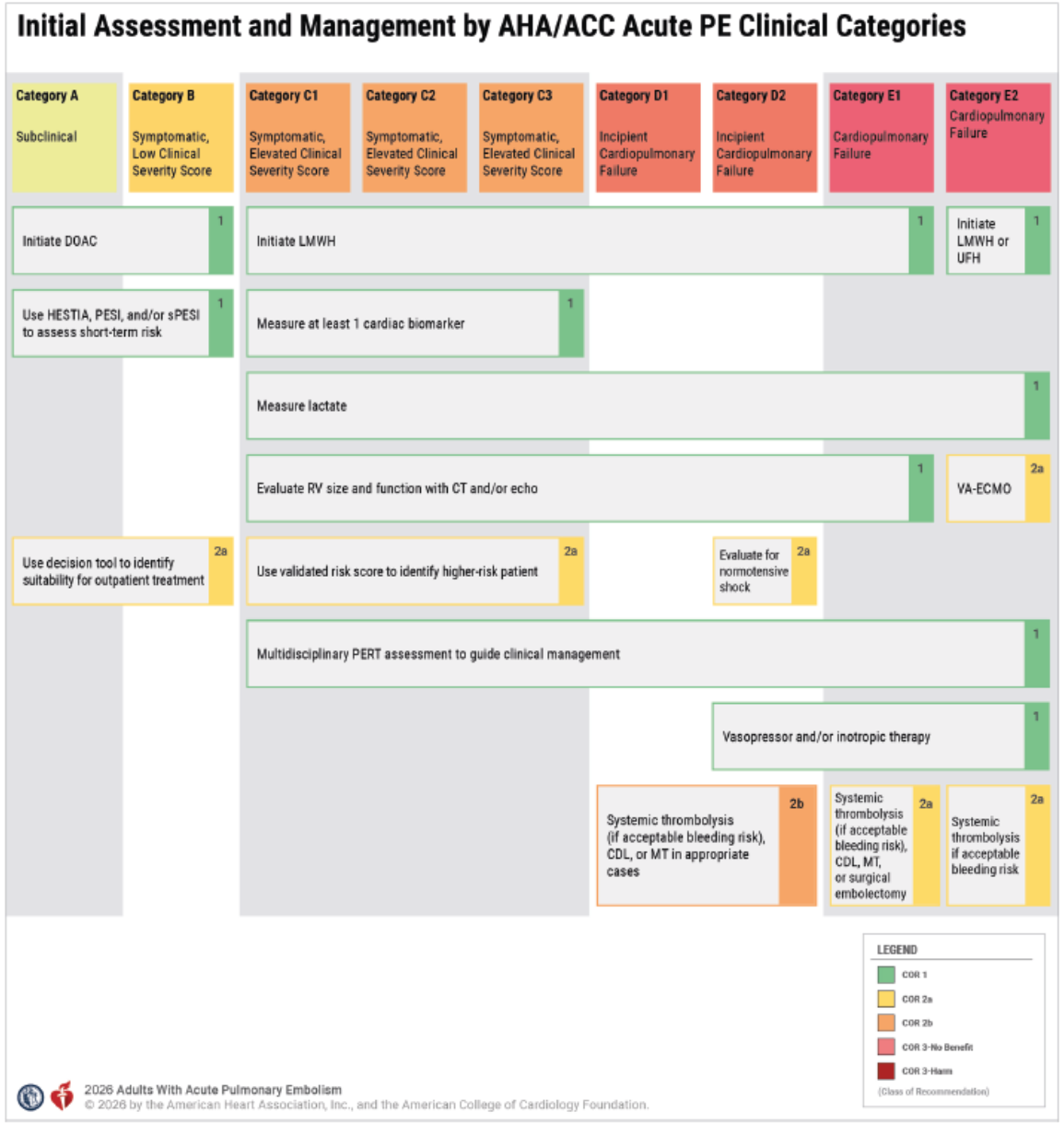
Clinical Severity Scores:

PESI

sPESI

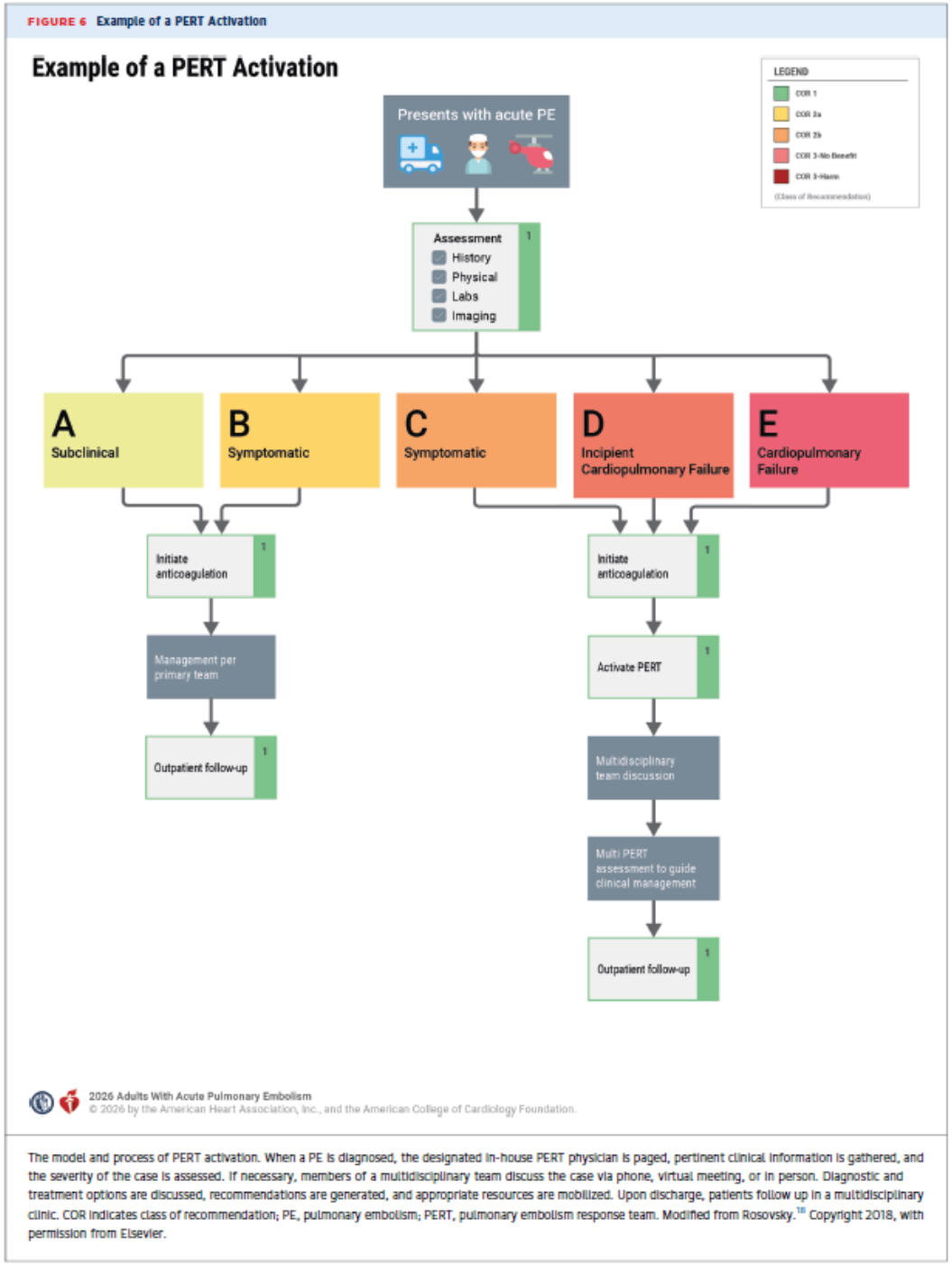
BOVA Score

Creager, M et al. *JACC* 87(13) 2026



Initial assessment and management of acute PE by category with associated COR 1 and 2a recommendations along with select COR 2b recommendations. Additional COR 2b recommendations that are not included in this figure may be appropriate in select clinical cases. ACC indicates American College of Cardiology; AHA, American Heart Association; CDL, catheter-directed thrombolysis; COR, class of recommendation; CT, computed tomography; DOAC, direct oral anticoagulant; ECMO, extracorporeal membrane oxygenation; LMWH, low-molecular-weight heparin; MT, mechanical thrombectomy; PE, pulmonary embolism; PERT, PE response team; PESI, Pulmonary Embolism Severity Index; RV, right ventricle; sPESI, simplified PESI; UFH, unfractionated heparin; and VA, venoarterial.

Creager, M et al. *JACC* 87(13) 2026



The model and process of PERT activation. When a PE is diagnosed, the designated in-house PERT physician is paged, pertinent clinical information is gathered, and the severity of the case is assessed. If necessary, members of a multidisciplinary team discuss the case via phone, virtual meeting, or in person. Diagnostic and treatment options are discussed, recommendations are generated, and appropriate resources are mobilized. Upon discharge, patients follow up in a multidisciplinary clinic. COR indicates class of recommendation; PE, pulmonary embolism; PERT, pulmonary embolism response team. Modified from Rosovsky.[18] Copyright 2018, with permission from Elsevier.

PERTs improve clinical outcomes in several areas (time to anticoagulation, decreased LOS, decreased use of IVC filters), but their effect on mortality is not yet conclusively established.

Creager, M et al. *JACC* 87(13) 2026

JAMA | Original Investigation

YEARS Algorithm for Diagnosis of Suspected Pulmonary Embolism in Patients With Cancer
A Randomized Clinical Trial

Bram Akerboom, MD; Emily S. L. Martens, MD; Milou A. M. Stals, MD, PhD; Rolf E. Brouwer, MD, PhD; Michiel Coppens, MD, PhD; Giorgio Costantino, MD, PhD; Francis Couturaud, MD, PhD; Yordi P. A. van Dooren, MD; René van der Griend, MD, PhD; Olivier Hugli, MD, MPH; David Jiménez, MD, PhD; Pieter W. Kamphuisen, MD, PhD; Ouiam El Kharbouchi, MD; Lucia J. M. Kroft, MD, PhD; Jenneke Leentjens, MD, PhD; Martje L. Maas, MD; Thijs E. van Mens, MD, PhD; Isabelle Mahé, MD, PhD; Oene A. van Meer, MD, PhD; Mattijs Out, MD, PhD; Roberto Pola, MD, PhD; Jo Raskin, MD; Marc Righini, MD, PhD; Reinier A. Sprenger, MD, PhD; Fleur H. J. Kaptein, MD, PhD; Rosa Talerico, MD, PhD; Tobias Tritschler, MD, PhD; Marije ten Wolde, MD, PhD; Frederikus A. Klok, MD, PhD; Menno V. Huisman, MD, PhD; for the Hydra Study Investigators

IMPORTANCE Although the YEARS algorithm is a safe and efficient way to rule out acute pulmonary embolism (PE), robust evidence on its accuracy in patients with cancer is lacking, and current guidelines suggest proceeding directly to computed tomographic pulmonary angiography (CTPA).

