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Blood Transfusion Practices in the Elective Total Joint Replacement Patient : A Research Study

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Blood Transfusion Practices in the Elective Total Joint Replacement Patient : A Research Study

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Problem/Purpose

- Evaluate the prescribing trends of red blood cell (RBC) transfusions in patients that have undergone elective total joint replacement surgery (total hip or total knee replacements) on the orthopedic unit during January-February 2011 (Phase 1) and January-February 2012 (Phase 2).
- Transfusion practices focused on quality and safety. Nursing owns several crucial roles in transfusion safety. Educator: encouraging the use of evidence-based guidelines by physicians; educating patients about the risks, benefits and alternatives to transfusion. Advocate: effective use of transfusion alternatives. Assessor: vigilant patient assessment during and after transfusion to identify adverse events early and minimize patient harm. (Thomas, J., 2010)

Research Questions

Phase 1
- Which factors (gender, age, preoperative hemoglobin, postoperative hemoglobin, type of surgery, autologous donor) are significant predictors of patients receiving RBC transfusions?

Phase 2
- Does implementation of a RBC transfusion order set decrease the number of transfusions, length of stay, and costs in elective total knee and total hip replacement?
- Did the elimination of autologous blood donation decrease blood transfusions, length of stay, costs and perioperative anemia?
- Which factors (gender, age, pre-operative hemoglobin, postoperative hemoglobin, type of surgery, autologous donor) are significant predictors of patients receiving RBC transfusions?

Summary of Research Study

- This research study was performed to determine the impact of a RBC transfusion order set on improving patient outcomes after total joint replacement surgery.
- The second objective was to identify the impact of elimination of autologous blood donation on improving patient outcomes after a total joint replacement surgery.
- The study was comprised of two retrospective chart reviews. Phase 1 included data prior to implementation of a RBC transfusion order set and elimination of autologous blood donation. Phase 2 included the data after they were implemented.
- The study population consisted of in-patients undergoing an elective total hip or total knee replacement on the orthopedic unit during the time frames of January 2011 through February 2011(Phase 1) and January 2012 through February 2012 (Phase 2).
- Study instruments used were the RBC Transfusion Order set and Data Collection Excel spreadsheet.
- Prior to implementation of the RBC transfusion order set, education was provided to nurses, physicians, nurse practitioners, and physician assistants by the nurse practitioners. Education included evidence-based data regarding safe transfusion practices. Continuing education was provided when needed.

Background

- Within the last decade many studies have been published stating that it is not necessary to transfuse according to a single hemoglobin level, but rather it is necessary to assess the combination of signs, symptoms and laboratory measures. (Barr & Bailie, 2011).
- One study by (Herbert, 1999) found that a threshold as low as 7.0 grams of hemoglobin were effective and decreased mortality, decreased risk of receiving a blood transfusion, decreased cardiac complications and organ dysfunction. Risks of blood transfusion can also include increased hospital stay (Boetnner, 2009) (Keating, 2005).
- Transfusion guidelines have been shown to reduce the rate of inappropriate blood transfusion by 10.4 percent (Wong, 2007).
- Preoperative autologous blood donation has been shown to be costly, increase risk of transfusion from phlebotomy-induced anemia, and does not eliminate risks of blood transfusions (Boetnner, 2009).

Methodology

- Retrospective chart review
- Study Population- Adult in-patients undergoing an elective total hip or total knee replacement on the orthopedic unit during the time frames of January 2011 through February 2011(Phase 1) and January 2012 through February 2012 (Phase 2).

Data points collected during chart review for Phase 1 and Phase 2:

- Age
- Gender
- Type of surgery
- Postoperative hemoglobin
- Autologous blood donation
- Blood transfusion
- Hemoglobin trigger for transfusion
- Anemia symptoms
- Length of stay
- Cost

- IRB approval received and Informed Consent was exempt and waived.

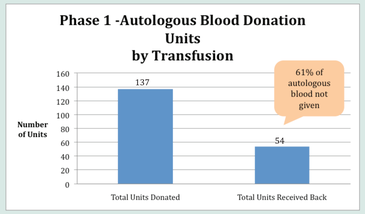
Tools
- Red Blood Cell Transfusion Order set: Used by practitioners to standardize the ordering of blood transfusions.
- Data Collection Excel Spreadsheet

Validity and Reliability
- Uniformly trained key personnel to perform chart reviews and data collection.

