Low molecular weight heparins to prevent thrombotic event in adults after major surgery

QUESTION
What is the effectiveness of low molecular weight heparins to prevent thrombotic event in adults after major surgery?

CONTEXT	Venous thromboembolism
Venous thromboembolism (VTE) is one of the most important preventable causes of morbidity and mortality in hospital patients, specially among those undergoing major surgery. Some studies have shown that up to one half of all patients after hip fracture will develop a deep venous thrombosis. A large number of studies have evaluated various prophylactic measures against thromboembolic complications. Injectable anticoagulants (unfractionated or low molecular weight heparins) and physical agents are the most widely used prophylactic methods.	

INTERVENTION	Low molecular weight heparins (LMWH)
Deep venous thrombosis: LMWH reduced the risk of deep venous thrombosis in comparison to unfractionated heparin. *High quality evidence.*	
Proximal deep venous thrombosis: LMWH reduced the risk of proximal deep venous thrombosis in comparison to unfractionated heparin. *High quality evidence.*	
Pulmonary Embolism: LMWH reduced the risk of pulmonary embolism in comparison to unfractionated heparin. *High quality evidence.*	
Bleeding complications: No differences between LMWH and unfractionated heparin in the risk of major bleeding. *High quality evidence.*	

Summary of the Evidence	
Benefits	A systematic review Commissioned by the National Institute for Health and Clinical Excellence (NICE) identified 76 randomized clinical trials (RCT) that evaluated different methods for preventing venous thrombosis in patients undergoing different types of surgery of all ages and both sexes [1]. The review compared LMWH to unfractionated heparin. LMWH reduced the risk of deep venous thrombosis (67 RCT, 1.644 events, RR 0.87, 95%CI 0.79-0.95), proximal deep venous thrombosis (19 RCT, 282 events, RR 0.49, 95%CI 0.49-0.78) and the incidence of pulmonary embolism (37 RCT, 99 events, RR 0.66, 95%CI 0.46-0.95).
Risks	Major adverse events related to anticoagulants are related to the increased risk of bleeding. There were no differences between LMWH and unfractionated heparin regarding the risk of major bleeding although the common estimate favored LMWH (47 RCT, 678 events, RR 0.87, 95%CI 0.76-1.01)
Applicability	It should be noted that other therapeutic alternatives exist such as oral anticoagulants, antiagregants or physical agents, alone or in combination. Thus, other multiple comparisons could be considered when assessing the most suitable strategy for preventing thrombotic events in those patients undergoing major surgery.
Commentaries	Although different strategies has been shown to be effective in reducing thrombotic complications in patients undergoing major surgery, direct comparisons between LMWH and unfractionated heparin favors LMWH.

Costs	This systematic review included a cost-effectiveness analysis made in the UK health system context that shows a similar incremental cost for LMWH or unfractionated heparins (£11 and £18, respectively) but treatment with a LMWH was related with a greater net benefit per patient (£117) than unfractionated heparins (£89) when compared to no treatment. No direct comparison between treatments was performed.

1. National Institute for Clinical Excellence. Venous Thromboembolism. Reducing the risk of venous thromboembolism (deep vein thrombosis and pulmonary embolism) in inpatients undergoing surgery. London: National Clinical Guideline Centre - Acute and Chronic Conditions; 2010.

TABLE	GRADE Evaluation of Clinical Outcomes								
Number of Studies	**Outcome**	**Comparison**	**Type of Evidence**	**Quality**	**Consistency**	**Direct Evidence**	**Size of Effect**	**GRADE**	**Comments**
67	Deep venous thrombosis	LMWH U Heparin	4	0	0	0	0	High	
19	Proximal deep venous thrombosis	LMWH U Heparin	4	0	0	0	0	High	
37	Pulmonary embolism	LMWH U Heparin	4	0	0	0	0	High	
47	Major bleeding	LMWH U Heparin	4	0	0	0	0	High	
Type of evidence: 4 = RCT; 2 = Observational; 1 = Non-analytic studies / Expert opinion									