OBJECTIVE To compare the safety and efficiency of the YEARS algorithm with CTPA only to rule out acute PE in patients with active cancer.

Visual Abstract
Research Summary
Editorial page 642
Supplemental content
CME Quiz at jamacmelookup.com

The HYDRA study group

Background

- Patients with active cancer have much higher VTE rates than the general population—11X higher in the first 6 months after a cancer diagnosis

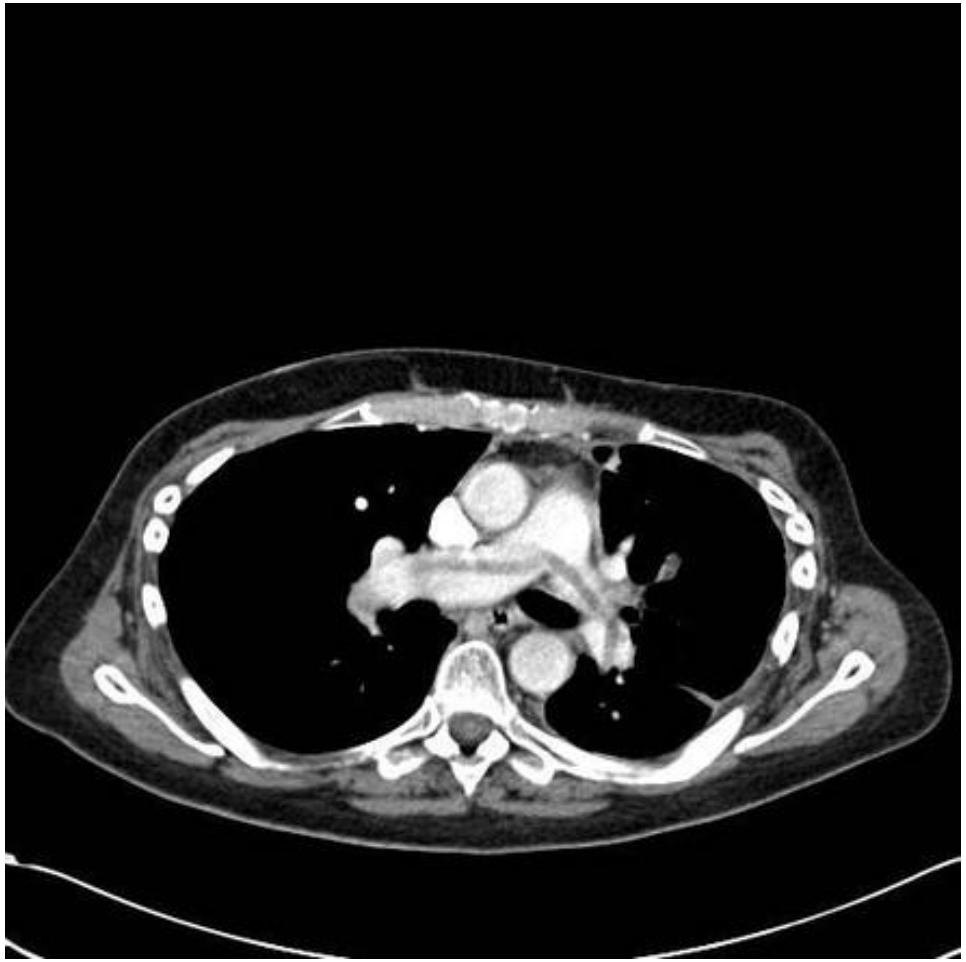
- VTE in cancer patients have higher mortality and lead to decreased quality of life

- The YEARS diagnostic algorithm assesses pretest probability of VTE based on 3 clinical items—signs of DVT, hemoptysis, and PE as the most likely diagnosis—and is used in conjunction with a probability-dependent D-dimer threshold to access the need for imaging



Background

- Current guidelines do not recommend the use of YEARS or similar clinical decision rules in patients with cancer because of uncertainty about how well it performs with this patient population



Study Design

- Open-label randomized clinical noninferiority trial conducted in 21 hospitals in six European countries

- Adults with active cancer (other than basal cell and squamous cell skin cancer) and suspected PE were included

- Exclusions included the need for anticoagulation for reasons other than suspected PE, hemodynamic instability, contraindications for CTPA, or life expectancy < 3 months

Akerboom B et al. *JAMA* 336(8) 2026

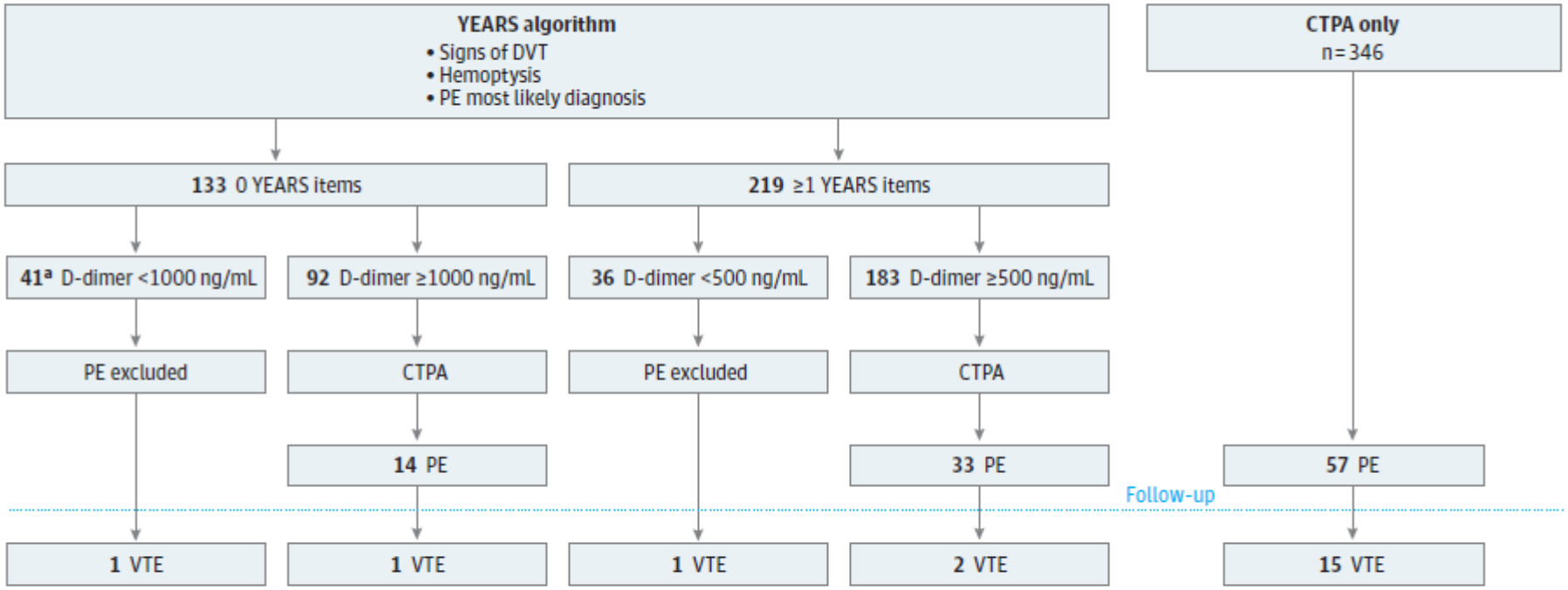
Outcomes

- The primary outcome was objectively proven, symptomatic PE, symptomatic upper or lower extremity deep vein thrombosis(DVT) or possible PE-related death during the 90-day follow-up period in patients with PE excluded at baseline

- Secondary outcome was efficiency, defined as the proportion of negative CTPAs relative to the number of CTPAs performed.

Results

Figure 2. Algorithm of the Number of Pulmonary Embolism Diagnoses at Baseline and Venous Thromboembolism Diagnoses During Follow-Up for Both Treatment Groups



[a]Of whom 21 patients had a D-dimer higher than 500 ng/mL.

Not included in this figure are 1 incidental VTE in the YEARS group and 3 incidental VTEs in the CTPA-only group.

CTPA indicates computed tomographic pulmonary angiography; DVT, deep vein thrombosis; PE, pulmonary embolism; VTE, venous thromboembolism.

