

## HIMSS and ASQ “Stories of Success!”

**1. Title:** Reducing Venous Thromboembolism Using a Clinical Decision Support Alert in the Electronic Medical Record

**2. Background Knowledge:** AHRQ and multiple systems<sup>1</sup> identify Venous Thromboembolism (VTE) as a major safety issue and “the most common cause of hospital deaths.”<sup>2</sup>

**3. Local Problem:** This was noted as the #1 co-morbid condition in Advocate Health Care, an integrated delivery system of nine acute care hospitals in Chicago with six sites live on an electronic medical record (EMR). It is known that the occurrence of Venous Thromboemboli (VTE), including Deep Venous Thrombosis (DVT) is a potential source of fatal pulmonary emboli. VTEs also increase length of stay, having the potential to increase nosocomial conditions, as well as increase resource utilization. Advocate persisted with a higher level of VTEs than acceptable, which had not changed, in spite of relative improvement activities.

**4. Intended Improvement:** The intervention’s aim was to improve VTE prophylaxis timeliness, thus decreasing the risk of VTE development. The expectation was to develop earlier ordering via CPOE (and other methods) of both timely and appropriate prophylaxis. Internal studies had identified both inappropriate and delayed prophylaxis timing.<sup>3</sup>

The internal champion was the Vice-President of Medical Informatics with sponsorship by the Chief Medical Officer based on the previously noted inadequate system performance on this measured condition. Advocate’s Clinical Decision Support (CDS) committee, chaired by the Vice-President of Medical Informatics, determined that VTE prophylaxis was an important clinical concern needing further intervention.

**5. Planning the Intervention; 6. HIT Dimensions Utilized:** Current workflow initiates a computerized nursing VTE risk assessment task for each admitted patient over age 18. Another computerized task is generated for the nurse to call the attending physician with the VTE risk assessment score. The VTE risk assessment has an eight hour timeframe to complete. The physician contact completion has a twelve hour time frame. Thus, a patient could, from the time of admission to receiving any prophylaxis, be hospitalized 20 hours before prophylaxis is begun. This did not include any time spent in the Emergency Department.

It was determined by Advocate’s Clinical Decision Support Committee that the time was too lengthy before prophylaxis was potentially instituted. In order to shorten the notification process, an alert was developed. The alert rule is initiated upon the electronically documented VTE risk assessment score. If any physician accesses the patient’s electronic medical record, before nursing notification, the patient’s risk status and a recommendation to consider VTE prophylaxis alerts the physician. The alert only fires if there is no documentation of any

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<sup>1</sup> HIMSS Clinical Decision Support Task Force including Advocate Healthcare, Texas Health Resources, HealthEast Care System, Memorial Hermann, Orlando Health, Children’s Hospital of Philadelphia

<sup>2</sup> [www.ahrq.gov/qual/vtguide](http://www.ahrq.gov/qual/vtguide)

<sup>3</sup> See VTE Prophylaxis graph

prophylaxis either ordered or in place. Additionally, clinical decision support is provided with Advocate's recommended prophylaxis guidelines, as well as those of the American College of Chest Physicians (ACCP).<sup>4</sup>

The CDS committee, which is multi-disciplinary including physicians, nurses, pharmacists, IT applications, patient safety and clinical excellence representatives, began a design process, that was further developed by IT applications. Review of the alert and implications once implemented were discussed and evaluated. A quantified analysis was already available to determine base-line measures.

**7. HIT Dimensions Utilized:** Advocate's current HIT is Cerner Millennium. Active is complete nursing and ancillary staff documentation, order entry (CPOE), a clinical data repository (CDR), a closed-loop pharmacy system, as well as, clinical decision support (CDS). These all play a role in the VTE safety process.

