

Background

The quality system requirements for Transfusion Services include monitoring of blood utilization. Each year, over 40 000 red blood cell (RBC) units are transfused in Alberta Health Services' (AHS) Edmonton Zone; that number is steadily increasing.

According to a 2004 blood utilization audit for Alberta Health Services' (AHS) Edmonton Zone, most of the red cell unit inventory was transfused to patients in the medical diagnostic group.

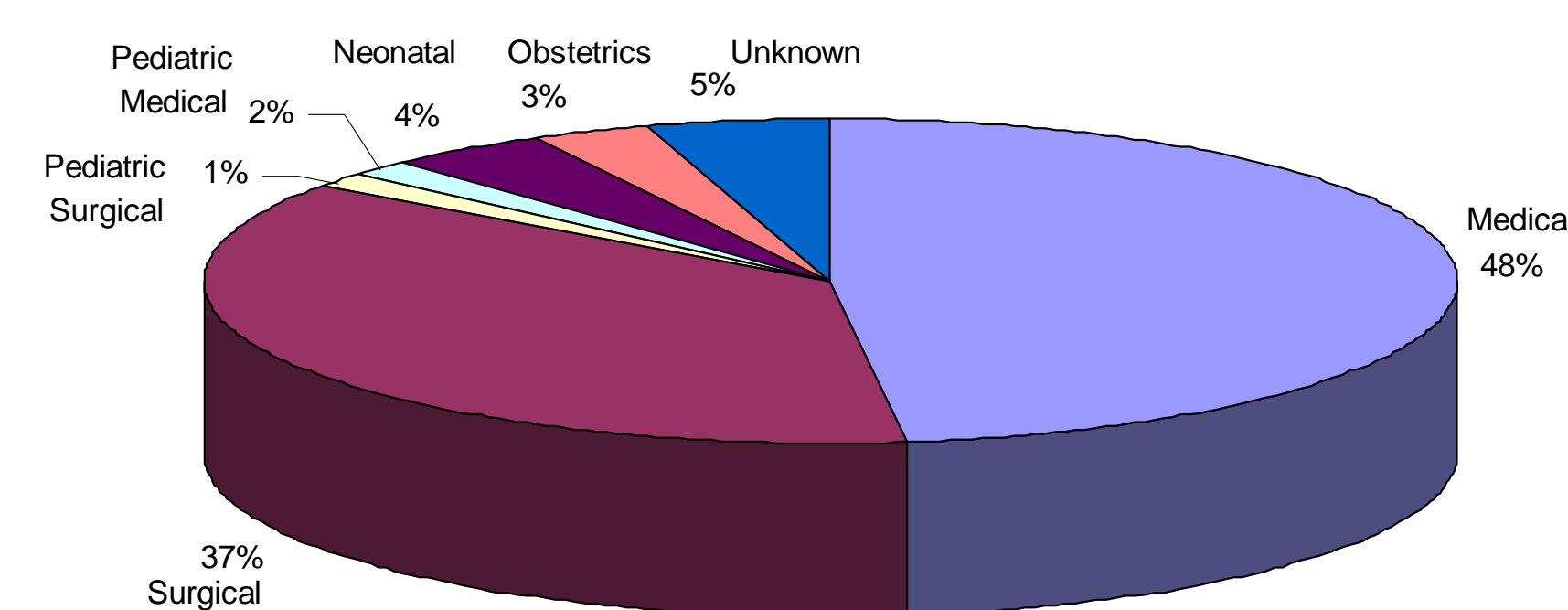


Figure 1. Red blood cell transfusions and diagnostic classes in 2004.

Indications for blood transfusions in the medical group include hematological disorders, malignancy, and gastrointestinal bleeding. From the blood bank inventory management perspective, one concern was that some of these patients are dependent on transfusions for the long term.

As the demand for blood increased over the years, the regional transfusion service chose to have a closer look at the patients who were on lifelong transfusion therapy: the chronic transfusion recipients.

We define chronic transfusion recipients as patients who receive red cell transfusions at least once every eight weeks for longer than six months.

The number of units these patients use along with the unique blood product attributes required combine to place constraint on the overall blood inventory.

Objectives

The purpose of this project was to identify the chronic transfusion recipients in the Edmonton Zone and to develop a registry to track and monitor blood product use in this group of patients.

Methods

We used month end blood product usage reports from the Regional Transfusion Services and the Laboratory Information System (LIS) to create the chronic transfusion database.

Ethics approval was granted by the University of Alberta's Health Research Ethics Board and administrative approval was granted by both AHS and Covenant Health.

Patient information collected for the chronic transfusion database included:

- Name
- Age
- Sex
- Dates of transfusion
- Number of units transfused
- Pre-transfusion Hemoglobin (Hb)
- Post-transfusion Hb
- Primary diagnosis
- Blood group
- Alloantibodies produced

Results

According to the annual audits between 2011-2013, approximately 14% of transfused RBC units were given to chronic transfusion recipients.

Table 1. Number of chronic transfusion recipients and number of red cell units received from 2011-13.

	2011	2012	2013
Number of chronic transfusion recipients	219	213	219
Units transfused (percent of red cell inventory)	6763 (14.1%)	6472 (13.5%)	6867 (14.8%)

The primary diagnoses of chronic transfusion recipients remained constant, with the top 3 diagnoses being hemoglobinopathies, myelodysplasia, and leukemia in this patient group from 2011-2013.

