Budget Impact Analysis of Increasing LMWH/FXI Utilization

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Introduction

Venous thromboembolism (VTE) refers to deep vein thrombosis (DVT) and its most serious complication, pulmonary embolism (PE). VTE is a major issue in healthcare quality, contributing to significant morbidity, mortality, and resource expenditure.[a,b]

- DVT affects 2 million Americans annually.[c,d]
- One-third (600,000) of individuals with DVT develop PE.[a,c,d]
- 10% of all U.S. hospital deaths are due to PE.[b]
- Myocardial infarction (MI) occurs in 935,000 Americans annually.[e]

The National Quality Forum defines preventable grave medical errors and events as "never events," including wrong-site surgery and injuries caused by care management rather than the underlying disease. Although failing to treat VTE and MI with low-molecular-weight heparins (LMWHs) and factor Xa inhibitors (FXIs) is a "never event," almost 60%[a] of individuals with VTE and MI do not receive appropriate LMWH/FXI medication.

Objective

To model the impact of LMWH/FXI market share changes and utilization on the annual budget of a hospital.

Methods

We examined a cohort of adults treated with three LMWH/FXI medications: dalteparin sodium (LMWH), enoxaparin sodium injection (LMWH), and fondaparinux (FXI).

MODEL ASSUMPTIONS:

Model Annual Hospital Cost Data:

- Annual hospital VTE event costs: $10,000 (DVT); $20,000 (PE); $9,000 (MI)[f]
- Drug costs (unit of supply; no. of syringes per pack) were estimated from 2010 wholesale acquisition costs: $305.76 (5,000 IU/0.2 mL;10) for dalteparin; $300.69 (40 mg/0.4 mL;10) for enoxaparin; and $106.26 (2.5 mg/0.5 mL;2) for fondaparinux.

Model Population and Utilization Data:

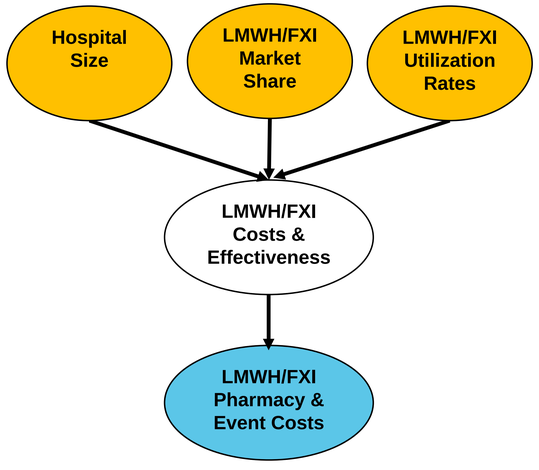
- Proportion of eligible patients treated with LMWH/FXI medication (LMWHI/FXI utilization) was assumed: 60% at baseline
- Baseline LMWH/FXI market share: 0% dalteparin, 90% enoxaparin, and 10% fondaparinux
- Perspective: hospital
- Hospital size: 500 beds
- Mean hospital occupancy rate: 70%[g]
- Mean hospital length of stay: 5.3 days[h]

ANALYSES:

Estimated changes in VTE event rates and costs, given increased LMWH/FXI utilization from 60% to 80% and:

- constant market share: 0% dalteparin, 90% enoxaparin; or
- changed market share: 90% dalteparin, 0% enoxaparin

Model Schematic



Results

Impact on Event Rates and Costs:

Increasing LMWH/FXI utilization from 60% to 80% resulted in:

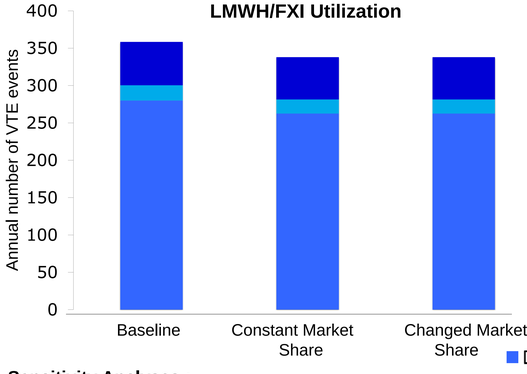
DVT: ↓6.3% and ↓$175,300 PE: ↓7.2% and ↓$29,500 MI: ↓2.4% and ↓$12,600

Impact on pharmacy and total hospital (event + pharmacy) costs:

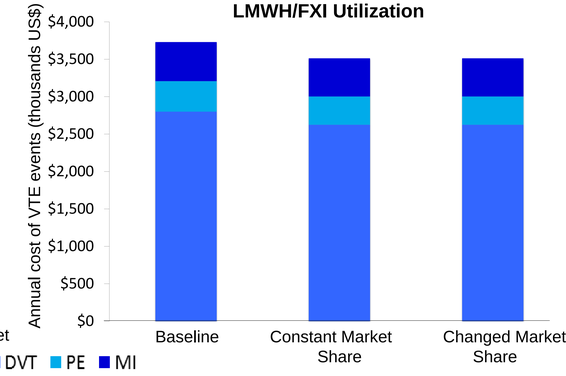
	Pharmacy costs	Total hospital costs
Increasing LMWH/FXI utilization from 60% to 80%	↑ $341,200 (+33.3%)	↑$123,800 (+2.6%)
In addition, *changing* market share to: 90% dalteparin, 0% enoxaparin, 10% fondaparinux	↑ $142,200 (+13.9%)	↓ $75,200 (-1.6%)

When LMWH/FXI utilization increased from 60% to 80%, total VTE events decreased by 20 (-5.7%) and total VTE costs decreased by $217,400 (-5.8%); these reductions occurred regardless of product market share distribution.

Reduction in VTE Events with Increased LMWH/FXI Utilization



Reduction in VTE Cost with Increased LMWH/FXI Utilization



Sensitivity Analyses :

- Total hospital costs *decreased* by $149,257 (3.14%) when LMWH/FXI utilization remained at 60% with 90% dalteparin and 0% enoxaparin.
- Total hospital costs *remained constant* when LMWH/FXI utilization increased to 80% with 54% dalteparin and 34% enoxaparin.

Conclusions

Limitations:

- We considered a hospital budget perspective (e.g., excluding outpatient costs, quality of life), which may underestimate societal impact.
- Results from individual hospital settings may differ due to different patient populations.

Conclusions:

- Increasing LMWH/FXI utilization has the potential to reduce VTE event rates and costs.
- Increased medication costs can be offset by changing the mix of LMWH/FXI products used.
- Clinical outcomes can potentially be improved by changing LMWH/FXI utilization from enoxaparin to dalteparin.

References: [a]Goldhaber *Am J Cardiol* 2004; [b]Geerts *Chest* 2004; [c]Hirsh *Circulation* 1996; [d]White *Circulation* 2003; [e]AHA Statistical Update 2010; [f]Maynard *AHRQ* 2008; [g]Analysis of 2007 AHRQ MEPS Full Year Consolidated Household Component Data File; [h]Analysis of 2008 HCUP Nationwide Inpatient Sample.