**8. Outcomes (a) and (b):** The VTE alert of the risk score and need for prophylaxis was begun in November, 2008 and further enhancements updated in February, 2009. Data queries were run to determine the alert's frequency, including breakdown by types of providers, residents vs. attending physicians and by specific physicians and physician types, e.g. IM, FP, Surgery, etc. This information was initially used to identify alert issues whereby modifications were made in February, 2009, diminishing inappropriate alerts and focusing more on appropriate clinician alerting. Specific items included not recognizing certain prophylactic medications, initiation of mechanical prophylaxis by nursing without specific orders and use of alternative mechanical prophylaxis devices not previously programmed in the system. Analyst staff was able to reprogram the alerts to recognize these factors, thus avoiding over-alerting physicians.

This alert was accessible both in the inpatient setting, as well as via the Advocate portal. When alerted, the clinician can access the CDS tool to determine the appropriate prophylaxis based on the risk assessment score. They then access the order entry page and can either choose an individual order or preferably their site's VTE prophylaxis order set. Once the order is placed, the alert no longer fires.

Success was measured by the decrease in alerts, as well as a decrease in VTE rate by ten percent as measured for our system improvement dashboard.<sup>5</sup> Our system was able to meet its clinical outcome goal.

**9. Barriers:** The barriers initially were the over alerting of physicians, as the rule firing the alert had not taken into account several items. First, nursing, many times, without an order, placed the patient on mechanical prophylaxis. The alert had only been written to identify orders and not devices recorded as present. Second, there were more mechanical devices than had been identified. Third, any physicians accessing the patient's record was notified. Specialists felt it was not their responsibility to manage this aspect of the patient's care, but that of the PCP. Finally, the need to account for all the correct drugs appropriate for chemoprophylaxis was initially missed.

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<sup>4</sup> See VTE Prophylaxis Alert

<sup>5</sup> See DVT/PE Monthly Rate/1000 and Advocate Health Care System Health Outcomes Dashboard

**10. Challenges Faced:** The challenges included the need to revamp the alert based on not only an order being placed, but a device documented in use. Also, appropriately identifying all possible mechanical devices was necessary. Additionally, in spite of some physicians feeling VTE prophylaxis was not their responsibility and that this alert firing to them increased liability, the CDS committee strongly felt ALL physicians managing any aspect of the patient's care had the responsibility for VTE prevention by either contacting the PCP or initiating the order themselves. The committee did not back down on this latter point. And finally, all appropriate VTE chemoprophylaxis drugs were added to the rule initiating the alert.

**11. Summary; 12. Interpretation:** Most importantly, the rate of VTEs decreased, in part because this alert was in place. A direct correlation exists between the initiation of this alert and the decrease in the VTE rate. The benefits of the alert are the early identification of patients needing prophylaxis, CDS guidelines are available as information to inform the clinician of the appropriate treatment based on patient risk status and that all providers are responsible for treating this condition.

While pleased with the results, potential further improvements exist. On a system level, we have agreed that a shorter timeframe for assessment, four hours vs. the current eight hours, is more appropriate and the alert will reflect this. Currently, no reassessment is done for patients with longer lengths of stay. The plan is to re-task nursing after 72 hrs. of stay to reassess patients' VTE risk. The expectation to notify the attending physician of any risk status change will continue. Eventually the type of prophylaxis needs to be evaluated, so that patients receiving inadequate or inappropriate prophylaxis can be brought to the attending physician's attention.

**14. Financial Considerations:** Future alert performance can be enhanced by connecting the alert directly with order entry. This is a software problem needing attention by the vendor. And while this intervention engendered no additional cost other than staff time, the financial gains by avoiding each VTE is \$3500 per patient.

**13. Conclusions:** In conclusion, timely alerting of VTE risk creates earlier prophylaxis and saves lives by decreasing the rate of VTEs and therefore pulmonary emboli. As noted above, there is a financial gain to the system as well, where these dollars saved can be redirected to further quality improvement projects.

