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The Utility of Thrombophilia Testing in the Acute Care Setting

Raquel Millet[1] **and Barry Meisenberg**[*]

[1]*MS, Michigan State University School of Medicine*

[*]**Corresponding author:** Barry Meisenberg M.D., Anne Arundel Health System Research Institute, Anne Arundel Medical Center, 2001 Medical Parkway, Annapolis MD 21401, Tel: 443-481-5824; Fax: 443-481-5890; E-mail: Meisenberg@aahs.org

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Abstract

Background: Acquired or congenital thrombophilia increases the risk of thrombosis but routine testing of all patients with thrombosis is not recommended. Inpatient ordering of thrombophilia testing is additionally problematic because the tests are moderately costly, hard to interpret and do not alter the inpatient course. Despite this, inpatient ordering still occurs. We studied the utility of thrombophilia testing in a community hospital.

Methods: The electronic medical records of consecutive patients having thrombophilia testing were reviewed for demographics, diagnoses, specialty of the ordering physician, role of hematology or other consultants, and the extent of duplicate testing.

Results: Most testing was ordered by hospitalists with no documented input from hematologists or laboratory medicine specialists. Testing met professional society guidelines in only one patient. Some testing duplicated what was already present in the electronic medical record. One patient was harmed by thrombophilia testing, being incorrectly diagnosed with lupus-like anticoagulant syndrome. After data analysis, routine thrombophilia test options were removed from the ordering panel of the electronic medical records and became available only upon special request. In the 9 months after this intervention, only one request for the thrombophilia testing was received. Restricting thrombophilia testing resulted in estimated cost savings of $45,000 annually.

Conclusions: Thrombophilia testing in the acute care setting was almost always ordered outside of clinical guidelines and provided no benefit. None of the "abnormal" tests were clinically significant. Over interpretation of one abnormal test lead to incorrect recommendations for long term anticoagulation in one patient. Hospitals, both teaching and non-teaching, should review their own experiences and consider locally appropriate ways to reduced overutilization.

Keywords Thrombophilia; VTE; Overutilization

Introduction

Inherited or acquired thrombophilia describes states of increased tendency toward venous thromboembolism (VTE). Despite the increased risk, only a minority of people with thrombophilia manifest VTE and there is controversy about which clinical situations, if any, warrant thrombophilia testing (TT). American Society of Hematology Choosing Wisely© recommendations endorse limited use of TT [1]. Other guidelines suggest testing only patients with high risk features: age <40 or 45 years and with strong family history of VTE [2,3].

TT, often ordered as a broad panel composed of up to 10 distinct tests, is moderately costly (up to $1,000 in mail out costs to reference labs) and requires experience to interpret properly. Among inpatients, additional caution is warranted because results may not be received until after a patient's discharge and because some tests can be affected by concurrent anticoagulant medications.

More importantly, results of TT do not change short term clinical management and may not change long term management [4]. In this study, we retrospectively examined the utility of TT in the inpatient setting in a community hospital. The results of that analysis and subsequent action steps are described.

Methods

Setting

Anne Arundel Medical Center is a 383 bed acute care hospital serving a population of over one million. The predominant mode of inpatient care is internal medicine hospitalist coverage supplemented by physician assistants to care for medical, neurologic and post-surgical patients. No residents cared for patients described in this study.

Patient identification

Laboratory-billing records identified consecutive adult in patients who received TT from 10/1/14 through 5/20/15. Data on patients' age, diagnoses, specialty of the ordering physician, role of hematology or other consultants in the TT, the extent of duplicate testing and if medical management changed based on results were obtained from the electronic medical record (Epic Verona Wisconsin, USA).

Results

220 separate tests were ordered on 48 patients, mostly by hospitalists. Table 1 displays the results of the data review. Only eight patients (17%) were ≤40 years and 12 (25%) had diagnoses that did not

involve thrombosis. Wasteful duplicate genetic testing was documented in the electronic medical records of six patients. Only 11(5%) of test results were abnormal; but none of these abnormalities were considered clinically significant upon subsequent review.

The ordering did not fit any pattern. It was not routine for any hospitalist not for any disease such as VTE, but rather appeared to be idiosyncratic: not restricted to a few hospitalists but not ordered on all VTE patients. One patient, a 67 year old man with first episode of VTE and concurrent pulmonary embolism had a minimally abnormal lupus like anticoagulant assay erroneously interpreted as lupus like anticoagulant syndrome by hospitalist medical staff. This diagnosis as relayed to the outpatient primary care physician who prescribed and supervised long-term anticoagulation. The patient subsequently suffered a subdural hematoma after a fall while on anticoagulation. Repeat TT was completely normal.

In no case was there evidence of Hematology or Laboratory Medicine consultations in either the ordering or interpretation of results. Among the 12 patients who did not have thrombosis as a diagnosis but who had TT ordered, there was no discussion in the medical record of what considerations lead to the ordering of TT.

Patient Age	**55.2 years (Range: 22-87 years)**
Specialty of Ordering Provider	**Hospitalist physician:** 157 tests on 34 patients
	Hospitalist (PA/NP): 46 tests on 11 patients
	ED Physician: 17 tests on 3 patients
Indications for Ordering Thrombophilia Tests	PE/DVT- 29 patients
	CVA- 7 patients
	Other non-thrombosis- 12 patients
Percent Ordered According to Guidelines [2]	1/ 48 patients borderline appropriate for testing (2%)
Total Number of Abnormal Results	11/220 (5% of tests)
Number of Duplicate Tests	14 tests on 6 patients
Clinically Significant Abnormal Results	0
PA: Physician's assistant; NP: Nurse Practitioner; ED: Emergency Department; PE: Pulmonary embolism; DVT: Deep venous thrombosis; CVA: Cerebrovascular accident	

Table 1: Thrombophilia testing results.

