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Resource Management: Efficient Utilization of Blood Transfusion: Lessons from the Blood Bank

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Cover Page Footnote

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Efficient Utilization of Blood Transfusion: Lessons from the Blood Bank

Key Words

Blood Utilization, MSHA, Choosing Wisely, Lean, Quality Improvement

Introduction

Blood is a vital resource that is solely dependent on generous donors. Approximately 36,000 units of red blood cells, 7,000 units of platelets, and 10,000 units of plasma are needed every day in the United States.¹ Blood cannot be manufactured in a laboratory, which creates a prominent need for efficient utilization and management of this resource. Despite the great need for blood, only about 10% of the eligible donor population donates¹, increasing the immense need for an efficient and organized blood management system.

Background

Mountain States Health Alliance is a not-for-profit healthcare organization based in Johnson City, Tennessee, operates a system of 13 hospitals serving a 29-county, four-state region of Northeast Tennessee, Southwest Virginia, Southeastern Kentucky and Western North Carolina. Mountain States utilizes Soarian as its primary electronic medical record system and portal for its Physician Order Entry (POE) system, enabling physicians to enter orders for their patients while in the hospital.

In 2013, changes were made across the POE system that required physicians to specify reasons blood was being ordered for patients. In 2014, an interdisciplinary team at Mountain States began collecting from POE and the Mountain States laboratory information system to generate a report to learn two things:

- A) Number of units of blood a doctor ordered for any given patient
- B) Reason why blood was being given

Reasons to give blood differ from patient to patient, yet the report showcased that the reasons for blood orders typically fell into one of the following categories:

1. Acute active bleeding (losing greater than 15% of entire blood volume)
Example: Trauma, invasive surgical procedure
2. Perioperative hemoglobin less than 9 g/dl.
Example: Patient with low hemoglobin who is going into surgery.
3. Hemoglobin less than 8 g/dl in a stable patient with cardiovascular disease.
Example: Stable adult with chest pain or history of heart attack.
4. Hemoglobin less than 7g/dl in an otherwise stable adult patient.
Example: Patient with anemia but no other symptoms.
5. Other: *Patients who don't fall into one of the above categories but the doctor must document the specific reason why transfusion is necessary.*

*Normal hemoglobin level is around 12 grams per deciliter (12 g/dl).

Making these changes to the POE system allowed for a detailed report to be generated and used to identify opportunities such as:

- 1) Reducing the number of inappropriate units transfused
- 2) Minimizing risks associated with transfusion reactions
- 3) Improving cost-efficient patient care

Problem Definition

The *Choosing Wisely* initiative of the American Board of Internal Medicine² includes a recommendation from the AABB (formerly American Association of Blood Banks) that suggests best practice is adhering to a restrictive transfusion strategy in hospitalized, stable patients. AABB suggests that transfusion decisions be influenced by symptoms as well as hemoglobin (Hgb) concentration.³ This recommendation is based upon strong medical evidence that, as opposed to 2 unit transfusions, 1 unit is preferable in cases with hemoglobin levels less than 7 g/dl and hemoglobin less than 8 g/dl in patients with cardiovascular disease.⁴

Mountain States sought to implement a system that would decrease the utilization of blood throughout the entire health system. To address this recommendation, a more detailed monitoring of blood transfusions was needed to ensure the preservation of the blood supply, minimize risks associated with transfusions, and ensure cost-efficient patient care.

Description of Project

Using the data collected in 2014 from across the system, Mountain States was able to generate baseline measures for the blood utilization management project. From 2014 to 2015, monthly reports showed fairly consistent transfusion statistics. The following chart is based on February 2015 data:

The reason blood was being given - Percentage of transfusions

- Hgb less than 7 g/dl in a stable adult patient 34%
- Hgb less than 8 g/dl with cardiovascular disease 32%
- Other 22%
- Active Bleeding 6%
- Perioperative Hgb less than 9 g/dl 5%

Average units ordered per transfusion

- Hgb less than 7 g/dl in a stable adult patient 2.1 units
- Hgb less than 8 g/dl with cardiovascular disease 1.7 units
- Other 1.6 units
- Active Bleeding 1.8 units
- Perioperative Hgb less than 9 g/dl 1.6 units
- *Average for all indications* 1.8 units

These baseline measures allowed the team at Mountain States to create target measures in accordance with the *Choosing Wisely* initiative of limiting blood transfusions. After analyzing the baseline measures, Mountain States found that on average, its providers were transfusing almost twice the recommended amount of blood as compared to the *Choosing Wisely* ideal target, as shown below.

Given that a provider chooses “other” and transfuses more than 1 unit of blood, they must then input a specific reason for the extra units being given. For example, if a patient had a hemoglobin level of 6.5 g/dl and was tachycardic, the physician would use best judgment and transfuse more than one unit. While this may be in conflict with the new AABB *Choosing Wisely* recommendations, it displays a patient-centered approach to medicine and confirms that physicians are choosing treatment options that are in the best interest of the patient. To monitor this, a report containing blood order details by provider was created from Mountain States’ internal data warehouse and then placed into Microsoft Access to allow for convenient analysis of physician performance.

Outcomes

After one year of the project implementation, Mountain States saw a sustained approximate reduction of 20% in blood utilization throughout the entire health system. Without factoring in the cost of workforce time and pay, the health system was able to save approximately \$250,000.

