EDITORIAL

Inpatient Thrombophilia Testing: At What Expense?

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Thrombotic disorders, such as venous thromboembolism (VTE) and acute ischemic stroke, are highly prevalent,[1] morbid, and anxiety-provoking conditions for patients, their families, and providers.[2] Often, a clear cause for these thrombotic events cannot be found, leading to diagnoses of "cryptogenic stroke" or "idiopathic VTE." In response, many patients and clinicians search for a cause with thrombophilia testing.

However, evaluation for thrombophilia is rarely clinically useful in hospitalized patients. Test results are often inaccurate in the setting of acute thrombosis or active anticoagulation. Even when thrombophilia results are reliable, they seldom alter immediate management of the underlying condition, especially for the inherited forms.[3] An important exception is when there is high clinical suspicion for the antiphospholipid syndrome (APS), because APS test results may affect both short-term and long-term drug choices and international normalized ratio target range. Despite the broad recommendations against routine use of thrombophilia testing (including the Choosing Wisely campaign),[4] patterns and cost of testing for inpatient thrombophilia evaluation have not been well reported.

In this issue of Journal of Hospital Medicine, Cox et al.[5] and Mou et al.[6] retrospectively review the appropriateness and impact of inpatient thrombophilia testing at 2 academic centers. In the report by Mou and colleagues, nearly half of all thrombophilia tests were felt to be inappropriate at an excess cost of over $40,000. Cox and colleagues identified that 77% of patients received 1 or more thrombophilia tests with minimal clinical utility. Perhaps most striking, Cox and colleagues report that management was affected in only 2 of 163 patients (1.2%) that received thrombophilia testing; both had cryptogenic stroke and both were started on anticoagulation after testing positive for multiple coagulation defects.

These studies confirm 2 key findings: first, that 43%-63% of tests are potentially inaccurate or of low utility, and second, that inpatient thrombophilia testing can be costly. Importantly, the costs of inappropriate testing were likely underestimated. For example, Mou et al. excluded 16.6% of tests that were performed for reasons that could not always be easily justified—such as "tests ordered with no documentation or justification" or "work-up sent solely on suspicion of possible thrombotic event without diagnostic confirmation." Additionally, Mou et al. defined appropriateness more generously than current guidelines; for example, "recurrent provoked VTE" was listed as an appropriate indication for thrombophilia testing, although this is not supported by current guidelines for inherited thrombophilia evaluation. Similarly, Cox et al included cryptogenic stroke as an appropriate indication to perform thrombophilia testing; however, current American Heart Association and American Stroke Association guidelines state that usefulness of screening for hypercoagulable states in such patients is unknown.[7] Furthermore, APS testing is not recommended in all cases of cryptogenic stroke in the absence of other clinical manifestations of APS.[7]

It remains puzzling why physicians continue to order inpatient thrombophilia testing despite their low clinical utility and inaccurate results. Cox and colleagues suggested that a lack of clinician and patient education may explain part of this reason. Likewise, easy access to "thrombophilia panels" make it easy for any clinician to order a number of tests that appear to be expert endorsed due to their inclusion in the panel. Cox et al. found that 79% of all thrombophilia tests were ordered as a part of a panel. Finally, patients and clinicians are continually searching for a reason why the thromboembolic event occurred. The thrombophilia test results (even if potentially inaccurate), may lead to a false sense of relief for both parties, no matter the results. If a thrombophilia is found, then patients and clinicians often have a sense for why the thrombotic event occurred. If the testing is negative, there may be a false sense of reassurance that "no genetic" cause for thrombosis exists.[8]

How can we improve care in this regard? Given the magnitude of financial and psychological cost of inappropriate inpatient thrombophilia testing,[9] a robust deimplementation effort is needed.[10,11] Electronic-medical-record–based solutions may be the most effective tool to educate physicians at the point of care while simultaneously deterring inappropriate ordering. Examples include eliminating tests without evidence of clinical utility in the inpatient setting (ie, methylenetetrahydrofolate reductase); using hard stops to prevent unintentional duplicative tests[12]; and preventing providers from ordering tests that are not reliable in certain settings—such as protein S activity when patients are receiving warfarin. The latter intervention would have pre-

vented 16% of tests (on 44% of the patients) performed in the Cox et al study. Other promising efforts include embedding guidelines into order sets and requiring the provider to choose a guideline-based reason before being allowed to order such a test. Finally, eliminating thrombophilia "panels" may reduce unnecessary duplicate testing and avoid giving a false sense of clinical validation to ordering providers who may not be familiar with the indications or nuances of each individual test.

In light of mounting evidence, including the 2 important studies discussed above, it is no longer appropriate or wise to allow unfettered access to thrombophilia testing in hospitalized patients. The evidence suggests that these tests are often ordered without regard to expense, utility, or accuracy in hospital-based settings. Deimplementation efforts that provide hard stops, education, and limited access to such testing in the electronic medical ordering system when ordering thrombophilia workups now appear necessary.

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