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Pulmonary Embolism

TO THE EDITOR: Kahn and de Wit (July 7 issue)¹ succinctly review strategies and guidelines for the treatment of intermediate-risk pulmonary embolism. Their article offers catheter-directed thrombolysis as an option for patients with intermediate-risk pulmonary embolism with proximal, central lesions. However, we believe that it is essential to ascribe an equivalent role to catheter-directed embolectomy. Evidentiary support for both strategies relies largely on small, industry-sponsored investigations that show benefit only in surrogate outcomes, such as the ratio of right ventricular to left ventricular diameter or the thrombus burden. Of note, patients did not have to meet the contemporaneous definition of intermediate-risk pulmonary embolism in order to be included in these clinical trials.^{2,3}

European Society of Cardiology recommendations acknowledge the dearth of quality evidence regarding the effect of both techniques on patient-centered outcomes and group them interchangeably as percutaneous catheter-directed treatment.⁴ American College of Chest Physicians guidelines do not recommend catheter-directed thrombolysis and provide a weak recommendation for catheter-directed embolectomy for a highly specific group of patients.⁵ Given the present gaps in evidence and wide-ranging, center-specific expertise, a multidisciplinary pulmonary embolism response team and an individualized approach to choosing the appropriate catheter-directed strategy can maximize the benefit for selected patients.

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TO THE EDITOR: Kahn and de Wit present an informative review of pulmonary embolism. However, we have concerns about the characterization of patients at intermediate risk and the treatment strategy for those patients.

Intermediate-risk pulmonary embolism is classified as intermediate-low risk or intermediate-high risk on the basis of the presence of right ventricular dysfunction, an elevated troponin level, or both.^{1,2} We found that death related to pulmonary embolism occurred in 7.2% of patients with pulmonary embolism of intermediate-high risk, and the risk of hemodynamic collapse was 10 times as high in that group as the risk among patients with low-risk or intermediate-low-risk pulmonary embolism.³ Other studies showed mortality related to intermediate-high-risk pulmonary embolism to be nearly 10 times as high as the mortality associated with low-risk pulmonary embolism.² Among patients who had pulmonary embolism and were normotensive, a score greater than 4 on the Bova scale (which predicts the risk of death related to pulmonary embolism; scores range from 0 to 7, with higher scores indicating greater risk) was associated with death related to pulmonary embolism in 10.5%.⁴ A score greater than 0 on the simplified Pulmonary Embolism Severity Index

(which measures the risk of death at 30 days among patients with pulmonary embolism, with 0 representing low risk and >0 representing high risk) was associated with a risk of death from any cause that was 10 times greater than the risk associated with a score of 0.¹ A patient with an intermediate-high-risk pulmonary embolism with severe right ventricular dysfunction and tachycardia (heart rate, 120 beats per minute), for example, must be assiduously evaluated.

More randomized trials are needed. Until then, mortality related to pulmonary embolism is too high for clinicians to simply closely monitor patients with this disorder. An expert in pulmonary embolism or a pulmonary embolism response team should be consulted for consideration of options beyond anticoagulation that are approved by the Food and Drug Administration.¹

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TO THE EDITOR: Kahn and de Wit correctly include primary care clinicians in their audience when addressing the diagnosis of pulmonary embolism.¹ However, the role of primary care may have been underestimated when it comes to stratifying patients with pulmonary embolism according to risk, identifying those whose treatment can safely be managed on an outpatient

basis, and sending patients home with anticoagulation therapy and close follow-up. Not all primary care physicians, on diagnosing acute pulmonary embolism in their patients, routinely refer the patients to the emergency department or hospital for definitive care. In a health care system that provides patients with ready access to pharmacotherapy, specialty consultation, and timely follow-up, primary care clinicians can treat patients with low-risk pulmonary embolism safely and effectively without a transfer of care.²

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TO THE EDITOR: In their recent Clinical Practice article on pulmonary embolism, Kahn and de Wit list rivaroxaban as an anticoagulant treatment option for pulmonary embolism. Rivaroxaban at a dose of 15 mg twice a day for 21 days followed by 20 mg once a day is consistent with the doses described in the package insert, with the exception of ensuring administration with food. The 15-mg and 20-mg doses must be administered with food in order to optimize absorption owing to reduced bioavailability when rivaroxaban is administered on an empty stomach; however, this is not the case with lower doses.¹ If the higher doses are taken without food, the concentrations that result may be subtherapeutic, resulting in an increased probability of treatment failure.

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THE AUTHORS REPLY: Intermediate-high-risk pulmonary embolism comprises approximately 10% of all pulmonary embolism cases. The composite risk of hemodynamic compromise and death in the patient population with intermediate-high-risk pulmonary embolism varies between 5% and 9% across published studies.^{1,2} Although the rates of complications and death are high, we lack evidence that balances the risks and benefits of endovascular intervention or systemic thrombolysis among patients with pulmonary embolism that is intermediate-high risk. In fact, Seedat et al. point out this lack of high-quality evidence supporting the use of endovascular therapy. As stated by Tapson and Jiménez, more randomized trials are needed to definitively identify therapies other than anticoagulation that result in greater benefit than harm for patients at intermediate-high risk. As yet, we cannot comment on the relative merits of catheter-directed thrombolysis as compared with embolectomy, and we agree that local expertise might help guide endovascular treatment choice and use.

Vinson et al. are right that the treatment of

some outpatients with pulmonary embolism may be safely managed by their primary care physician, assuming that the patients have timely access to appointments and the providers have expertise in the management of pulmonary embolism. As with patients whose pulmonary embolisms are diagnosed in the emergency department or a hospital ward, rapid access to initial and follow-up care is essential for patients who receive a diagnosis and treatment in the primary care setting. Finally, we concur with Hoover that the 15-mg and 20-mg doses of rivaroxaban should be administered with food for the reasons stated and that the reasons should be explained to patients when rivaroxaban is prescribed for the treatment of pulmonary embolism.

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Since publication of their article, the authors report no further potential conflict of interest.

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Quality Improvement and Children's Hospitals

TO THE EDITOR: It has often seemed that U.S. children's hospitals were being left out of the value-based care movement. Children's hospitals don't have national benchmark quality data from the Centers for Medicare and Medicaid Services (CMS) because they have few Medicare patients, and pediatric patients are not targeted in value-based payment programs from either CMS or commercial payers. Most national comparative-quality systems are not pertinent to pediatric health systems.

But as Rosenbaum points out in her series on quality improvement (April 28, May 5, and May 12 issues),¹⁻³ movement toward value-based payment models has shifted the focus from actual

improvement to documentation of improvement to maximize payment. This shift has led to costly administrative overhead, increased documentation burden and related burnout, focus on risk adjustment, and few results in terms of increased quality or decreased cost. Meanwhile, in children's hospitals, the primary motivation has been improving care, not payment strategies.

For example, 137 children's hospitals voluntarily participate in Solutions for Patient Safety (SPS), which uses shared data-driven learning to improve safety culture and reduce hospital-acquired harm.^{4,5} SPS data show that in 2017, the frequency of eight different harm events was reduced by 9 to 71%, more than 9000 children