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Impact of Tranexamic Acid (TXA) on Hemoglobin Levels in Elective Total Knee Arthroplasty Patients

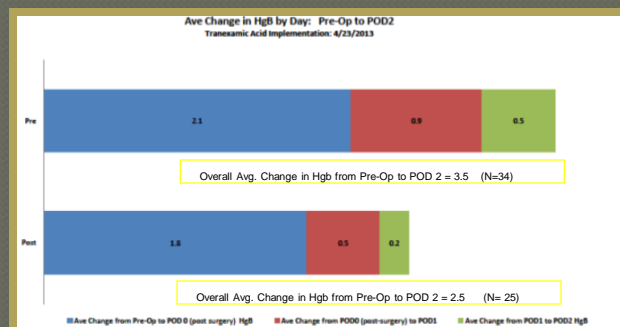
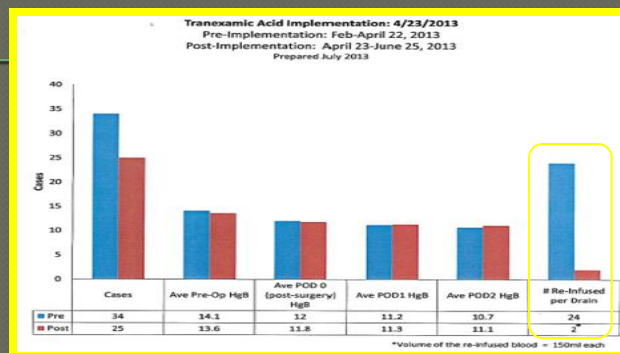
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Situation

- Over the last 2 years, the Bone and Joint Center has focused on blood utilization for total knee and total hip arthroplasty. With the use of a blood transfusion protocol, we significantly reduced blood transfusion rates and standardized the approach to care.
- As an expansion of this work, other ideas to further decrease blood utilization were considered.
- The purpose of the data collection of preoperative and postoperative Hemoglobin (Hgb) levels was to evaluate the effect of Tranexamic Acid (TXA) on the average change in Hgb levels compared to Hgb levels of patients that did not receive the medication. In addition, a review of the consistency of practice for Hgb draws, cost to the patient, and blood re-infusion per drain were recognized as other opportunities.
- The use of a post-operative drain has been shown to be associated with an additional cost to the patient and hospital, increased length of stay, possible risk of infection, potential increase in blood loss and increase in the need for a blood transfusion.

Background

- Varied techniques such as preoperative autologous donation, blood re-infusion per drain postoperatively, and blood algorithms have been utilized to reduce blood loss and/or the need for a blood transfusion after total knee arthroplasty.
- In review of literature, one grade level A article and three grade level B articles, support the use of TXA to reduce the risk of infection, decrease length of stay, minimize postoperative blood loss and decrease the cost associated with blood transfusions via blood bank and/or drain reinfusion.
- TXA is a synthetic antifibrinolytic agent that has successfully been used to reduce blood loss following total knee replacement and to decrease the need for a blood transfusion. This medication can be administered intraoperatively either intravenously or topically (intra-articular).
- Through the work on a core measure for Disease Specific Care Certification, the blood transfusion rate for elective total knee and total hip replacement decreased from 20% in FY 2012 to 5% in FY 2013, with an estimated cost savings of \$150,000.
- Discussion at Department of Orthopedics with key stakeholders from perioperative services, OR, and Bone and Joint on benefits of TXA to reduce blood loss and blood utilization postoperatively. Some orthopedic surgeons initiated the use of TXA after this discussion and discontinued the use of a blood salvage drain or changed to a non re-infusable drain, constavac.
- Acuity of patients is higher due to the drain in place and the need to re-infuse, time for vital sign monitoring, and removal of the drain. This results in increased cost related to nursing time and staff needed to care for the patient.



Patient Scenario	Charge per case	Savings per case
Tranexamic Acid and Blood Salvage Drain	\$584.69	N/A
Tranexamic Acid and Constavac Drain	\$373.95	\$210.74
Tranexamic Acid and no drain	\$260.72	\$323.97

Estimated Total Savings in one year, considering an average of 500 Total Knee Arthroplasty cases per year =

\$161,985

Assessment

- We defined our patient population by comparing 34 total knee arthroplasty cases of one orthopedic surgeon, surgery dates of February 1st to April 22nd, 2013 pre-implementation of TXA compared to 25 cases from April 23rd to June 25th, 2013 post-implementation of TXA.
- We compared the average change in preoperative Hgb level to day after surgery level. The average change in Hgb level from day of surgery to day after surgery, along with day after surgery and post-operative day 2 were evaluated.
- The overall average decrease in the Hgb level from pre-op to POD 2 was 1.0 less in the TXA group.
- The percent of patients requiring a re-infusion per drain postoperatively that did not receive TXA was 69% compared to 8% for patients that did receive TXA. Of the patients that did not receive TXA, 24 had a drain re-infusion. There were only 2 patients that received TXA and had a drain re-infusion for 150 ml each.
- Since December 2013, surgeons have discontinued the routine usage of the reinfusion drain in elective total knee arthroplasty. TXA is utilized in majority of these cases and either a non-reinfusable drain or no drain.
- There is also a significant cost savings of salary dollars, due to decreasing nursing time for preparation and re-infusion per drain, monitoring of vitals, and discontinuation of the drain. On average patients received one reinfusion per drain initiated in a 6 hour time period postoperatively.

Recommendation

Future considerations:

- Utilize TXA to decrease decline of Hgb level postoperatively and decrease drain blood loss.
- Decrease or eliminate routine usage of a re-infusion or constavac drain.
- Possibly administer TXA in other types of orthopedic procedures such as fracture repair and total shoulder replacement.
- Incorporate order for TXA into preop order sets to increase awareness and accessibility of the medication in OR.
- Evaluate the need for the number of Hgb draws postoperatively and decrease frequency as appropriate.

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