

Cost-Effectiveness Analysis of VTE Prophylaxis in Patients Undergoing Craniotomy for Tumor.

Minal Jain MD, MPH; Kristopher T. Kimmell MD; Dushyant Damania MD; Jignesh H. Patel PharmD, BS; Anunaya Jain MD, MCEM, MBA; Babak S. Jahromi MD PhD FRCSC

> Department of Neurosurgery, University of Rochester Medical Center, Rochester, NY Department of Pharmacy, University of Rochester Medical Center, Rochester, NY



Introduction

Studies have evaluated various regimens for prophylaxis against VTE in neurosurgical patients, but optimal choice of VTE prophylaxis in patients with brain tumor remains controversial. Our aim was to perform a CE analysis of various prophylactic measures employed to reduce VTE in patients undergoing craniotomy for brain tumor.

Abbreviations

CE analysis: Cost-effectiveness analysis; DVT: Deep venous thrombosis; PE: Pulmonary embolism; ICH: Intracranial hemorrhage; MP: mechanical prophylaxis; UFH: Unfractionated heparin; LMWH: Low molecular weight heparin; P: Probability; ICER: Incremental costeffectiveness ratio

Methods

We searched for studies examining VTE prophylaxis in patients undergoing craniotomy for brain tumor between 1973 and 2013. We restricted analysis to studies which examined either MP alone, MP+LMWH or MP+UFH. Each study had at least 30 days follow-up, and specified whether VTE was symptomatic or not. Development of symptomatic VTE and/or ICH within 30-days of craniotomy was considered the endpoint. Outcome was reported in health utilities. Cost data included inpatient, outpatient, diagnostic cost and physician fees, collected from published literature (2013 US\$). CE analysis was performed from an insurance perspective.

We identified 11 studies that satisfied the inclusion criteria for CEA. The P(VTE) was 1.1% in the UFH arm, 2.56% in LMWH arm, and 2.59% in the MP arm. The corresponding P(ICH) were 0.37%, 2.79%, and 0%, respectively. The average cost/utility was \$279.16 for MP+UFH, \$445.01 for MP alone and \$709.61 for MP+LMWH (figure 2). As use of MP+LWMH was strongly dominated by other options, it was removed from further analysis. 1-way sensitivity analysis was conducted on the following remaining variables - utility of craniotomy with no further complications, P(VTE with MP+UFH) (figure 3), P(ICH with MP+UFH) (figure 4) and utility of DVT, based on the relative importance revealed on tornado analysis. For the entire range tested for utility of craniotomy with no further complications and utility of DVT, UFH+MP remained the most cost effective option. Figure 5 shows a 2way sensitivity analysis between P(VTE) and P(ICH) with MP+UFH.

Results





Conclusions

Our model suggests that in patients undergoing craniotomy for brain tumor, MP+UFH is the most cost-effective VTE prophylaxis. For higher ranges of probability of hemorrhage and DVT with MP+UFH, MP alone becomes the more cost effective option.



(VTE) and P(ICH) within the blue shaded region.