Economic impact of using a fibrin sealant (human) in orthopedic surgeries.

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Publication Date: 2010

Abstract:

Introduction: Inadequate surgical hemostasis may lead to bleeding-related complications and the need for transfusion following orthopedic surgery. Fibrin sealants are used as adjunctive surgical hemostatic agents and their effectiveness have been demonstrated in a variety of procedures including orthopedic surgeries. However, perceived relatively high costs of fibrin sealants have been a concern to many clinicians and hospital purchasers. The objectives of this study were to present an economic model that evaluates the cost of potentially avoidable bleeding related consequences and examine the cost implications of the use of EVICEL Fibrin Sealant (Human) in total knee replacement (TKR) and total hip replacement (THR) surgeries in US hospitals. Methods: An economic model was developed to estimate the costs of major bleeding related consequences, which include blood transfusion, hematoma management, drain placement and erythropoietin use (EPO, as a surrogate for anemia). Based on this model, total expected costs of using a fibrin sealant (EVICEL) in total knee and total hip replacement surgeries versus standard surgical techniques were examined. The clinical and economic input data are derived from peer-reviewed published studies to assess the costs of clinical events/resource utilization of blood transfusion, hematoma management, drain placement and EPO use with EVICEL versus standard surgical techniques. Specifically, the transfusion rates used in the model are pooled estimates from three clinical trials in total knee replacement procedures (standard: 38.3% vs. EVICEL: 20.1%) and two clinical trials in total hip replacement procedures (standard: 41.9% vs. EVICEL: 21.6%) that evaluated the impact of EVICEL on blood loss and transfusions. The cost of transfusion is estimated on the basis of $1004

per unit of blood and 2.5 additional hospital days associated with transfusion. Hematoma is estimated to occur in 4% of patients with EVICEL and 14% of patient without EVICEL and results in one additional hospital day. Because current clinical data on drain use and EPO are lacking, default values for Evicel and standard treatment are equal. However, the model can be adjusted based on local practice patterns, usage and data. A one-way sensitivity analysis was performed on the key inputs. Results: Based on the model calculations for 100 TKR and 100 THR surgeries, a projected overall cost savings of $51,020 and $67,070 was shown for TKR and THR, respectively, from the use of EVICEL, mainly attributable to reduction in transfusions and shorter length of stay. Results: of the one-way sensitivity analysis show that the model is most sensitive to the incidence of blood transfusion, followed by the incidence of hematoma, followed by the cost of an additional day in the hospital Conclusions: The economic model provides a comprehensive framework to evaluate the financial impact and support optimal use of interventions that lead to blood conservation. This framework was used to evaluate the conditions under which EVICEL Fibrin Sealant (Human) could be a cost-saving treatment for hemostasis in patients that undergo orthopedic surgery. This methodological approach can theoretically also be applied to assess the cost effectiveness of other blood management adjunctive treatments.