With repeated exposure to RBC transfusions, one concern was patient alloimmunization: the development of antibodies against antigens present on donor RBCs. We investigated patient alloimmunization starting in 2012. Some chronic transfusion recipients formed alloantibodies; in some patients, the alloantibodies developed after initiating long-term transfusion therapy.

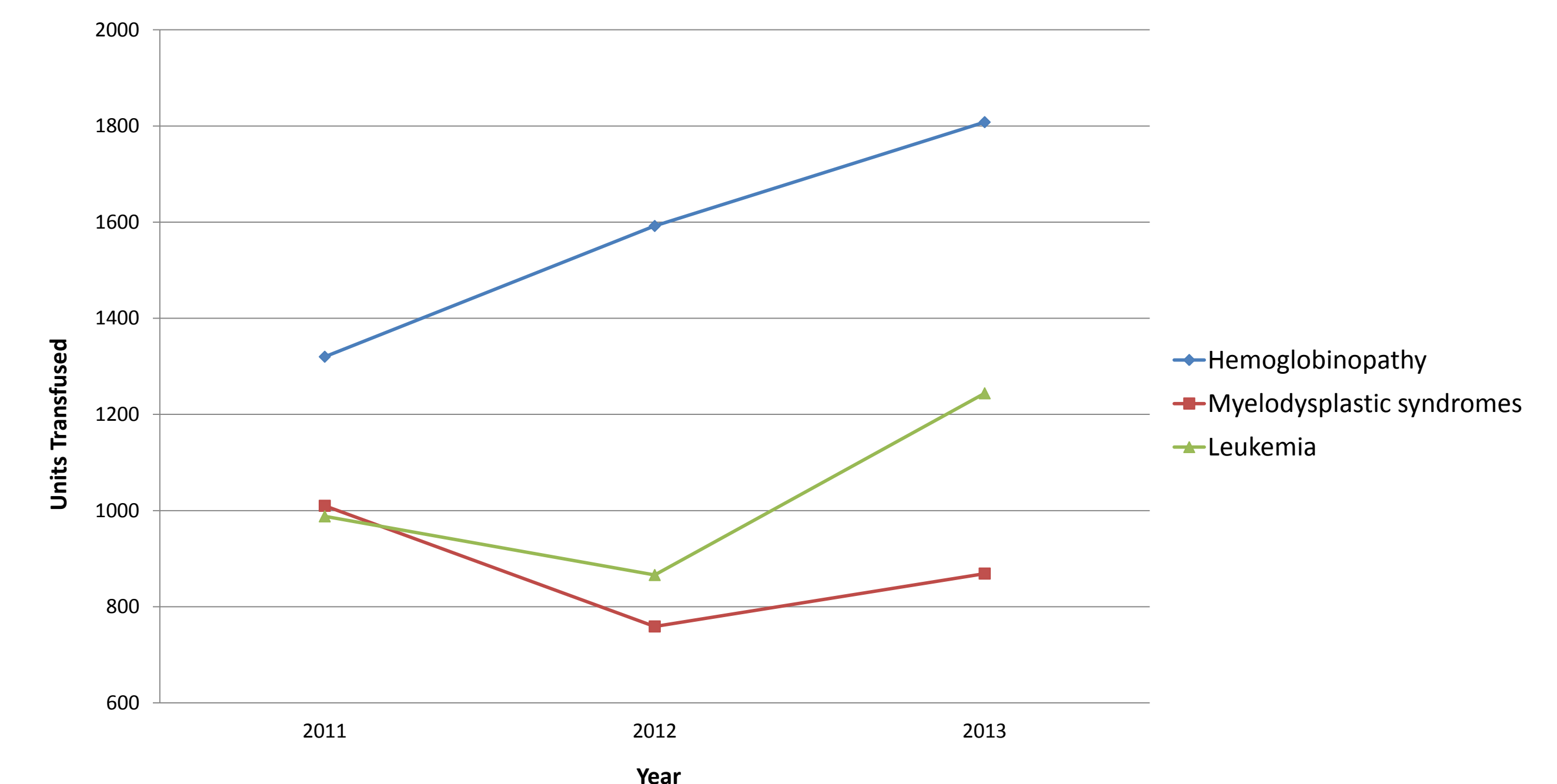


Figure 2. Leading diagnoses of chronic transfusion recipients and number of RBC units transfused.

Table 2. Alloimmunization of patients on chronic transfusion therapy (2012-13).

	2012	2013
Number of alloimmunized chronic transfusion recipients	62 (29.1%)	89 (40.6%)
Total number of alloantibodies	135	188
Number of alloantibodies identified during chronic transfusion period	130	

Discussion & Conclusion

The chronic transfusion database has allowed us to determine the number of blood recipients on long-term transfusion therapy, the diagnostic groups that have a high transfusion need, and to identify which patients require blood units with specific attributes (such as compatibility with recipient alloantibodies).

Some hemoglobinopathy patients receive RBC exchange transfusion on a regular basis. In this type of transfusion, patients require many units (between 7 and 14), which potentially places constraint on the blood bank inventory.

Knowing the usage patterns in chronically transfused patients enable the blood bank to manage inventory and to set aside units with special antigen typing. Some patients are transfused with antigen-matched blood at the initiation of therapy as a measure to prevent alloimmunization.

The creation of the chronic transfusion database has allowed Transfusion Services to track and monitor blood product use. We have identified the patients who require RBC transfusions for long-term therapy and the implications it may mean for both the patient and the blood bank.