Paper Seminar Presentation

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Project Statement

- Develop a clinician performance review tool for risk-appropriate VTE prophylaxis
  - Keeps track of clinician compliance
  - Ranks anonymous clinician adherence
  - Combine the information with output from the APL NLP algorithm
  - Automated retrospective analysis on past prophylaxis data

Impact of a venous thromboembolism prophylaxis "smart order set": Improved compliance, fewer events

Amer M. Zeidan, Michael B. Streiff, Brandyn D. Lau, Syed-Rafay Ahmed, Peggy S. Kraus, Deborah B. Hobson, Howard Carolan, Lambrianidi Chryso, Paula B. Horn, Kenneth M. Shermock, Gabriel Tinoco, Salahuddin Siddiqui, and Elliott Haut

Why? The paper was chosen because it gives additional background information about our project as well as gives actual statistics on the effectiveness of the VTE CDS tools

Background Information

- The majority of patients who suffer from VTE are medical patients
  - Decrease the risk with VTE prophylaxis treatment
 - Many hospitalized patients do not receive risk-appropriate prophylaxis.

Problem: In 2005, suboptimal VTE prophylaxis practices noticed in the Johns Hopkins Hospital

Development of "smart order set"

- VTE risk stratification and prophylaxis recommendation tool
    - Used for all admitted medically ill patients
    - Two checklists
    - Shows optimal risk-appropriate choice for VTE prophylaxis
    - Opt-in

Hypothesis: The implementation of a VTE prophylaxis "smart order set" would increase order for risk-appropriate VTE prophylaxis and decrease VTE events without compromising safety

Simplified Flowchart of the Smart Order Set
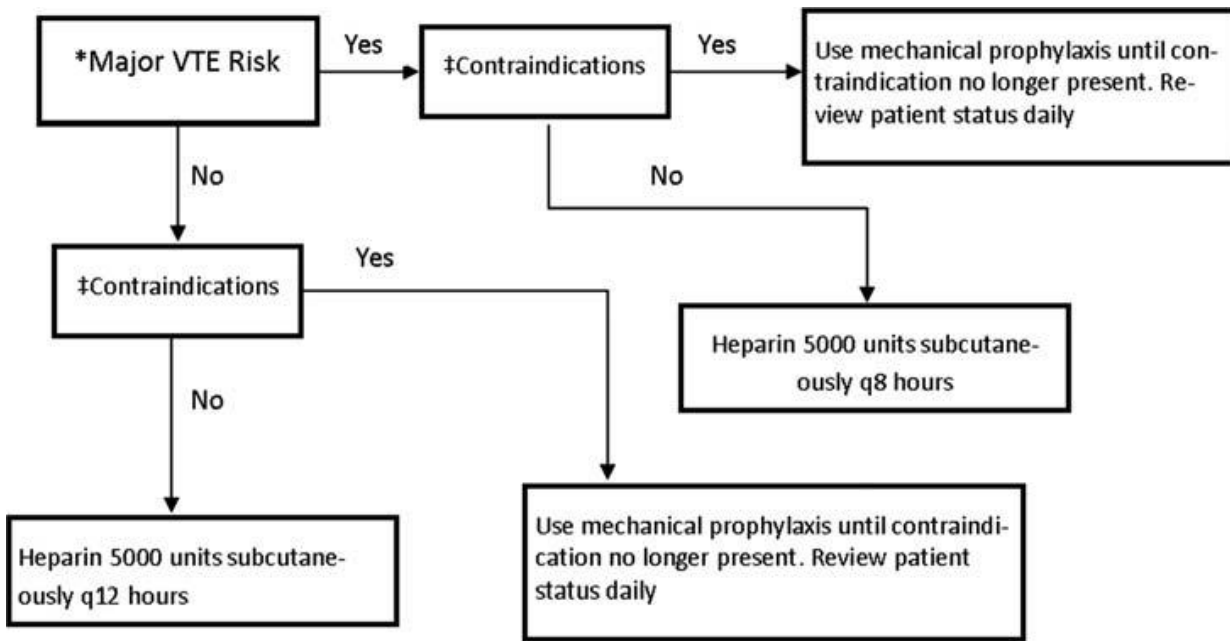
*Major Risk Factors
- ☐ Age older than 60 years
- ☐ Cancer (active or on chemotherapy)
- ☐ Previous VTE
- ☐ Acute Cerebrovascular event with paresis (within last 3 months)
- ☐ Thrombophilia
- ☐ Decompensated New York Heart Association (NYHA) Class III/IV congestive heart failure
- ☐ Respiratory failure (ventilator-dependent)
- ☐ Clinically-significant infection/sepsis

