Healthcare-Associated
VTE Prevention Challenge

2015 CDC HA-VTE PREVENTION HONORABLE MENTION

ORGANIZATION:

University of Cincinnati Medical Center | Cincinnati, Ohio

PATIENT POPULATION:

- 27,837 inpatient admissions in 2014; 505 beds
- 40% belong to a racial or ethnic minority
- 41% are enrolled in Medicaid

BACKGROUND

The University of Cincinnati Medical Center (UCMC) is an urban American College of Surgeons verified Level 1 trauma center and quaternary referral center. Starting in the early 1990s, UCMC initiated a comprehensive, interdisciplinary VTE prevention strategy for patients admitted to the trauma service.

OBJECTIVES

UCMC trauma service utilizes a VTE prevention strategy daily to optimize patient care. The objective of the prevention strategy is to improve patient outcomes through prompt mechanical and chemical thromboprophylaxis initiation, high-risk patient identification, and chemical thromboprophylaxis dosing adequacy. The desired outcome is to decrease treatable VTE in traumatically injured patients in order to reduce patient morbidity and mortality.

METHODS

VTE prevention protocols for dosing and risk stratification have been developed by the UCMC physicians, nurse clinicians, and pharmacists since 1993. All pertinent physicians agreed to protocolized, prompt initiation of chemical thromboprophylaxis. Within 24 hours of admission, a nurse clinician calculates the Risk Assessment Profile (RAP) score for each trauma service patient and shares this information during rounds to guide the choice of chemical thromboprophylaxis. Chemical thromboprophylaxis plans are then discussed daily as needed for each patient on service.

Based on recent data postulating anti-Xa level correlation with LMWH efficacy, the trauma service implemented an anti-Xa-driven dosing protocol with dose adjustment from dalteparin, once-daily to twice-daily in high-risk patients with low anti-Xa levels. Subsequent formulary and protocol changes have emerged over time with each protocol monitored for internal quality assurance with formal, on-going, investigational review board approved research.

RESULTS

Prospective chart review of the dalteparin anti-Xa dosing protocol evaluating a total of 785 patients (428 pre-protocol and 357 post-protocol) who were admitted to the UCMC trauma service from April 2010 to April 2011, had at least a 72-hour length of stay, and were initiated on VTE chemical thromboprophylaxis revealed:

- VTE occurred in 55 (12.8%) PRE patients and 25 (7.0%) POST patients ($p = 0.009$).
- Overall DVT (12.2% vs. 6.4%; $p = 0.007$) and proximal, clinically treated lower extremity DVT (5.6% vs. 2.2%; $p = 0.001$) were significantly lower in POST patients.
- PE was similar between groups (0.56% vs. 1.4%; $p = 0.30$).
- VTE occurred in 53 (16.3%) high-risk PRE patients compared to 24 (9.0%) high-risk POST patients ($p = 0.01$).
- Overall DVT (50 [15.3%] vs. 22 [8.2%]; $p = 0.01$) and proximal, clinically treated DVT (24 [7.4%] vs. 7 [2.6%]; $p = 0.017$) were also lower in high-risk POST patients.
- There was no difference in rates of PE (PRE 6 [1.8%] vs. POST 2 [0.75%]; $p = 0.43$) in high-risk patients.
- Among low-risk patients, there was no difference in VTE (PRE 2 [2.0%] vs. POST 1 [1.1%]; $p = 0.86$).

Following a formulary conversion from dalteparin to enoxaparin (September 2012), 952 high-risk patients admitted to the trauma service for greater than 72 hours from October 2011 to September 2013 and initiated on chemical thromboprophylaxis, were evaluated. Overall, 422 patients in the anti-Xa adjusted dalteparin group and 530 patients in the unadjusted enoxaparin group were included.

- VTE occurred in 46 (10.9%) patients in the anti-Xa adjusted dalteparin group and 70 (13.2%) patients in the unadjusted enoxaparin group ($p = 0.33$).
- The incidence of clinically treated proximal DVT was 4.7% vs. 5.3% and PE was 2.4% vs. 3.4%.

Anti-Xa adjusted enoxaparin was initiated shortly after the above study to reduce the rates of VTE. Two hundred twenty-five high-risk patients with at least a 72 hour length of stay and initiated on enoxaparin per protocol with documented anti-Xa assessment, were included.

- VTE occurred only in patients with an anti-Xa < 0.10.
- VTE occurred in 12 (8.5%) patients: proximal, clinically treated DVT in 10 (7.1) patients and PE in 4 (2.8%) patients. (unpublished data).
- Internal quality assurance data of 712 high-risk patients with at least a 72 hour length of stay admitted to the trauma service from July 1, 2014 through June 30, 2015, revealed 19 (2.7%) patients with proximal DVT and 12 (1.7%) with PE. Only one patient had both a proximal DVT and a PE. Decreased rates are likely due to initiation of weight-based initial enoxaparin dosing plus anti-Xa adjustment.

CONCLUSIONS

UCMC trauma service has an extensive history of VTE prevention strategies, and is a leader in the novel use of anti-Xa driven prophylactic LMWH dosing. Studies and internal quality assurance data demonstrate that anti-Xa dosing decreases the overall rate of VTE for both dalteparin (absolute risk reduction 5.8%) and enoxaparin in high-risk trauma patients. UCMC is continuing to evaluate the pre- and post-implementation of enoxaparin anti-Xa dose adjustments. Prospective studies are also underway at UCMC to validate the retrospective data, create novel dosing strategies, and continue to improve patient care.