SPSS for Windows version 19 used for Quantitative Analysis
- Independent Samples T-Test
- Direct Logistic Regression
- Multiple regression analysis

Results/Findings

Phase 1



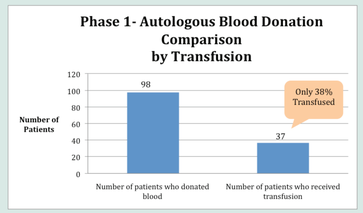


Table 1
Phase 1 - Logistic Regression Predicting Likelihood of Receiving a Blood Transfusion

	B	S.E.	Wald	df	p	Odds Ratio	95.0% C.I. for odds Ratio Lower	Upper
Age	.06	.02	5.23	1	.022	1.06	1.01	1.11
Gender	-.08	.60	.02	1	.90	.93	.29	3.01
Type of Surgery	-.19	.52	.14	1	.71	8.2	.29	2.30
Preoperative Hemoglobin	-.37	.29	1.58	1	.21	.69	.39	1.23
Postoperative Hemoglobin	-.86	.30	7.96	1	.005	.43	.23	.77
Autologous Donation	.42	.40	1.12	1	.29	1.52	.70	3.32

Phase 2

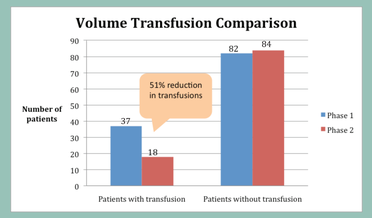
Table 2
Phase 2 - Logistic Regression Predicting Likelihood of Receiving a Blood Transfusion

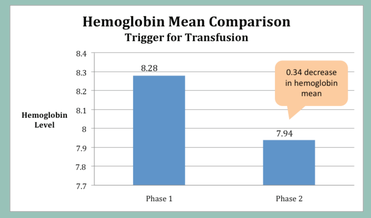
	B	S.E.	Wald	df	p	Odds Ratio	95.0% C.I. for odds Ratio Lower	Upper
Age	.05	.02	6.89	1	.009	1.05	1.01	1.09
Gender	.10	.39	.07	1	.79	1.11	.52	2.38
Type of Surgery	-.03	.36	.01	1	.93	.97	.48	1.97
Postoperative Hemoglobin	-1.03	.18	32.76	1	<.001	.36	.25	.51
Autologous Donation	.64	.23	7.53	1	.006	1.89	1.2	2.98

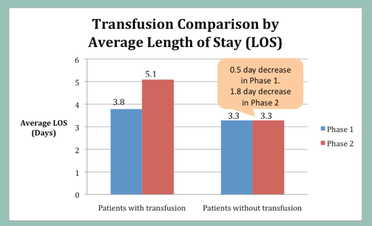
Table 3
Phase 2 - Multiple Regression Predicting Length of Stay

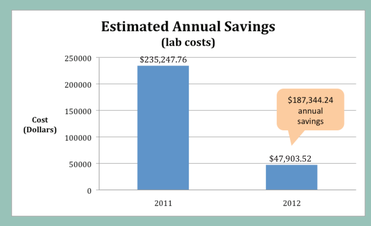
Variable	B	SE B	β	Sig.
Postoperative Hemoglobin	-.09	.05	-.11	.09
Autologous Donation	-.179	.09	-.13	.04
Received Transfusion Postoperatively	.71	.10	.43	<.001

Comparison (Phase 1 vs. Phase 2)









Sample

- Elective Total Joint Replacement patients admitted to the Orthopedic Unit at Baptist Hospital of Miami

Phase One
- 118 patients
- Male= 46; Female= 72
- Ages 44-90
- Total Knee Replacement = 71; Total Hip Replacement = 48
- Admitted January-February 2011

Phase Two
- 109 patients
- Male =47; Female =62
- Ages 43-96
- Total Knee Replacement = 62; Total Hip Replacement = 40
- Admitted January-February 2012

Study Limitations

- Noncompliance in the use of the RBC transfusion order set.
- Small sample size.
- During the month of January 2012 (Phase 2), there was an increase in length of stay due to patients with complications requiring intensive care.

Study Conclusions

- Decreased number of patients receiving blood transfusion after implementation of RBC transfusion order set.
- Decreased hemoglobin trigger value in patients receiving a blood transfusion after implementation of RBC transfusion order set.
- Individually, age, post-operative hemoglobin, and autologous blood donor, were found to predict the likelihood of a patient receiving a blood transfusion.
- The strongest predictor of receiving a blood transfusion was autologous blood donation and age.
- Individually, autologous blood donors and patients receiving a blood transfusion, had an increased length of stay.

Implications

- The study accentuates the need for standardization in regards to prescribing blood transfusions for acute post operative anemia. Standardization can be obtained with the use of the RBC transfusion order set.
- The order set was devised to be used as a practice tool for practitioners to reduce cost, improve outcomes and standardize patient care. It can be used for any anemic patient within the hospital setting. Therefore, use of the RBC transfusion order set will decrease unnecessary transfusions hospital wide.
- This study has shown how influential advanced practice nurses and registered nurses can be in directing and advocating for the care of the orthopedic patient.
- Future studies are recommended to examine standardized blood transfusion guidelines in all orthopedic patients.
- Further cost analysis should be done to determine financial burden of blood transfusions.

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