- YEARS non-inferior to CTPA only
- 77 pts managed without CTPA in the YEARS group

Akerboom B et al. *JAMA* 336(8) 2026

Limitations

- Excluded pts with < 3-month life expectancy
- Not blinded
- No subgroup analyses for different primary cancer sites and stages

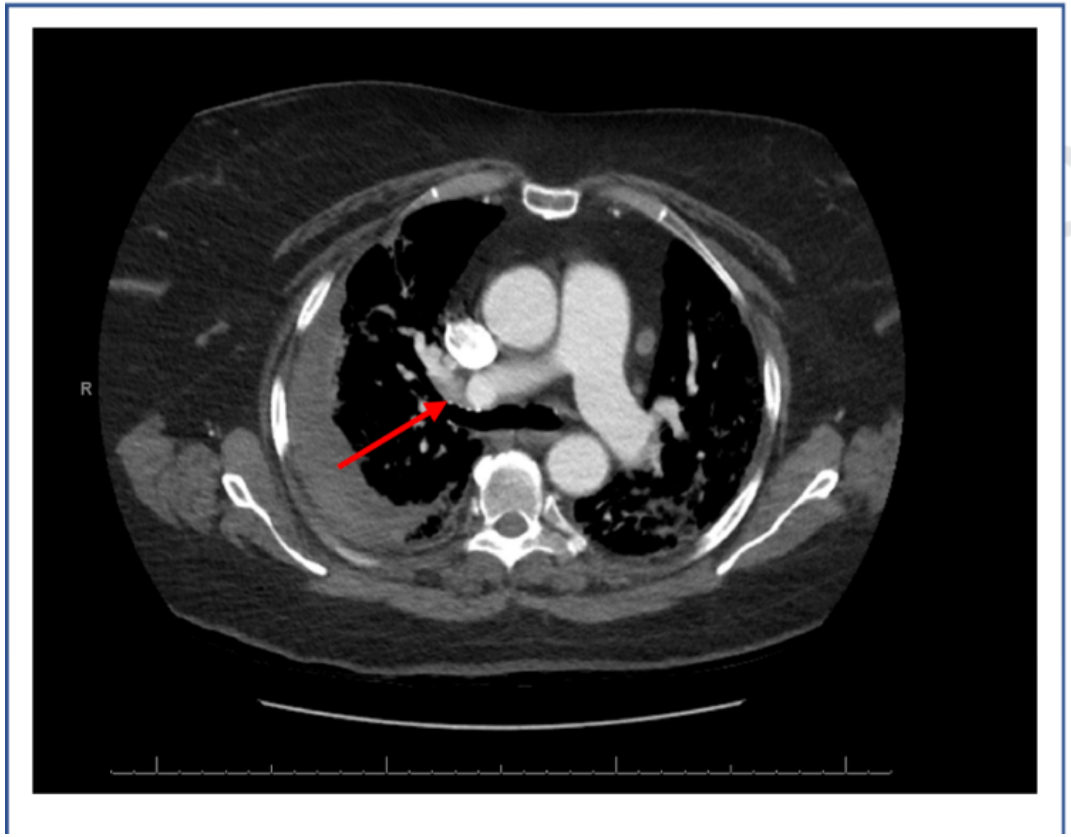
Bottom Line

You can safely use the YEARS algorithm in patients with suspected PE and active cancer to reduce the need for imaging

The case continues…

DM's CTPA comes back positive for multiple segmental PEs. He does well on LMWH and it's now time to switch him to a DOAC.

Which DOAC is better—apixaban or rivaroxaban?



The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 MARCH 12/19, 2026 VOL. 394 NO. 11

Bleeding Risk with Apixaban vs. Rivaroxaban in Acute Venous Thromboembolism

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ABSTRACT

BACKGROUND

Apixaban and rivaroxaban are the oral anticoagulants most frequently used to treat acute venous thromboembolism. However, uncertainty remains about the difference in bleeding risk between the two medications.

The authors' full names, academic degrees, and affiliations are listed at the end of the article. Lana Castellucci may be contacted at lcastellucci@toh.ca or at Ottawa Hospital,

Castellucci L et al. *N Engl J Med* 2026 Mar 12/19; 394:1051

Background

- Rivaroxaban and apixaban are the most frequently prescribed treatments for acute VTE



- Clinically relevant bleeding rates in clinical trials are lower for apixaban than rivaroxaban

- No head-to-head trials

Study Design

- International prospective, randomized, open-label, blinded endpoint (PROBE) trial of 2760 adult patients with acute VTE

- 1370 pts randomized to the apixaban group and 1390 to the rivaroxaban group

- Exclusion criteria included GFR < 30ml/min, active cancer, and Child–Pugh B or C liver disease

Results

Table 2. Clinical Outcomes during the Trial Period.

Outcome	Apixaban (N=1345)	Rivaroxaban (N=1355)	Relative Risk (95% CI)*
Primary outcome			
Clinically relevant bleeding†	44 (3.3)	96 (7.1)	0.46 (0.33–0.65)‡
Secondary outcomes			
Major bleeding	5 (0.4)	32 (2.4)	0.16 (0.06–0.40)
Clinically relevant nonmajor bleeding	39 (2.9)	67 (4.9)	0.59 (0.40–0.86)
Death from bleeding	0	0	
Recurrent symptomatic venous thromboembolism	15 (1.1)	14 (1.0)	1.08 (0.52–2.23)
Death from recurrent venous thromboembolism	0	0	
Death from any cause	1 (0.1)	4 (0.3)	0.25 (0.03–2.26)

* Analyses of secondary outcomes were not adjusted for multiplicity, and the widths of the confidence intervals should not be used in place of hypothesis testing.
† Clinically relevant bleeding was defined as a composite of major bleeding or clinically relevant nonmajor bleeding.
‡ P<0.001 for the comparison of the apixaban group with the rivaroxaban group.

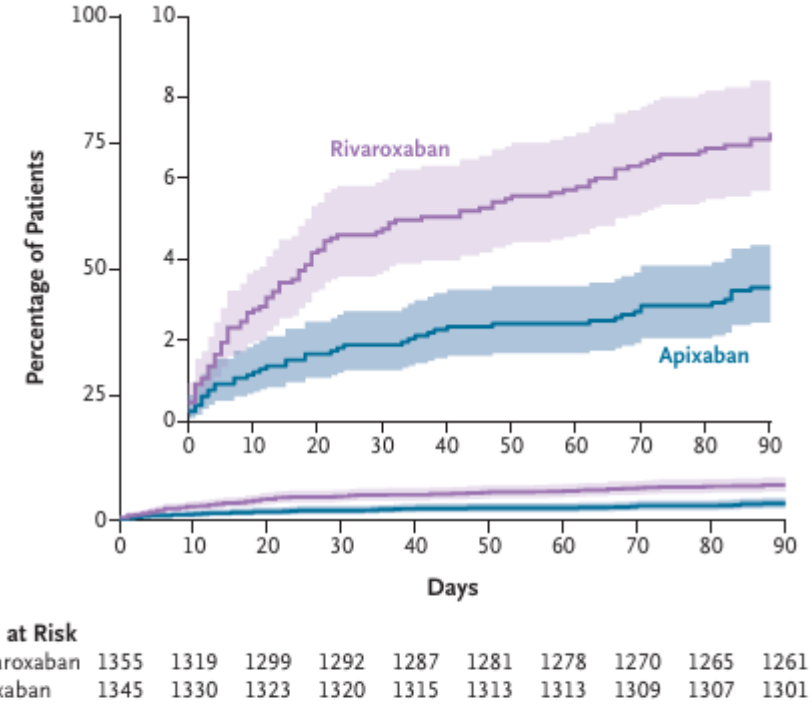


Figure 2. Clinically Relevant Bleeding.
Shown are Kaplan–Meier curves for the first episode of clinically relevant bleeding, a composite of major bleeding or clinically relevant nonmajor bleeding, during the 3-month treatment period (primary outcome). The inset shows the same data on an enlarged y-axis. Shading indicates 95% confidence intervals.

Castellucci L et al. *N Engl J Med* 2026;394:1051

Limitations

- Only followed pts for the first 3 months of therapy
- Not blinded
- Only 10% non-white participants

Bottom Line

The risk of clinically relevant bleeding is lower with apixaban compared to rivaroxaban

Your next patient…

AP is a 31yo M with a h/o T1DM and CKD3.



He presents with SBP 85, fever, and cellulitis. He is given 1.25L LR and antibiotics in the ED and admitted to your Medicine team.

When you see him his SBP is 95 and his lactate is 3. His urine output is poor, but he is mentating well.

Do you start pressors now? Continue IVF?

ORIGINAL ARTICLE

Vasopressors or Fluids in Early Septic Shock

The ARISE FLUIDS Investigators, the ANZICS Clinical Trials Group,
and the ACEM Clinical Trials Network*

ABSTRACT

BACKGROUND

The optimal approach to early resuscitation in septic shock is unknown. Equipoise exists between the use of larger volumes of intravenous fluids to restore perfusion and the use of early vasopressor therapy along with smaller volumes of fluids to minimize potential harm from excess fluid.

Peake S et al. *N Engl J Med* 2026;395 Jun 11

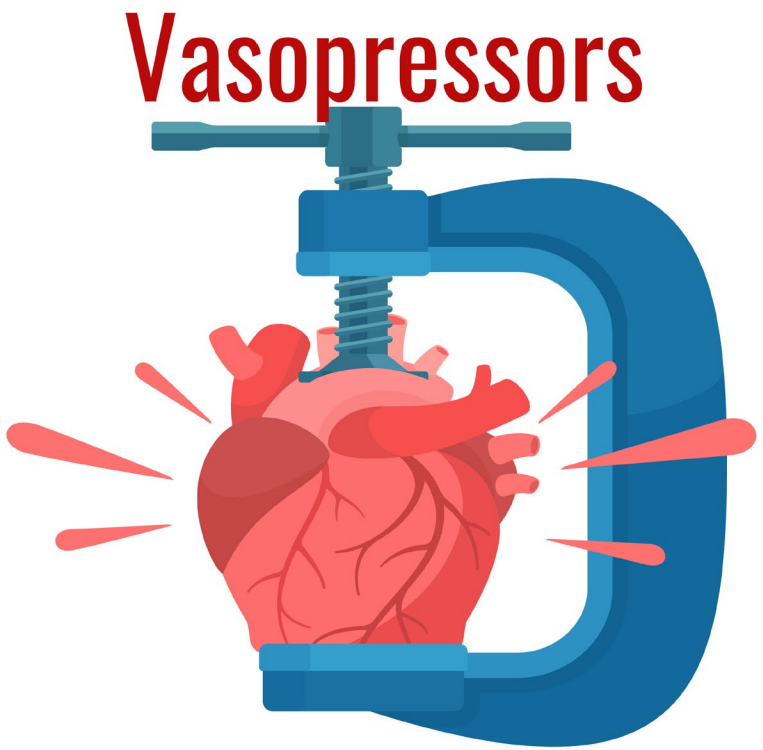
Background

- The best approach to IVF volume and the timing of vasopressors in patients with early septic shock is controversial
- Sepsis IVF guidelines recommend at least 30ml/kg of body weight within the first 3 hours after diagnosis of hypotension from presumed sepsis
- No specific guideline around the timing of vasopressor initiation



Background

- Studies show mixed results regarding the benefit of a restrictive IVF, early vasopressor strategy
- Some studies have suggested harm with large amounts of IVF
- The above leads to practice variation across hospitals



Study Design

- Multicenter, open-label, randomized trial at 51 sites across three countries (Australia, New Zealand, Ireland) looking at restrictive IVF and pressor initiation at the time of randomization vs liberal IVF resuscitation and later pressors if BP targets not met

- Adults with suspected infection and SBP < 90 or MAP < 65 after 1000ml of IVF boluses, blood lactate > 2.0, and started on IV antibiotics were eligible

- Exclusions included > 2000 ml of IVF, > 6 hours since presentation to the ED, and the presence of barriers to the intervention, including the need for immediate surgery

Outcomes

- Primary outcome was days alive and out of the acute care hospital from randomization to follow-up at day 90.