‡Contraindications
- ☐ High risk of bleeding
- ☐ Active bleeding
- ☐ Systemic anticoagulation
- ☐ INR ≥ 1.5 or aPTT ratio ≥ 1.3

Methodology

- Retroactive cohort study of patients
  - During November 2007 (1 month prior to smart order set activation)
  - And April 2010 (1 month prior to data collection)
- The EPR and CPOE system manually reviewed
- Compared VTE prophylaxis patients pre and post-implementation
  - Using chi squares and t tests
  - Compared patient demographics, risk factors, and contraindications

Key Results: Prescription of VTE prophylaxis

	Preimplementation (*N* = 1,000)	Postimplementation (*N* = 942)	*P*-value
Total receiving risk-appropriate VTE Prophylaxis	656 (65.6%)	849 (90.1%)	<0.0001
Total Receiving Any Form of VTE Prophylaxis	764 (76.4%)	901 (95.6%)	<0.0001
Heparin 5000 Units SQ BID	140 (14.0%)	302 (32.1%)	<0.0001
Heparin 5000 Units SQ TID	439 (43.9%)	327 (34.7%)	<0.0001
Enoxaparin 40 mg SQ Daily	8 (0.8%)	1 (0.1%)	0.0394
Mechanical Prophylaxis (only)	57 (5.7%)	189 (20.1%)	<0.0001
Therapeutic Anticoagulation	120 (12.0%)	82 (8.7%)	0.0213
Total receiving any form of pharmacologic VTE prophylaxis including therapeutic anticoagulation	707 (70.7%)	712 (75.6%)	0.0176
Not receiving any form of VTE prophylaxis	236 (23.6%)	41 (4.4%)	<0.0001

N, number; SQ, subcutaneous; BID, twice daily; TID, thrice daily; VTE, venous thromboembolism

Key Results: Clinical outcomes

	Preimplementation *N* = 1,000	Postimplementation *N* = 942	*P*-value
Total VTE episodes	25 (2.5%)	7 (0.7.%)	0.0022
Preventable harm from VTE	11(1.1%)	0 (0)	0.001
Total in-house VTE	5 (0.5%)	5 (0.5%)	1.0000
Total 30-day post-discharge VTE	9 (1.1%)	2 (0.3%)	0.0300
Total 90-day post-discharge VTE	20 (2.7%)	2 (0.3%)	0.0003
Fatal PE	2 (0.2%)	1 (0.1%)	1.000
Anatomic location of VTE episodes			
Lower extremity DVT	14 (1.4%)	3 (0.3%)	0.0130
Upper extremity DVT	6 (0.6%)	1 (0.1%)	0.1255
PE (± DVT)	5 (0.5%)	3 (0.3%)	0.7270
Major bleeding episodes	3 (0.3%)	1 (0.1%)	0.6253
In-hospital all-cause mortality	13 (1.3%)	19 (2.0%)	0.2845

VTE, venous thromboembolism; DVT, deep venous thrombosis; PE, pulmonary embolism; N, number.

Significance of Key Results

- Patient harm when not compliant

- Emphasizes importance of risk stratification tools

- Risk-appropriate prophylaxis does not compromise patient safety

Conclusion

- Smart order sets reduce the number of VTE occurrences in hospitalized patients

- No increase in frequency of prophylaxis associated bleeding

Future directions: Incorporate alert function for prompt risk factor reassessment and a real-time provider report card

Personal Assessment

- Shows the importance of risk-appropriate prophylaxis
- However
    - Small number of positive results may make the results less generalizable
    - Does not figure into whether or not nurses actually carried out the prescribed intervention
    - Small scope: only medically ill patients.

Future direction: Automate a clinician report tool to increase compliance as well as well as give retrospective data analysis. Also, combine the results from the clinician report tool with the APL VTE NLP tool to generate more conclusive statistics on the efficacy of the smart order set in a broader range of patient populations.