Interventions

The data suggested that the existing pattern of ordering TT was most often clinically inappropriate, without the benefit of expert opinion and potentially harmful. These results argued for restriction on ordering by non-specialists, or only with guidance by computer decision support which should also include duplicate test warnings for genetic tests.

An educational effort was undertaken for hospitalist medical staff in the context of a morbidity and mortality conference centered upon the patient who was injured from unnecessary anti-coagulation. There was a knowledge deficit about the role TT plays in short-and long-term anticoagulation recommendations. Subsequently, meetings were held with the medical specialty groups most often involved with thrombophilic patients: hospitalists, vascular medicine, hematology and clinical pathology. A consensus decision was reached not to create additional best practice advisories, but rather to remove TT panels and the individual tests from the visible ordering menu of the electronic medical record though still making them available upon request to the clinical laboratory. A duplicate test warning was created as it would also be of benefit in alerting ambulatory physicians of existing genetic test results. In the nine months following removal of the test from the ordering menus, only one request for TT has been made, by a hematologist for a patient with suspected anti-phospholipid antibody syndrome. The change in ordering pattern represents an annualized savings of $45,000 in mail out lab costs.

Discussion

TT is controversial in patient with VTE because it seldom changes recommendations regarding anticoagulation for either the patient or family members [4]. This is because the risk of a subsequent thrombosis among those with common types of thrombophilia is not necessarily elevated beyond the already heightened risk of subsequent VTE that follows all first VTE [4]. A recent review revealed no benefit of TT to reduce subsequent thrombosis after first VTE [5]. Circumspection about inpatient TT is especially warranted because TT does not alter the hospital management of VTE, and the patient may be taking medications which alter levels of commonly ordered TT. Furthermore results can be hard to interpret due to the broad range of "normal" and the lack of clinical significance of abnormal results unless they are substantially lower than normal [6]. Thus results that are only slightly below the "normal range" can be misinterpreted as described herein especially by unfamiliar clinicians.

In this study we found that TT was inexpertly ordered outside of clinical guidelines in patients with both VTE and non-VTE. The ordering was predominantly by hospitalists and in no case was the rationale for TT discussed in the chart. Neither hematologists nor laboratory medicine specialists were involved in ordering or interpreting TT. As a result, the yield of clinical useful information was nil. Ordering was diffuse among hospitalists, idiosyncratic and not limited to only a few individuals for which targeted education might have been an effective remedy.

Our data indicating inexpert use of TT is similar to a previous study of 1314 patients with acute VTE in which 24% of all acute VTE pts had TT, but was considered retrospectively appropriate in only 10% [7]. That study did not report any follow up action steps. Our study focused not on VTE diagnosis, but rather on the use of the TT in order to get a fuller picture of TT use patterns. Indeed we found that 25% of patients who underwent TT did not have VTE as the diagnosis. Our data is also similar to that from an urban tertiary care hospital which showed a pattern of inappropriate use in both VTE and non-VTE patients, including TT patients already on anticoagulation which gave false positive results for protein C and protein S tests 20% of the time [8].

Our discussions with ordering physicians and service groups indicated a lack of appreciation for the intricacies of appropriate ordering and interpretations of what is considered a clinically significant abnormal value. While we considered best practice advisories, other 'soft stops' and advisories have not been uniformly effective at our institution or at hospitals in general [9,10]. Thus with the consent of hospitalist leadership, we removed TT from the visible ordering menu, requiring a phone consult with clinical pathology prior to ordering. This still allowed it to be ordered for emergencies after consultation with laboratory medicine experts. This was highly effective in reducing the over-utilization. To our knowledge, no patient was harmed by this effective method of discouraging inappropriate use.

These data highlight the potential for misapplying and misinterpreting TT. In an era of renewed emphasis on teaching and practicing the principles of 'high value' medicine and harms reduction, all acute care hospitals, both teaching and non-teaching, should examine their own TT patterns and consider locally appropriate techniques for TT demand management.

References

1. American Society of Hematology (2016). Ten Things Physicians and Patients Should Question.
2. Baglin T, Gray E, Greaves M, Hunt BJ, Keeling D, et al. (2010) Clinical guidelines for testing for heritable thrombophilia. Br J Haematol 149: 209-220.
3. Anderson J and Weitz JL (2010) Hypercoagulable States. Clin Chest Med 31: 659-673.
4. Middeldorp S (2011) Evidence-based approach to thrombophilia testing. J Thromb Thrombolysis 31: 275-281.
5. Coppens M, Reijnders JH, Middeldorp S, Doggen CJ, Rosendaal FR (2008) Testing for inherited thrombophilia does not reduce recurrence of venous thrombosis. J Thromb Haemost 6: 1474-1477.
6. Khor B, Van Cott EM (2009) Laboratory Evaluation of Hypercoagulability. Clin Lab Med 29: 339-366.
7. Meyer MR, Witt DM, Delate T, Johnson SG, Fang M, et al. (2015) Thrombophilia testing patterns amongst patients with acute venous thromboembolism. Thromb Res 136: 1160-1164.
8. Somma J, Sussman II, Rand JH (2007) An Evaluation of Thrombophilia Screening in an Urban Tertiary Care Medical Center: A real world experience. Am J Clin Pathol 126: 120-127.
9. Agency for Healthcare Quality and Research (2016). Alert Fatigue.
10. Shojania KG, Jennings A, Mayhew A, Ramsay C, Eccles M, et al. (2010) Effect of point-of-care computer reminders on physician behaviour: a systematic review CMAJ 182: 216-225.