- Secondary outcomes were mortality at 28 and 90 days, survival time from randomization at 90 days, days alive and at home at 90 days, and days alive and free from organ support at 28 days

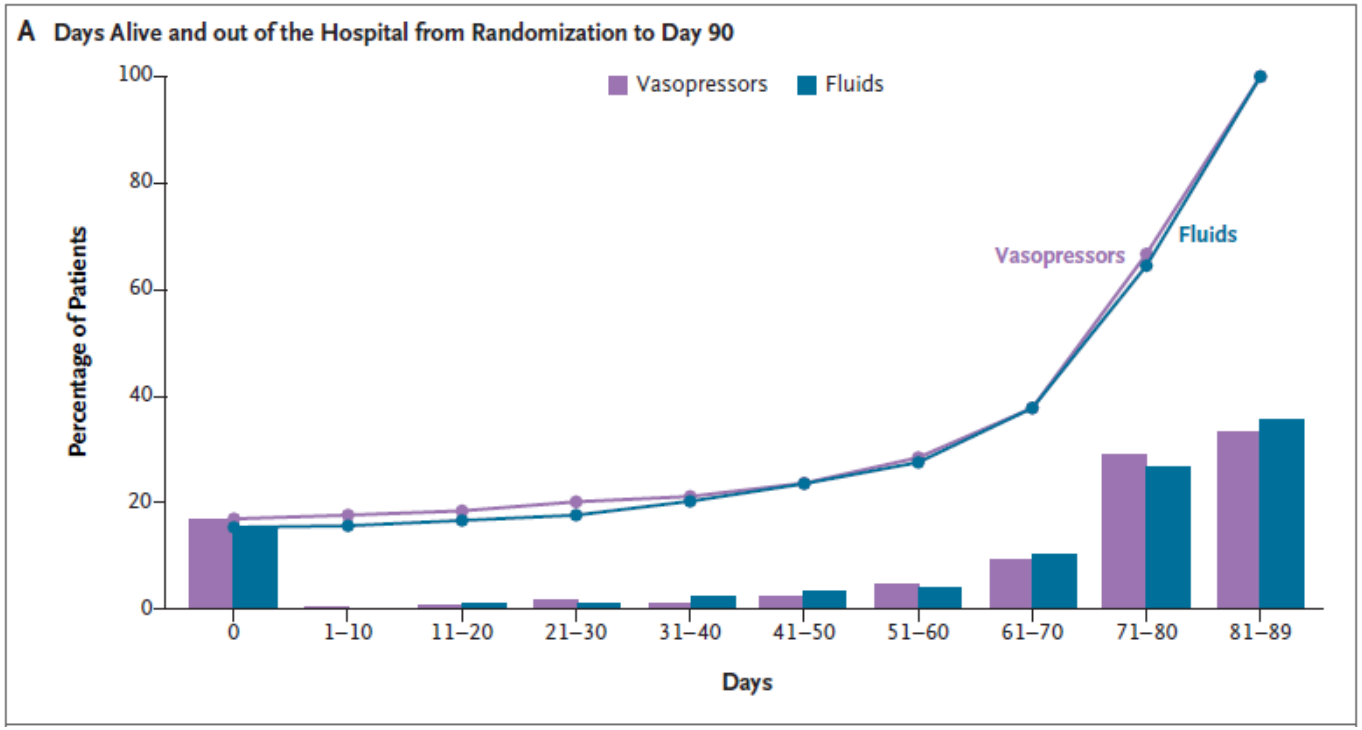
- Tertiary outcomes included times to discharge from the ED, ICU, and hospital and in-hospital mortality among others

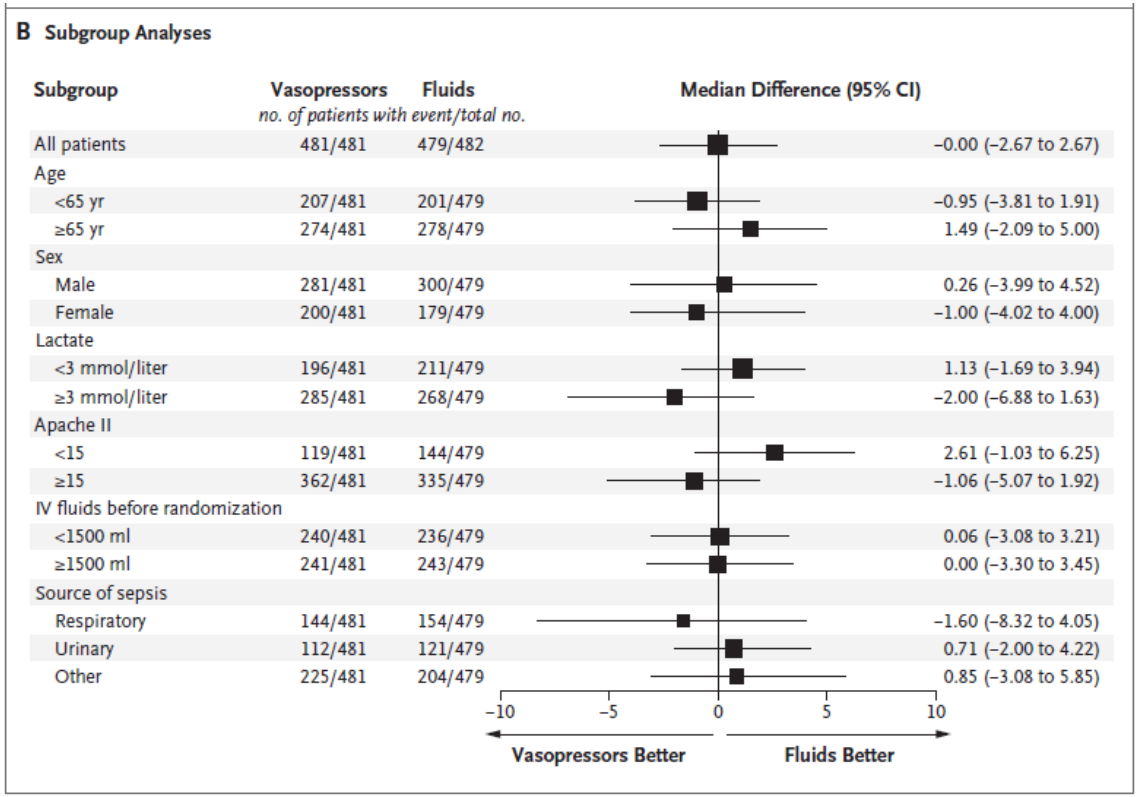
Table 3. Outcomes.

Outcome	Vasopressor Group (N=481)	Fluids Group (N=482)	Effect Estimate (95% CI)*
Primary outcome†			
Median no. of days alive and out of the hospital from randomization to day 90 (IQR)	76 (55 to 83)	76 (55 to 82)	0.0 (–2.7 to 2.7)
Days alive and out of the hospital to day 90, adjusted analysis‡	—	—	1.3 (–0.8 to 3.3)
Secondary outcomes			
Death by day 28 — no. (%)	62 (12.9)	48 (10.0)	1.29 (0.91 to 1.85)§
Death by day 90 — no./total no. (%)	79/481 (16.4)	69/479 (14.4)	1.14 (0.85 to 1.54)§
Time between randomization and death	—	—	1.17 (0.85 to 1.62)¶
Median no. of days alive and at home at day 90 (IQR)‖	76 (46 to 83)	76 (46 to 82)	0.8 (–1.9 to 3.5)**
No. of days free of organ support at day 28 (IQR)††‡‡			
Vasopressor support	27 (26 to 28)	27 (26 to 28)	–0.2 (–0.5 to –0.1)**
Invasive ventilation	28 (28 to 28)	28 (28 to 28)	0.6 (–0.1 to 1.4)**
Renal replacement therapy	28 (28 to 28)	28 (28 to 28)	0.2 (–0.5 to 0.9)**
Tertiary outcomes			
Death in an intensive care unit — no./total no. (%)	32/370 (8.6)	28/333 (8.4)	
Death in a hospital, censored at 90 days — no./total no. (%)	60 (12.5)	46 (9.5)	1.31 (0.91 to 1.88)§
Use of organ support — no. (%)††‡‡			
Vasopressor support	416 (86.5)	331 (68.7)	1.26 (1.18 to 1.35)§
Invasive ventilation	74 (15.4)	73 (15.1)	1.02 (0.76 to 1.37)§
Renal replacement therapy	30 (6.2)	25 (5.2)	1.20 (0.72 to 2.01)§
Time-to-event outcomes from randomization (IQR)§§			
First cessation of vasopressors — hr	22.4 (9.5 to 42.2)	30.1 (11.9 to 51.1)	1.25 (1.12 to 1.41)¶¶
First cessation of invasive ventilation — hr	45.4 (15.9 to 188.8)	67.9 (22.1 to 185.9)	1.14 (0.85 to 1.53)¶¶
First cessation of renal replacement therapy — hr	114.0 (45.2 to 274.0)	138.8 (80.5 to 302.3)	1.13 (0.69 to 1.87)¶¶
Time to emergency department discharge — hr	4.0 (2.4 to 6.5)	4.7 (2.9 to 8.2)	1.15 (0.99 to 1.34)¶¶
Time to intensive care unit discharge — hr	59.3 (35.3 to 94.2)	69.0 (42.0 to 117.4)	1.23 (1.06 to 1.43)¶¶
Time to hospital discharge — days	6.8 (3.7 to 12.9)	7.1 (4.1 to 13.9)	1.02 (0.89 to 1.18)¶¶

More pulmonary edema in the fluids group

Peake S et al. *N Engl J Med* 2026;395





Peake S et al. *N Engl J Med* 2026;395

Limitations

- Not blinded
- IV resuscitation ended when pressors started
- Intervention was limited to the first 24 hours
- Significant patients deemed ineligible to be randomized based on exclusion criteria reducing generalizability

Bottom Line

A liberal fluid strategy appears to be equal to an aggressive pressor strategy in septic shock

The case continues…

AP continues to have borderline BP despite aggressive fluid resuscitation and now you are worried he is getting fluid overloaded.