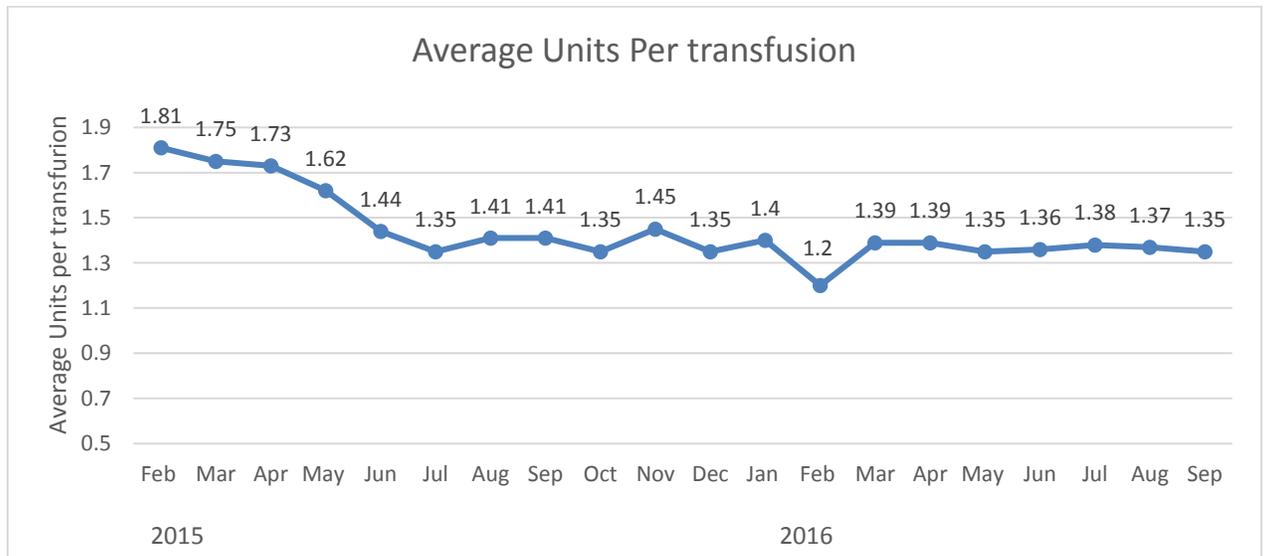


Figure 1: Units per Transfusion: approximate 20% decrease in blood utilization attributed to project implementation May 2015.

Along with the financial savings, the health system was able to reduce adverse transfusion reactions, such as Transfusion Associated Cardiac Overload, and the community was able to take a substantial step toward supporting the local need for blood through blood donation.

The Microsoft Access database generated detailed information on physician ordering behaviors, allowing for rapid feedback to the medical staff, on physician compliance with the guidelines. The performance feedback was well-accepted by the medical staff and physician compliance with the guidelines rapidly improved. Any extreme deviance from evidence-based guidelines was monitored by blood bank staff and discussed with physicians, which not only resulted in immediate correction of physicians' ordering behavior but affected the facility ordering as a whole.

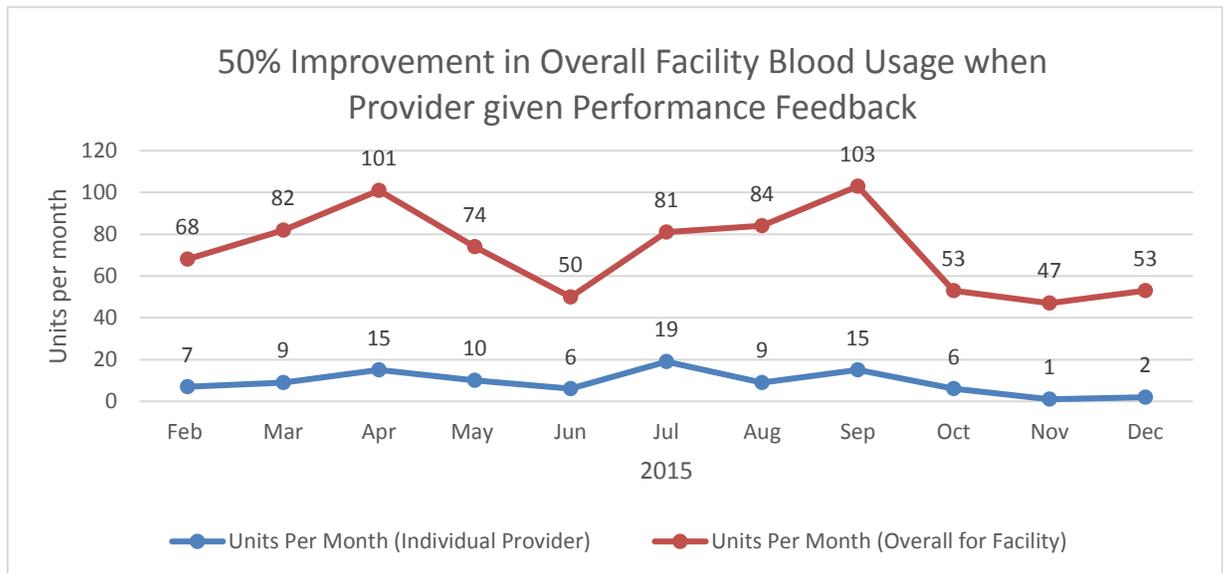


Figure 2: Individual Provider blood utilization (bottom) compared to Overall facility blood utilization (top). This shows the effect that speaking to one practitioner about ordering practices can have on the entire facility

Limitations to this project do exist. For example, the internally created dashboard monitoring tool does not capture blood being used in traumas, for pediatric patients, or blood ordered in the operating room. While these services use blood products that were not accounted for, the sustained 20% across the entire system is still significant and shows a promising monitoring system and use of new protocols.

This blood bank utilization model has now been successfully adapted to address multiple areas of resource utilization at Mountain States, including areas such as radiology, laboratory, and pharmacy, helping to ensure higher quality health care with lower costs.

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