Understanding Intra Operative Blood Use: a retrospective procedure-specific analysis of MPOG data

A proposal to the MPOG PCRC

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Background

- Some surgical procedures require blood products crossmatched in advance, others do not.
- Having the appropriate level of pre-operative transfusion support avoids:
  - Unnecessary Lab test utilization when not needed
  - Rushed or bottle neck of resources with last-minute/unanticipated request for support when needed

Background (cont'd)

- Many hospitals have a Master Blood Ordering Schedule or Maximum Blood Ordering Schedule (MSBOS)
- MSBOS is a list of surgical procedure types and the default Blood Bank order:
  - Nothing needed
  - Type and Screen only
  - Type and Screen plus Crossmatch 2-4 RBCs

Background (cont'd)

- MSBOS was proposed over 30 years ago, based on analysis of 300 hospitals
- Literature suggests poor compliance with its use, or understanding of its value
- Only one recent study assessing MSBOS in their hospital (John Hopkins)
- No other studies in the recent literature has looked at intraoperative blood use to help define appropriate preoperative transfusion support

Overall Goals of Study

- To provide data to MPOG institutions and to the larger community on the current level of intraoperative blood use for various surgical procedures
- To improve preoperative planning of transfusion support for surgical procedures where appropriate

Study Design

- Multicenter retrospective study of cross-sectional de-identified data from the MPOG database
  - Patient inclusion criteria: All patients undergoing elective and urgent surgery.
  - Patient exclusion criteria: All pediatric patients < 18 years old, all patients undergoing trauma surgery.
- The primary outcome for the proposed studies is intraoperative blood use (all blood components including autologous blood use).

Action steps for this study

- Part 1: Understanding the scope:
  - Analysis of current intraoperative blood use that is grouped by procedure type (general categories)
    - Define 10^{th} to 90^{th} percentile blood use for procedure type
  - Generate a revised data-based version of the MSBOS
  - Variation in blood use is anticipated (our primary research hypothesis)

Action steps for this study (cont'd)

- Part 2: Understanding the risk factors:
  - Identify preoperative risk factors associated with blood use
  - Compare with prior models of risk factor analysis in cardiac surgery literature – can these models be extended outside of cardiac surgery?
  - Identify common traits/risk factors in outlier cases where blood use exceeded 90th percentile

Proposed Study Part 1: Identification and classification of surgical procedures associated with intraoperative blood transfusions.

- Procedures associated with 80% of intraoperative blood use will be identified (Pareto analysis)
- Procedure types will be grouped into larger categories to simplify study and analysis
- Median, 10^{th} -90^{th} percentile range of blood use will be determined
- Degree of inter-institutional vs. intra-institutional variation will be analyzed

Proposed Study Part 2: Determination of risk factors associated with greater blood use

- Multivariate linear regression analysis will be performed with quantity of blood use as dependent factor versus:
  - patient variables (age, gender, weight, lowest intraoperative hemoglobin, creatinine, pre-existing diabetes, pre-existing liver disease), surgical procedure variables (complex surgery, repeat surgery, urgent vs. elective), and anesthesia technique
- Logistic regression to compare cases with greater than 90th percentile blood use vs. less will be performed, using same variables as above.

Potential follow up studies after completion of proposed analysis

- Creation of a software application that alerts surgery and anesthesiology teams of high risk patients (high need for transfusion support) based on data
- Analysis of patient outcomes associated with intraoperative transfusions --- does improving knowledge of potential need for transfusions improve outcomes?
- Benchmarking of high blood use vs. low blood use institutions (for the same procedure) and identification of effective local initiatives or measures

Proposed Research Team

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Data elements to be analyzed

Element	Source
MPOG case identifier	General_Case_Information
MPOG patient identifier	General_Case_Information
MPOG institution identifier	General_Case_Information
Case Date	General_Case_Information.AIMS_Scheduled_DT
age	Caseinfo.age_in_years
gender	Caseinfo.sex
Height in cm	Anthropometrics.MPOG_height_cm
Weight- kg	Anthropometrics.MPOG_weight_kg
BMI	Anthropometrics.Body_Mass_index
Primary Surgical Service	General_Case_Information. MPOG_Primary_Procedural_Service_Concept_ID
Primary Surgical Service	General_Case_Information. MPOG_Primary_Procedural_Service_Concept_Desc
Procedure Code	General_Case_Information. Charge_Capture_Primary_Anesthesia_Code
Procedure Code	General_Case_Information. Charge_Capture_Primary_Surgery_Code

Data elements to be analyzed (cont'd)

PACKED RED BLOOD CELLS- AUTOLOGOUS	Intraoperative Blood Products In -10489
PACKED RED BLOOD CELLS – HOMOLOGOUS	Intraoperative Blood Products In - 10490
WHOLE BLOOD – AUTOLOGOUS	Intraoperative Blood Products In - 10491
WHOLE BLOOD – HOMOLOGOUS	Intraoperative Blood Products In - 10492
FRESH FROZEN PLASMA	Intraoperative Blood Products In - 10493
PLATELETS	Intraoperative Blood Products In - 10494
CRYOPRECIPITATE	Intraoperative Blood Products In - 10495
SALVAGED BLOOD (CELLSAVER)	Intraoperative Blood Products In - 10496
Endocrine – Diabetes	Preoperative Observations - 70046
Formal lab- Hemoglobin	Laboratory or Testing Observations - 5005
POC- Coulter counter – Hemoglobin	Laboratory or Testing Observations - 3440
Formal lab – Blood gas - Hemoglobin	Laboratory or Testing Observations - 5080
POC – Blood gas - Hemoglobin	Laboratory or Testing Observations - 5081
Formal lab –Creatinine, Serum	Laboratory or Testing Observations - 5002
GI – Liver Disease	Preoperative Observations - 70052
Formal lab – Int'l Normalized Ratio	Laboratory or Testing Observations - 5008
ASA class	ASA_Class
Emergent	ASA_Class
Block_yn	Anesthesia Technique
Epidural_yn	Anesthesia Technique
General_yn	Anesthesia Technique
Spinal_yn	Anesthesia Technique

Thanks for your attention!
Questions? Thoughts?