You decide he needs pressors. Does that mean he needs a central venous catheter as well?



JAMA Network Open

Original Investigation | Critical Care Medicine

Incidence of Adverse Events in Peripheral Intravenous Vasopressor Use
A Systematic Review and Meta-Analysis

Shang-Jun ZhangJian, MD; Kuang-Yu Niu, MD, MSc; Chen-Bin Chen, MD; Chen-June Seak, MD, MSc; Chieh-Ching Yen, MD

Abstract

IMPORTANCE Peripheral intravenous (PIV) vasopressors are increasingly used but remain associated with adverse events (AEs). Quantifying the incidence of these AEs is essential to guide clinical decision-making regarding PIV vasopressor use.

OBJECTIVE To assess the incidence of AEs and avoidance of central venous catheter (CVC) placement after PIV vasopressor administration in adults with hypotension, shock, or critical illness.

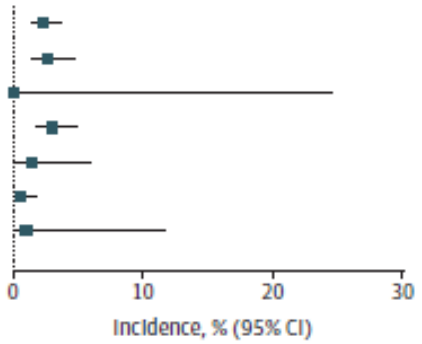
Key Points

Question What is the incidence of adverse events (AEs) and avoidance of central venous catheter (CVC) placement after peripheral intravenous (PIV) administration of vasopressors in adults?

ZhangJian, S et al. *JAMA Network Open* 2026;9(3): Mar 16

Figure 2. Forest Plot Showing Pooled Incidence of Minor Adverse Events (AEs) Associated With Individual Vasopressor Agents

Vasopressor	Studies, No. (N = 49)	Minor AEs, No.	PIV catheters, No.	Incidence, % (95% CI)
Overall	48	735	31212	2.3 (1.5-3.7)
Norepinephrine	30	612	23118	2.6 (1.4-4.7)
Epinephrine	11	7	643	0.0 (0.0-24.6)
Phenylephrine	11	50	1756	2.9 (1.8-4.8)
Dopamine	8	7	375	1.4 (0.3-5.9)
Vasopressin	7	2	440	0.5 (0.1-1.8)
Metaraminol	4	5	462	0.9 (0.1-11.5)

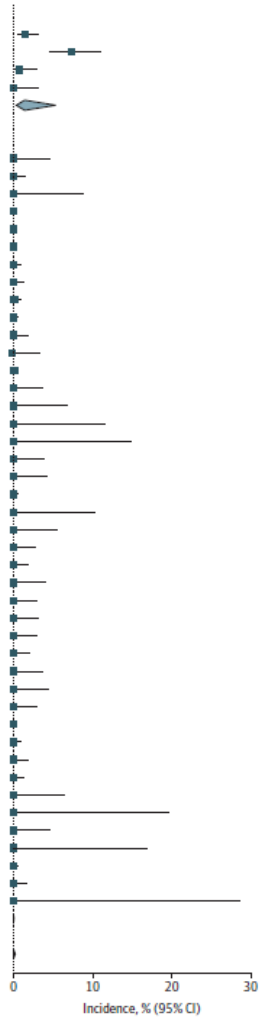


Minor AE—infiltration, cellulitis, phlebitis, pain

- 2.4% minor adverse events with PIV
- 0% major adverse events with short PIV
- 1.4% major adverse events with midlines
- 60% avoidance of central lines with PIV use

Figure 3. Forest Plot Showing Pooled Incidence of Major Adverse Events (AEs), Stratified by Midline or Short Peripheral Intravenous (PIV) Catheter Use

Study	Major AEs, No.	PIV catheters, No.	Incidence, % (95% CI)
Midline catheter			
Karlsson et al,[68] 2024	7	472	1.5 (0.6-3.0)
Gershengorn et al,[39] 2023	21	287	7.3 (4.6-11.0)
Prasanna et al,[73] 2021	2	248	0.8 (0.1-2.9)
Spiegel et al,[40] 2020	0	119	0.0 (0.0-3.1)
Total		1126	1.4 (0.4-5.4)
Heterogeneity: $\chi^2_3 = 20.23$ ($P = .001$); $I^2 = 85.2\%$			
Short PIV catheter			
McCurry et al,[66] 2025	0	80	0.0 (0.0-4.5)
Petros et al,[33] 2025	0	250	0.0 (0.0-1.5)
Ramanan et al,[69] 2025	0	40	0.0 (0.0-8.8)
Schmucki et al,[28] 2025	0	1561	0.0 (0.0-0.2)
Shyu et al,[44] 2025	1	3734	0.0 (0.0-0.1)
Christensen et al,[27] 2024	0	1004	0.0 (0.0-0.4)
Dansereau et al,[45] 2024	0	382	0.0 (0.0-1.0)
Han and Zhou,[63] 2024	0	273	0.0 (0.0-1.3)
Munroe et al,[67] 2025	0	400	0.0 (0.0-0.9)
Yerke et al,[38] 2024	0	635	0.0 (0.0-0.6)
Zichichi et al,[47] 2025	0	198	0.0 (0.0-1.8)
Asher et al,[30] 2023	0	108	0.0 (0.0-3.4)
Fabick et al,[48] 2023	0	2163	0.0 (0.0-0.2)
Powell et al,[49] 2023	0	98	0.0 (0.0-3.7)
Vitharana et al,[35] 2023	0	52	0.0 (0.0-6.8)
Aykanat et al,[70] 2022	0	30	0.0 (0.0-11.6)
Bima et al,[62] 2022	0	23	0.0 (0.0-14.8)
Cape et al,[29] 2022	0	92	0.0 (0.0-3.9)
Groetzinger et al,[50] 2022	0	87	0.0 (0.0-4.2)
He and Yin,[64] 2022	0	640	0.0 (0.0-0.6)
Kilian et al,[51] 2022	0	34	0.0 (0.0-10.3)
Marques et al,[34] 2022	0	64	0.0 (0.0-5.6)
Marti et al,[52] 2022	0	129	0.0 (0.0-2.8)
Stolz et al,[59] 2022	0	194	0.0 (0.0-1.9)
Yasuda et al,[36] 2022	0	88	0.0 (0.0-4.1)
Ballieu et al,[53] 2021	0	125	0.0 (0.0-2.9)
Feng et al,[65] 2021	0	116	0.0 (0.0-3.1)
Messina et al,[41] 2021	0	127	0.0 (0.0-2.9)
Nguyen et al,[54] 2021	0	177	0.0 (0.0-2.1)
Ruchti et al,[32] 2021	0	100	0.0 (0.0-3.6)
Sardaneh et al,[60] 2021	0	81	0.0 (0.0-4.5)
Padmanaban et al,[37] 2020	0	122	0.0 (0.0-3.0)
Pancaro et al,[42] 2020	0	14385	0.0 (0.0-0.0)
Delaney et al,[9] 2020	0	389	0.0 (0.0-0.9)
Lewis et al,[55] 2019	0	202	0.0 (0.0-1.8)
Datar et al,[56] 2018	0	277	0.0 (0.0-1.3)
Medlej et al,[31] 2018	0	55	0.0 (0.0-6.5)
Andrews et al,[71] 2017	0	17	0.0 (0.0-19.5)
Hallengren et al,[43] 2017	0	79	0.0 (0.0-4.6)
Delgado et al,[57] 2016	0	20	0.0 (0.0-16.8)
Cardenas-Garcia et al,[40] 2015	0	734	0.0 (0.0-0.5)
Putland et al,[61] 2006	0	220	0.0 (0.0-1.7)
Johnson et al,[72] 1977	0	11	0.0 (0.0-28.5)
Total	0	29596	0.0 (0.0-0.1)
Heterogeneity: $\chi^2_{32} = 0$ ($P > .99$); $I^2 = 0.0\%$			
Total	0	30722	0.0 (0.0-0.2)
Heterogeneity: $\chi^2_{46} = 45.58$ ($P = .49$); $I^2 = 0.0\%$			
Test for subgroup differences: $\chi^2_1 = 11.01$ ($P < .001$)			



Major AE—VTE, tissue necrosis

ZhangJian, S et al. *JAMA Network Open* 2026;9(3)

Bottom Line

If you need to use pressors in septic shock you can safely use a PIV

Your next patient…

WJ is a 77yo M with h/o alcohol use disorder, major depressive disorder, and normal pressure hydrocephalus.

He presents with confusion and a UTI and is found to have a serum sodium of 119mEq/L. His last known sodium was 141mEq/L six months ago.

You treat him with antibiotics and NS. His repeat sodium the next morning is 132.

You worry the correction of the sodium is too fast, and the patient is going to have osmotic demyelination syndrome (ODS)

Should you be worried?



JAMA Internal Medicine | Original Investigation

Correction Rates and Clinical Outcomes in Hospitalized Adults With Severe Hyponatremia

A Systematic Review and Meta-Analysis

Juan Carlos Ayus, MD; Michael L. Moritz, MD; Nora Angélica Fuentes, MD; Jhonatan R. Mejia, MD; Juan Martín Alfonso, MD; Saeha Shin, MPH; Michael Fralick, MD, PhD, SM; Agustín Ciapponi, MD, MSc, PhD

IMPORTANCE Hyponatremia treatment guidelines recommend limiting the correction of severe hyponatremia during the first 24 hours to prevent osmotic demyelination syndrome (ODS). Recent evidence suggests that slower rates of correction are associated with increased mortality.

OBJECTIVE To evaluate the association of sodium correction rates with mortality among hospitalized adults with severe hyponatremia.