# VTE Patient Prophylaxis

VTE Risk Score			
Min	Mean	Median	Max
1	5.4	5.0	19

VTE Risk Category		
Category	Count	%
Low	4	10.0%
Moderate	5	12.5%
High	10	25.0%
Highest	21	52.5%

Mechanical Prophylaxis (Y/N)		
Mech Prophylaxis?	Count	%
N	7	18%
Y	32	82%
Total	39	100%

1 case where mechanical prophylaxis was refused is excluded here

Pharmacological Prophylaxis (Y/N)?		
Chem Prophylaxis?	Total	%
No	17	43%
Yes	23	58%
Total	40	100%

1 case where chemical prophylaxis was administered as treatment counted as "No" here

Optimal Pharmacological Prophylaxis (Y/N)		
Optimal Chem Prophylaxis?	Total	%
No	27	68%
Yes	13	33%
Total	40	100%

5 cases where optimal prophylaxis was ambiguous



Audit period: 3/17/2008 – 4/28/2008

**VTE Prophylaxis Alert**

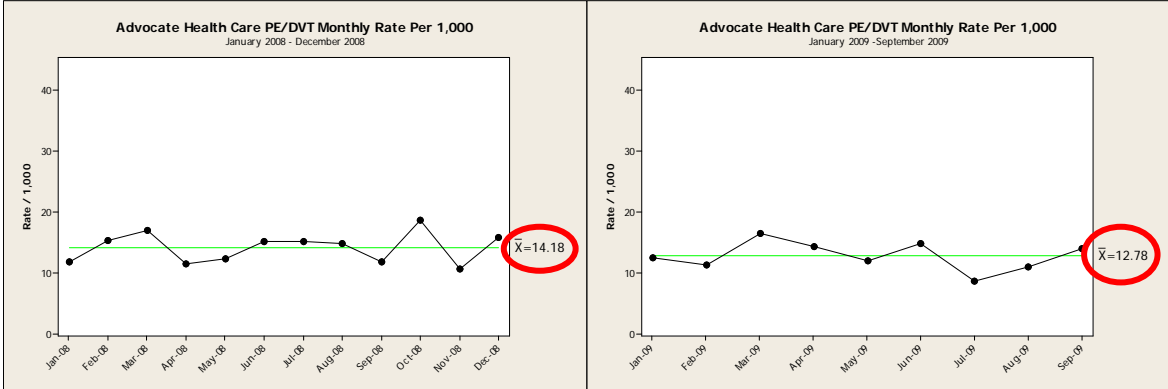
Your patient appears to be a candidate for VTE Prophylaxis with a score of 8  
 Please order VTE Prophylaxis  
 (See VTE order set in the Orders section)  
 ACCP Guidelines: [http://www.chestjournal.org/cgi/content/full/126/3\\_suppl/338s](http://www.chestjournal.org/cgi/content/full/126/3_suppl/338s)  
 Advocate VTE Guidelines: <http://advocateonline.advocatehealth.com/documents/Venous%20Thromboembolism/VTE%20PROPHYLAXIS%20GUIDELINES.doc>

Alert Noted

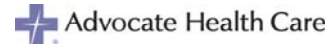
Since: 12/21/2007

M2007 TEST\_ANNSTD | 16 September 2008 | 10:05

# PE/DVT Monthly Rate Per 1,000



Data Source: EDW Solucient & AHRQ Databases, January 2008 through September 2009 Discharges  
 Condell data from January 2009 through August 2009  
 AHRQ PSI 12 definition



## ADVOCATE HEALTH CARE SYSTEM HEALTH OUTCOMES DASHBOARD

September 2009

	<u>BASELINE</u>	<u>TARGET</u>	<u>PREVIOUS RESULT</u>	<u>CURRENT RESULT</u>
<b>HEALTH OUTCOMES PERFORMANCE</b>				
AHRQ - Post-Operative PE or DVT Rate Per 1,000	13.8	≤13.1	13.3	13.1
	Result worse than baseline	Result better than baseline, but worse than target	Result meets or exceeds target	