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Medical Admission Order Sets to Improve Deep Vein Thrombosis Prevention: A Model for Others or a Prescription for Mediocrity?

Excellence is best described as doing the right things right—selecting the most important things to be done and then accomplishing them 100% correctly.

In this issue of *JHM*, O'Connor et al.¹ examine the impact of paper-based admission order sets on several quality measures relevant to medical inpatients in a large community medical center, focusing the most attention on the use of venous thromboembolism (VTE) prophylaxis. Randomly selected medical admissions from 4 time periods were examined by chart review for use of the order set, and for the use of VTE prophylaxis (defined as either unfractionated heparin [UFH] 5,000 units subcutaneous [sc] twice daily [BID] or compression stockings). VTE prophylaxis was ordered in an abysmally low 10.9% of inpatients in the baseline period. In spite of the limitations inherent in a “before and after” study design and a failure to assess the appropriateness of VTE prophylaxis, VTE rates, or side effects, the authors present convincing evidence that improvement in VTE prophylaxis did occur. However, it was a very limited and suboptimal improvement. By the fourteenth and fifteenth month after order set introduction, only about one-half of admissions used the order set, and even when the order set was used, only 44% had VTE prophylaxis ordered. The percent of patient-days with pharmacologic VTE prophylaxis in medical inpatients improved after order set implementation, but remained very low, at 26%. Therefore, the key lessons to be learned from this study are likely derived from what went wrong, rather than what went right.

Why did VTE prophylaxis rates stay so low in the face of a multiyear effort? An examination of more successful efforts,^{2–5} recent reviews in the VTE and quality improvement literature,^{6–10} and the Society of Hospital Medicine VTE Prevention Collaborative experience reveals several principles for effective improvement that were not followed in this study.

A VTE PREVENTION ORDER SET SHOULD PROVIDE DECISION SUPPORT (NOT JUST A PROMPT)

A simple prompt for mechanical prophylaxis or for UFH 5,000 units sc BID was embedded into a voluntary order set in this effort. Mechanical prophylaxis, pharmacologic prophylaxis, and no prophylaxis were treated as equal options, even though most medical inpatients have significant VTE risk factors,^{11,12} and in

spite of strong evidence-based recommendations¹² relegating mechanical prophylaxis to an adjunctive role for pharmacologic prophylaxis (unless there are contraindications to pharmacologic prophylaxis). The authors point out that “the way order sets are structured or introduced is important to ensure they achieve the desired changes in practice.” I could not agree more, but, unfortunately, the structure of their order set only secured the desired change in 44% of patients, even if you count compression stockings as adequate prophylaxis. This relatively poor result should have sparked a redesign of the VTE prevention component of the order set.

A more effective order set would reflect an institutional VTE prevention protocol.^{6,7,9,13} A VTE prevention protocol consists of a standardized VTE risk assessment and contraindications to pharmacologic or heparin prophylaxis, linked to a menu of appropriate VTE prophylaxis options for each level of risk.¹³ The best protocols provide decision support at the point of care,^{9,13} and yet preserve the ability to customize care for special patient situations or circumstances.

Ease of use issues and the lack of prospectively validated models have hindered widespread adoption of VTE risk assessment protocols (especially the point-based models),¹⁴ but a simpler and more streamlined approach has been validated by the UCSD Medical Center experience,² and by the general success of similar protocols in diverse medical centers taking part in the Society of Hospital Medicine (SHM) VTE Prevention Collaborative. This simpler method generally places patients into 1 of 3 levels of VTE risk, can be completed in seconds, and has excellent interobserver agreement. Reinforcing the expectation that pharmacologic prophylaxis is desirable for most ill inpatients (unless there is a contraindication to it) is likely more important than the finer details of the risk assessment model.

PROTOCOLS AND ORDER SETS MUST REACH THE GREAT MAJORITY OF PATIENTS

Protocols and order sets that sit on the shelf do not benefit patients. An order set that is used for one-half of the targeted population has no chance of promoting excellent adherence to a protocol, and protocols/order sets must be widely adapted to be effective.¹³ Institutional mandates for the use of preprinted (or computerized) orders can be

a very effective strategy. If the order set is constructed properly, it is easy to use and can actually save clinician time, thereby promoting widespread use, in some cases even without such a mandate. The SHM VTE Prevention Collaborative generally endorses an institution-wide protocol and order set module that covers a variety of patient populations. A “plug and play” modular order set design allows the VTE prevention order set to be incorporated into all appropriate admission and transfer orders, and lends itself well to paper or computerized order formats.

LAYER ON ADDITIONAL INTERVENTIONS TO ENHANCE THE POWER OF THE PROTOCOL

Skillful introduction of a good order set that reaches most patients has often yielded observed VTE prophylaxis rates of 75% to 80% in the SHM VTE Prevention Collaborative. To reach higher levels, a multifaceted approach using a variety of techniques has been an effective strategy in the literature^{2-4,6,7,10,13,15} and in the Collaborative. Educational programs alone,^{4,16,17} while not generally sufficient to bring about reliable VTE prophylaxis, remain an important intervention that can foster a more enthusiastic and appropriate use of order sets and protocols. Periodic audit and feedback and computerized decision support can also be very effective,^{3,18-22} particularly when there is an institutional protocol to hold up as the defining standard for adequate prophylaxis. We favor a method that involves real-time identification of outliers (i.e., patients without prophylaxis who have some VTE risk and no obvious contraindication to prophylaxis). This identification can be done manually, but automated reports are generally feasible and effective. A simple templated note or page from a nurse or pharmacist to the provider of an outlier patient can bolster VTE prevention rates to well over 95%.⁵ Fatigue from alerts is minimized if this strategy is deployed after substantial improvement in VTE prophylaxis rates has been achieved via a well-implemented and uniformly-utilized order set. Trending and discussing cases of hospital-acquired VTE can also motivate medical staff and reduce resistance to standardization.^{2,3}

THE FOUNDATION FOR IMPROVEMENT MUST BE IN PLACE

To explain why they did not implement educational programs, guidelines, or provide feedback

to providers on their performance, the authors cite a lack of resources common to community medical centers. Yet, they were able to achieve the most resource-intensive and challenging component of a VTE prevention effort, data collection and analysis. While resources for quality improvement are indeed insufficient in many academic and community hospitals, suboptimal levels of improvement tend to reflect, as in this study, fundamental failures in approach or execution. In this case, the order set design and implementation issues outlined above do not require extensive resources. Moreover, the foundation for effective improvement must be in place to address these issues effectively. This foundation includes administrative buy-in that VTE prevention is an institutional priority, a commitment to support standardization (even in the face of occasional medical staff resistance), and a willingness to examine and redesign processes.¹³ It is unclear whether the administration was convinced that the effort should be a priority or whether this improvement team reported results through appropriate medical staff committees. The key point, of course, is that a culture of shared purpose, cooperation, and high expectations between the medical staff and the administration is more important than extensive resources. The right foundational elements put most improvement resources within the grasp of most medical centers.

The authors present work that is praiseworthy in many respects, but their suboptimal levels of improvement should serve as a cautionary tale rather than a model for other centers. Core improvement principles are of key importance. A mere prompt to order VTE prophylaxis within voluntarily-used order sets, without supporting strategies to enhance VTE prophylaxis, is a recipe for mediocre improvement. Far superior results have been demonstrated in both community and academic centers, even in environments with limited resources. A multifaceted approach, including order sets that promote VTE prophylaxis and provide decision support for the majority of the targeted population, proactive intervention applied to outliers who are not on appropriate prophylaxis, educational programs, and an institutional commitment to standardization, are the ingredients for excellent results.

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