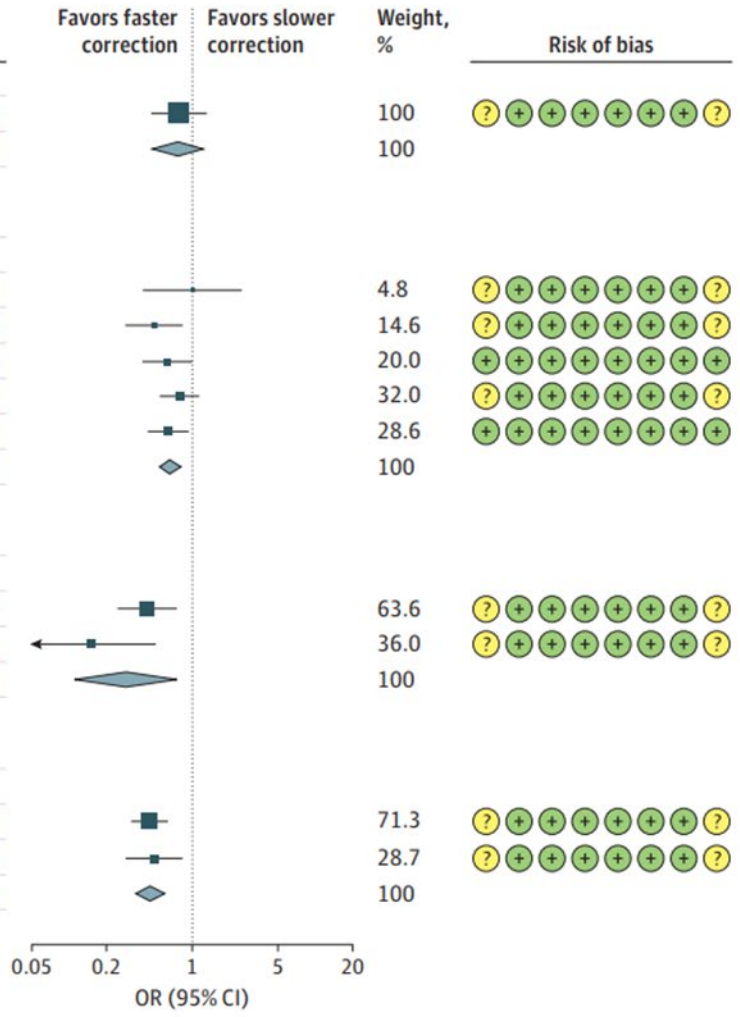
Supplemental content

Ayus, JC *et al*. *JAMA Intern Med.* 2025;185(1):38-51

Results

Figure 2. Adjusted In-Hospital Mortality by Speed of Correction

Source	Log (OR)	SE	Total No. Faster correction	Total No. Slower correction	OR (95% CI)	Weight, %	Risk of bias
Very rapid vs rapid correction							
MacMillan et al,[9] 2023	-0.2485	0.2585	595	823	0.78 (0.47-1.29)	100	
Subtotal (95% CI)			595	823	0.78 (0.47-1.29)	100	
Heterogeneity: NA							
Test for overall effect: $z = 0.96$; $P = .34$							
Rapid vs slow correction							
Geoghegan et al,[22] 2015	0	0.4675	114	211	1.00 (0.40-2.50)	4.8	
Grim et al,[24] 2021	-0.7133	0.2676	91	197	0.49 (0.29-0.83)	14.6	
Kinoshita et al,[10] 2023	-0.4711	0.2288	451	573	0.62 (0.40-0.98)	20.0	
MacMillan et al,[9] 2023	-0.2390	0.1808	823	1538	0.79 (0.55-1.12)	32.0	
Seethapathy et al,[11] 2023	-0.4463	0.1912	1067	952	0.64 (0.44-0.93)	28.6	
Subtotal (95% CI)			2546	3471	0.67 (0.55-0.82)	100	
Heterogeneity: $\tau^2 = 0$; $\chi^2_4 = 3.05$; $P = .55$; $I^2 = 0\%$							
Test for overall effect: $z = 3.94$; $P < .001$							
Rapid vs very slow correction							
Grim et al,[24] 2021	-0.8440	0.2767	91	118	0.43 (0.25-0.74)	63.6	
Turkmen et al,[29] 2022	-1.8991	0.6155	18	145	0.15 (0.04-0.50)	36.0	
Subtotal (95% CI)			109	263	0.29 (0.11-0.79)	100	
Heterogeneity: $\tau^2 = 0.33$; $\chi^2_1 = 2.44$; $P = .12$; $I^2 = 59\%$							
Test for overall effect: $z = 2.42$; $P = .02$							
Slow vs very slow correction							
Geoghegan et al,[22] 2015	-0.7985	0.1698	114	211	0.45 (0.32-0.63)	71.3	
Grim et al,[24] 2021	-0.7133	0.2676	0	0	0.49 (0.29-0.83)	28.7	
Subtotal (95% CI)			114	211	0.46 (0.35-0.61)	100	
Heterogeneity: $\tau^2 = 0$; $\chi^2_1 = 0.07$; $P = .79$; $I^2 = 0\%$							
Test for overall effect: $z = 5.40$; $P < .001$							
Test for subgroup differences: $\chi^2_3 = 7.51$; $P = .06$; $I^2 = 60\%$							



Green symbols represent low risk of bias, while yellow symbols represent moderate risk of bias. NA indicates not applicable; OR, odds ratio; SE, standard error.

- Lower LOS for rapid vs slow or very slow correction strategies
- No significant difference in ODS between correction strategies

Ayus, JC *et al. JAMA Intern Med.* 2025;185(1):38-51

ORIGINAL RESEARCH

Annals of Internal Medicine

Sodium Correction Rates and Associated Outcomes Among Patients With Severe Hyponatremia

A Retrospective Cohort Study

Dustin G. Mark, MD; Mubarika Alavi, MS; Joshua R. Nugent, PhD; and Mary E. Reed, DrPH; for the Kaiser Permanente CREST Network Investigators*

Background: Slow correction of severe hyponatremia is recommended to prevent osmotic demyelination syndrome but is associated with higher mortality.

Objective: To examine the association between sodium correction rates and death or delayed neurologic events.

Design: Retrospective cohort study.

Setting: Twenty-one community hospitals of an integrated health system in northern California.

74 years; 63% female). Comorbidities included congestive heart failure (24%), liver disease (18%), alcohol dependence (14%), and metastatic cancer (10%). The primary outcome occurred in 3000 patients (21%); 90-day death occurred in 2554 (18%), and 90-day delayed neurologic events occurred in 587 (4%). Compared with slow 24-hour sodium correction, both medium (RD, −5.6 percentage points [95% CI, −7.1 to −4.0 percentage points]) and fast (RD, −9.0 percentage points [CI, −11.1 to −6.9 percentage points]) correction rates were associ-

Mark D et al. *Ann Intern Med.* 2026;179:330-339. Jan 27

Background

- Severe hyponatremia (Na < 120mEq/L) is associated with significant morbidity and mortality

- A recent meta-analysis reported 30-day mortality rates of 6%-13% among patients with slower (< 8mEq/L in 24 hrs) versus rapid (≥8 to 10 mEq/L per 24 hours) sodium correction

- Significant concern for ODS and other neurologic events with rapid correction rates



Study Design

- Retrospective cohort study of 14,000 adults admitted with Na ≤120mEq/L at 21 Kaiser hospitals in Northern California over a 15-year period
- 24-hour correction rates were categorized as slow (<8 mEq/L), medium (8 to 12mEq/L), or fast (>12mEq/L)
- Primary outcomes was a composite of death or delayed neurologic events through 90 days
- Secondary outcomes were the separate components of the composite primary outcome and in-hospital death

Results

Table 2. Standardized Risk Estimates and Risk Differences for Primary and Secondary Outcomes, by Maximum 24-Hour Sodium Increase

Outcome	Standardized Risk (95% CI), %*			Standardized Risk Difference (95% CI), *percentage points*		
	Slow (<8 mEq/L)	Medium (8–12 mEq/L)	Fast (>12 mEq/L)	Medium vs. Slow	Fast vs. Medium	Fast vs. Slow
Primary outcome: 90-day death or delayed neurologic event	24.7 (23.7 to 25.7)	19.1 (17.9 to 20.4)	15.7 (13.9 to 17.6)	−5.6 (−7.1 to −4.0)	−3.4 (−5.6 to −1.3)	−9.0 (−11.1 to −6.9)
Secondary outcomes						
90-day death	21.3 (20.3 to 22.2)	16.1 (14.9 to 17.3)	13.2 (11.5 to 14.9)	−5.2 (−6.7 to −3.7)	−2.9 (−5.0 to −0.8)	−8.1 (−10.0 to −6.2)
90-day delayed neurologic event	4.8 (4.3 to 5.4)	4.0 (3.3 to 4.6)	3.2 (2.4 to 3.9)	−0.9 (−1.8 to 0.0)	−0.8 (−1.8 to 0.2)	−1.7 (−2.6 to −0.7)
In-hospital death†	6.4 (5.8 to 7.0)	4.9 (4.3 to 5.6)	4.5 (3.4 to 5.6)	−1.4 (−2.3 to −0.6)	−0.4 (−1.6 to 0.9)	−1.8 (−3.1 to −0.6)

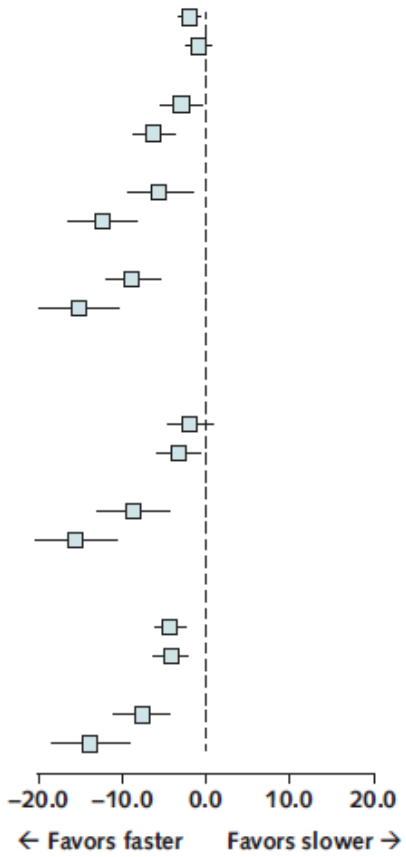
* Standardized risks were estimated using targeted maximum likelihood estimation after multiple imputations of missing maximum 24-hour sodium increases. Models were adjusted for age, sex, race, initial serum sodium concentration, hypokalemia, modified Laboratory-based Acute Physiology Score, weighted Elixhauser comorbidity score, key comorbidities (liver disease, congestive heart failure, malnutrition, alcohol dependence, metastatic cancer), active medication use at admission, surgery in the past 72 hours, admission level of care, primary admitting diagnosis group, study year, and hospital as fixed effects.
† Expanded cohort ($n = 16\,102$).

