Pharmacoeconomic Analysis of Fondaparinux for the Prevention of Thromboembolic Events in Orthopedic Surgical Patients

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Abstract

Background: Fondaparinux is a novel synthetic antithrombin, which has been evaluated extensively for the prevention of VTEs. In large trials of patients undergoing major hip or knee surgery, fondaparinux was found to be safe and more effective than enoxaparin. To generate Canadian pharmacoeconomic data for fondaparinux, an internationally developed cohort simulation model was used to estimate the costs and consequences of prophylaxis with fondaparinux compared to enoxaparin in the Canadian setting.

Methods: A health economic advisory group was assembled to provide the pharmacoeconomic evaluation. Efficiency and safety data for fondaparinux relative to enoxaparin were abstracted from a meta-analysis of the four randomized trials. Canadian cost data to populate the model were obtained from a survey of a sampling of five large Canadian hospitals, the Canadian Institute for Health Information (CIHI) and from the Canadian Economic Resource Compendium. Resource information obtained from CIHI was incorporated into the cohort simulation, which included 100,000 simulated patients. The number of VTEs and bleeding complications following prophylaxis by fondaparinux and enoxaparin within 60 days of surgery, and the economic consequences were derived. The utility of the base case model was evaluated with sensitivity analysis.

Results: Among a caseload of 763 patients in 80 hospitals, performed in Canada in 2001/2002, the cohort simulation model predicted that prophylaxis with fondaparinux would avoid an additional 16 VTEs per 1000 orthopedic surgery patients treated and would save an average of $55 per patient. The savings would mainly be composed of hospital resources for the treatment of clinical DVTs and PEs.

Conclusions: Prophylactic fondaparinux compared to enoxaparin would avoid an additional 16 VTEs per 1000 orthopedic surgery patients treated and would save an average of $55 per patient. The savings would mainly be composed of hospital resources for the treatment of clinical DVTs and PEs.

Study Limitations

1. The most important limitation relates directly to the use of a simulation model rather than actual data from randomized trials comparing fondaparinux with enoxaparin using clinical endpoints, rather than venography, a surrogate outcome for clinically important VTEs.

2. Although the cost of treating a VTE in Canada was estimated from a survey of four large centers with active orthopedic services, these centers might not be representative of all Canadian centers.

3. Only direct hospital and related expenditures were considered; additional indirect costs (e.g., loss of productivity etc.) secondary to VTE complications were not included in the analysis.

Introduction

1. Deep vein thrombosis (DVT) and pulmonary embolism (PE) are manifestations of venous thromboembolic events (VTEs).

2. Without prophylaxis, over 50% of patients develop DVT or PE following major hip or knee surgery.

3. To reduce the risk of VTE, prophylactic anticoagulation therapy is essential following high-risk surgical procedures.

4. The low molecular weight heparins are commonly used for VTE prophylaxis in high-risk groups, such as patients undergoing major hip or knee surgery.

Fondaparinux for the Prevention of VTEs

1. Fondaparinux is a novel synthetic antithrombin, which has been extensively evaluated for the prevention of VTEs.

2. The safety and efficacy of prophylaxis relative to enoxaparin for VTE prophylaxis was evaluated in four randomized double-blind trials involving 7454 patients who underwent hip replacement, hip fracture or major knee surgery.

3. The primary efficacy outcome was VTE incidence by day 60, defined as DVT detected by statin venographic or documented symptomatic DVT of PE. A meta-analysis of the four trials generated a pooled relative risk reduction (RRR) of ~ 65% (95% CI 56% – 74%) that was highly statistically significant and in favor of fondaparinux.

4. Fondaparinux was recently approved for use in orthopedic prophylaxis by Health Canada.

Objectives

1. To adopt a cohort simulation model for predicting VTEs for the Canadian setting.

2. To predict the number of clinical DVTs and PEs avoided with fondaparinux relative to enoxaparin in the first 60 days post-surgery.

3. To estimate the incremental cost per quality-adjusted life year when fondaparinux is used as an alternative to enoxaparin for VTE prophylaxis.

Methods

Adaptation of Cohort Simulation Model to the Canadian Setting

1. The process to adopt the global cohort simulation model began with the creation of a Canadian health economic advisory group.

2. The advisory group reviewed the appropriate data from the cohort simulation model for the Canadian setting, as an economic evaluation comparing fondaparinux to enoxaparin in the prevention of VTEs, and individual members collected hospital resource use data from their home institutions.

3. The simulation model was designed to predict the number of VTEs and associated costs in a cohort of orthopedic surgical patients for 60 days following surgery.

4. The model translated reported data from large international asymptomatic clinical trial endpoints (venographic DVT) into endpoints relevant to routine practice (symptomatic DVT and PE).

Results

The surveyed hospitals were acute care centres ranging in size from 300 to 650 beds.

Table 1. Summary of resource utilization data for the treatment of clinical DVT and PE in Canadian settings.

Table 2. Model cost estimates used as input in model.

Table 3. Clinical and economic outcomes in patients undergoing total knee replacement.

Table 4. Costs of prophylactic fondaparinux compared to enoxaparin in the prevention of VTEs.

Table 5. Model projections of prophylaxis with fondaparinux compared to enoxaparin for VTE prevention in orthopedic surgical patients.