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Results

Figure 2. Heterogeneity of effect analyses: association between 24-hour sodium correction and primary outcome of 90-day death or delayed neurologic events, by predicted outcome risk.

24-Hour Sodium Correction Rate	Standardized Risk Estimate, %			Standardized Risk Difference (95% CI), *percentage points*	Risk Ratio (95% CI)
	Slow	Medium	Fast		
Overall					
Risk quartile 1 (lowest)	3.9	1.9	3.2		
Medium vs. slow				−2.0 (−3.2 to −0.9)	0.48 (0.28 to 0.82)
Fast vs. slow				−0.7 (−2.4 to 0.9)	0.81 (0.52 to 1.28)
Risk quartile 2	12.8	9.1	6.0		
Medium vs. slow				−3.6 (−6.0 to −1.3)	0.72 (0.56 to 0.91)
Fast vs. slow				−6.7 (−9.4 to −4.0)	0.47 (0.35 to 0.64)
Risk quartile 3	25.1	19.3	12.9		
Medium vs. slow				−5.8 (−9.7 to −1.9)	0.77 (0.66 to 0.90)
Fast vs. slow				−12.2 (−16.1 to −8.3)	0.51 (0.40 to 0.65)
Risk quartile 4 (highest)	54.3	44.7	37.7		
Medium vs. slow				−8.8 (−11.9 to −5.6)	0.82 (0.76 to 0.90)
Fast vs. slow				−15.3 (−20.0 to −10.6)	0.69 (0.61 to 0.79)
Initial serum sodium level ≤115 mEq/L					
Risk quartiles 1 and 2	7.3	5.4	4.0		
Medium vs. slow				−1.9 (−4.6 to 0.9)	0.74 (0.49 to 1.13)
Fast vs. slow				−3.3 (−5.9 to −0.7)	0.55 (0.35 to 0.85)
Risk quartiles 3 and 4	39.8	31.1	24.2		
Medium vs. slow				−8.7 (−13.0 to −4.4)	0.78 (0.69 to 0.88)
Fast vs. slow				−15.6 (−20.4 to −10.8)	0.61 (0.51 to 0.72)
Initial serum sodium level 116–120 mEq/L					
Risk quartiles 1 and 2	9.7	5.3	5.5		
Medium vs. slow				−4.3 (−6.1 to −2.5)	0.55 (0.42 to 0.73)
Fast vs. slow				−4.2 (−6.3 to −2.1)	0.57 (0.41 to 0.79)
Risk quartiles 3 and 4	40.7	33.0	26.9		
Medium vs. slow				−7.7 (−11.1 to −4.3)	0.81 (0.73 to 0.90)
Fast vs. slow				−13.9 (−18.6 to −9.1)	0.66 (0.58 to 0.78)



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Limitations

- Retrospective study
- Neurologic diagnosis based solely on ICD-10 codes so may be inaccurate
- ODS is very hard to diagnose and may be missed, especially in complex patients

Bottom Line

Faster sodium correction rates decease mortality and do not seem to increase the occurrence of ODS

What about correction of hypernatremia?

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Clinical outcomes of early fast compared to slow sodium correction rate in adults with severe hypernatremia: A comparative effectiveness study

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ABSTRACT

Purpose: Severe hypernatremia (serum sodium (SNa) ≥ 155 mmol/L) in critical illness is associated with high mortality; however, the optimal correction rate remains uncertain. We compared outcomes of fast (>0.5 mmol/L/h) versus slow (≤0.5 mmol/L/h) SNa correction within the first 24 h.

Material and methods: We performed a target trial emulation (TTE) using the MIMIC-IV database. Critically ill adults with severe hypernatremia were assigned to early fast or slow SNa correction. Propensity score matching with per-protocol analysis was applied. Primary outcome was 30-day mortality; secondary outcomes were 30-day hospital-free survival, intensive care unit (ICU) and hospital length of stay (LOS), and 7-day, 90-day, and in-hospital mortality. Outcomes were estimated using Cox proportional hazards and Fine–Gray competing risk models. Sensitivity analyses included entropy balancing and inverse probability treatment weighting.

Results: Among 364,627 patients, 1861 were eligible; 233 received fast and 1628 slow correction. After matching, 430 patients were included. Fast correction significantly reduced 30-day mortality (adjusted HR 0.49, 95 % CI 0.28–0.84, $p = 0.01$) and improved 30-day hospital-free survival (adjusted HR 1.75, 95 % CI 1.40–2.18, $p < 0.001$). Fast correction was also associated with shorter ICU LOS (median 4 vs. 5 days, $p = 0.002$) and hospital LOS (8 vs. 11 days, $p = 0.01$). Sensitivity analyses confirmed robustness of these findings.

Conclusion: In this TTE of adults with severe hypernatremia, early fast correction of SNa was associated with lower mortality, greater hospital-free survival, and shorter ICU and hospital stays compared with slow correction.

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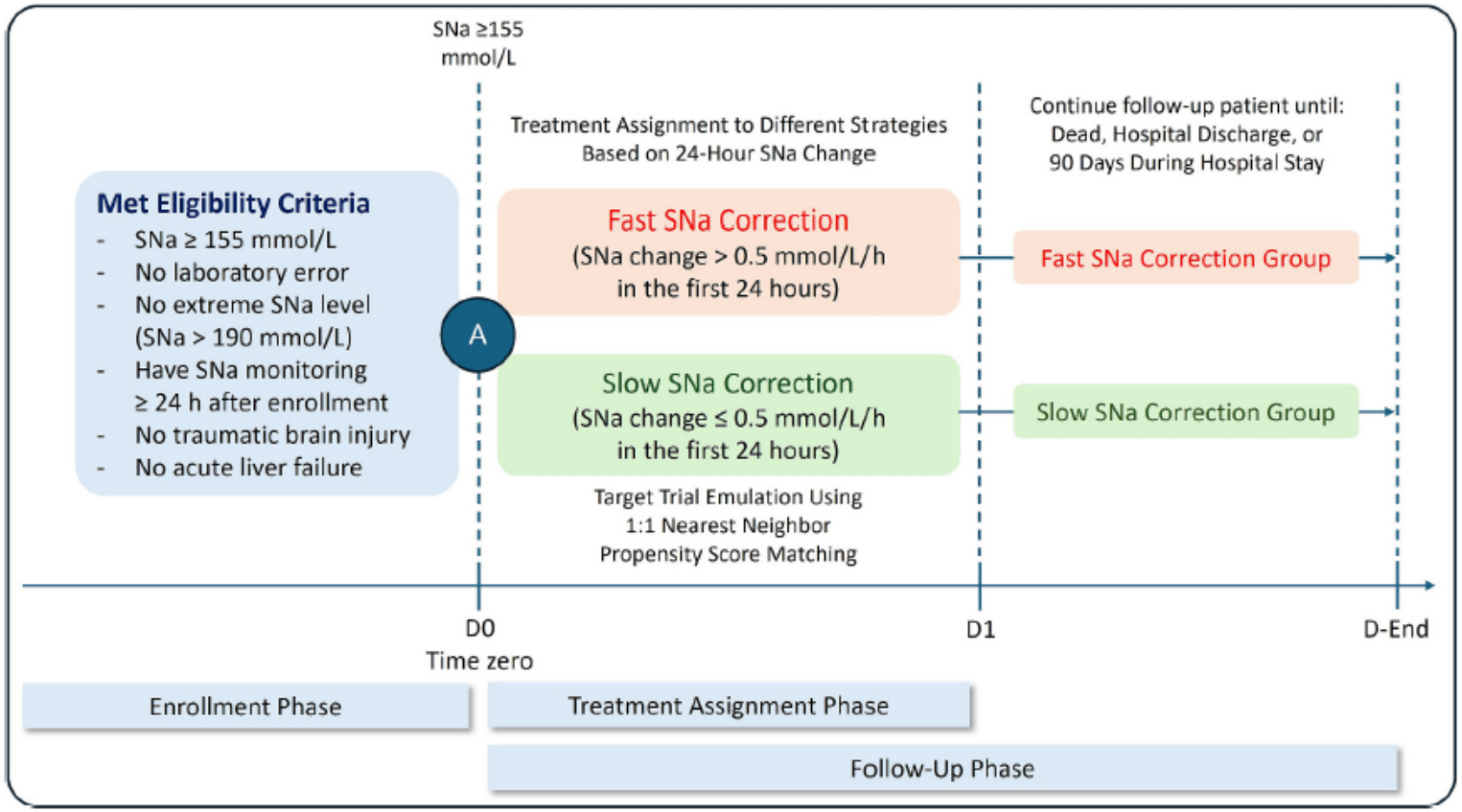


Fig. 1. Study Design Diagram. The study consists of three phases: enrollment, treatment assignment, and follow-up. The enrollment phase begins before time zero and includes patients meeting the eligibility criteria: serum sodium (SNa) ≥ 155 mmol/L, no laboratory errors, no extreme hypernatremia (SNa ≥ 190 mmol/L), adequate SNa monitoring for at least 24 h, and no history of traumatic brain injury or acute liver failure. The treatment assignment phase starts at time zero (Day 0, D0), defined as the first time when SNa above 155 mmol/L. Patients are assigned to one of two SNa correction strategies: fast correction, defined as a change in SNa > 0.5 mmol/L/h in the first 24 h, or slow correction, defined as a change in SNa ≤ 0.5 mmol/L/h in the first 24 h. After completing the treatment phase, target trial emulation is performed using 1:1 nearest-neighbor propensity score matching to balance baseline covariates between the two groups. The follow-up phase begins after the time of enrollment (Day 0,D0) and continues until patients reach an endpoint (D-End), which includes up to 90 days of hospital stay, discharge, or death, whichever occurs first.

- Target trial emulation (TTE) using the MIMIC-IV database
- 1861 pts from the database “enrolled”
- After matching, 215 pts in each group

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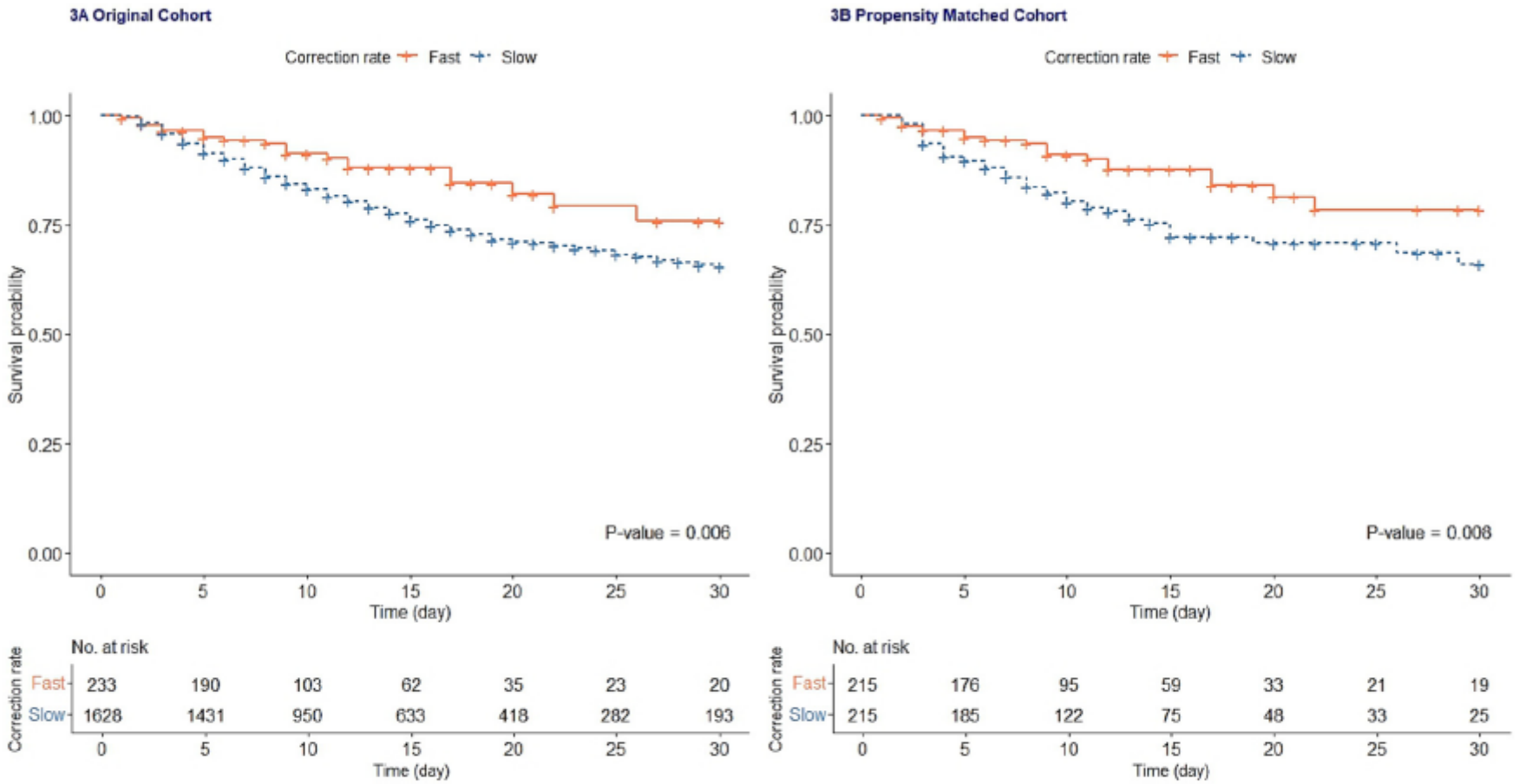


Fig. 3. Kaplan-Meier Estimation Curve for 30-Day Mortality According to Fast and Slow Serum Sodium Correction. Fig. 3A shows the 30-day survival plots for time to mortality for fast versus slow early sodium correction in the original cohort, while Fig. 3B displays the same comparison in the propensity-matched cohort. Both analyses show significant differences in time to event up to 30 days between the fast and slow early correction groups. Slow correction is defined as a sodium correction rate of $\leq$0.5 mmol/L/h, and fast correction as a rate of >0.5 mmol/L/h in the first 24 h of treatment.

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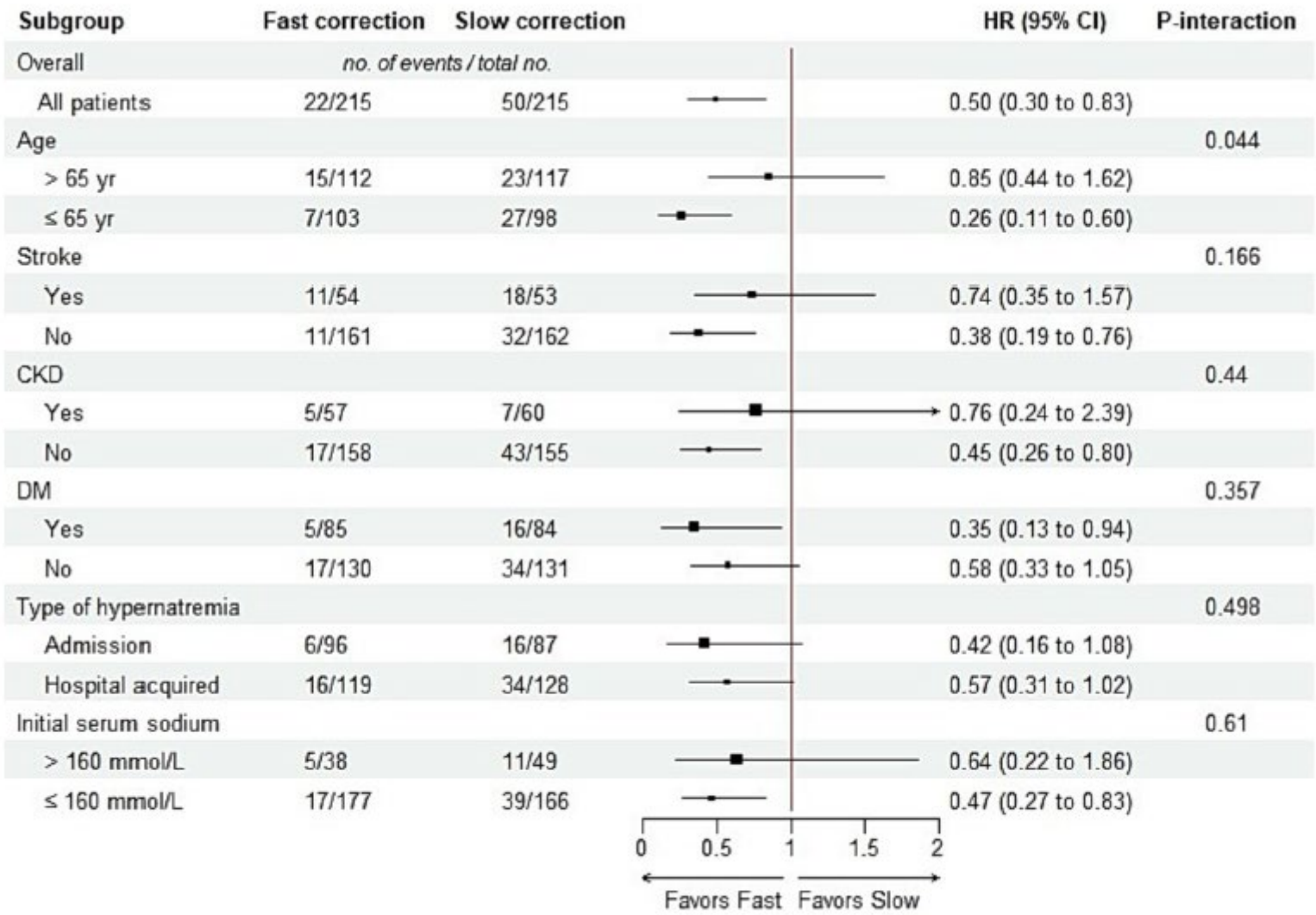


Fig. 5. Forest plot presenting the impact of early sodium correction rate in different subgroups.

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Bottom Line

Faster sodium correction rates decease mortality for hypo- and hypernatremia

2026 Evidence Summary: Shifting the Safe Zone

Condition Threshold	Condition Threshold
Severe Hyponatremia (Na ≤120)	Severe Hypernatremia (Na ≥155)
The Old Speed Limit < 8 mEq/L/24hr	**The Old Speed Limit** ≤ 0.5 mmol/L/hr
The New Safe Zone **> 12 mEq/L/24hr**	**The New Safe Zone** **> 0.5 mmol/L/hr**
Observed Benefit of Speed 9.0 percentage point reduction in 90-day death/neuro events	**Observed Benefit of Speed** 51% lower 30-day mortality risk

In both extremes of dysnatremia, massive observational data suggests that restoring homeostasis rapidly improves survival.

Gemini Notebook

What Did We Learn Today?

- ✓ Giving IV iron is beneficial in patients with IDA and infection
- ✓ Non-severe CAP patients with a positive viral assay do not need Abx
- ✓ Use the updated acute PE clinical categories to help decide appropriate triage and treatment
- ✓ Use the YEARS algorithm and D-dimer to decide if your patient with cancer needs a CTPA for PE symptoms
- ✓ Apixaban has lower clinically relevant bleed rates than rivaroxaban
- ✓ Aggressive fluid resuscitation is just as good as early pressors in patients with septic shock
- ✓ You can use a PIV for pressors in your septic shock patients
- ✓ Faster (than guidelines) is better when it comes to correcting hypo- and hypernatremia
- ✓ AI makes way better slides than Dr. Markoff does

Thank you

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